



THE Essential

CHROMATOGRAPHY & SPECTROSCOPY

CATALOG

2011

2012

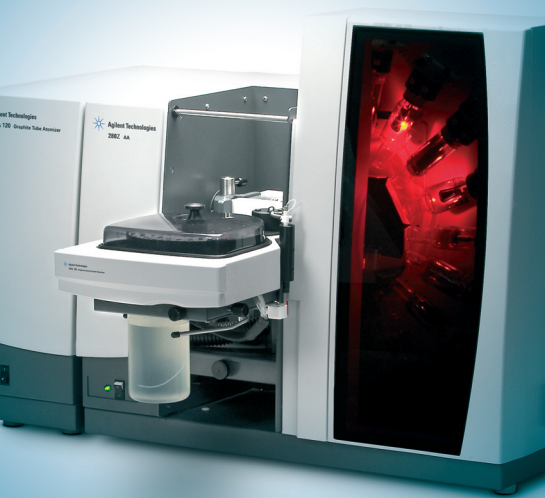
EDITION

YOUR COMPREHENSIVE REFERENCE GUIDE

The Measure of Confidence



Agilent Technologies



Dear Valued Customer,

This year we mark a new milestone with the 2011-2012 edition of *The Essential Chromatography and Spectroscopy Catalog*. It's our first catalog since the acquisition of Varian. We continue to be excited about this acquisition, because it gives us the opportunity to offer you many more products for your analytical work.

In preparation, we held global customer focus groups to ask you what we could do to incorporate so much new information into one document, while still keeping it manageable. We hope you are pleased with the results.

Inside, you'll find everything you need to ensure maximum instrument performance and reproducible results, including compatibility charts, application notes, and maintenance schedules. Plus, you'll find new products for sample preparation; an expanded portfolio of Agilent J&W GC Columns; an extensive selection of GPC-SEC columns and standards; new columns for preparative HPLC, flash chromatography and biological characterization; and a full line of atomic spectroscopy and molecular spectroscopy supplies.

And remember, when you buy columns and supplies from Agilent, you get more than just products. You also get over 40 years of analytical problem solving experience. We have expanded our sales force, increased our on-line telephone support capabilities and upgraded the content on our website with many more how-to videos and training materials. In other words – when you need help, we will be there.

If you have any questions, or would like to place an order, you can contact your local Agilent office or Authorized Distributor using the information on pages 24-33 of your catalog. And as always, please feel free to contact me directly with any comments or suggestions you may have.

Sincerely,

A handwritten signature in blue ink that reads 'Helen Stimson'.

Helen Stimson
Vice President and General Manager
Columns and Supplies Division
helen_stimson@agilent.com
302-636-8437

P.S. Our customers tell us that their budget challenges have never been greater. So we've made it easy to find valuable discounts on Agilent columns, supplies, and more. For details, visit www.agilent.com/chem/specialoffers.

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Put more than 40 years of relentless innovation behind your every result

By continually raising the standards for technologies that support your routine analysis, Agilent's R&D efforts have led to breakthroughs such as:

- New GC columns that help you achieve higher levels of inertness and column-to-column reproducibility
- LC column choices that deliver the sensitivity and reliability you need for demanding applications
- Cutting-edge sample preparation products that promote reliable extraction and concentration
- Fresh atomic and molecular spectroscopy ideas for identifying and confirming targets and unknowns

Longtime Agilent customers have experienced our commitment firsthand. And now, we look forward to demonstrating how Agilent's approach to relentless innovation can work to your advantage, too.

Chemical Analysis Solutions



Food

From high-volume screening of vegetables for large numbers of pesticides, through rapid identification of pathogens, Agilent understands the analytical needs of food producers, shippers and regulators. When a new toxin appears, we deploy substantial resources to quickly help customers develop robust, reliable methods.



Environmental

Agilent offers more than 40 years of environmental analysis and regulatory expertise. We help government and private labs with the full range of assays, from routine testing of soils for heavy metals through detection of pharmaceuticals in groundwater in concentrations down to parts-per-trillion.



Energy and Fuels

Agilent collaborates closely with process industry customers to offer analytical systems that meet their needs for separation, detection, throughput and support. We'll even preconfigure custom or standard analyzers so they arrive at the lab ready-to-go. Agilent's expertise in both chemical analysis and life science is a powerful combination for researching and producing biofuels, including a wide range of analytical techniques for fatty acid methyl esters (FAMES). Our newly-expanded portfolio also offers powerful tools for developing and producing photovoltaic films and solar panels.



Forensics

Because the careers of world class athletes and many other individuals hinge on drug testing, it's critical that those doing the testing have the highest level of confidence in the results. Forensics analysts worldwide have grown to depend on Agilent tools for accuracy, reliability and speed in this high stakes, high throughput field. Our best selling GC, GC/MS and popular LC and LC/MS are workhorses in forensics labs.



Traditional Lab Informatics

The ways labs generate and store data profoundly affect their efficiency. Agilent offers a rich, integrated suite of software products built on a set of customer-driven architectural values with the Agilent OpenLAB Laboratory Software Suite. OpenLAB delivers superior performance, open systems integration, and investment protection. Our commitment is to deliver more value across each step in the life cycle of scientific data – from data collection and analysis to interpretation and management.



Materials Science

Agilent offers a newly expanded portfolio of instruments used for the research, manufacturing and testing of advanced materials, from precision optics through pulp and paper. Tools for chromatography, atomic absorption spectroscopy, molecular spectroscopy, X-ray crystallography and nuclear magnetic resonance support continuous progress in materials science.

Life Science Solutions



Biopharmaceutical

As “multi-omics” studies gain momentum in the search for new therapeutics, Agilent is uniquely positioned to provide the instruments, reagents and powerful software needed to perform experiments in multiple disciplines and combine the massive amounts of data into biological insight.



Pharmaceutical

Drug manufacturing requires the accuracy, sensitivity and high throughput of other analytical applications, with the added demands of regulatory record-keeping and validation requirements. Agilent provides a potent combination of rugged, high-throughput tools along with unmatched compliance services. Agilent now offers the market-leading family of dissolution apparatus and sampling systems that pair perfectly with our HPLC and UV systems.



Proteomics

Research into how large sets of proteins affect the health of an organism requires special sets of analytical tools. Agilent has built a formidable arsenal of liquid chromatograph/mass spectrometers, bioinformatics systems, multiple affinity protein removal columns and OFFGEL electrophoresis for protein identification and protein biomarker discovery. Accurate Mass mass spectrometry and the microfluidic HPLC-Chip/MS are two Agilent innovations speeding the work of proteomics researchers around the globe.



Metabolomics

Collections of small molecules are increasingly being seen as rich sources of biomarkers, but studying metabolites presents many challenges. Molecules are constantly entering, leaving or changing within the metabolome, underscoring the need for speed, accuracy and powerful interpretation capabilities in looking at chemical profile snapshots. Agilent’s GC, LC, NMR and MS portfolios align well with needs of metabolomics researchers, along with our excellent bioinformatics offerings, user-customizable METLIN metabolite database for LC/MS and the industry’s first commercial GC/MS retention time locked metabolite library.



Genomics

Agilent is a global leader in microarrays, scanners, and reagents used in a wide variety of genomic-based disease research experiments. Our SureSelect Target Enrichment System dominates the category, streamlining next generation sequencing studies worldwide. We offer a wide range of catalog microarrays and a highly-developed capability to produce custom arrays thanks to ink jet-based SurePrint fabrication and the eArray on-line design tool. All Agilent microarrays feature highly-sensitive, selective 60-mer probes. With as many as eight arrays printed on a standard 1 x 3 in. slide, the cost per experiment becomes very affordable.



Life Science Informatics

Mirroring its extensive instrument portfolio, Agilent offers the industry’s most extensive suite of bioinformatics software, helping users derive knowledge from complex genomic, proteomic, metabolomic and other biological data. This includes DNA Analytics for analyzing CGH, ChIP and methylation microarray data. The GeneSpring suite includes informatics software for microarray-based gene expression data, genotyping data and GeneSpring MS, useful for analyzing mass spec data from proteomics and metabolomics experiments. Scientists can compare complex datasets to explore biological questions from multiple perspectives.



Lab Automation

To meet the skyrocketing demand for more throughput and automation, Agilent has substantially expanded its lab automation offerings. The Velocity 11 line of liquid handlers and microplate processors are designed to streamline high-volume life science workflows. Agilent is also continually upgrading its advanced autosamplers for LC, GC, LC/MS and GC/MS, adding functionality and speed to reflect the performance of its advanced instruments.



Vacuum Technology

Agilent works with customers to solve vacuum challenges from experiments in high energy physics to developing systems for producing flat panel displays. We manufacture vacuum systems used in our own mass spectrometry instruments as well as those of other manufacturers.



GC and GC/MS

Agilent GC and GC/MS Systems

Achieve the highest levels of productivity and confidence

- Agilent's flagship 7890A GC brings new analytical and productivity features to the Agilent GC platform, including advanced separation capabilities, simplified routine maintenance, and real-time self-monitoring intelligence.
- The Agilent 7820A GC is ideal for routine analysis in small- to medium-sized labs.
- The innovative design and advanced capabilities of the Agilent 5975C Series GC/MSD with Triple-Axis Detector boost productivity and enhance results.
- Agilent's 7000 Series Triple Quadrupole GC/MS delivers lower detection limits and advanced high-speed quantification, even with dirty samples in demanding environments.
- Agilent offers the broadest range of GC, Micro GC, and GC/MS systems and analyzers for any application, delivering the highest level of analytical performance and day-after-day productivity.



LC and LC/MS

The Agilent 1200 Infinity Series

Infinitely better chromatography

The Agilent 1200 Infinity Series gives you uncompromised chromatographic performance within the confines of your budget. Whatever your application requires – now or in the future – common technology across the portfolio helps you increase laboratory productivity and decrease operational costs.



Agilent 6100 Series Single Quadrupole LC/MS

Clearly better performance

From routine QC to research applications, Agilent 6100 Series Single Quadrupole LC/MS Systems give you unmatched reliability and throughput.



Accurate-Mass Q-TOF LC/MS

For low molecular-weight compounds and biomolecules

Agilent 6500 Series provides superior data quality and advanced analytical capabilities for profiling, identifying, characterizing, and quantifying.

Agilent 6200 Series delivers top speed and performance in a benchtop instrument.



Agilent 6400 Series Triple Quadrupole LC/MS

Breakthrough sensitivity made routine

Whether you are quantifying pharmaceutical candidates, measuring trace-level environmental or food contaminants, or confirming biomarkers, Agilent 6400 Series Triple Quadrupole LC/MS Systems deliver sensitivity, productivity, and value.

Ready-to-use Analyzers and Application Kits

Generate high-quality data from day one

Packaged workflow solutions for GC, GC/MS, LC and LC/MS include application-specific components, such as methods, column, supplies, application note, database and test mixes.





Electrophoresis

Agilent 7100 Capillary Electrophoresis System

Maximum sensitivity, maximum productivity

Our newest electrophoresis system offers unprecedented HPLC-like sensitivity, best-in-class analytical performance, and the industry's broadest selection of detectors – plus plug-and-play compatibility with Agilent 6000 Series mass spectrometers.

Agilent 3100 OFFGEL Fractionator

Dramatically improve your protein and peptide identification

The easy-to-use Agilent 3100 OFFGEL Fractionator uses novel isoelectric focusing to achieve highly reproducible pI-based fractionation. The resulting fractions are in solution, making recovery much easier than with old-fashioned gels. Sample processing steps (such as immunodepletion, protein digestion, and liquid chromatography) can also be interfaced for multi-dimensional separations of complex samples.

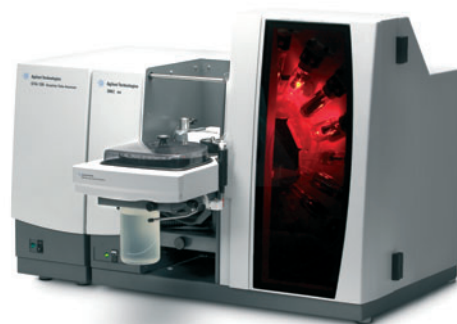


Atomic Spectroscopy

Atomic Absorption (AA) Spectrometers

Extend your productivity, performance, and output boundaries

Agilent AA instruments are suitable for routine analysis where reliability and simple operation are vital. With the world's fastest flame AA, the world's most sensitive furnace AA, user-friendly software, and unbeaten instrument ruggedness, you can be sure you're getting answers you can trust.



Agilent 700 Series ICP-OES

The world's most productive high-performance simultaneous ICP-OES

Our 700 Series ICP-OES features temperature-controlled optics with no moving parts, which ensures stability and long-term precision. In addition, Agilent's superior plasma performance allows direct analysis of samples ranging from organic solvents to industrial waste and brines, minimizing sample preparation times. With extended dynamic range, robust plasma, and one-step measurement of major, minor, and trace elements, the Agilent 700 Series ICP-OES gives you maximum confidence in your results.

Agilent 7700 Series ICP-MS

Extraordinary design, unparalleled performance

As ICP-MS has evolved into the premier technique for trace-metals analysis, Agilent has been at the forefront of development, design, and innovation. With our 7700 Series, Agilent continues to shape the ICP-MS landscape by increasing performance, reducing interferences and improving productivity – all while making the technology easier to use, maintain, and service.



Molecular Spectroscopy



UV Fluorescence

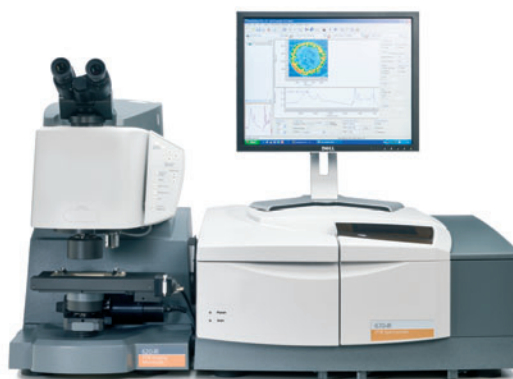
Superior fluorescence sensitivity and fast kinetics

The Agilent Cary Eclipse Spectrophotometer uses a Xenon flash lamp for superior sensitivity, high signal-to-noise, and fast kinetics.

Fourier Transform Infrared (FTIR) Spectrometers

Unrivalled analytical performance

The Agilent 600 Series FTIR provides unmatched performance under real-world conditions. The 660 FTIR is a versatile high-performance spectrometer designed to meet your routine and research needs, while the 670 and 680 FTIR are research-grade spectrometers designed to extend performance boundaries in application areas such as polymers/materials, pharmaceuticals, biotechnology and chemicals.



FTIR Microscopy and Imaging

See more than ever – fast

The Agilent 610/620 Series is the highest performing, most versatile FTIR microscope and spectrochemical imaging system available, providing superior quality information in the shortest time for the most challenging samples.



UV-Vis and UV-Vis-NIR Spectrophotometers

You can do it all with a Cary spectrophotometer

The Agilent Cary range of UV-Vis and UV-Vis-NIR spectrophotometers are renowned for their superior performance, flexibility and ease-of-use. With unsurpassed photometric accuracy and a wide range of flexible accessories, the series is designed to meet your application requirements now and in the future. The instruments vary in capabilities from the budget-priced Cary 50 to the industry-leading Cary 6000i and from scanning spectrophotometers to the photodiode-array-based 8453.

Bioanalysis Solutions

Agilent 2100 Bioanalyzer

One platform, endless possibilities for DNA, RNA, protein, and cell analysis

Agilent's industry-standard bioanalyzer replaces gel electrophoresis for RNA sample QC – and is rapidly replacing gel electrophoresis for DNA fragment analysis and SDS-PAGE analysis of protein samples. The versatile Agilent 2100 Bioanalyzer can also be used for electrophoretic separation and flow cytometric analysis of cell fluorescence parameters.



Ready-to-use Assays and Reagent Kits

Fast analysis with excellent data quality

- RNA Kits let you monitor the quality of RNA samples and reliably identify degraded RNA samples with minimal sample consumption
- DNA Kits are a smarter solution for nucleic acid analysis, allowing you to size and quantitate PCR fragments and restriction digests accurately and reproducibly
- Protein Kits replace tedious SDS-PAGE methods for assessing protein concentration, identity, and purity
- On-Chip Flow Cytometry Set makes it easy to acquire cell-based fluorescence parameters and perform simple flow cytometry assays; the set also extends the lab-on-a-chip application portfolio for Agilent's 2100 Bioanalyzer from electrophoretic separation assays to automated two-color flow cytometric assays



Microarray Solutions



Agilent DNA Microarray Scanner

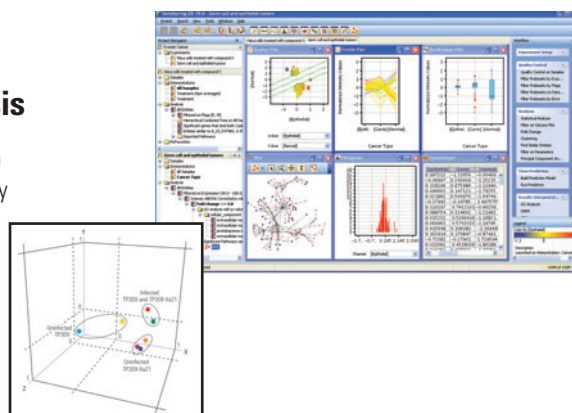
A new level of performance and precision

Whether you are performing gene expression studies, aCGH, miRNA profiling, or other novel applications, Agilent's DNA Microarray Scanner with SureScan High-Resolution Technology delivers the highest-quality data when increased genome coverage is necessary.

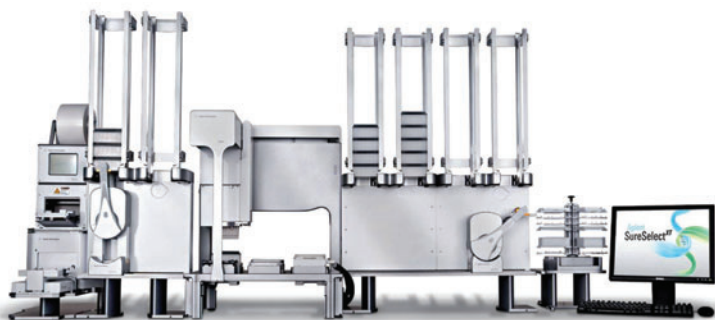
Agilent GeneSpring

The gold standard for desktop expression analysis

GeneSpring provides powerful, accessible statistical tools for fast visualization and analysis of gene expression data. It also allows you to quickly and reliably identify targets of interest that are statistically and biologically meaningful.



Automation Solutions



Innovative standalone units and fully integrated systems for life science applications

From standalone units to fully integrated systems, Agilent combines key sample preparation and creative walk-away automation approaches with personalized customer service to provide complete solutions for your laboratory. Combining innovative engineering with high standards of quality, Agilent designs and manufactures high-performance equipment for processes that are revolutionizing pharmaceutical, biotech, and genomic research.

Dissolution

Agilent 708-DS Dissolution Apparatus

Ideal for testing tablets, capsules, and other pharmaceutical products

Our family of dissolution instruments also includes:

- Dissolution automation (UV) combines Agilent's industry-leading dissolution instruments with the award-winning Cary 50 UV-Vis spectrophotometer
- Physical testers for pharmaceutical tablets verify physical parameter specifications vital to the integrity of dosage forms and compounds
- Automated dissolution samplers improve productivity and eliminate missed sampling time points

In addition, Agilent provides quality and value beyond the system – including qualification services, training, SOP guidance, and support options, as well as educational seminars, technical support hotline, and sponsorship for the online Dissolution Discussion Group (DDG) forum.



Research Products

Versatile X-ray Diffraction Systems

Optimized for small molecule and protein X-ray crystallography

Agilent's single- and dual-source X-ray crystallography systems allow even non-experts to obtain high-quality results with scope for intelligent automation or full manual control. Moreover, our diffractometers use sealed-tube molybdenum and copper wavelength X-ray sources that contain no moving parts. They are highly reliable and avoid the expense and inconvenience of regular servicing and maintenance.



Magnetic Resonance Products

Designed for flexibility and expandability

- Magnetic resonance imaging (MRI) systems are engineered with our powerful DirectDrive technology, making them the most advanced magnetic resonance scanners ever developed
- Nuclear magnetic resonance (NMR) systems deliver the highest sensitivity, productivity, and flexibility for demanding molecular characterization applications





qPCR

Agilent's Mx3005P qPCR System

Unmatched flexibility and capability for gene expression analysis

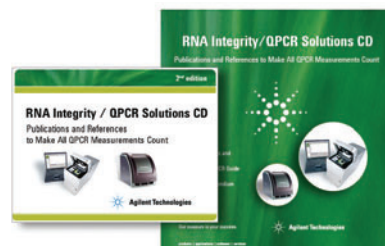
The Mx3005P qPCR System supports current and emerging real-time qPCR applications and chemistries to accommodate your research needs now and in the future. Its precision optics and uniform thermal response ensure maximum sensitivity and linear performance over a broad wavelength range so all the users in your lab can run their applications of choice.

With its 5-color detection and user-selectable filters, the Mx3005P system accommodates virtually all fluorescent dyes and chemistries, including Brilliant III SYBR® and probe kits.

Agilent's Brilliant qPCR & RT-qPCR Master Mixes

Reproducibility, specificity, sensitivity, and speed in one kit

Agilent's Brilliant qPCR reagent portfolio offers a wide selection of high performance reagents for sensitive, rapid, and reproducible results on the Mx and other real-time PCR platforms. With a full line of qPCR reagent offerings and the ability to provide custom reagent solutions, Agilent is the clear choice for your real-time PCR research.



Atomic Force Microscopes

Agilent 5500 Atomic Force Microscope

A powerful, multi-user research system

The Agilent 5500 is well suited to electrochemistry, materials science, polymer science, life science, nanografting, and nanolithography. It delivers atomic-scale resolution over a large scan range, while permitting the simple integration of numerous imaging modes and application-specific sample-handling plates.



Agilent 6000ILM Atomic Force Microscope

Preserve an efficient, natural workflow with an AFM for light microscopes

The 6000ILM AFM seamlessly integrates the capabilities of an AFM with those of an inverted light (or confocal) microscope, allowing you to achieve nanoscale resolution beyond the optical light diffraction limit. It is ideal for studying cell membranes, single DNA/RNA strands, individual proteins, and biopolymers.

Agilent 8500 Field Emission Scanning Electron Microscope

Scientific-grade FE-SEM right in your laboratory

This compact, plug-and-play system is optimized for low-voltage imaging, extremely high surface contrast, and resolution typically found in larger, more expensive FE-SEMs. It accommodates several imaging techniques, allowing nanoscale features to be observed on a variety of nano-structured materials – including biological materials and energy-sensitive samples on any substrate, even glass.





Vacuum Technologies

Complete, user-friendly vacuum solutions for Pharma and BioTech

Agilent's innovative vacuum pumping products are designed to work with today's sophisticated and precise analytical instruments used in pharmaceutical, biotech and research laboratories.

Building on years of experience and technological leadership, Agilent provides both dry scroll and rotary vane pumping solutions to minimize routine maintenance, reduce cost-of-ownership, and tailor products to fit your unique needs.



Software Solutions

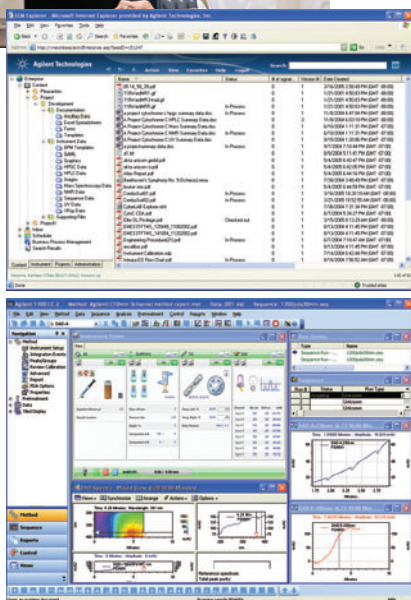
Agilent OpenLAB Software

Capture, analyze, and share without barriers

OpenLAB is a rich, integrated suite of software products that supports each step in the life cycle of scientific data, delivering superior performance, open systems integration, and investment protection. In addition, OpenLAB accelerates your research and development efforts and makes problem solving easier.

The suite consists of three software products:

- **OpenLAB CDS:** Provides multi-technique, multi-vendor instrument control while supporting ChemStation and EZChrom Elite workflows
- **OpenLAB ECM:** Automates business processes and enables searching, managing, archiving, and reporting of business-critical information
- **OpenLAB ELN:** Facilitates collaboration by allowing you to capture and manage the details from each day's experiments





Agilent 7696A Sample Prep WorkBench

Automate your tedious manual sample prep

Agilent Technologies has developed an automated sample prep instrument that combines common sample prep techniques with an easy, intuitive software interface.

This standalone instrument can be used for the preparation of samples and standards for chromatographic analysis – eliminating the variability of manual techniques and exposure to hazardous solvents.

The Agilent 7696 Workbench offers precise handling of liquids for routine sample preparation protocols such as aliquoting, dilution, standard or reagent addition, liquid/liquid extraction, heating for reactions such as derivitization, vortex mixing, and Peltier temperature control of samples and reagents.

Products Compatible with 7696A Sample Prep WorkBench

Product	Page No.
Certified Screw Top Vials	41
Certified Screw Caps with Septa	42
Certified, Pre-Assembled Vial Convenience Packs	43
Certified Crimp Top Vials	45
Crimp Caps with Septa	46
Crimping and Decapping Tools	60
Vial Racks	61
Premium Blue Line Autosampler Syringes	64



MS Analyzed Vial Kits

End the need to pre-test or to re-run samples due to unexpected peaks with vials lot-tested by both GC/MS and LC/MS.

Turn to page 40.

Gas Clean Filters

Reduce downtime with fast, leak-free filters.

Turn to pages 88–89.



Bulk GC Supplies

Ideal for high-usage laboratories, Agilent bulk gas chromatography supplies provide the high quality and consistency of Agilent chromatography supplies in convenient and economical packaging.

Turn to page 254.

2 mm Dimpled GC Inlet Liner

Designed for use in the Agilent MultiMode Inlet, this cost-effective liner for dirty samples is ideal for high throughput labs doing heavy matrix sample analysis, especially cold splitless or solvent vent injection mode.

Turn to page 265.



Bond Elut Plexa

The Bond Elut Plexa Family is the next generation of polymeric SPE products. A unique polymeric functionality and optimized methodologies deliver high recoveries with excellent cleanliness, reduced ion suppression and ease-of-use in any SPE workflow.

Turn to page 152.



Agilent QuEChERS Kits

With Agilent QuEChERS disposable pre-weighed extraction and dispersive SPE kits, you can extract and prepare difficult matrices for multi-class, multi-residue pesticide analysis in minutes rather than hours.

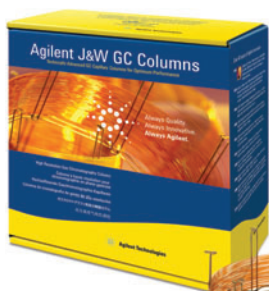
Turn to pages 228–233.

Captiva Filtration

Faster than centrifugation and easily automated, Captiva's unique dual-depth filtration media provide complete removal of precipitated proteins and outstanding resistance to sample clogging.

Turn to pages 235–241.





Agilent J&W Ultra Inert GC Columns

Ultra Inert GC columns push the industry standards for consistent column inertness and exceptionally low column bleed, resulting in lower detection limits and more accurate data for difficult analytes.

Agilent J&W High Efficiency GC Columns

Our High Efficiency GC columns offer a simple and cost effective way to increase your sample throughput without loss of resolution.

Agilent J&W Select GC Columns

With the widest selection of application-specific GC columns created for your unique applications, Select GC Columns offer optimized selectivity for ultimate confidence in your results.

Agilent J&W PoroBOND PLOT Columns

These columns deliver spike-free chromatograms for the analysis of volatile compounds, resulting in better data quality and increased productivity.

Turn to page 351.



Agilent Ultra Inert Liners

The perfect companion to Agilent J&W Ultra Inert GC Columns, providing reproducible inertness liner after liner, maintained through a sequence of samples, and for a range of analytes.

Turn to page 261.

Agilent 1260 Infinity Bio-inert Quaternary LC Supplies

The Agilent 1260 Infinity Bio-inert Quaternary LC features bio-inertness for all components without exception. Agilent offers a full portfolio of parts and supplies designed for this system.

Turn to page 712.



Poroshell 120

Providing exceptional efficiency and analytical speed for HPLC and UHPLC, with lower backpressure. It's easy to transfer your conventional methods to Poroshell 120 for significant time savings.

Turn to page 822.

ZORBAX Rapid Resolution High Definition Columns

ZORBAX RRHD columns are the only columns available that are stable to 1200 bar, enabling you to maximize the capabilities of your UHPLC instrument. They are available in multiple phases and configurations, for easy scaling and method transfer.

Turn to page 892.



Ion Exchange Chromatography

Agilent Bio IEX HPLC columns ensure high resolution, high recovery and highly efficient separations of proteins, peptides, oligonucleotides and other biomolecules.

Turn to pages 1006–1007.

Agilent Bio MAb Columns

Specially designed for high resolution ion exchange separations of monoclonal antibodies. Ideal for charge heterogeneity analysis of MAbs.

Turn to page 1004.



GPC/SEC Columns and Calibrants

Polymer Laboratories is now Agilent. The complete Polymer Labs line of GPC/SEC columns and calibration standards for polymer analysis is now part of Agilent's chromatography offering.

Turn to pages 945–948.

Size Exclusion Chromatography (SEC) Columns for Biomolecules

Agilent Bio SEC-3 and Bio SEC-5 HPLC columns offer higher resolution and faster sized-based separations for monoclonal antibodies and other proteins, peptides and biomolecules. Ideal for aggregation studies.

Turn to page 997.



Agilent Technologies is committed to creating products that are environmentally friendly and responsible. Products with this icon are designed with special features to reduce environmental impact.

Agilent CrossLab

Agilent CrossLab

You'll never look at your lab the same way again...

Agilent Technologies, a leader in innovation, is proud to introduce a change to the way you see your lab.

The new Agilent CrossLab portfolio offers you the advantage of Agilent's innovation, service, and support for other brands of analytical instruments in your lab.

- Breakthrough technology and innovation
- Consistent and superior product quality
- Optimal performance for routine and challenging applications
- Global technical support on the phone, the web, and in the lab
- Dependable worldwide product availability
- Convenience of consolidated purchasing

To learn more about Agilent CrossLab and to request your copy of the Agilent CrossLab product catalog, visit www.agilent.com/chem/CrossLab



Agilent Technologies



AGILENT SERVICE AND SUPPORT FOR INSTRUMENT SYSTEMS

Focus on what you do best

For 40 years, Agilent has been building and maintaining the instruments you count on to stay competitive and successful. Trust us to protect your investment with a broad portfolio of services, backed by a global network of experienced service professionals dedicated to the productivity of your lab.

Agilent Advantage Service Plans

The best service available for your Agilent instruments

Agilent offers a flexible range of service plans so that you can choose the level of coverage that is best for your lab.

- **Agilent Advantage Gold** – Priority-one coverage for ultimate uptime and productivity
- **Agilent Advantage Silver** – Comprehensive coverage for dependable laboratory operations
- **Agilent Advantage Bronze** – Total repair coverage at a fixed annual price
- **Agilent Repair Service** – Basic coverage for reliable instrument repair

Agilent Advantage service plans include Agilent Remote Advisor for real-time remote monitoring and diagnostics. Through secure internet connections, you can interact with Agilent service professionals, receive detailed asset reports, and configure text or email alerts to notify you before problems occur – helping you to maximize instrument uptime and optimize laboratory workflows.

Get the Agilent Service Guarantee

Should your instrument require service while covered by an Agilent service agreement, we guarantee repair or we will replace your instrument for free.

No other company offers this level of commitment to keep your lab up and running at peak efficiency.

Agilent Compliance Services

Equipment qualification that meets the most stringent requirements

Enterprise Edition Compliance was developed to streamline compliance across your entire lab. Used globally in regulated labs, including standards organizations and regulatory agencies, Enterprise Edition enables you to:

- Improve qualification efficiency by automating protocols across platforms to ensure greater efficiency and minimize regulatory risk
- Standardize your entire compliance operation with robust test designs that work with all your instruments
- Add, remove or reconfigure tests based upon your unique user requirements
- Significantly reduce staff review time with consistently formatted, computer generated, tamper-proof reports



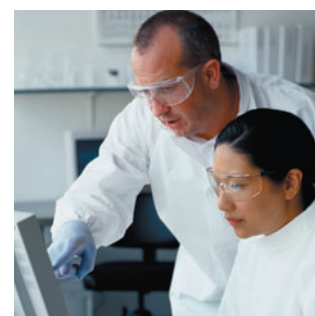
Laboratory decision makers and users ranked Agilent as their first choice for general laboratory compliance services.

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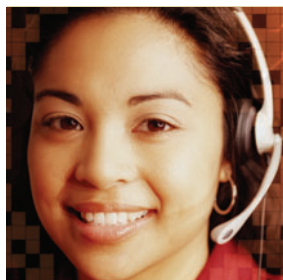
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GENERAL CHROMATOGRAPHY SUPPLIES



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Certified Vials and Closures

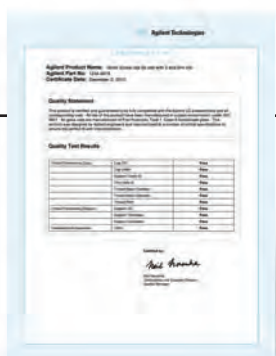
Prevent sequence problems and unpleasant surprises: Use Agilent Certified Vials, Caps, and Septa



Agilent Certified Vials are the only vials that are designed and tested to Agilent's exact specifications – and are the only vials guaranteed to be fully compatible with Agilent autosamplers and corresponding closures. In addition, Agilent Certified Vials are:

- Agilent engineered and manufactured to critical specifications, ensuring an exact fit with Agilent instrumentation
- In-line opto-electronic testing inspects 100% of all key dimensions
- Produced in a clean environment
- Produced in an ISO 9001 certified facility
- Packaged in material that has been tested and selected for cleanliness
- Made from First Hydrolytic Type 1 Class A borosilicate glass, which conforms to US FDA, USP, and EU Pharmacopeia standards
- Subjected to rigorous end-of-line sampling and quality control procedures to ensure all vials remain within specifications
- Available deactivated

To raise the bar even higher, Agilent Certified Caps and Septa are also designed for proper sealing and smooth operation with Agilent instruments. We even perform chromatographic tests on our silicone septa to ensure the highest standards of purity.



For a detailed Certificate of Conformance listing critical quality specifications and signed by Agilent's Quality Manager, visit www.agilent.com/chem/cofc

Why it is Critical to Use Certified Vials and Closures on Agilent Autosamplers

Common Problems	Effects	Benefits of Agilent Certified Vials and Caps
Inconsistency with vial bottom thickness	<ul style="list-style-type: none"> • Sample draw inconsistency • Damaged needle 	Consistent and valid relative standard deviation (RSD) values
Autosampler sequence interruption	<ul style="list-style-type: none"> • Mishandled or dropped vials • Loss of precious sample 	Confidence in unattended operation
Undetected improper seal	<ul style="list-style-type: none"> • Sample loss/evaporation • Possible sample contamination 	Proper sealing for accurate results
Dislodged or misaligned septa	<ul style="list-style-type: none"> • Sample loss • Sample contamination 	Accurate results
Ghost peaks	<ul style="list-style-type: none"> • Contamination by cap septa 	Chromatographic purity test that eliminates outliers and analysis errors

Agilent Vials Selection Guide

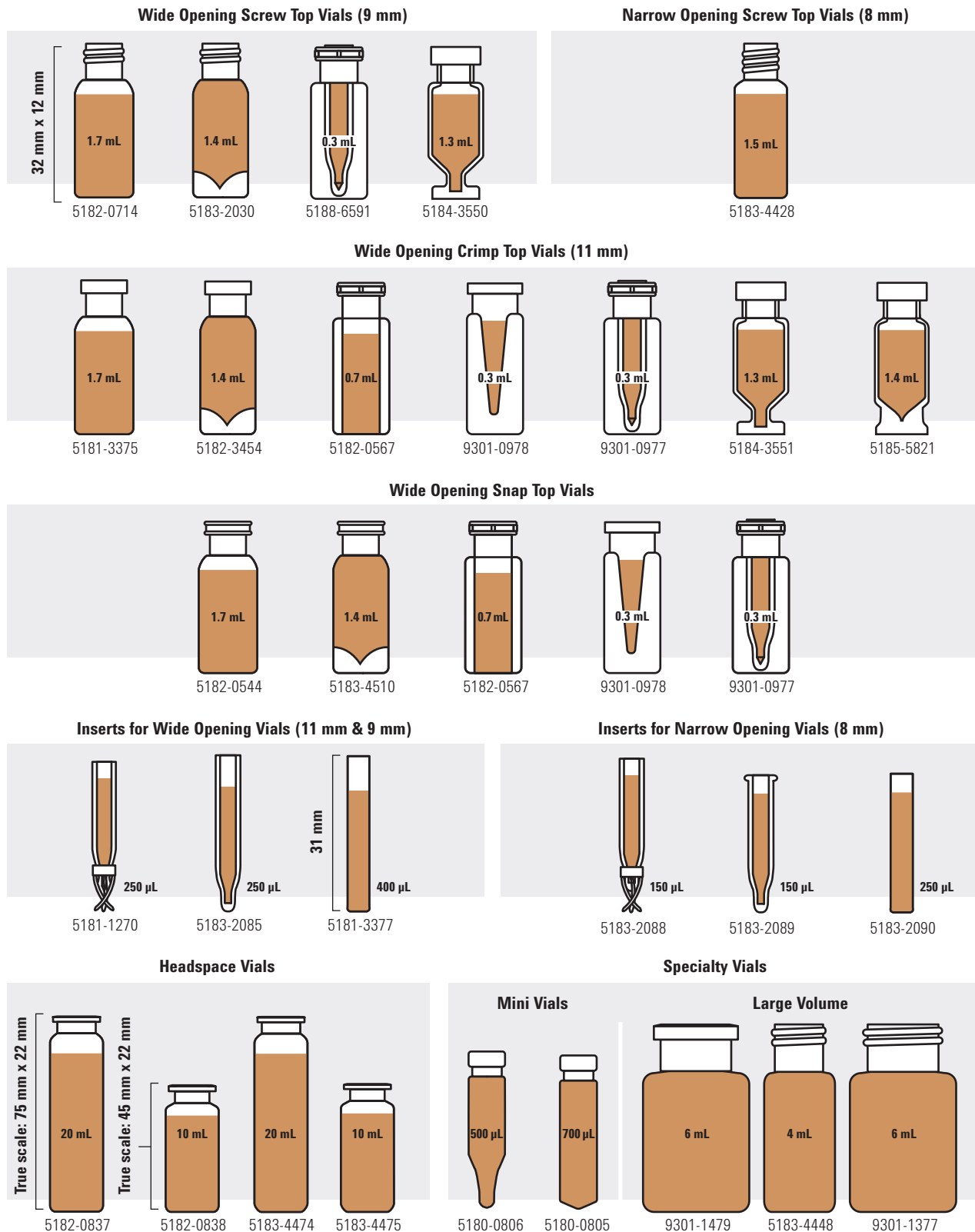
	MS Analyzed	Certified for Agilent Autosamplers	Amber	Clear	Write-on Spot	Silanized	Convenience Pack	High Recovery	Fixed Inserts
2 mL Screw Top	◆	◆	◆	◆	◆	◆	◆	◆	◆
2 mL Crimp Top	◆	◆	◆	◆	◆	◆	◆	◆	◆
2 mL Snap Top			◆	◆	◆	◆	◆	◆	◆
4 mL Screw Top			◆	◆					
6 mL Screw Top				◆				◆	
6 mL Crimp Top				◆					
Standard Opening (8-425)			◆	◆	◆	◆			
Headspace Crimp Top		◆	◆	◆			◆		
Polypropylene		◆							◆

Septum Selection Guide

Septum Material	Compatible with	Incompatible with	Resealability	Max. Temperature
Rubber (Natural or Butyl)	ACN, acetone, DMF, alcohols, diethylamine, DMSO, phenols	Chlorinated solvents, aromatics, hydrocarbons, carbon disulfide	Excellent	< 100°C
PTFE/Natural or Butyl Rubber	PTFE resistance until punctured, then septa or liner will have compatibility of rubber		Good	< 100°C
Silicone/Silicone Rubber	Alcohol, acetone, ether, DMF, DMSO	ACN, THF, benzene chloroform, pyridine, toluene, hexane, heptane	Excellent	< 200°C
PTFE/Silicone, PTFE/Silicone/PTFE	PTFE resistance until punctured, then septa will have compatibility of silicone		Average	< 200°C
Viton	Chlorinated solvents, benzene, toluene, alcohols, hexane, heptane	DMF, DMSO, ACN, THF, pyridine, dioxane, methanol, acetone	Good	< 260°C



Agilent Vial Identification Chart and Actual Fill Volumes



MS Analyzed Vial Kits

Agilent MS Analyzed Vial Kits end the need to pre-test or to re-run samples due to unexpected peaks. All MS Analyzed Vials Kits include a Certificate of Analysis that contains true, lot-specific and fully traceable LC/MS and GC/MS signal traces, as well as critical physical dimensions. Agilent's new MS Analyzed Vial Kits provide lot-specific test results for greater confidence in your results.

- All vials lot-tested by both GC/MS and LC/MS using Agilent system
- Manufactured for full-warranted compatibility with Agilent GC and LC autosampler
- Available in unique packaging designed to reduce vial breakage
- Packed in a clean environment using clean packaging to reduce contamination
- Available in both crimp top and screw top closures
- Larger write-on spots for easier labeling and identification
- Conveniently packaged in a combination pack with 100 vials and 100 caps/septa



Screw top MS analyzed vial kit, 5190-2277



Screw top MS analyzed vial kit, 5190-2280



Crimp top MS analyzed vial kit, 5190-2282

MS Analyzed Vial Kits

Vial Type	Septa Type	Cap Color	Unit	Part No.
Screw Top MS Analyzed Vial Kits				
Clear	PTFE/red silicone septa	Blue	100/pk	5190-2277
Clear with write-on spot	PTFE/red silicone septa	Blue	100/pk	5190-2278
Amber	PTFE/red silicone septa	Blue	100/pk	5190-2279
Amber with write-on spot	PTFE/red silicone septa	Blue	100/pk	5190-2280
Crimp Top MS Analyzed Vial Kits				
Clear	PTFE/white silicone septa	Silver aluminum	100/pk	5190-2281
Clear with write-on spot	PTFE/white silicone septa	Silver aluminum	100/pk	5190-2282
Amber	PTFE/white silicone septa	Silver aluminum	100/pk	5190-2283



Screw Top Vials and Closures

Combine the excellent autosampler handling of a crimp cap profile with the ease of a screw cap. The screw caps and precision fit septa give a secure seal with microvolume inserts.

- Certified for full warranted compatibility with Agilent autosamplers
- 2 mL, 12 x 32 mm, 9 mm diameter
- Available in unique packaging designed to reduce vial breakage
- 40% larger opening than standard narrow opening vials
- Unique thread design for consistently secure seal
- Precision-formed neck for optimal robotic arm handling
- Rigorous quality assurance for dimensional consistency from lot-to-lot
- Optional ceramic write-on spot with fill marks

2 mL Wide Opening Screw Top Glass Vials

Description	Certified	100/pk	1000/cs*
Clear	◆	5182-0714	5183-2067
Clear, write-on spot	◆	5182-0715	5183-2068
Amber	◆	5188-6535	5188-6536
Amber, write-on spot	◆	5182-0716	5183-2069
Deactivated Vials			
Clear	◆	5183-2070	
Clear, write-on spot	◆	5183-2071	
Amber, write-on spot	◆	5183-2072	
Screw Top Vials with Fixed Inserts			
Clear, 300 µL insert volume		5188-6591	
Amber, 300 µL insert volume		5188-6592	

*Case includes 10 packs of 100 vials



Screw caps with septa

Screw Caps for 2 mL Vials

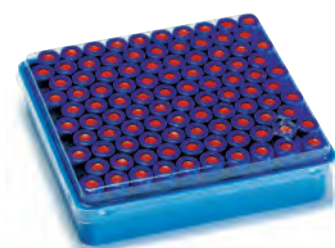
Color	Septa Type	Certified	100/pk	500/pk	1000/pk
Blue	PTFE/red silicone septa	◆	5182-0717	5185-5820	5190-1599
	PTFE/white silicone septa	◆	5182-0720	5185-5863	
	PTFE/silicone/PTFE septa	◆	5182-0723	5185-5862	
	Pre-slit PTFE/silicone septa	◆	5183-2076	5185-5865	
	PTFE-lined solid top	◆	5183-2075		
	Open top, no septa	◆	5182-0728		
	Bonded PTFE/silicone septa		5185-5823		
	Bonded pre-slit PTFE/silicone septa		5185-5824		5040-4649
Green	PTFE/red silicone septa	◆	5182-0718	5185-5829	
	PTFE/white silicone septa	◆	5182-0721	5185-5864	
	PTFE/silicone/PTFE septa	◆	5182-0724	5185-5861	
	Pre-slit PTFE/silicone septa	◆	5183-2077		
	Open top, no septa	◆	5182-0727		
Red	PTFE/red silicone septa	◆	5182-0719		
	PTFE/white silicone septa	◆	5182-0722		
	PTFE/silicone/PTFE septa	◆	5182-0725		
	Pre-slit PTFE/silicone septa	◆	5183-2078		
	Open top, no septa	◆	5182-0726		
Black	PTFE/red silicone septa	◆	5185-5838		
Purple	PTFE/silicone septa	◆	5040-4681		
Light turquoise	PTFE/silicone septa	◆	5040-4683		

Certified Septa for Wide Opening Screw Caps

Septa Type	Color	Unit	Part No.
PTFE/red silicone	Ivory	100/pk	5182-0731
PTFE/white silicone/red PTFE	Red	100/pk	5182-0729
Pre-slit PTFE/white silicone	Blue	100/pk	5183-2074
PTFE/white silicone	Red	100/pk	5182-0730

Certified Screw Cap Pack for 7696 Sample Prep Workbench

Description	Septa Type	Part No.
Multicolor screw cap pack Includes 50/pk of each color: blue, green, red, light turquoise, purple	PTFE/silicone septa	5040-4682



Pre-assembled vial pack

Certified 2 mL Screw Top Vial Packs

Pre-assembled packs come ready-to-use with the cap and septum of your choice attached to the vial. A time- and labor-saving product for use with your Agilent Autosampler or any rotating tray automatic sampler. **Note:** Review the Septum Selection Guide to choose the septum best suited for your application.

Certified 2 mL Screw Top Vial Packs

Vial Type	Septa Type	Cap Color	Unit	Part No.
Clear	PTFE/red rubber septa	Blue	100/pk	5182-0553
Clear with write-on spot	PTFE/red rubber septa	Blue	100/pk	5182-0864
Amber with write-on spot	PTFE/red rubber septa	Green	100/pk	5182-0554
Clear	PTFE/silicone/PTFE septa	Blue	100/pk	5182-0555
Clear with write-on spot	PTFE/silicone/PTFE septa	Blue	100/pk	5182-0866
Amber with write-on spot	PTFE/silicone/PTFE septa	Green	100/pk	5182-0556
Clear	PTFE/silicone septa	Blue	100/pk	5182-0557
Clear with write-on spot	PTFE/silicone septa	Blue	100/pk	5182-0865
Amber with write-on spot	PTFE/silicone septa	Green	100/pk	5182-0558
Clear	Pre-slit PTFE/silicone septa	Blue	100/pk	5183-2082
Clear with write-on spot	Pre-slit PTFE/silicone septa	Blue	100/pk	5183-2083



Certified Screw Top Vial Convenience Packs

Convenience packs are an easy way to get 500 of each component using one part number. Packed in our six-drawer, reusable blue plastic cabinet, 500 vials and caps with septa installed are kept handy and dust-free. **Note:** Review the Septum Selection Guide to choose the septum best suited for your application.

Certified Screw Top Vial Convenience Packs

Vial Type	Septa Type	Cap Color	Unit	Part No.
Clear	PTFE/red rubber septa	Blue	500/pk	5182-0732
Clear with write-on spot	PTFE/red rubber septa	Blue	500/pk	5182-0867
Amber with write-on spot	PTFE/red rubber septa	Green	500/pk	5182-0733
Clear	PTFE/silicone/PTFE septa	Blue	500/pk	5182-0736
Clear with write-on spot	PTFE/silicone/PTFE septa	Blue	500/pk	5182-0869
Amber with write-on spot	PTFE/silicone/PTFE septa	Green	500/pk	5182-0737
Clear	PTFE/silicone septa	Blue	500/pk	5182-0734
Clear with write-on spot	PTFE/silicone septa	Blue	500/pk	5182-0868
Amber with write-on spot	PTFE/silicone septa	Green	500/pk	5182-0735
Clear	Pre-slit PTFE/silicone septa	Blue	500/pk	5183-2079
Clear with write-on spot	Pre-slit PTFE/silicone septa	Blue	500/pk	5183-2080
Amber with write-on spot	Pre-slit PTFE/silicone septa	Green	500/pk	5183-2081
Clear	Bonded, pre-slit PTFE/silicone septa	Blue	500/pk	5067-0205



Clear crimp top vials, 5181-3375

Crimp Top Vials and Closures

The wide opening crimp cap provides a larger target area for improved autosampler needle accuracy. Select from five cap colors and a variety of septa. Whatever your crimp top vial needs, Agilent has what you are looking for.

- Certified for full warranted compatibility with Agilent autosamplers
- 2 mL, 12 x 32 mm
- Available in unique packaging designed to reduce vial breakage
- Tightly controlled crown for improved crimping
- Precision-formed neck for improved autosampler handling
- Rigorous quality assurance provides dimensional consistency from lot-to-lot
- Optional ceramic write-on spot with fill marks

2 mL Wide Opening Crimp Top Glass Vials

Description	Certified	100/pk	1000/cs*
Clear	◆	5181-3375	5183-4491
Clear, write-on spot	◆	5182-0543	5183-4492
Amber, write-on spot	◆	5181-3376	5183-4493
Deactivated Vials			
Clear	◆	5183-4494	
Clear, write-on spot	◆	5183-4495	
Amber, write-on spot	◆	5183-4496	
Crimp Top Vials with Fixed Inserts			
Amber, 300 μ L recommended useable volume		5188-6572	
Clear, 300 μ L recommended useable volume		9301-1388	

*Case includes 10 packs of 100 vials

Crimp Caps with 11 mm Septa

Agilent recommends using certified crimp caps with PTFE/silicone septa to ensure seamless operation with your Agilent autosampler. Agilent certified crimp caps are guaranteed to work with your instrument to reduce autosampler malfunctioning and contamination.

Crimp Caps with 11 mm Septa

Cap Color	Septa Type	Certified	25/pk	100/pk	500/pk	1000/pk
Silver aluminum	PTFE/silicone/ PTFE septa	◆		5181-1211		5183-4499
	PTFE/silicone septas	◆		5182-0552		5183-4500
	Black Viton septas	◆		5181-1212		
	Thin PTFE septas	◆		5182-0871		
	Thin- membrane rubber septa		5062-3582			
	PTFE/red rubber septa			5181-1210	5061-3370	5183-4498
Blue aluminum	PTFE/red rubber septa			5181-1215		
Green aluminum	PTFE/red rubber septa			5181-1216		
Red aluminum	PTFE/red rubber septa			5181-1217		
Gold aluminum	Magnetic			5188-5386		



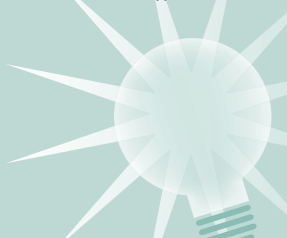
Magnetic crimp caps, 5188-5386

Crimp Top Vial Convenience Packs

Vial Type	Septa Type	Cap Color	Unit	Part No.
Clear	PTFE/red rubber septa	Silver aluminum	500/pk	5181-3400
Clear with write-on spot	PTFE/red rubber septa	Silver aluminum	500/pk	5190-2241
Amber with write-on spot	PTFE/red rubber septa	Silver aluminum	500/pk	5181-8801

Tips & Tools

Red rubber septa have a tendency to cause needle sticking during sampling. Agilent recommends a 23/26 gauge needle when using red rubber septa. Agilent certified crimp caps are compatible with all needle types.





Certified Microvolume Inserts

To meet your microsampling needs, Agilent has a variety of microvolume inserts with capacities and designs that can transform our vials from full-capacity to limited volume with one simple step. Microvolume inserts are certified to work with all certified vials for excellent fit with Agilent autosamplers.

Certified Microvolume Inserts

Description	Unit	Part No.
Conical Inserts with Polymer Feet		
250 µL glass inserts with polymer feet and mandrel interior	100/pk	5181-1270*
250 µL deactivated glass inserts with polymer feet and mandrel interior	100/pk	5181-8872
250 µL polypropylene inserts with polymer feet	100/pk	5182-0549
Conical Glass Inserts		
250 µL pulled-point glass inserts	100/pk	5183-2085
Flat Bottom Inserts		
400 µL glass flat bottom inserts	500/pk	5181-3377
400 µL deactivated glass flat bottom inserts	500/pk	5183-2086
400 µL polypropylene flat bottom inserts	500/pk	5183-2087
Narrow neck inserts	500/pk	9301-1387



250 µL pulled-point glass inserts, 5183-2085



400 µL glass flat bottom inserts, 5181-3377

*For vortexing or mixing small volume samples, Agilent recommends using 5181-1270 because it provides a secure seal with the cap and septum



Polypropylene Vials

Wide opening 12 x 32 mm vials are manufactured from virgin polypropylene, meeting the requirements of 21 CFR 177.1520. Polypropylene is chemically resistant and the material of choice for pH sensitive samples, sodium or heavy metals analysis. Polypropylene vials are translucent and can be used with crimp or snap caps.

For economical and effective microsampling, choose the polypropylene vial with molded glass flanged insert. Its polypropylene body has a glass flanged insert molded to the inside, so the sample comes in contact only with the 100 µL high quality glass insert and the septum. Use with crimp or snap caps.



Polypropylene vial with glass insert, 9301-0977

Polypropylene Vials

Vial Type	Volume	Certified	100/pk	1000/pk
Polypropylene, crimp/snap top	250 µL	◆	5188-2788	9301-0978
Polypropylene, screw top	250 µL	◆	5190-2242	5190-2243
Polypropylene, crimp/snap top	250 µL			5190-3155
Polypropylene, crimp/snap top	1 mL		5182-0567	
Polypropylene with glass insert, crimp/snap top	100 µL		9301-0977	
Polypropylene with glass insert, screw top	100 µL		5188-5390	



Crimp/Snap top polypropylene vial, 250 µL, 5188-2788



Headspace Vials and Closures

Beveled-neck headspace vials are available in both 10 mL and 20 mL capacities, flat or rounded bottom. The 20 mm crimp caps provide a consistently secure seal. Agilent also offers cost-saving convenience packs with vials, caps and septa packaged together.

- Certified for full warranted compatibility with Agilent autosamplers
- Choice of crimp or screw top vials
- Beveled top for maximum secure seal
- Two neck lengths available
- Choice of a pressure safety release cap at 45 psi
- Available in flat or rounded bottom designs



Certified headspace crimp top vials

Certified Agilent Headspace Crimp Top Vials

Vial Size	Vial Type	Unit	Flat Bottom	Rounded Bottom
20 mL, 23 x 75 mm	Clear	100/pk	5182-0837	5183-4474
	Amber	100/pk	5067-0226	5190-2239
10 mL, 23 x 46 mm	Clear	100/pk	5182-0838	5183-4475
	Amber	100/pk	5067-0227	5190-2238
With Graduation Marks and Write-on Spot				
20 mL, 23 x 75 mm	Clear	100/pk	5190-2286	
	Amber	100/pk	5190-2288	
10 mL, 23 x 46 mm	Clear	100/pk	5190-2285	
	Amber	100/pk	5190-2287	



Aluminum crimp caps, 5183-4477

20 mm Headspace Crimp Caps and Septa

Cap Color	Septa Type	Specifications	Certified	100/pk	10,000/pk
20 mm Headspace Crimp Caps with Septa					
Silver aluminum	PTFE/silicone septa	-60°C to 180°C	◆	5183-4477	5190-2257
Silver aluminum with safety feature	PTFE/silicone septa	-60°C to 180°C	◆	5183-4478	
Silver aluminum	Molded PTFE/butyl septa	-40°C to 125°C	◆	5183-4479	5190-2258
Silver aluminum with safety feature	Molded PTFE/butyl septa	-40°C to 125°C		5183-4480	
Silver aluminum	No septa			9301-0721	
Silver aluminum with safety feature	No septa			9301-0718	
Septa only	Gray PTFE/black butyl molded	-40°C to 125°C		9301-0976	
Septa only	Tan PTFE/white silicone	-60°C to 180°C		9301-0719	5067-0234



Headspace vial convenience kit

Certified Headspace Vial Convenience Kits

Septa Type	Vial Type	Cap Color	Specifications	Unit	Part No.
Molded PTFE/black butyl septa	Flat bottom	Silver aluminum with safety feature	< 125°C	100/pk	5182-0839
PTFE/silicone septa	Flat bottom	Silver aluminum with safety feature	< 180°C	100/pk	5182-0840



CombiPAL Headspace Vials and Closures

Screw top vials and caps are recommended for the tightest seal and the most reproducible headspace results. CombiPAL headspace vials and caps are precision-thread, making them an excellent choice for dependability and ease-of-use. They are ideal for applications in the environmental, food and beverage, industrial hygiene, drug analysis, and clinical chemistry industries.

CombiPAL Headspace Screw Top Vials

Vial Size	Vial Type	Unit	Part No.
20 mL, 23 x 75 mm	Clear	100/pk	5188-2753
	Amber	100/pk	5188-6537
10 mL, 23 x 46 mm	Clear	100/pk	5188-5392
	Amber	100/pk	5188-6538

CombiPAL Ultra Clean 18 mm Screw Top Caps with Septa

Cap Color	Septa Type	Unit	Part No.
Silver aluminum, magnetic	PTFE/silicone septa (top white, bottom blue)	100/pk	5188-2759



Snap Top Vials and Closures

Snap top vials and caps are the simple, efficient way to a secure seal without crimping. It's as easy as push-on, pull-off. Crimp caps can also be used with wide opening snap top vials.

Note: Snap cap vials cannot be pressurized.

- 2 mL, 12 x 32 mm
- Use with any 11 mm snap or crimp cap
- Available in unique packaging designed to reduce vial breakage
- Provides a total seal around the entire circumference of the vial crown
- Precision-formed neck improves autosampler handling
- Optional ceramic write-on spot
- Uniformly flat bottom ensures compatibility with inserts



Snap top vials with fixed inserts

2 mL Snap Top Glass Vials

Description	Unit	100/pk	1000/cs*
Clear	100/pk	5182-0544	5183-4504
Clear, write-on spot	100/pk	5182-0546	5183-4505
Amber, write-on spot	100/pk	5182-0545	5183-4506
Deactivated Vials			
Clear	100/pk	5183-4507	
Clear, write-on spot	100/pk	5183-4508	
Amber, write-on spot	100/pk	5183-4509	
Snap Top Vials with Fixed Inserts			
Clear, 300 µL useable volume	100/pk	5188-6593	
Amber, 300 µL useable volume	100/pk	5188-6594	

*Case includes 10 packs of 100 vials



Snap caps with septa

Polyethylene Snap Caps with 11 mm Septa

Cap Color	Septa Type	100/pk	500/pk
Clear	Clear PTFE/red silicone septa	5182-0550	
Blue	Clear PTFE/red silicone septa	5182-3458	
Green	Clear PTFE/red silicone septa	5182-3457	
Red	Clear PTFE/red silicone septa	5182-3459	5182-0564
Clear	PTFE/silicone/PTFE septa	5182-0566	
Blue	PTFE/silicone septa	5182-0541	
Clear	Pre-slit PTFE/silicone septa	5183-4511	
Clear	Solid polyethylene membrane septa	5182-0542	
Clear	PTFE septa	5182-0540	

Snap Top Vial Convenience Packs

Vial Type	Septa Type	Cap Color	Unit	Part No.
Clear	PTFE/red rubber septa	Clear polypropylene	500/pk	5182-0547
Clear with write-on spot	PTFE/red rubber septa	Clear polypropylene	500/pk	5190-2240
Amber	PTFE/red rubber septa	Clear polypropylene	500/pk	5182-0548

Specialty Vials and Closures

High and Extreme Recovery Vials

High Recovery Glass Vials

Wide opening, 1.5 mL vials with 30 μ L reservoir are for sample concentration and injection without transferring to microvolume inserts.



Crimp top vial, high recovery, 5182-3454

1.5 mL Wide Opening High Recovery Glass Vials

Vial Type	Unit	Screw Top	Crimp Top	Snap Top
Clear	100/pk	5183-2030	5182-3454	5183-4510
Clear, silanized	100/pk		5183-4497	
Amber	100/pk	5183-2073		

Extreme Recovery Vials

- Uniform internal surface without ridges to hold back sample
- Wider neck opening for easy pipetting
- Increased sample volume capacity versus standard inserts
- Low residual volume for smaller volume injections without using the inserts
- Safe to use with Vortex for sample concentration



Extreme recovery vial, clear, 5185-5821

1.5 mL Crimp Top Extreme Recovery Vials

Description	Part No.
Clear	5185-5821



Micro-V Vials

- Wide opening, 1.5 mL vials with low residual volume
- Made from first hydrolytical glass Type 1
- Standard 12 x 32 mm dimension
- Compatible with 11 mm crimp closures
- Lower cost alternative to high recovery vials

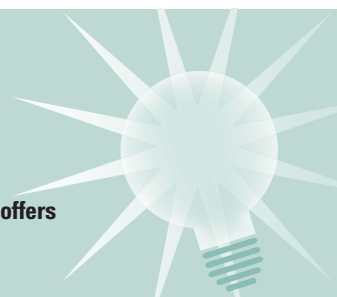
Micro-V Vials

Description	Unit	Screw Top	Crimp Top	Snap Top
Clear	100/pk	5184-3550	5184-3551	5184-3552
Amber	100/pk	5184-3554	5184-3555	5184-3556

Tips & Tools

Don't forget, we have special offers throughout the year.

To learn more, visit www.agilent.com/chem/specialoffers





8-425 Screw Top Vials, Closures and Inserts

The original, smaller opening vials with an 8-425 thread size screw cap are available with black caps and a variety of septa to meet the needs of your application.

- 8-425 thread design
- Original, narrow neck size

2 mL 8-425 Screw Top Glass Vials

Description	Unit	Part No.
Clear	100/pk	5183-4428
Amber	100/pk	5183-4429
Clear, PTFE-lined storage cap	100/pk	5183-4518
Deactivated Vials		
Clear	100/pk	5183-4432
Amber	100/pk	5183-4433



8-425 screw top vials

8-425 Screw Caps and Septa

Cap Color	Septa Type	Unit	Part No.
Black	Red PTFE/white silicone septa	100/pk	5183-4442
Black	No septa	100/pk	5183-4438
Septa only	Red PTFE/white silicone/red PTFE, 8 mm	100/pk	5183-4436
Septa only	Red PTFE/white silicone, 8 mm	100/pk	5183-4437
Septa only	PTFE coated butyl rubber septa	500/pk	9301-1130

Microvolume Inserts for 2 mL 8-425 Screw Top Vials

Description	Unit	Part No.
Conical Inserts with Polymer Feet		
150 μ L glass inserts with polymer feet	100/pk	5183-2088
Conical Glass Inserts		
150 μ L pulled-point interior glass inserts	100/pk	5183-2089
Flat Bottom Inserts		
250 μ L glass flat bottom inserts	100/pk	5183-2090



4 mL screw top vials

4 mL Screw Top Vials and Closures

- 4 mL, 15 x 45 mm
- Precision formed screw threads (13 x 425) for consistently secure seal
- Can be used as wash, waste or storage vials

4 mL Screw Top Vials

Description	Unit	Part No.
Clear	100/pk	5183-4448
Clear with write-on spot	100/pk	5067-0246
Amber	100/pk	5183-4450
Amber with write-on spot	100/pk	5067-0247

Caps and Septa for 4 mL Screw Top Vials

Description	Unit	Part No.
Black 13 x 425 caps, PTFE/silicone septa	100/pk	5183-4464
Black 13 x 425 open top screw caps	100/pk	5183-4461
Diffusion inserts used with black open top screw caps	12/pk	07673-40180
PTFE/natural rubber septa	144/pk	9301-1031
Red PTFE/white silicone septa	100/pk	5183-4460
White virgin PTFE septa	1000/pk	5183-4459

4 mL Screw Top Convenience Packs

Description	Unit	Part No.
Clear vials with caps (no septa)	144/pk	9301-0723
4 mL wash vials with fill markings and caps	25/pk	5182-0551



LC Vials and Closures

Agilent Technologies offers a variety of vials for Agilent's LC instruments. Choose from small volume vials, 2 mL, and 6 mL vials.

LC Vials and Closures

Description	Certified	Unit	Part No.
6 mL Screw Top Vials and Closures			
Clear, flat bottom	◆	100/pk	9301-1377
Clear, extreme high recovery	◆	30/pk	5188-2757
Screw caps, 16 mm	◆	100/pk	9301-1379
PTFE/silicone septa	◆	100/pk	9301-1378
PTFE/silicone septa, pre-slit	◆	100/pk	5188-2758
5 mL Screw Top Vials			
Clear, high recovery	◆	30/pk	5188-5369
6 mL Crimp Top Vials and Closures			
Clear, flat bottom		100/pk	9301-1419
Crimp caps, 20 mm, PTFE/silicone septa		100/pk	9301-1425



Vial plate, G2255-68700



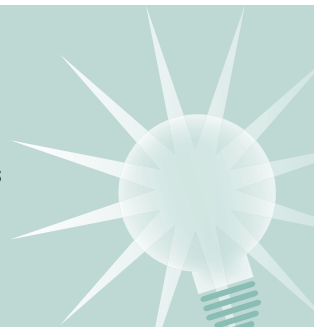
Vial plate, 5022-6539

Vial Plates for 1100/1200 Series Autosamplers and Fraction Collectors

Description	Unit	Part No.
Vial plate for 54 x 2 mL vials	6/pk	G2255-68700
Plate for 27 Eppendorf safe lock tubes, 0.5/1.5/2 mL		5022-6538
Vial plate for 15 x 6 mL vials		5022-6539
Plate for 24 tubes with 18 mm diameter		5042-8544

Tips & Tools

6 mL high recovery screw top vials are recommended for G2258 Dual Loop and G1367 Well Plate Autosamplers only. 5 mL high recovery screw top vials can be used with all autosamplers.





General Purpose Sample Storage Vial Kits

Agilent caps and vials are ideal for sampling and storage. Caps are lined with PTFE/silicone for excellent sealability and chemical resistance. All caps include bonded septa that will prevent liner fallout during shipping and sampling. Caps are manufactured of high quality materials to eliminate sample contamination.



Sample storage vial kit, 5183-4324

General Purpose Sample Storage Vial Kits

Vial Size	Cap Size	Vial Type	Unit	Closed Top	Open Top
4 mL, 15 x 45	13-425	Clear	100/pk	5183-4311	5183-4331
		Amber	100/pk	5183-4321	
12 mL, 19 x 65	15-425	Clear	100/pk	5183-4312	5183-4332
		Amber	100/pk	5183-4322	
22 mL, 23 x 85	20-400	Clear	100/pk	5183-4313	5183-4333
		Amber	100/pk	5183-4323	
40 mL, 28 x 95	24-414	Clear	100/pk	5183-4314	5183-4334
		Amber	100/pk	5183-4324	

Bonded Caps

Cap Size	Cap Color	Cap Type	Septa Type	Unit	Closed Top	Open Top
13-425	White	Polypropylene	PTFE/silicone liner	100/pk	5183-4301	5183-4305
15-425	White	Polypropylene	PTFE/silicone liner	100/pk	5183-4302	5183-4306
20-400	White	Polypropylene	PTFE/silicone liner	100/pk	5183-4303	5183-4307
24-414	White	Polypropylene	PTFE/silicone liner	100/pk	5183-4304	5183-4308



Electronic crimper

Crimping and Decapping Tools

Electronic Crimpers and Decappers

Designed to replace awkward and bulky manual crimping pliers, the Agilent electronic handheld crimpers give tight, reproducible seals every time. Adjustable, slim steel jaws fit around closely spaced vials, enabling you to crimp vials directly in crowded autosampler trays. Using the same handheld design as the crimpers, Agilent's electronic decappers remove caps instantly and are designed for laboratories that recycle or reuse vials.

- Improved design with stronger battery and faster recharging
- Electronic motor-driven design for consistent and reproducible crimping and decapping
- Reduces stress and repetitive motion injuries associated with using manual plier-type crimpers and decappers
- Hand-held, push button operation
- Microprocessor provides electronic adjustment
- Settings are saved when not in use or when battery is changed
- Crimp force can be adjusted for desired tightness of the seals
- Slim, steel jaws fit between closely-spaced vials

Electronic Crimpers and Decappers

Description	Part No.
11 mm electronic crimper with 4.8 V rechargeable battery pack and charger	5062-0207
20 mm electronic crimper with 4.8 V rechargeable battery pack and charger	5062-0208
11 mm electronic decapper with 4.8 V rechargeable battery pack and charger	5062-0209
20 mm electronic decapper with 4.8 V rechargeable battery pack and charger	5062-0210
4.8 V nickel metal hydride replacement battery	5188-6565



Manual Crimpers and Decappers

Agilent's new ergonomic manual crimpers and decappers remove the pain and discomfort of wrist strain with a lightweight, tailored design. Weighing 25-30% less than predecessors and eliminating sore, pinched hands, the new design dramatically improves your experience. Extensively tested with Agilent vials for optimal fit, and color-coded for ease-of-use, this tool is a necessity for every lab. The new crimpers are built for lasting performance: the 11 mm crimper will cap at least 100,000 caps and the 20 mm at least 60,000 before wear starts to impact performance.

- Comfortable, lightweight, ergonomically-designed handles fit smoothly in the hand and eliminate pinching
- Top-mounted adjustment knob shows directionality for tightening/loosening
- Adjustment knob doubles as an indicator that the crimp (or decap) is complete
- Crimpers are color-coded with blue knobs and labels, decappers with orange
- Narrow jaws provide better vertical clearance over vials
- Bottom handle motion allows for better control and enhanced stability of crimping jaw
- Sturdy construction of rugged, fiber-reinforced resin with steel reinforcement in the handles



Ergonomic manual crimper, 5040-4667



Micro vial tray, 5061-3349



Vial rack, 9301-0722



Vial storage container, 5182-0575

Manual Crimpers and Decappers

Description	Part No.
Ergonomic manual crimper for 11 mm caps	5040-4667
Ergonomic manual decapper for 11 mm caps	5040-4668
Ergonomic manual crimper for 20 mm caps	5040-4669
Ergonomic manual decapper for 20 mm caps	5040-4671
11 mm electronic crimper, manual decapper and cap bundle	5040-4674
Includes 1 electronic crimper for 11 mm caps, 1 manual decapper for 11 mm caps and 100 silvertone aluminum 11 mm caps with PTFE/rubber septa	
20 mm electronic crimper, manual decapper and cap bundle	5040-4675
Includes 1 electronic crimper for 20 mm caps, 1 manual decapper for 20 mm caps and 100 silvertone aluminum 20 mm caps with PTFE/silicone septa	

Vial Racks

Description	Part No.
Rack for 8 mm, 100 μ L and 300 μ L minivials, solid plexiglass, holds 50 vials per rack	5061-3349
Rack for 12 mm, 2 mL vials, holds 50 vials per rack, 5/pk	9301-0722
Vial storage container, holds 50 vials per container	5182-0575

Syringes

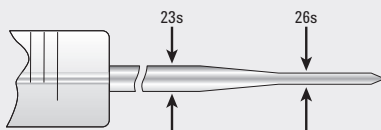
With a broad selection of syringes for manual and auto injectors, Agilent has what you need for accurate and effective sampling.



Typical Needle Gauge Dimensions

Gauge	OD		ID	
	mm	inches	mm	inches
22	0.71	0.028	0.41	0.016
23s	0.635	0.025	0.11	0.0045
25	0.5	0.02	0.2	0.008
26s	0.47	0.0184	0.11	0.0045

Needle Gauge



Tapered Dual Gauge 23-26 or 23s-26s (0.64-0.47 mm)

Durability of a 23-gauge

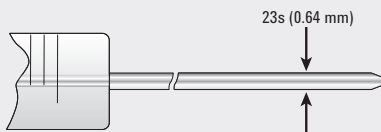
Versatility of a 26-gauge for split/splitless and on-column injection



Single Gauge 22 (0.71 mm)

HPLC valves

Pipetting liquids

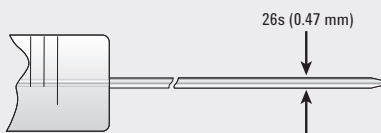


Single Gauge 23 or 23s (0.64 mm)

Merlin Microseal septa

Packed column injector ports

Split/splitless injector ports



Single Gauge 26 or 26s (0.47 mm)

Packed column injector ports

Split/splitless injector ports

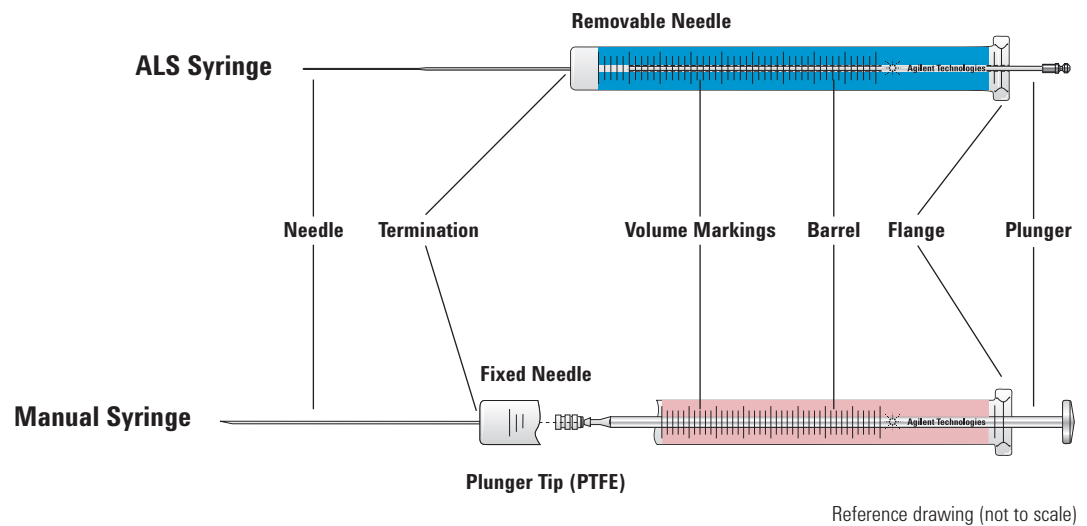
Note: Needles with an 'S' following the gauge are more durable, with a thicker needle wall and smaller ID bore.

Needle Termination

Needle terminations are available in fixed or removable, with various tip styles:

- **Fixed (cemented)** – Economical, reproducible injections for autosamplers
- **Removable needle** – One syringe fixed – many methods, simplicity of fixed needle, but needle can be replaced if damaged or clogged
- **Luer tip** – Easy, fast needle replacement, syringe filter or pump priming, Luer tip is ground glass suitable for mounting chromatographic or PTFE needles, syringes can be autoclaved (without plunger or needle)
- **Luer Lok** – Security of a locked needle, syringe filter or pump priming, PTFE, male Luer taper with nickel-plated brass locking hub for use with KEL-F or metal hub needles and universal connectors

Syringe Features





Autosampler Syringes

Premium autosampler syringes optimize system productivity and ensure precise sample handling

Agilent Blue Line Autosampler Syringes for 7693A ALS

Agilent blue line autosampler syringes are specifically designed to support the higher productivity features of the 7693A ALS, while increasing plunger life and reducing costly downtime. Backed by over 40 years of chromatography experience, these meticulously crafted syringes offer:

- Wider range of volumes including exclusive 250 and 500 μL syringes for sample enhancement with the new 7693A
- Precise match with your autosampler's stroking mechanism, resulting in more accurate volume delivered
- Smooth needle that reduces septum coring and keeps your system working at its full potential
- Choice of PTFE-tipped or metal fitted plunger to meet application needs
- Easy-open, environmentally friendly packaging
- Certified compliance with strict Agilent specifications



Blue Line Autosampler Syringes with Fitted Plungers

Fitted plunger syringes are recommended for homogeneous liquid samples. Each fitted syringe is individually matched with the plunger for precision injection. Plungers are not interchangeable or replaceable.

Blue Line Autosampler Syringes with Fitted Plungers

Volume (µL)	Description	Unit	Needle	Part No.
0.5	Plunger in needle, fixed		23/42/cone tipped	G4513-80229
	Replacement needle/plunger			G4513-80240
1	Plunger in needle, fixed		23/42/cone tipped	G4513-80215
	Replacement needle/plunger			G4513-80239
5	Straight, fixed		23/42/HP	G4513-80213
	Straight, fixed	6/pk	23/42/HP	G4513-80205
	Straight, fixed		26s/42/HP	G4513-80226
	Straight, fixed	6/pk	26s/42/HP	G4513-80212
	Tapered, fixed		23-26s/42/HP	G4513-80206
	Tapered, fixed	6/pk	23-26s/42/HP	G4513-80201
	Straight, removable		23/42/HP	G4513-80234
	Replacement needle	3/pk	23/42/HP	G4513-80238
	Tapered, removable		23-26s/42/HP	G4513-80224
	Replacement needle	3/pk	23-26/42/HP	G4513-80225
10	Straight, fixed		23/42/HP	G4513-80209
	Straight, fixed	6/pk	23/42/HP	G4513-80202
	Straight, fixed		26s/42/HP	G4513-80216
	Straight, fixed	6/pk	26s/42/HP	G4513-80211
	Tapered, fixed		23-26s/42/HP	G4513-80204
	Tapered, fixed	6/pk	23-26s/42/HP	G4513-80200
	Straight, removable		23/42/HP	G4513-80235
	Replacement needle	3/pk	23/42/HP	G4513-80238
	Removable		23-26s/42/HP	G4513-80218
	Replacement needle	3/pk	23-26/42/HP	G4513-80225
25	Tapered, fixed		23-26/42/HP	G4513-80242
50	Tapered, fixed		23-26/42/HP	G4513-80244



Blue Line Autosampler Syringes with PTFE-Tipped Plungers

Suitable for gas and liquid samples, the PTFE tip of the plunger creates a tight seal between the plunger and glass, helping to reduce carry-over and increase syringe lifetime. Replacement plungers are available.

Blue Line Autosampler Syringes with PTFE-Tipped Plungers

Volume (µL)	Description	Unit	Needle	Part No.
10	Straight, fixed		23/42/HP	G4513-80220
	Straight, fixed	6/pk	23/42/HP	G4513-80210
	Tapered, fixed		23-26/42/HP	G4513-80203*
	Replacement plunger for fixed needle			G4513-80227
	Tapered, fixed	6/pk	23-26s/42/HP	G4513-80208
	Straight, removable		23/42/HP	G4513-80219
	Replacement needle	3/pk	23/42/HP	G4513-80236
	Tapered, removable		23-26/42/HP	G4513-80233
	Plunger for fixed needle			G4513-80237
	Replacement needle	3/pk	23-26s/42/HP	G4513-80231
	Replacement plunger for removable needle			G4513-80232
25	Straight, fixed		23/42/HP	G4513-80228
	Tapered, fixed		23-26/42/HP	G4513-80241
50	Straight, fixed		23/42/HP	G4513-80221
	Tapered, fixed		23-26/42/HP	G4513-80223
100	Tapered, fixed		23-26/42/HP	G4513-80243

*Included in 7693A shipments



Advanced Sample Enhancement Autosampler Syringes with PTFE-Tipped Plungers

Used with the 7693A optional Enhanced Sample Handling Syringe Carriage, these syringes can eliminate analyst-to-analyst variability and reduce re-work in sample preparation, such as dilution and internal standard addition.

Advanced Sample Enhancement Autosampler Syringes with PTFE-Tipped Plungers

Volume (µL)	Description	Needle	Part No.
250	Fixed	23/42/HP	G4513-60560
500	Fixed	23/42/HP	G4513-60561



Gold Standard Autosampler Syringes

Use one needle and get the benefits of two. The upper portion of the tapered needle offers the strength of a 23-gauge needle, while the lower portion at 26s-gauge allows use with split/splitless or on-column injections with 0.53 mm ID columns. All standard plungers are stainless steel.

Tapered Needle, 23-26s Gauge Autosampler Syringes

Volume (μL)	Description	Unit	Needle	Part No.
5	Tapered, fixed		23-26s/42/HP	5181-1273
	Tapered, fixed	6/pk	23-26s/42/HP	5181-8810
	Tapered, removable		23-26s/42/HP	5182-0835
	Replacement needle for 5 μL syringe	3/pk		5182-0832
10	Tapered, fixed		23-26s/42/HP	5181-1267
	Tapered, fixed	6/pk	23-26s/42/HP	5181-3360
	Tapered, removable		23-26s/42/HP	5181-3321
	Replacement needle for 10 μL syringe	3/pk		5181-3319
	Tapered, fixed, PTFE-tipped plunger		23-26s/42/HP	5181-3354
	Tapered, fixed, PTFE-tipped plunger	6/pk	23-26s/42/HP	5181-3361
	Replacement plunger with PTFE tip for fixed needle 10 μL syringe			5181-3365
	Tapered, removable		23-26s/42/HP	5181-3356
Replacement plunger with PTFE tip for removable needle 10 μL syringe			5181-3358	
50	Tapered, fixed, PTFE-tipped plunger		23-26s/42/HP	5183-0314
100	Tapered, fixed, PTFE-tipped plunger		23-26s/42/HP	5183-2042



Straight Needle, 23 and 26s Gauge Autosampler Syringes

Volume (μL)	Description	Unit	Needle	Part No.
1	Cone-tipped		23/42/HP	5188-5246
2	Cone-tipped		23/42/HP	5188-5247
5	Straight, fixed		26s/42/HP	9301-0891
	Straight, fixed	6/pk	26s/42/HP	5183-4728
	Straight, fixed		23/42/HP	9301-0892
	Straight, fixed	6/pk	23/42/HP	5182-0875
	Straight, removable		23/42/HP	5182-0834
	Replacement needle for 5 μL syringe	3/pk		5182-0830
10	Straight, fixed		26s/42/HP	9301-0714
	Straight, fixed	6/pk	26s/42/HP	5183-4729
	Straight, fixed		23/42/HP	9301-0713
	Straight, fixed	6/pk	23/42/HP	9301-0725
	Straight, fixed, PTFE-tipped plunger		23/42/HP	5181-8809
	Straight, fixed, PTFE-tipped plunger	6/pk	23/42/HP	5183-4730
	Replacement plunger for 10 μL fixed needle syringe			5181-8808
	Straight, removable		23/42/HP	5181-8806
	Straight, removable, PTFE-tipped plunger		23/42/HP	5181-8813
	Replacement needle for 10 μL syringe	3/pk		5181-8811
Replacement plunger with PTFE tip for removable needle 10 μL syringe			5181-3358	
25	Straight, fixed, PTFE-tipped plunger		23/42/HP	5183-0316
50	Straight, fixed, PTFE-tipped plunger		23/42/HP	5183-0318
100	Straight, fixed, PTFE-tipped plunger		23/42/HP	5183-2058



7673/7683 On-Column Autosampler Syringes

Agilent 7673/7683 on-column syringes with needle diameter for columns ranging from 0.25 mm to 0.53 mm are specifically designed for the 7673/7683 Autosampler.

7673/7683 On-Column Autosampler Syringes

Volume (μL)	Description	Unit	Part No.
5	Removable needle, barrel only		5182-0836
	Stainless steel needle for 0.53 mm column	3/pk	5182-0832
	Stainless steel needle for 0.32 mm column	3/pk	5182-0831
	Stainless steel needle for 0.25 mm column	3/pk	5182-0833
	Plunger button	10/pk	5181-8866

HP 7670/71/72 Autosampler Syringes

This syringe has a long needle and regular plunger button for compatibility with HP 7670/71/72 autosamplers. Available with a fixed or removable needle.

HP 7670/71/72 Autosampler Syringes

Volume (μL)	Description	Needle	Part No.
1	Straight, removable	23/56/2	5182-9622
10	Straight, fixed	23/50/HP	5182-9734
	Straight, removable	23/50/HP	5182-9626
	Straight, fixed, PTFE-tipped plunger	23/50/HP	5182-9799



Manual Syringes

Agilent color-coded manual syringes allow you to determine syringe volume with one quick glance, so you can more efficiently perform manual dilution, extraction, and sample prep. They also give you the advantages of:

- Improved scale readability with a new vertical syringe scale orientation for more intuitive use
- An easy-access box design that allows you to store syringes right on your lab bench, making it easy to find the volume you need without digging through drawers or unpacking extra cartons
- A wide selection of volumes, making Agilent your "one-stop" resource for all of your sample manipulation needs
- Accuracy within $\pm 1\%$ of nominal volume, and precision within 1%, measured at 80% of total scale volume
- Earth-friendly cardboard and recyclable plastic packaging that helps reduce landfill waste
- A Certificate of Conformance to ensure the highest quality construction and performance, available for viewing and printing anytime
- Lot-traceable for accurate identification

Of course, all Agilent syringes are backed by over 40 years of chromatography expertise, industry-leading technical support, and a 90-day warranty from the date of shipment.



0.5 μL



1.0 μL



2.0 μL



5.0 μL



10 μL
1.0 mL



25 μL
2.5 mL



50 μL
5.0 mL



100 μL
10.0 mL



250 μL
25.0 mL



500 μL
50.0 mL



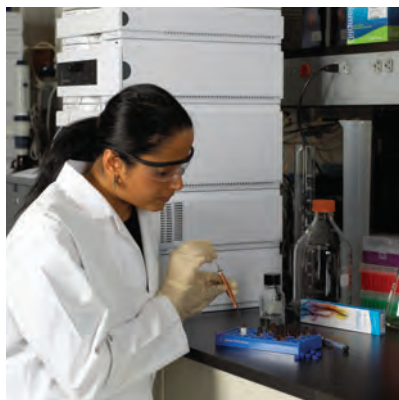
Manual Syringes with Fitted Plunger, Fixed and Removable Needle, 0.5 to 5 μ L

Volume (μ L)	Description	Unit	Needle	Part No.
0.5	Plunger in needle, removable		23/70 mm/cone tip	5190-0464
	Replacement needle and plunger kit for 0.5 μ L syringe			5190-1461
	Plunger in needle, removable		23/70 mm/bevel tip	5190-1460
	Replacement needle and plunger kit for 0.5 μ L syringe			5190-1462
1	Plunger in needle, removable		26/70 mm/cone tip	5190-1463
	Replacement needle and plunger kit for 1.0 μ L syringe			5190-1467
	Plunger in needle, removable		26/70 mm/bevel tip	5190-1466
	Replacement needle and plunger kit for 1.0 μ L syringe			5190-1470
	Plunger in needle, removable		23/70 mm/cone tip	5190-1464
	Replacement needle and plunger kit for 1.0 μ L syringe			5190-1468
	Plunger in needle, removable		23/70 mm/bevel tip	5190-1465
	Replacement needle and plunger kit for 1.0 μ L syringe			5190-1469
2	Plunger in needle, removable		23/70 mm/cone tip	5190-1471
	Replacement needle and plunger kit for 2.0 μ L syringe			5190-1473
	Plunger in needle, removable		26/bevel tip	5190-1472
	Replacement needle and plunger kit for 2.0 μ L syringe			5190-1474
5	Plunger in needle, removable		23/cone tip	5190-1475
	Replacement needle and plunger kit for 5.0 μ L syringe			5190-1477
	Plunger in needle, removable		23/70 mm/bevel tip	5190-1476
	Replacement needle and plunger kit for 5.0 μ L syringe			5190-1478
	Straight, fixed		26/50 mm/bevel tip	5190-1479
	Removable, with flexible plunger		26/50 mm/bevel tip	5190-1481
	Replacement needle for 5.0 μ L syringe	3/pk		5190-1482



Manual Syringes with Fitted Plunger, Fixed and Removable Needle, 10 to 500 μ L

Volume (μ L)	Description	Unit	Needle	Part No.
10	Fixed		26/50 mm/bevel tip	5190-1483
	Fixed	10/pk	26/50 mm/bevel tip	5190-1487
	Fixed, with flexible plunger		26/50 mm/bevel tip	5190-1488
	Fixed, with flexible plunger	6/pk	26/50 mm/bevel tip	5190-1489
25	Fixed		25/50 mm/bevel tip	5190-1493
	Removable		25/50 mm/bevel tip	5190-1495
	Replacement needle	3/pk		5190-1496
50	Fixed		25/50 mm/bevel tip	5190-1500
	Removable		25/50 mm/bevel tip	5190-1502
	Replacement needle	3/pk		5190-1496
100	Fixed		25/50 mm/bevel tip	5190-1507
	Removable		25/50 mm/bevel tip	5190-1509
	Replacement needle	3/pk		5190-1496
250	Fixed		25/50 mm/bevel tip	5190-1514
	Removable		25/50 mm/bevel tip	5190-1516
	Replacement needle	3/pk		5190-1496
500	Fixed		25/50 mm/bevel tip	5190-1521
	Removable		25/50 mm/bevel tip	5190-1524
	Replacement needle	3/pk		5190-1496



Manual Syringes with PTFE-Tipped Plunger, Removable Needle, 10 to 500 μL

Volume (μL)	Description	Unit	Needle	Part No.
10	Removable		25/50 mm/bevel tip	5190-1491
	Replacement needle	3/pk		5190-1496
	Replacement plunger with PTFE tip for 10 μL syringe			5190-1559
25	Removable		25/50 mm/bevel tip	5190-1498
	Replacement needle	3/pk		5190-1496
	Replacement plunger with PTFE tip for 25 μL syringe			5190-1560
50	Removable		25/50 mm/bevel tip	5190-1504
	Replacement needle	3/pk		5190-1496
	Replacement plunger with PTFE tip for 50 μL syringe			5190-1561
100	Removable		25/50 mm/bevel tip	5190-1511
	Replacement needle	3/pk		5190-1496
	Replacement plunger with PTFE tip for 100 μL syringe			5190-1562
250	Removable		25/50 mm/bevel tip	5190-1518
	Replacement needle	3/pk		5190-1496
	Replacement plunger with PTFE tip for 250 μL syringe			5190-1563
500	Removable		25/50 mm/bevel tip	5190-1525
	Replacement needle	3/pk		5190-1496
	Replacement plunger with PTFE tip for 500 μL syringe			5190-1564

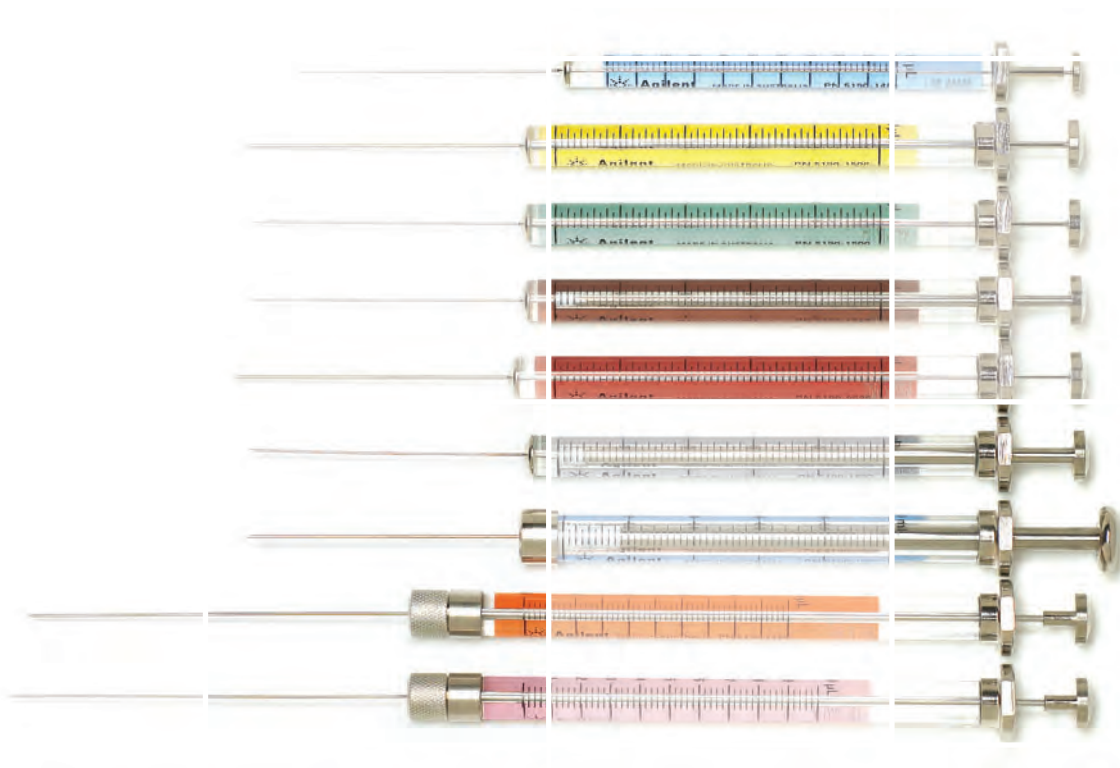


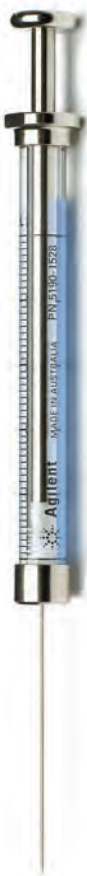
Manual Syringes with PTFE-Tipped Plunger, Fixed Needle, 10 to 500 μ L

Volume (μ L)	Description	Needle	Part No.
10	Fixed	26/50 mm/bevel tip	5190-1490
	Replacement plunger with PTFE tip for 10 μ L syringe		5190-1558
25	Fixed	25/50 mm/bevel tip	5190-1497
	Replacement plunger with PTFE tip for 25 μ L syringe		5190-1560
50	Fixed	25/50 mm/bevel tip	5190-1503
	Replacement plunger with PTFE tip for 50 μ L syringe		5190-1561
100	Fixed	25/50 mm/bevel tip	5190-1510
	Replacement plunger with PTFE tip for 100 μ L syringe		5190-1562
250	Fixed	25/50 mm/bevel tip	5190-1517
	Replacement plunger with PTFE tip for 250 μ L syringe		5190-1563
500	Fixed	25/50 mm/bevel tip	5190-1523
	Replacement plunger with PTFE tip for 500 μ L syringe		5190-1564

**Manual Syringes with PTFE-Tipped Plunger,
Removable Needle, 1 mL to 10 mL**

Volume (mL)	Description	Unit	Needle	Part No.
1	Removable		23/50 mm/bevel tip	5190-1529
	Replacement needle	3/pk		5190-1581
	Replacement plunger with PTFE tip for 1 mL syringes			5190-1565
2.5	Removable		23/50 mm/bevel tip	5190-1533
	Replacement needle	3/pk		5190-1581
	Replacement plunger with PTFE tip for 2.5 mL syringes			5190-1572
5	Removable		23/50 mm/bevel tip	5190-1537
	Replacement needle	3/pk		5190-1538
	Replacement plunger with PTFE tip for 5 mL syringes			5190-1573
10	Removable		23/50 mm/bevel tip	5190-1542
	Replacement needle	3/pk		5190-1538
	Replacement plunger with PTFE tip for 10 mL syringes			5190-1574





Manual Syringes with PTFE-Tipped Plunger, Fixed Needle, 1 mL to 10 mL

Volume (mL)	Description	Needle	Part No.
1	Fixed	22/50 mm/bevel tip	5190-1528
	Replacement plunger with PTFE tip for 1 mL syringes		5190-1565
2.5	Fixed	22/50 mm/bevel tip	5190-1532
	Replacement plunger with PTFE tip for 2.5 mL syringes		5190-1572
5	Fixed	22/50 mm/bevel tip	5190-1536
	Replacement plunger with PTFE tip for 5 mL syringes		5190-1573
10	Fixed	22/50 mm/bevel tip	5190-1541
	Replacement plunger with PTFE tip for 10 mL syringes		5190-1574

Manual Syringe with PTFE-Tipped Plunger and Luer Lok, 50 to 500 µL

Volume (µL)	Description	Needle	Part No.
50	Luer Lok	Luer Lok/50 mm or 2 in.	5190-1506
	Replacement plunger with PTFE tip for 50 µL syringe		5190-1561
100	Luer Lok	Luer Lok/50 mm or 2 in.	5190-1513
	Replacement plunger with PTFE tip for 100 µL syringe		5190-1562
250	Luer Lok	Luer Lok/50 mm or 2 in.	5190-1519
	Replacement plunger with PTFE tip for 250 µL syringe		5190-1563
500	Luer Lok	Luer Lok/50 mm or 2 in.	5190-1527
	Replacement plunger with PTFE tip for 500 µL syringe		5190-1564



Luer Lok valve, 5190-1531



Luer Lok valve, 5190-1543

Manual Syringe with PTFE-Tipped Plunger and Luer Lok, 1 to 50 mL

Volume (mL)	Description	Needle	Part No.
1	Luer Lok	Luer Lok/50 mm or 2 in.	5190-1530
	Luer Lok valve	Luer Lok valve/50 mm or 2 in.	5190-1531
	Replacement plunger with PTFE tip for 1 mL syringes		5190-1565
2.5	Luer Lok	Luer Lok/50 mm or 2 in.	5190-1534
	Luer Lok valve	Luer Lok valve/50 mm or 2 in.	5190-1535
	Replacement plunger with PTFE tip for 2.5 mL syringes		5190-1572
5	Luer Lok	Luer Lok/50 mm or 2 in.	5190-1539
	Luer Lok valve	Luer Lok valve/50 mm or 2 in.	5190-1540
	Replacement plunger with PTFE tip for 5 mL syringes		5190-1573
10	Luer Lok	Luer Lok/50 mm or 2 in.	5190-1457
	Luer Lok valve	Luer Lok valve/50 mm or 2 in.	5190-1543
	Replacement plunger with PTFE tip for 10 mL syringes		5190-1574
25	Luer Lok	Luer Lok/50 mm or 2 in.	5190-1544
	Replacement plunger with PTFE tip for 25 mL syringe		5190-1575
	Luer Lok valve	Luer Lok valve/50 mm or 2 in.	5190-1545
	Replacement plunger with PTFE tip for 25 mL syringe		5190-1576
50	Luer Lok	Luer Lok/50 mm or 2 in.	5190-1546
	Luer Lok valve	Luer Lok valve/50 mm or 2 in.	5190-1547
	Replacement plunger with PTFE tip for 50 mL syringes		5190-1577

Luer Lok and Luer Lok Valve Needles

Description	Unit	Needle	Part No.
Needle	3/pk	23/50/bevel tip	5190-1548
Needle	3/pk	23/50/sidehole tip	5190-1549
Needle	3/pk	22/51/LC tip	5190-1550



LC Manual Syringes with Fitted Plungers

Volume (μL)	Description	Unit	Needle	Part No.
5	Fixed		22 gauge/2 in./LC tip	5190-1480
10	Fixed		22 gauge/2 in./LC tip	5190-1484
	Removable		22 gauge/2 in./LC tip	5190-1485
	Replacement needle for 10 μL syringe	3/pk		5190-1486
25	Fixed		22 gauge/2 in./LC tip	5190-1494
50	Fixed		22 gauge/2 in./LC tip	5190-1501
100	Fixed		22 gauge/2 in./LC tip	5190-1508
250	Fixed		22 gauge/2 in./LC tip	5190-1515
500	Fixed		22 gauge/2 in./LC tip	5190-1522

LC Manual Syringes with PTFE-Tipped Plungers

Volume (μL)	Description	Unit	Needle	Part No.
10	Removable		22 gauge/2 in./LC tip	5190-1492
	Replacement needle for 10 μL syringe	3/pk		5190-1486
	Replacement plunger with PTFE tip for 10 μL syringe			5190-1558
25	Removable		22 gauge/2 in./LC tip	5190-1499
	Replacement needle	3/pk		5190-1571
	Replacement plunger with PTFE tip for 25 μL syringe			5190-1560
50	Removable		22 gauge/2 in./LC tip	5190-1505
	Replacement needle	3/pk		5190-1571
	Replacement plunger with PTFE tip for 50 μL syringe			5190-1561
100	Removable		22 gauge/2 in./LC tip	5190-1512
	Replacement needle	3/pk		5190-1571
	Replacement plunger with PTFE tip for 100 μL syringe			5190-1562
250	Removable		22 gauge/2 in./LC tip	5190-1520
	Replacement needle	3/pk		5190-1571
500	Removable		22 gauge/2 in./LC tip	5190-1526
	Replacement needle	3/pk		5190-1571
	Replacement plunger with PTFE tip for 500 μL syringe			5190-1564



CTC Autosampler Supplies

To better serve Agilent instrument users who choose CTC Analytics autosamplers for high-throughput and flexible sample introduction, Agilent has partnered with CTC to provide a fully integrated system, including CTC approved consumables.

Agilent's portfolio includes a variety of vials, caps, syringes, and well plates compatible with the CTC Analytics HTC PAL, GC PAL, and CombiPAL systems.

CombiPAL and GC PAL Liquid Injection Syringes

A key feature of CTC's GC PAL and CombiPAL is the ability to inject a wide range of sample volumes, up to 500 μL for LVI applications. The following fixed needle syringes are recommended by CTC to sustain high reproducibility and accuracy.



Fixed needle, G6500-80120

CombiPAL and GC PAL Liquid Injection Syringes

Volume (μL)	Description	Unit	Needle	Part No.
1.2	Fixed needle		26/51/AS	G6500-80113
5	Fixed needle		26/51/AS	G6500-80114
10	Fixed needle		26/51/2	G6500-80115
			26s/51/AS	G6500-80116
			Fixed needle, Merlin & PTV	23s/51/AS
25	Fixed needle		26/51/AS	G6500-80117
	Replacement plunger	10/pk		G4200-80104
100	Fixed needle		26/51/AS	G6500-80118
	Replacement plunger	10/pk		G4200-80105
250	Fixed needle		26/51/AS	G6500-80119
	Replacement plunger	10/pk		G4200-80102
500	Fixed needle		26/51/AS	G6500-80120
	Replacement plunger			G4200-80106



Fixed needle, G6500-80109

CombiPAL Headspace Supplies

Our fixed needle headspace syringes feature a sideport needle for gas flushing, in conformance with strict CTC standards. Use with Agilent's Merlin Microseal to minimize instrument downtime and to prevent lost or compromised data caused by septum leaks and liner contamination.

CombiPAL Headspace Syringes

Volume (mL)	Description	Gauge	Part No.
1	Fixed needle	23	G6500-80107
	Replacement plunger		G4200-80101
2.5	Fixed needle	23	G6500-80109
	Replacement plunger		G4200-80107
5	Fixed needle	23	G6500-80111
	Replacement plunger		G4200-80108

CombiPAL Headspace Supplies

Description	Part No.
Liner, inlet for SPME, deactivated	5188-6471

For vials and caps that work seamlessly with your CTC Analytics PAL Autosamplers, see our complete Vials and Closures section.

Turn to page 51.



HTS and HTC PAL Liquid Injection Crimp Top Micro Vials and Caps

HTS and HTC PAL high-throughput LC injection systems are configured to cope with today's high-throughput LC/MS demands. Agilent offers a selection of crimp top micro vials designed specifically for HTS and HTC PAL systems.

HTS and HTC PAL Liquid Injection Crimp Top Micro Vials and Caps

Description	Unit	Part No.
0.8 mL, amber glass, flat bottom	1000/pk	5183-4487
0.1 mL, clear glass, tapered bottom	500/pk	5180-0844
0.3 mL, clear glass, round bottom	500/pk	5180-0841
0.7 mL, amber glass, round bottom	500/pk	5180-0805
0.5 mL, amber glass, conical bottom	500/pk	5180-0806
Micro Caps		
Crimp caps with PTFE/silicone septa	500/pk	5180-0842

HTS and HTC PAL Liquid Injection Syringes

Designed specifically for CTC autosamplers, these X-type syringes feature zero carryover and a long-lasting plunger for applications that demand precision and productivity. They are strongly recommended for high-throughput applications.

Agilent offers a wide selection of fixed needle, 22-gauge, pointstyle 3 syringes to accommodate a variety of applications.

HTS and HTC PAL Liquid Injection Syringes



Volume (µL)	Description	Unit	Needle	Part No.
25	X-type fixed needle		22s/51/3	G4200-80117
	Replacement plunger for X-type syringe	3/pk		G4200-80112
50	X-type fixed needle		22/51/3	5188-6485
	Replacement plunger for X-type syringe	3/pk		5188-5395
100	X-type fixed needle, fast aspiration and eject		22/51/3	G4200-80118
	X-type fixed needle, low dead volume		22s/51/3	G4200-80119
	Replacement plunger for X-type syringe	3/pk		G4200-80111
10	Fixed needle		22s/51/3	G4200-80113
	Replacement plunger	10/pk		G4200-80103
25	Fixed needle		22s/51/3	G4200-80114
	Replacement plunger	10/pk		G4200-80104
100	Fixed needle		22/51/3	G4200-80115
	Fixed needle		22s/51/3	G4200-80116
	Replacement plunger	10/pk		G4200-80105
250	Fixed needle		22/51/3	G6500-80102
	Replacement plunger	10/pk		G4200-80102
500	Fixed needle		22/51/3	G6500-80103
	Replacement plunger			G4200-80106
1000	Fixed needle		22/51/3	G6500-80104
	Replacement plunger			G4200-80101
2500	Fixed needle		22/51/3	G6500-80105
	Replacement plunger			G4200-80107
5000	Fixed needle		22/51/3	G6500-80106
	Replacement plunger			G4200-80108

HTS and HTC PAL Liquid Injection Valve Supplies

Whether your HTS or HTC PAL autosampler uses the Agilent proprietary Rheodyne high-pressure 600 bar injection valve or Valco Cheminert injection valves, Agilent can help you find a sample loop to meet your most challenging applications – including:

- Rheodyne 600 bar injection valve loops, which include high-pressure Swagelok fittings
- Cheminert metal loops, which feature two 1/16 in. stainless steel nuts and two stainless steel ferrules
- Cheminert PEEK loops, which include two PEEK nuts and two PEEK ferrules



Stainless steel loop, 5188-6486



2 µL PEEK loop, 5188-6469



10 µL PEEK loop, 5188-6467

HTS and HTC PAL Liquid Injection Valve Loops and Needle Seals

Description	Part No.
Rheodyne 600 bar Valve Supplies	
Stainless Steel Loops: Supplied with Swagelok fittings required for high pressure	
5 µL	5188-6486
10 µL	5188-6487
20 µL	5188-6488
50 µL	5188-6489
100 µL	5188-6490
Stator, Rheodyne 600 bar	5188-6491
RheBuild Kit, 600 bar, includes Rotor Seal and 3/32 in. hex wrench	5188-6492
Needle Seals, Rheodyne valve, 600 bar, 10/pk	5188-6478
Cheminert Valve Supplies	
PEEK Loops: Include two PEEK nuts and two PEEK ferrules	
2 µL	5188-6469
5 µL	5188-6470
10 µL	5188-6467
20 µL	5188-6468
Metal Loops: Include two 1/16 in. stainless steel nuts and two stainless steel ferrules	
2 µL	5188-6457
10 µL	5188-6458
50 µL	5188-6460
100 µL	5188-6461
250 µL	5188-6462
500 µL	5188-6463
1000 µL	5188-6464
2000 µL	5188-6465
5000 µL	5188-6466
PEEK Needle Seal, Valco, 22-gauge, 10/pk	5188-6476
PTFE Needle Seal, Valco, 22-gauge, 10/pk	5188-6477

CTC Autosampler General Supplies



Well plate foil cutter, 5188-6479



Sample tray, G6500-80101

For your convenience, Agilent offers a selection of replacement sampling trays, well plates and sampling accessories for CTC autosamplers.

Description	Part No.
Sample tray, 200 vials, 0.7 or 1 mL	G6500-80100
Sample tray, 98 2 mL or 78 1 mL vials	G6500-80101
Sample tray, 32 10 or 20 mL vials	G6500-80121
Sample tray, 54 2 mL vials, for PAL deep-well stack	G6500-80122
96-well plates, 0.5 mL, polypropylene, 10/pk	5042-1386
96-deep well plates, 1 mL, polypropylene, 50/pk	5042-6454
384-well plates, 90 μ L, polypropylene, 30/pk	5042-1388
Closing mats for 96-well plates, silicone, pre-slit, fits 96-well plates P/N 5042-1385 and 5042-1386 only, 50/pk	5042-1389
Well plate foil cutter, max 22-gauge needle	5188-6479



Gas Purification

Impure gases can cause installation delays, premature instrument failure, and flawed results. Purification is one of the most important steps you can take to optimize your system performance.

Agilent brings the highest performance and largest variety of gas purifiers to gas chromatographers. We manufacture purifiers in a variety of sizes and configurations to remove oxygen, moisture, and hydrocarbons. Our product line contains in-line gas purifiers, including refillable, indicating, S-shaped, and metal body types. In-line gas purifiers are designed to remove specific contaminants. We also carry gas purification systems with removable cartridges. Please refer to the following Gas Purifier Selection Guide to determine which gas purifiers you should use.



Gas Clean Filters

Carrier Gas Purification

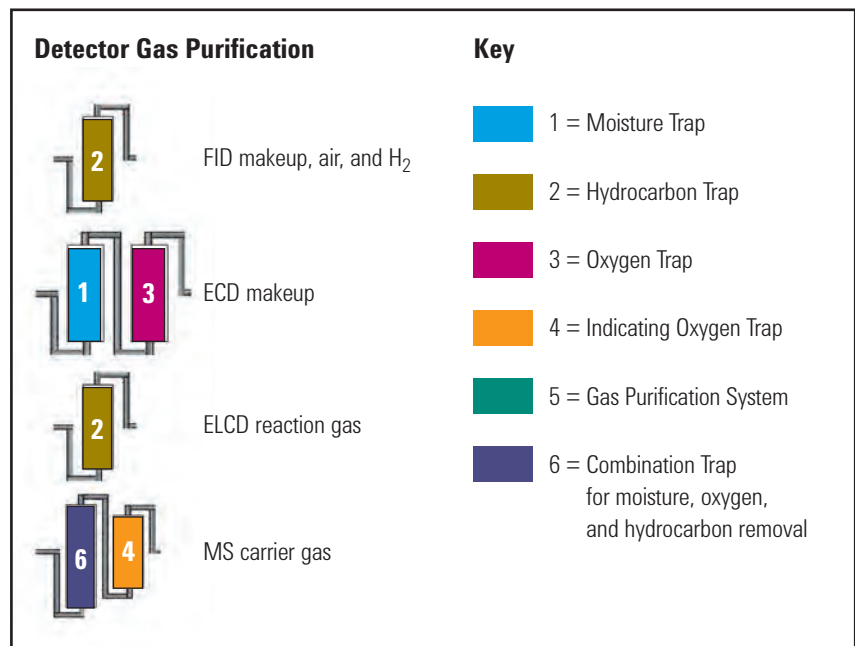
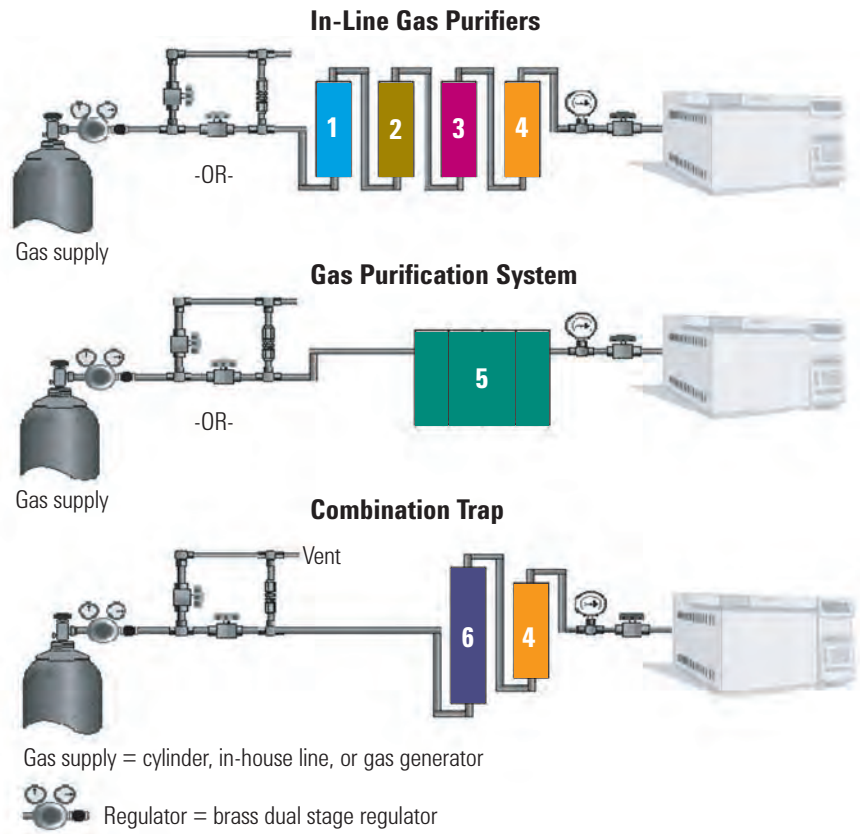
The Carrier Gas Purification illustration shows the most common gas purification configurations used in gas chromatography.

Regardless of which purification system is employed, proper installation and maintenance is required to achieve optimal performance. A purifier that is not maintained will eventually expire and become ineffective, or worse, a source of contamination.

Helpful Hints for Purification Success

- Determine desired purity level
- Keep number of fittings in gas line to a minimum
- Install purifiers in a convenient location close to the GC
- Use purifier log books to determine maintenance and cartridge replacement schedules
- Use indicating traps closest to the GC so you can determine when to change the traps that are upstream

Carrier Gas Purification



Gas Purifier Selection Guide					
Contaminant	Description	Series	Unique Features	Refillable	Page No.
Purification Systems					
Multiple	Gas Clean Filter		Highly sensitive indicators with fast, leak free filter replacement	No	88
	Renewable Gas Purification System	G3440	Recyclable high-capacity system filters moisture, oxygen and hydrocarbons in a small, single-cartridge unit, featuring quick changes and easy-to-read dual indicators	Yes	92
	Quick Change + Point of Operation Panel		Cartridges only	No	93
	Super-Clean Gas Filter System		1, 2, 3, or 4 position modular, quick-connect cartridge system with visible indicators	No	94
	High Capacity Gas Purification System	5182/5183	Cartridges only	No	96
In-Line Purifiers					
Moisture (H ₂ O)	Economy Indicating Moisture Traps	MT, MT-D, MT-S	Economical plastic "Lexan" body for durability	Yes	100
	Glass Indicating Moisture Traps	GMT, LGMT	Glass body for no moisture diffusion	Yes	103
	S-Traps		Can be reconditioned in GC oven	No	104
	Big Moisture Traps	BMT	Ultra-high capacity for moisture	Yes	104
	Refills for Moisture Traps	MT, MT-D, MT-S GMT, LGMT, BMT	Makes gas purification more economical		100
Oxygen (O ₂)	Indicating Oxygen Traps	IOT, LIOT	Glass construction with plastic safety shield	No	105
	Oxygen Traps	OT1	Economical non-indicating oxygen trap	No	105
	Big Oxygen Traps	BOT	Ultra-high capacity for oxygen	No	106

(Continued)

Gas Purifier Selection Guide

Contaminant	Description	Series	Unique Features	Refillable	Page No.
In-Line Purifiers					
Hydrocarbons (HCs)	Hydrocarbon Traps	HT	Economical trap for hydrocarbons	Yes	107
	Big Hydrocarbon Traps	BHT	Ultra-high capacity for hydrocarbons	Yes	107
	S-Traps		Can be reconditioned in GC oven	No	108
	Capillary Grade Hydrocarbon Traps	HT3	High surface area adsorbent, purged with high purity helium	Yes	108
	Refills for Hydrocarbon Traps	HT, BHT, HT3	Makes gas purification more economical		107
Combination Traps	Oxygen/Moisture Trap	OT3	Bi-functional trap, leak-free one-piece design	No	110
	Hydrocarbon/Moisture Trap	HMT	Bi-functional trap, leak-free one-piece design	Yes	112
	Big Universal Trap	RMS	Gas-specific (for purifying He, N ₂ , or H ₂), ultra-high capacity, removes H ₂ O, O ₂ , HCs, CO, and CO ₂ , recommended for GC and GC/MS gas supplies	No	98
	Refill for Hydrocarbon/Moisture Trap	HMT	Makes gas purification more economical		112
Other Purifiers					
Organics	Split Vent Trap	RDT	Cartridge design with durable cartridge holder and replacement cartridges	No	113





Gas Clean Filters

Gas Purification Systems

Gas Clean Filters

- Fast, leak-free filter replacement reduces downtime
- Economical, with immediate payback
- Highly sensitive filter indicators provide maximum instrument protection

Our Gas Clean Filter System provides enhanced gas quality for maximum productivity. Clean gases reduce the risk of column damage, sensitivity loss and instrument downtime; contaminants in gases can significantly affect your analysis. Oxygen, hydrocarbons and moisture can cause loss of sensitivity and accuracy of the GC, and damage your column. Impurities activate glass wool in liners and accelerate septa degradation, causing high background signals and ghost peaks, leading to time-consuming troubleshooting. Oxygen in the supply gas for ICP-OES or ICP-MS can cause plasma shutdown and loss of sensitivity. Carbon dioxide in supply gas for TOC analyzers causes elevated baselines and loss of sensitivity and accuracy.

Supply gases can pick up contaminants from every part of the gas line. Therefore, you need a Gas Clean Filter System even if your supply gas is of the highest quality – it is too costly to buy expensive, high purity gases if their quality is downgraded by impurities in the gas line.

Inserting a Gas Clean Filter System in the gas line immediately before the instrument inlet greatly reduces the level of impurities, thus improving trace analysis. Contaminants entering your GC column will also be reduced, which is critical for high temperature analysis and essential for longer column lifetime.

Benefits of Using Gas Clean Filters

Technique	Filters	Benefit
GC/MS	GC/MS filter	Higher data accuracy and less maintenance
GC column	Moisture filter and oxygen filter	Longer lifetime
ECD detector	Moisture filter and oxygen filter	Greater sensitivity
TCD detector	Moisture filter and oxygen filter	Greater sensitivity and less maintenance
Process GC	Process moisture filter	Long term stability
FID detector	Two charcoal filters (for air and hydrogen)	Greater sensitivity
PID detector	Oxygen filter and charcoal filter	Greater sensitivity
PFPD or FDP detector	Charcoal filter, CO ₂ filter and moisture filter	Greater sensitivity
TSD or NPD detector	Charcoal filter, CO ₂ filter and moisture filter	Greater sensitivity
Total organic carbon	CO ₂ filter and moisture filter	Greater sensitivity
Zero-air generator	CO ₂ filter and moisture filter	Cleaner gas
ICP-OES, ICP-MS	High flow connection unit with two oxygen filters	Greater sensitivity

Gas Clean Filters Technical Specifications

Description	Function	Indicator Color Change	Capacity	Outlet Concentration (at operating flow of 1-10 L/min)
Oxygen Filter	Removes oxygen as well as traces of sulfur and chlorine compounds from carrier gas	From green to gray	150 mL oxygen	< 50 ppm
Moisture Filter/Process Moisture Filter	Removes water, oil and other foreign material from the carrier gas	From green to pale green	7.2 g water	< 0.1 ppm
Charcoal Filter	Removes organic compounds from gas streams	No indicator	Approximately 7 g, depending on impurities	< 0.1 ppm
GC/MS Filter	Single combination filter, removes water, oxygen and organic compounds	Oxygen, from green to gray; Moisture, from green to pale brown	100 mL oxygen, 1 g water, organics depending on impurities	Oxygen < 50 ppb Moisture < 0.1 ppm Organics < 0.1 ppm
CO₂ Filter	Removes CO ₂ from the gas stream; use with moisture filter	From white to violet	9 g CO ₂	< 1 ppm

Gas Clean Filters

Description	Part No.
Gas Clean filter kit, connecting unit for four filters Includes four filters, 1/4 in. tube, oxygen, moisture and 2x charcoal	CP7995
Gas Clean filter kit, connecting unit for four filters Includes four filters, 1/8 in. tube, oxygen, moisture and 2x charcoal	CP736530
Gas Clean GC/MS filter kit Includes one connecting unit 1/8 in. and two GC/MS filters	CP17976
Gas Clean GC/MS filter kit Includes one connecting unit 1/4 in. and two GC/MS filters	CP17977
Gas Clean GC/MS filter installation kit Includes CP17976, 1 m copper tubing, two nuts and two ferrules 1/8 in.	CP17978
CO ₂ kit, 1/4 in. Includes 2-position connecting unit, CO ₂ and moisture filters	CP17982
CO ₂ kit, 1/8 in. Includes 2-position connection unit, CO ₂ and moisture filters	CP17983

Replacement Gas Clean Filters

Description	Part No.
Gas Clean CO ₂ filter	CP17969
Gas Clean oxygen filter	CP17970
Gas Clean moisture filter	CP17971
Gas Clean process moisture filter	CP17971P
Gas Clean charcoal filter	CP17972
Gas Clean GC/MS filter	CP17973

Replacement Supplies

Description	Part No.
1 filter, 1/4 in. tube	CP7980
1 filter, 1/8 in. tube	CP7988
2 filters, 1/4 in. tube	CP738406
2 filters, 1/8 in. tube	CP738407
4 filters, 1/4 in. tube	CP7989
4 filters, 1/8 in. tube	CP736520
1 filter, stainless steel, 1/4 in. tube	CP7980P4
1 filter, stainless steel, 1/8 in. tube	CP7988P8
1 filter, stainless steel, 3 mm tube	CP7988P3
1 filter, stainless steel, 6 mm tube	CP7980P6
High flow connecting unit, 1/4 in.	CP17984
High flow connecting unit 1/8 in.	CP17985
Wall mounting bracket for connecting unit For CP7980 and CP7988	CP7981
TCD filter kit	CP738408
Includes oxygen and moisture filter	
Upper part filter connecting unit	CP7978
Flush head for connecting unit	CP7987
Male connector, 1/4 in. with dust filter	CP7986
Male connector, 1/8 in. with dust filter	CP82117
Male connector, stainless steel, 1/4 in. with dust filter	CP7986SS
Male connector, stainless steel, 1/8 in. with dust filter	CP82117SS
Male connector, stainless steel, 3 mm with dust filter	CP82117SS3
Male connector, stainless steel, 6 mm with dust filter	CP7986SS6
Viton O-rings, two sets	CP7983

(Continued)



Renewable gas purification system (left) and recycled cartridge (right)

Renewable Gas Purification System

The Renewable Gas Purification System from Agilent not only traps large quantities of contaminants and lasts a long time, but it is also recyclable. With average use, you'll only need to purchase a replacement cartridge once per year or after approximately 20 cylinders' worth of purification. When you need a replacement, you have the option to purchase a new or recycled cartridge. Recycled cartridges are refilled and certified to the full specifications of the new cartridges.

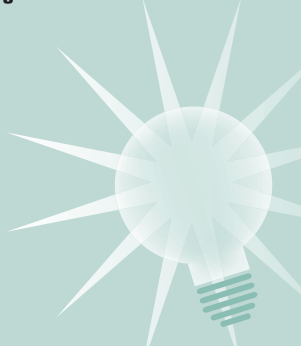
- Agilent's highest capacity and most economical purification system
- All cartridges are environmentally friendly and reduce waste
- High capacity – 850 cc or more oxygen filtration, 12 g H₂O, and approximately 8 g hydrocarbon filtration per cartridge – in a compact footprint
- Improves 99.995% gas purity to 99.9995% purity
- Dual indicators make it easy to see the purification results
- Labeling displays indicator color and shape for accurate reading
- Simple twist on/off knob and guide rod make cartridge changes quick and easy
- One renewable gas purifier system can support up to four GC systems
- Designed with efficiency, safety, and environmental responsibility in mind
- All replacement cartridges include return packaging and instructions

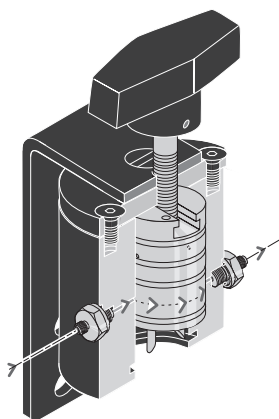
Renewable Gas Purification System

Description	Part No.
Renewable gas purifier system startup kit Includes one G3440-80007 base, one G3440-60003 renewable gas purifier cartridge, wall or bench mount hardware, and instruction manual	G3440-60004
Renewable gas purifier cartridge, new	G3440-60003
Renewable gas purifier cartridge, recycled	G3440-69003
Renewable gas purifier system, base only	G3440-80007
Return packaging set	5190-1414
For return of G3440-60003 or G3440-69003 renewable gas purification cartridge when original packaging is lost or damaged	

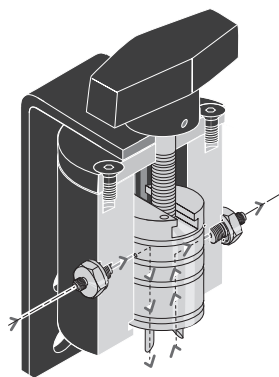
Tips & Tools

For more information about the Renewable Gas Purification System, visit www.agilent.com/chem/renewable





a



b

Figures a and b. The "plus" valve (a) features a closed gas path when changing cartridges. When placed in the down position (b), the "plus" valve shifts gas through the cartridge.

QC+ Point of Operation Panels

QC+ Point of Operation Panel purifier cartridges can be quickly changed – that's the QC. The cartridges are removed from the panel without interruption of gas flow to the system – that's the + – drastically minimizing costly instrument downtime – and that's a real +.

Filter cartridges are of all metal or glass construction, eliminating infusion and resultant signal noise associated with filters constructed from plastics. Cartridges are quickly installed via a simple knurled retaining nut. No wrenches are needed! As many as four cartridges can be replaced in a matter of seconds, and because there is low dead volume, a minimal amount of gas system purge is required after installation.

Replacement Cartridges

Description	Capacity	Efficiency	Part No.
High capacity oxygen	396 mg	< 15 ppb	GC-1
High capacity moisture	15 g	< 9 ppb	GC-2
Indicating moisture	7 g	< 9 ppb	GC-2-I
Hydrocarbon	8 g	< 30 ppb	GC-3
Indicating oxygen	40 mg	< 2 ppb	GC-4
Replacement O-ring set			R2D2-ORINGS

Super Clean Gas Purification Systems

Super Clean gas filter systems are designed to provide convenience and reduce contamination. During cartridge replacement, check valves close off the system to the atmosphere, further minimizing the entry of contaminants. Maximum pressure is 150 psi (11 bar).

- Triple filter cartridge for carrier gas purification with a single cartridge
- Fuel gas filter for removal of hydrocarbons and moisture from FID fuel gases
- The filter's gas flow path is made from high quality glass and stainless steel
- Filters can be changed easily without tools

Specifications

Max pressure	150 psi (11 bar)
Dimensions	33 cm x 31 cm x 11 cm – 4 filter system
Weight	8 kg
Purity Level	< 0.1 ppm at max flow rate of 2 L/min (max pressure 10 bar)



Triple filter cartridge, 5182-9705

Super Clean Gas Purification Systems

Description	Part No.
FID Gas Purification System Dedicated three-position system for purifying all gases used in an FID-equipped GC; includes triple filter cartridge for carrier gas, and 2 fuel gas filter cartridges for both hydrogen and zero air	5182-9703
Carrier Gas Purification System Single-position system for GC/MS, ECD and NPD detectors; includes triple filter cartridge.	5182-9704
Super Clean Gas Purification System Includes four-position baseplate manifold with 4 filter cartridges: oxygen and moisture (both with indicator), and 2 hydrocarbon cartridges	5182-0816
FID Fuel Gas Purification System Two-position system dedicated to purifying the incoming hydrogen and zero grade air directly at your FID-equipped GC	5183-4774
GC/MS assembly for He (gas specific) Includes 1 filter/base plate, triple cartridge (O ₂ /Moisture/Charcoal)	5188-6475
Wall mount bracket for Super Clean Gas Purification System	5182-0821
O-ring kit 8/pkg, four each of two sizes	5182-3423

Super Clean Replacement Filter Cartridges

Description	Part No.
Triple filter cartridge A single carrier gas filter with hydrocarbon, moisture, and oxygen trapping capability; includes moisture and oxygen indicator	5182-9705
Fuel Gas Filter Cartridge Combination hydrocarbon and moisture trap with moisture indicator; ensures the highest quality hydrogen and zero air for your FID	5183-4771
Moisture filter cartridge with indicator	5182-0817
Oxygen filter cartridge with indicator	5182-0818
Hydrocarbon filter cartridge	5182-0820
Filter cartridge bundle of 4 Includes 1 each of oxygen and moisture, and 2 hydrocarbon	5183-4770
FID filter cartridge bundle Includes 1 Triple Filter Cartridge and 2 Fuel Gas Filter Cartridges	5183-4769
GC filter, triple, gas specific for He (O ₂ /Moisture/Charcoal) for GC/MS	5188-6474



High capacity gas purification replacement cartridge

High Capacity Gas Purification Replacement Cartridges

The High Capacity Gas Purification system has been discontinued. Replacement cartridges for the High Capacity Gas Purification system are still available.

High Capacity Gas Purification Replacement Cartridges

Description	Part No.
Replacement Cartridge Kit	
Replacement cartridge kit for three-cartridge system (H ₂ O/hydrocarbon, oxygen and indicating O ₂)	5182-9780
Detector-Specific Purifiers	
FID Purifier, 1/8 in. fittings	5182-9793
Includes two hydrocarbon/moisture cartridges with separate connections for air and hydrogen lines	
Individual Cartridge Filters and Replacement Cartridges	
Moisture/hydrocarbon replacement cartridge	5182-9777
Oxygen replacement cartridge	5182-9778
Indicating oxygen replacement cartridge	5182-9779
Moisture only replacement cartridge	5182-9792
Hydrocarbon only replacement cartridge	5182-9791
Triple combination replacement cartridge for single-cartridge system	5183-4600

In-Line Gas Traps

The purpose of gas traps is to remove detrimental impurities from carrier and detector gases. Combination traps are available which remove moisture, oxygen and/or organics with a single trap. The effectiveness of the traps depends on the initial quality of the gas.

Constant exposure of capillary columns to oxygen and moisture, especially at high temperatures, results in rapid and severe column damage. The use of oxygen and moisture traps for the carrier gas may extend column life and protect the instrument. Any moisture or oxygen introduced into the gas stream due to a leak will be removed by the trap until it expires.

Oxygen Removal		
Type of Trap	Removal Capacity (mg)	Performance (ppb)
OT3 series	600.0	15
IOT series	30.0	2
LIOT series	100.0	1
OT3 + IOT	630.0	2
GC-1	396.0	5
GC-4	40.0	2
RBC series	436.0	2
RQC series	436.0	2
BOT series	3400.0	1



Big universal trap

Big Universal Traps

Big Universal Traps utilize a layered, multi-adsorbent bed packing of the most effective, highest capacity adsorbent materials available today for the removal of oxygen, moisture, hydrocarbons, carbon dioxide and carbon monoxide from helium gas streams. The volume of the various adsorbent materials in the Big Universal Trap was developed through rigorous testing and evaluation in order to ensure that breakthrough of the five major contaminant groups occurs as simultaneously as possible as each material achieves complete saturation.

One Big Universal Trap unit will easily purify the contents of thirteen "K" size cylinders of 99.997% purity helium to a cumulative level of 100 ppb of O₂, H₂O, CO₂, CO and hydrocarbons at a flow rate of up to 8 L/min. All tube fittings are Swagelok stainless steel, fitted with 40 μm stainless steel frits for particulate control. Maximum pressure is 500 psi.

Big Universal Traps are more economical than other purifiers, offering nearly three times the capacity.

Big Universal Traps are ideal for any GC or GC/MS application where helium is employed and assurance of purity is essential. Combining the contents of three individual in-line traps into a single unit reduces the number of potential leaks and the possibility of aspirating contaminants into the gas stream. A single purifier also simplifies installation and replacement.

Capacity Data

High Purity Helium-99.997%		Removal Capacity
O ₂	< 5 ppm	1.07 L
THC*	< 1 ppm	20 g
H ₂ O	< 5 ppm	46 g

*Total Hydrocarbons, analysis limited to three contaminate groups

Effluent Concentration

Research Grade Helium-99.9999%			
Impurities	< 1 ppm	H ₂ O	< 0.2 ppm
N ₂	< 0.5 ppm	H ₂	< 0.2 ppm
O ₂	< 0.5 ppm	Ar	< 0.1 ppm
THC*	< 0.1 ppm	Ne	< 0.5 ppm
CO+CO ₂	< 0.1 ppm		

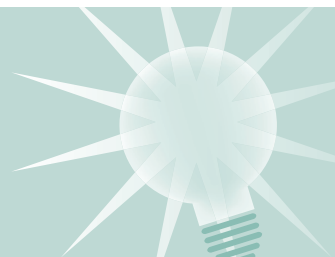
*Total Hydrocarbons, analysis limited to three contaminate groups

Big Universal Traps (RMS Series)

Description	1/8 in. Part No.	1/4 in. Part No.
Hydrogen	RMSHY-2	RMSHY-4
Helium (Ar/Me)	RMSH-2	RMSH-4
Nitrogen	RMSN-2	RMSN-4
Trap Mounting Clips		
Big Mounting Clip, 2/pk	UMC-5-2	UMC-5-2

Tips & Tools

Big universal traps have nearly three times the capacity of other purifiers.





Refillable moisture trap MT120

Moisture Traps

Economy Indicating Refillable Moisture Traps

Agilent Indicating Moisture Traps are designed to remove water, oil, and organics from gases employed in, but not limited to, gas chromatography. Refillable moisture traps are constructed from Lexan polycarbonate tubing. Lightweight, chemically resistant and of superior strength when compared to traps manufactured from acrylic, Agilent Indicating Moisture Traps have become the chromatographer's choice for water adsorption from GC gases.

- Available in three refillable sizes and three different packings
- Both inlet and outlet connectors are equipped with stainless steel frits to prevent particulates from entering the gas stream
- Mixed packing bed makes improper installation impossible
- Easily refillable
- Tested to 125 psi (helium)

Molecular Sieve 13X and Indicating 4A (MT Series)

- Preferred adsorbent for GC gas drying
- Blue indicating sieve turns buff at 20% relative humidity

Molecular Sieve 13X and Indicating 4A (MT Series)

Description	Size (cc)	Removal Capacity (g)	Max. Effluent H ₂ O Concentration (ppb)	1/8 in. Part No.	1/4 in. Part No.
Refillable Moisture Trap	120	21.6	20	MT120-2	MT120-4
Refillable Moisture Trap	200	36.0	18	MT200-2	MT200-4
Refillable Moisture Trap	400	72.0	14	MT400-2	MT400-4

Refills and Mounting Clips

Adsorbent Refill (1 pint) for MT Series	MSR-1	MSR-1
Mounting clip for 120 and 200 cc traps	MC-1	MC-1
Universal mounting clip for 400 cc traps	UMC-4	UMC-4

Molecular Sieve 5A and Indicating Drierite (MT-D Series)

- High moisture capacity
- Simultaneously removes hydrogen sulfide and oil
- Indicating Drierite changes dramatically from bright blue to pink as the gas stream approaches 40% relative humidity

Molecular Sieve 5A and Indicating Drierite (MT-D Series)

Description	Size (cc)	Removal Capacity (g)	Max. Effluent H ₂ O Concentration (ppb)	1/8 in. Part No.	1/4 in. Part No.
Refillable Moisture Trap	120	21.6	22	MT120-2-D	MT120-4-D
Refillable Moisture Trap	200	36.0	20	MT200-2-D	MT200-4-D
Refillable Moisture Trap	400	72.0	16	MT400-2-D	MT400-4-D
Refills and Mounting Clips					
Adsorbent Refill (1 pint) for MT-D Series				MSR-2	MSR-2
Mounting clip for 120 and 200 cc traps				MC-1	MC-1
Universal mounting clip for 400 cc traps				UMC-4	UMC-4



Refillable Moisture trap MT400

Silica Gel, Grade 40, and Indicating Silica Gel, Grade 48 (MT-S Series)

- Highest moisture capacity adsorbent
- Adsorbs as much as 40% of its weight in water
- High affinity for hydrocarbons
- Blue indicating gel turns from a deep blue to pale pink at 40% relative humidity

Silica Gel, Grade 40, and Indicating Silica Gel, Grade 48 (MT-S Series)

Description	Size (cc)	Removal Capacity (g)	Max. Effluent H ₂ O Concentration (ppb)	1/8 in. Part No.	1/4 in. Part No.
Refillable Moisture Trap	120	31.5	40	MT120-2-S	MT120-4-S
Refillable Moisture Trap	200	52.5	39	MT200-2-S	MT200-4-S
Refillable Moisture Trap	400	105.0	39	MT400-2-S	MT400-4-S
Refills and Mounting Clips					
Adsorbent Refill (1 pint) for MT-S Series				SGR	SGR
Mounting clip for 120 and 200 cc traps				MC-1	MC-1
Universal mounting clip for 400 cc traps				UMC-4	UMC-4



Glass indicating moisture trap



Refillable glass moisture trap

Glass Indicating Moisture Traps (GMT and LGMT Series)

Ideal for GC/MS Systems, Electron Capture Detectors, and Electrolytic Conductivity Detectors

- Molecular Sieve 13X and a band of Indicating Molecular Sieve 4Å
- Available in 70 cc, 100 cc and 250 cc sizes
- Heavy wall borosilicate glass tube – no moisture diffusion
- Refillable

The 100 cc unit will treat 10 standard "A" cylinders with up to 30 ppm water or 16.3 g to less than 10 ppb. Molecular sieves differ from all other commercially available adsorbents, as they have an extremely high adsorption capacity for water and polar compounds, even at relatively low concentrations. The color change takes place in the middle of the trap bed, giving ample warning. In addition to the inherent qualities of the sieve material, we treat the bed material under high vacuum and heat to ensure maximum scrubbing efficiency and capacity.

Glass Indicating Moisture Traps (GMT and LGMT Series)

Description	Size (cc)	Removal Capacity (g)	Max. Effluent H ₂ O Concentration (ppb)	1/8 in. Part No.	1/4 in. Part No.
Glass Indicating Moisture Trap	70	11.4	7	GMT-2GC-HP	GMT-4GC-HP
Glass Indicating Moisture Trap	100	16.3	6	GMT-2-HP	GMT-4-HP
Glass Indicating Moisture Trap	250	40.09	6	LGMT-2-HP	LGMT-4-HP
Refills and Mounting Clips					
Molecular Sieve Refill for GMT and LGMT Series				GMSR	GMSR
Mounting clip for 70 and 100 cc traps				UMC-3	UMC-3
Universal mounting clip for 400 cc traps				UMC-4	UMC-4



Moisture S-trap

Moisture Removal S-Traps

- Contains Molecular Sieve 5Å, 45/60 mesh
- Can be reconditioned

Moisture Removal S-Traps

Description	Part No.
Moisture S-trap, preconditioned, 1/8 in. fittings*	5060-9084
Moisture S-trap, unconditioned, 1/8 in. fittings	5060-9077

*Traps can be reconditioned by heating at a minimum of 350°C, with flow for 6 hours



Big moisture trap

Big Moisture Traps (BMT Series)

- Capacity: 130 g H₂O
- Pressure: Up to 250 psig
- Efficiency: reduction of H₂O to less than 5 ppb
- 750 cm³ gas purifiers
- Ideal for bulk purification applications or where several instruments are plumbed from a single gas source
- One piece of heavy-walled aluminum tube eliminates potential leaks
- Equipped with sintered stainless steel frits to prevent particulate contamination
- Refillable

Big Moisture Traps (BMT Series)

Description	Size (cc)	1/8 in. Part No.	1/4 in. Part No.
Big Moisture Trap	750	BMT-2	BMT-4
Refills and Mounting Clips			
Refill for Big Moisture Trap (enough for 2 refills)		BMSR-1	BMSR-1
Big Mounting Clip, 2/pk		UMC-5-2	UMC-5-2

Oxygen Traps

Indicating Oxygen Traps

- Reduces oxygen to less than 1 ppb
- Environmentally safe
- Available in two sizes: standard and large – three times the capacity

This trap removes the oxygen rather than converting it to another form of contamination.

Oxygen and a wide range of oxides react with the activated bed material to form a manganese oxide. This reaction results in a progressive and dramatic color change, from light green in the adsorbent's active state to deep brown as oxygen saturation occurs. The Indicating Oxygen Trap is designed to be used in conjunction with any of our high capacity, non-indicating oxygen traps. When properly installed downstream from the non-indicating trap, the Indicating Oxygen Trap provides a visual indication of oxygen breakthrough BEFORE contamination reaches sensitive system components.

Unlike adsorbent materials utilized in competitive products, our indicating media can be exposed to air and water in virtually any quantity without resulting in an exothermic reaction. The spent product is non-toxic, non-hazardous, non-flammable, and non-reactive. The high impact Lexan shield prevents "lab catastrophes" if the trap is exposed to pressure beyond its stated pressure limit. Safe for land-fill refuse.

Indicating Oxygen Traps



Economy non-indicating oxygen trap

Description	Size (cc)	Removal Capacity (g)	1/8 in. Part No.	1/4 in. Part No.
Indicating Oxygen Traps (IOT and LIOT Series)				
Indicating Oxygen Trap	30	50 cm ³	IOT-2-HP	IOT-4-HP
Large Indicating Oxygen Trap	150	120 cm ³	LIOT-2	LIOT-4
Economy Non-Indicating Oxygen Traps (OT1 Series)				
Oxygen Trap	70		OT1-2	OT1-4
Trap Mounting Clips				
Mounting clip for IOT traps			UMC-2	UMC-2
Mounting clip for LIOT traps			UMC-3	UMC-3
Mounting clip for OT1 traps			MC-1	MC-1



Big oxygen trap

Big Oxygen Traps (BOT Series)

- Capacity: 3 L O₂ or 3.2 g
- Pressure: Up to 250 psig
- Efficiency: reduction of O₂ to less than 1 ppb
- 750 cm³ gas purifiers
- Ideal for bulk purification applications or where several instruments are plumbed from a single gas source
- One piece of heavy-walled aluminum tube eliminates potential leaks
- Equipped with sintered stainless steel frits to prevent particulate contamination

Big Oxygen Traps (BOT Series)

Description	Size (cc)	1/8 in. Part No.	1/4 in. Part No.
Big Oxygen Trap	750	BOT-2	BOT-4
Trap Mounting Clips			
Big Mounting Clip, 2/pk		UMC-5-2	UMC-5-2



Big hydrocarbon trap

Hydrocarbon Traps

Hydrocarbon Traps (HT Series)

- Remove organics from carrier gases, air and hydrogen
- High capacity – 200 cc of filtering media
- Impregnated carbon filter media
- Mounting Panel
- Refillable

Hydrocarbon Traps (HT Series)

Description	Size (cc)	1/8 in. Part No.	1/4 in. Part No.
Hydrocarbon Trap	200	HT200-2	HT200-4
Refills and Mounting Clips			
Adsorbent Refill (1 pint), 2 recharges for Hydrocarbon Trap		ACR	ACR
Mounting clip for HT200 Series		MC-1	MC-1

Big Hydrocarbon Traps (BHT Series)

Recommended for use with Agilent LC/MS Systems

- Capacity: 80 g of medium to heavy molecular weight hydrocarbons
- Pressure: Up to 250 psig
- Efficiency: reduction of C4 hydrocarbons to less than 15 ppb
- 750 cubic centimeter gas purifiers
- Ideal for bulk purification applications or where several instruments are plumbed from a single gas source
- One-piece, heavy-walled aluminum tube design eliminates potential leaks
- Equipped with sintered stainless steel frits to prevent particulate contamination
- Refillable

Big Hydrocarbon Traps (BHT Series)

Description	Size (cc)	1/8 in. Part No.	1/4 in. Part No.
Big Hydrocarbon Trap	750	BHT-2	BHT-4
Refills and Mounting Clips			
Refill for Big Hydrocarbon Trap (enough for two refills)		BACR	BACR
Big Mounting Clip, 2/pk		UMC-5-2	UMC-5-2



Hydrocarbon S-trap

Hydrocarbon Removal S-Traps

- Filled with 40/60 mesh activated charcoal
- Can be reconditioned

Hydrocarbon Removal S-Traps

Description	Part No.
Hydrocarbon S-Trap, 1/8 in. fittings, used for trapping organics from gases*	5060-9096

*This trap can be reconditioned by heating at a minimum of 350°C, with flow for 6 hours

Capillary Grade Hydrocarbon Traps (HT3 Series)

- Extremely high surface area, coconut shell-based, activated carbon
- 100 cc of filtering media
- Purged with ultra-high purity helium
- Refillable

Capillary Grade Hydrocarbon Traps (HT3 Series)

Description	Size (cc)	1/8 in. Part No.	1/4 in. Part No.
Capillary Grade Hydrocarbon Trap	100	HT3-2	HT3-4
Refills and Mounting Clips			
Adsorbent Refill (1 pint), 3 recharges for Capillary Grade Hydrocarbon Trap		ACR	ACR
Mounting clip for HT3 Series		MC-1	MC-1

**Ability of Activated Carbon to Remove Substances
from Gases Using Hydrocarbon Traps**

Compound	Efficiency	Compound	Efficiency
acetone	excellent	dissolved oils	excellent
hypochlorous acid	excellent	nitrobenzenes	excellent
alcohol	excellent	nitrotoluene	excellent
amines	very good	ethyl acetate	excellent
inorganic acids	none	ethyl alcohol	excellent
ammonia	poor	organic acids	excellent
iodine	excellent	ethyl chloride	excellent
amyl acetate	excellent	oxalic acid	excellent
isopropyl acetate	excellent	ethyl ether	excellent
amyl alcohol	excellent	ozone	excellent
isopropyl alcohol	excellent	fluoride	poor
benzene	excellent	phenol	excellent
ketones	excellent	formaldehyde	poor
butyl acetate	excellent	potassium permanganate	excellent
butyl alcohol	excellent	propyl acetate	excellent
lactic acids	excellent	glycol	excellent
by-products-organic	very good	propyl alcohol	excellent
lysol	excellent	propyl chloride	excellent
calcium hypochlorite	excellent	hydrogen bromide	satisfactory
mercaptans	excellent	hydrogen chloride	poor
carbon dioxide	none	sodium hypochlorite	excellent
methyl acetate	excellent	hydrogen fluoride	none
chlorobenzene	excellent	solvents	excellent
methyl alcohol	excellent	hydrogen iodide	satisfactory
chlorine	excellent	sulfuric acid	satisfactory
methyl bromide	excellent	hydrogen selenide	satisfactory
chlorophenol	excellent	hydrogen sulfide	satisfactory
methyl chloride	excellent	toluene	excellent
chlorophyl	excellent	trichloroethylene	excellent
methyl ethyl ketone	excellent	xylene	excellent
cresol	excellent		

Combination Traps

Oxygen/Moisture Traps

Oxygen/moisture adsorbents team up to give you two functionalities in the same trap. Unlike some oxygen/moisture traps, these traps are disposable.

Consider the safety, performance, and cost advantages of Agilent capillary-grade oxygen/moisture traps (OT3) compared to heated, catalytic traps.

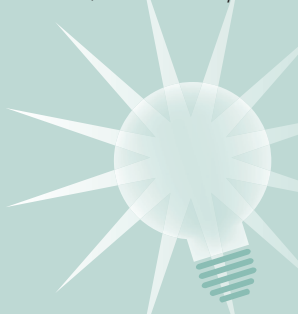
- Optimized for maximum surface area and capacity
- Leak-free, one-piece design (tested to 2000 psi)
- Bed material treated with ultra-high purity helium
- Filter design: prevents channeling, promotes efficient scrubbing

Recommended Applications

- Electron Capture Detectors, oxygen/water removal effectively prevents detector degradation from contamination
- GC/MS

How does it work?

The Agilent OT3 Trap contains a highly active, metal-containing, scrubbing material in an inert, aluminum body.



Using OT3 with your MSD can improve sensitivity and selectivity

M/Z Ratio*	18/28	32/28	32/40
Without Agilent OT3 Trap	0.098	0.266	11.08
With Agilent OT3 Trap	0.005	0.0118	0.247

*Contribution of inherent instrument background removed. Analysis by California Analytica Laboratories, Inc. Sacramento, California

In addition to inert gases (nitrogen, helium, argon and krypton), the Agilent OT3 Trap treats streams of hydrogen, alkanes, alkenes, aliphatic hydrocarbon gases, low boiling aromatics, carbon dioxide, carbon monoxide, and argon-methane.

Oxygen/Moisture Traps (OT3 Series)



Agilent OT3 trap

Description	Capacity	Efficiency	Size (cc)	1/8 in.	1/4 in.
				Part No.	Part No.
OT3 Trap	500 mL O ₂ 2 g H ₂ O	< 15 ppb	100	OT3-2	OT3-4
Trap Mounting Clips					
Mounting clip				MC-1	MC-1



Hydrocarbon/Moisture trap

Hydrocarbon/Moisture Traps

- Replace most mixed bed traps supplied by GC manufacturers
- Mounting panel
- Refillable

Hydrocarbon/Moisture Traps (HMT Series)

Description	Size (cc)	1/8 in. Part No.	1/4 in. Part No.
Hydrocarbon/Moisture Trap	200	HMT200-2	HMT200-4
Refills and Mounting Clips			
Adsorbent Refill (1 pint), 2 recharges for Hydrocarbon/Moisture Trap		HCRMS	HCRMS
Mounting clip		MC-1	MC-1

Combination Traps for Chemical Ionization MS

Description	Fitting (in.)	Part No.
Chemical Ionization for MS*	1/8	G1999-80410

*Isobutane or methane applications only



Split vent trap and cartridges, RDT-1020

Universal/External Split Vent Trap

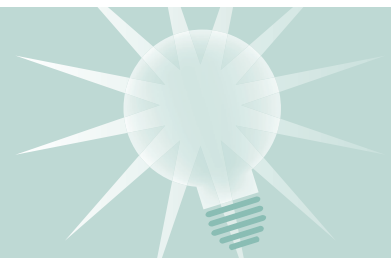
- Protects lab from contaminants released by split injection systems
- Stops environmental pollution by trapping and eliminating a broad range of contaminants
- Easy to change
- Comes with three packs of replacement cartridges

Universal/External Split Vent Trap

Description	Part No.
Universal/external split vent trap with 3 cartridges, 1/8 in. Swagelok fitting	RDT-1020
Replacement cartridges, 3/pk	RDT-1023

Tips & Tools

Remember to replace split vent cartridge every six months.





Precision gas flow meter, 5067-0223

Flow Meters

Precision Gas Flow Meter

Agilent's Precision Gas Flow Meter is the ultimate gas flow meter for chromatography applications. This handheld flow meter is highly accurate, reliable and incorporates industry leading performance. The inherent stability of the rugged, solid state components allows Agilent to provide the longest calibration interval on the market, all traceable to NIST standards.

- Highly accurate and reliable measurement of common carrier and fuel gases used in GC, including nitrogen, air, carbon dioxide, hydrogen, helium, and argon/methane
- Two year guaranteed calibration period traceable to NIST standards
- Measures flow based on gas viscosity properties with an accuracy of $\pm 0.8\%$ of reading + 0.2% of full scale
- Flow rate range from 5 to 500 mL/min
- Displays mass flow, volumetric flow, temperature, and pressure readings simultaneously
- Can be plumbed inline

Precision Gas Flow Meter

Description	Part No.
Precision gas flow meter	5067-0223



ADM flow meters



ADM 1000

ADM Flow Meters

ADM flow meters allow most gas measurements with the touch of only one button – turn it on, and the instrument provides continuous, hands-free flow readings. Measure column, detector, and carrier gas flows without making any adjustments. ADM flow meters are ideal for measuring gas streams with a changing gas composition. For example, if gas flow is measured from a digestion system, concentration changes in methane, carbon dioxide, and oxygen will not affect accuracy.

All ADM flow meters are battery powered and field-portable. Agilent calibrates each instrument to 5-point, NIST-traceable standards to ensure the highest available accuracy. The ADM family measures flow volumetrically, so you don't have to make adjustments when changing from one gas to another.

ADM 1000

- Accuracy $\pm 3\%$
- Operating temperature range – 0 to 45°C for the instrument, -70 to 135°C for the tubing
- Calibration – traceable to NIST primary standards
- Real-time, split ratio measurement
- CE mark certified
- Measures flow rates from 0.5 to 1000 mL/min
- Split ratios – compare the ratio from one gas measurement to another (i.e., injection port split ratios)



ADM 2000

ADM 2000

In addition to the features of the ADM 1000, the ADM 2000 includes:

- Mass flow measurements – measure flow rate, independent of atmospheric pressure and temperature (calculated)
- Data output through RS-232 port
- 9 V battery and AC power adapter (120 or 220 VAC)

ADM Flow Meters

Description	Flow Rate (mL/min)		Gases Measured*	Accuracy (%)	Power Supply	RS-232 Data Output	Part No.
	Low	High					
ADM 1000**	0.5	1000	All	± 3	9 V Battery	None	220-1170
ADM 2000**	0.5	1000	All	± 3	Battery or 120 VAC	Yes	220-1171-U
ADM 2000E**	0.5	1000	All	± 3	AC Adapter, 220 V	Yes	220-1171-E
Carrying Case for ADM							907-0056

*± 3% or ± 0.2 mL/min, whichever is greater with a flow rate of 0.5-1,000 mL/min

**Non-corrosive gases only



Gas leak detector, G3388A

Gas Leak Detector

Gas leaks can cause detector noise and baseline instability, shorten column life and waste expensive carrier gas. Liquid leak detectors, although inexpensive, can contaminate your system. Agilent's G3388A Electronic Gas Leak Detector is an easy way to quickly identify leaks in your system and prevent system downtime.

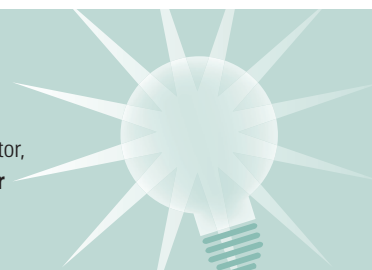
- Detects thermal conductivity differences
- Fast detection – 1 s
- Audible and visual alerts
- Minimum detection limit – 0.01 mL/min hydrogen and helium
- Lightweight – only 310 g
- Small – roughly 2.5 x 1.5 x 5.75 in.
- Rechargeable NiMH battery with over 5 hours of life
- Agilent sourced and approved power supply
- One year warranty from Agilent

Gas Leak Detector

Description	Part No.
Handheld electronic gas leak detector	G3388A
Replacement filter tip	5067-0218
Replacement battery	5067-0219
Replacement power supply	5067-0220

Tips & Tools

For more information about the Gas Leak Detector, visit www.agilent.com/chem/leakdetector





Low Gas Alarm System, 2.0 and 2.5 in.

Low Gas Alarm System

- Patented design audibly and visually alerts you when the regulator gauge reaches your specified level
- Ensures GC instrument uptime and improves lab productivity by protecting your system from gas outages and sludge contamination
- Designed for standard 50 mm/2 in. and 64 mm/2.5 in. regulator gauges
- Available in standalone (alarms at cylinder) or wireless models (alarms at cylinder AND up to 30 m away)

As cylinders run out of gas, sludge at the bottom can contaminate your GC system, ruin columns, and require extensive cleaning processes that take your instrument out of service. The Low Gas Alarm System will help you avoid these problems and keep your system up and running when you need it. A safe, reliable, and easy-to-use tool, the Low Gas Alarm System audibly and visually alerts you when a gas cylinder's pressure reaches a specified level. The system is completely non-invasive, and it indicates low pressure regardless of cylinder size, gas contained or regulator used.

Standalone

- Safe, non-invasive design eliminates hazards such as high voltage and high pressure
- Uses a low voltage, low current battery
- Easy to install and maintain; attaches to existing regulator gauge

Wireless

The wireless Low Gas Alarm System features all of the benefits of the standalone version plus:

- Uses wireless chip to communicate gas level to the Laboratory Network Controller (LNC)
- Features unique identifier so LNC can display individual status for each system
- Alerts you to alarm state with audible and visual indicators on LNC or pop-up software
- Allows you to monitor up to 12 cylinders from one location using a low-power short-range wireless technology



Laboratory network controller, G3387A



Low Gas Alarm System with LNC

Low Gas Alarm System

Description	2.0 in.	2.5 in.
Standalone	G7311A	G3377A
Wireless*	G3374A	G3378A
Wireless with LNC*	G3376A	G3379A
Replacement battery, 3 V	5190-1453	5190-1453

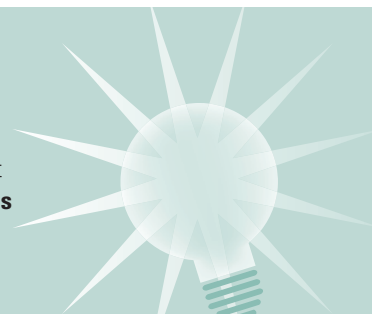
*Due to regulatory requirements, the wireless Low Gas Alarm System may not be available in all countries. Please contact your local Agilent sales office or Agilent Authorized Distributor for details.

Laboratory Network Controller (LNC)

Description	Part No.
Laboratory network controller	G3387A
DC power supply for LNC, 7.5 V	5190-1454
LNC power supply option	5190-1578
Needed only if LNC is not being used with a PC	

Tips & Tools

For additional information and to view a product demo, visit www.agilent.com/chem/lowgas





Brass body regulator

Gas Cylinder Regulators, U.S. Only

To plumb your system properly, select one of Agilent's economical brass regulators and the proper gas purification devices from our newly expanded product offering. These regulators and our broad spectrum of in-line filters, combination traps, and gas purification systems are an excellent combination to plumb your systems. Our new gas purification selection guide and diagrams will help you determine which products can be used with the regulators below.

Brass Body, Dual Stainless Steel Diaphragms

Specifications

Max inlet pressure	3000 psig
Operating temperature range	-40°F to 165°F
Inlet-outlet port	1/4 in., MNPT
Outlet valve	1/4 in., MNPT 2 1/2 in. dual scale gauges CGA-346, 350, 340, 580, 590 Internal self-reseating relief valve
Delivery pressures	1 to 125 psig
Weight	5.6 lb

Materials of Construction



Brass Body, Dual Stainless Steel Diaphragms, 1/8 in., U.S. Only*

Description	Part No.
CGA 346, 125 psig max (8.6 bar), Air	5183-4641
CGA 350, 125 psig max (8.6 bar), H ₂ , Ar/Me	5183-4642
CGA 540, 125 psig max (8.6 bar), O ₂	5183-4643
CGA 580 Regulator, 125 psig max (8.6 bar), He, Ar, N ₂	5183-4644
CGA 590, 125 psig max (8.6 bar), Air	5183-4645

*For 1/4 in. tubing, purchase a 1/4 in. adapter, U.S. only

Connectors (Swagelok to Female NPT)

Description	Unit	Part No.
1/8 in. (A) x 1/4 in. (B) connector, brass (included with brass regulators)	1/ea	0100-0118
1/4 in. (A) x 1/4 in. (B) connector, brass*	1/ea	0100-0119

*Required for plumbing 1/4 in. tubing to regulators

Tubing – Precleaned

Description	Part No.
Copper tubing, 1/8 in., 50 ft	5180-4196
Copper tubing, 1/8 in., 12 ft	5021-7107
Teflon tape, industrial roll	0460-1266



Cylinder wall bracket, 5183-1941

Cylinder Wall Bracket

Description	Part No.
Cylinder wall bracket with strap & chain (cylinder size up to 14 in., 35 cm)	5183-1941

GC Installation Kits

Agilent Installation Kits for GC are designed to provide you with the essential items necessary for a successful installation while providing a substantial cost savings over individual purchases.

GC Installation Kit with Gas Purifiers (no tools)

Description	Unit	Part No.
GC Installation Kit with Renewable Gas Purifiers		19199C
Renewable gas purifier system startup kit		G3440-60004
Snoop, 8 oz (236 mL) bottle		9300-0311
1/8 in. brass nut and ferrule set	20/pk	5080-8750
Copper tubing, 1/8 in., 50 ft		5180-4196
1/8 in. tee, brass	2/pk	5180-4160
1/8 in. cap, brass	6/pk	5180-4121
Universal/external split vent trap with 3 cartridges		RDT-1020
Precision tubing cutter		5190-1442

GC Installation Kit with Tools (no gas purifiers)

Description	Unit	Part No.
GC Installation Kit with Tools (no gas purifiers)		19199M
Snoop, 8 oz (236 mL) bottle		9300-0311
1/8 in. brass nut and ferrule set	20/pk	5080-8750
Copper tubing, 1/8 in., 50 ft, precleaned		5180-4196
1/8 in. tee, brass	2/pk	5180-4160
Tubing cutter, 1/8 to 5/8 in. OD tubing		8710-1709
1/8 in. cap, brass	6/pk	5180-4121
Nut driver, 7 mm		8710-1217
Screwdriver, Torx T10		5182-3466
Screwdriver, Torx T20		5182-3465
Open end wrench, 1/4 and 5/16 in.		8710-0510
Open end wrench, 7/16 and 9/16 in.		8710-0803
Open end wrench, 7/16 and 3/8 in.		8710-0972
Wrench, 1/2 and 7/16 in.		8710-0806

GC Basic Installation Kit

Description	Part No.
GC Basic Installation Kit	5182-3453
Includes copper tubing, column nuts, two moisture traps, and five wrenches	



Brass nut and ferrule set, 5080-8750

Fittings

Nuts, Front and Back Ferrule Sets

Description	Unit	Part No.
1/16 in. stainless steel nut and ferrule set	10/pk	5180-4149
1/8 in. brass nut and ferrule set	20/pk	5080-8750
1/8 in. stainless steel nut and ferrule set	20/pk	5080-8751
1/4 in. brass nut and ferrule set	20/pk	5080-8752
1/4 in. stainless steel nut and ferrule set	20/pk	5080-8753

Nuts

Description	Unit	Part No.
1/16 in. nut, stainless steel	10/pk	5180-4102
1/8 in. nut, brass	10/pk	5180-4103
1/4 in. nut, brass	10/pk	5180-4105



Stainless steel front ferrules, 5180-4108

Front Ferrules

Description	Unit	Part No.
1/16 in. stainless steel front ferrule	10/pk	5180-4108
1/16 in. front ferrule, stainless steel, Valco one piece	10/pk	5181-1292
1/8 in. front ferrule, brass	10/pk	5180-4109
1/4 in. front ferrule, brass	10/pk	5180-4111

Back Ferrules

Description	Unit	Part No.
1/16 in. stainless steel back ferrule	10/pk	5180-4114
1/8 in. back ferrule, brass	10/pk	5180-4115
1/4 in. back ferrule, brass	10/pk	5180-4117

Caps

Description	Unit	Part No.
1/8 in. cap, brass	6/pk	5180-4121
1/4 in. cap, brass	6/pk	5180-4120



Stainless steel blanking nut, 01080-83202



Brass adapter, 0100-0420



Stainless steel tee, 0100-0542



Brass cross, 0100-0161



Stainless steel union, 0100-0124



Brass union, 0100-1316

Plugs

Description	Unit	Part No.
1/8 in. plug, brass	6/pk	5180-4124
1/4 in. plug, brass	6/pk	5180-4125

Blanking Nut, Adapter, Hose Connector

Description	Unit	Part No.
1/16 in. stainless steel blanking nut		01080-83202
1/8 in. x 1/8 in. adapter, brass	1/ea	0100-0420
1/16 in. hose connector, brass	10/pk	5180-4148

Tees

Description	Unit	Part No.
1/16 in. tee, stainless steel	1/ea	0100-0782
1/8 in. tee, brass	2/pk	5180-4160
Stainless steel tee for O ₂ gas mix, 1/8 in.	1/ea	0100-0542
1/4 in. tee, brass	2/pk	5180-4129
1/6 in. tee, low dead volume, stainless steel	1/ea	0100-0969

Crosses

Description	Unit	Part No.
1/8 in. cross, brass	1/ea	0100-0161
1/4 in. cross, brass	1/ea	0100-0985

Elbows

Description	Unit	Part No.
1/8 in. elbow, brass	1/ea	0100-0091

Unions

Description	Unit	Part No.
1/16 in. union, stainless steel	1/ea	0100-0124
1/16 in. union, brass	1/ea	0100-1316
1/8 in. union, brass	2/pk	5180-4127
1/8 in. union, stainless steel	1/ea	0100-0126
1/4 in. union, brass	2/pk	5180-4128
1/4 in. union, stainless steel	1/ea	0100-0128

Zero Dead Volume Unions

Description	Unit	Part No.
1/16 in. union, zero dead volume, stainless steel	1/ea	0100-0900

Bulkhead Unions

Description	Unit	Part No.
1/8 in. bulkhead union, stainless steel	1/ea	0100-0132
1/8 in. bulkhead union, brass	1/ea	0100-0133



Connector (Swagelok-style to male NPT),
5180-4143

Connectors (Swagelok to Male NPT)

Description	Unit	Part No.
1/8 in. (A) x 1/4 in. (B) connector, brass	2/pk	5180-4143
1/4 in. (A) x 1/4 in. (B) connector, brass	2/pk	5180-4145

Connectors (Swagelok to Female NPT)

Description	Unit	Part No.
1/8 in. (A) x 1/4 in. (B) connector, brass	1/ea	0100-0118
1/4 in. (A) x 1/4 in. (B) connector, brass*	1/ea	0100-0119

*Required for plumbing 1/4 in. tubing to regulators



Connector (Swagelok-style to female NPT),
0100-0118



Reducing union, 0100-0241



Reducing union, 0100-0121

Reducing Unions

Description	Unit	Part No.
1/16 x 1/8 in. reducing union, brass	2/pk	5180-4130
1/16 x 1/8 in. reducing union, stainless steel	1/ea	0100-0241
1/8 x 1/4 in. reducing union, brass	2/pk	5180-4131
1/8 x 1/4 in. reducing union, stainless steel	1/ea	0100-0121

Reducers

Description	Unit	Part No.
1/8 in. (A) x 1/4 in. (B) reducer, brass	2/pk	5180-4135
1/4 in. (A) x 1/8 in. (B) reducer, brass	2/pk	5180-4134

Fittings Kit

Description	Unit	Part No.
Fittings Kit: Includes items below		5180-4161
1/8 in. nut, brass	10/pk	5180-4103
1/4 in. nut, brass	10/pk	5180-4105
1/8 in. front ferrule, brass	10/pk	5180-4109
1/4 in. front ferrule, brass	10/pk	5180-4111
1/8 in. back ferrule, brass	10/pk	5180-4115
1/4 in. back ferrule, brass	10/pk	5180-4117
1/4 in. cap, brass	6/pk	5180-4120
1/8 in. cap, brass	6/pk	5180-4121
1/8 in. plug, brass	6/pk	5180-4124
1/4 in. plug, brass	6/pk	5180-4125
1/8 in. union, brass	2/pk	5180-4127
1/4 in. union, brass	2/pk	5180-4128
1/8 in. tee, brass	2/pk	5180-4160
1/4 in. tee, brass	2/pk	5180-4129
1/8 x 1/4 in. reducing union, brass	2/pk	5180-4131
1/4 in. (A) x 1/8 in. (B) reducer, brass	2/pk	5180-4134
1/8 in. (A) x 1/4 in. (B) reducer, brass	2/pk	5180-4135



General laboratory tool kit, 5180-4162

Tools

General Laboratory Tool Kit

The general laboratory tool kit is made in the USA and includes the following items:

- Toolbox
- Flashlight
- 8 in. bastard file
- 6 in. adjustable wrench
- 12 in. adjustable wrench for use with regulator
- No. 1 pt, 3 in. Pozidriv shaft, fits no. 2-4 screws
- No. 2 pt, 4 in. Pozidriv shaft, fits no. 5-10 screws
- Flathead screwdriver, 2 in. steel shaft, 1/8 in. blade
- Flathead screwdriver, 4 in. steel shaft, 1/4 in. blade
- Hex key set, 1.5, 2, 2.5, 3, 4, 5, and 6 mm keys
- 6 in. long jaw needle nose pliers with side cutters
- Three open-end wrenches (1/4 x 5/16 in., 1/2 x 9/16 in., 7/16 x 3/8 in.)
- Snoop-liquid leak detector
- PTFE tape

Description	Part No.
General laboratory tool kit	5180-4162

LC Tool Kits

Description	Part No.
HPLC system tool kit	G4203-68708
Compact tool kit	G4296-68715

Wrenches

Description	Part No.
Open end wrench, 1/4 and 5/16 in.	8710-0510
Wrench, 1/2 and 7/16 in.	8710-0806
Open end wrench, 7/16 and 9/16 in.	8710-0803
Open end wrench, 7/16 and 3/8 in.	8710-0972
Adjustable wrench, 12 in., for use with regulators	8710-1712
Open end wrench, 9/16 and 5/8 in.	8720-0010
Open end wrench, 1/2 and 9/16 in.	8720-0025
Open end wrench, 14 mm	8710-1924
Open end wrench, 12 mm, 116 mm long	8710-1841
Open end wrench, 4 mm	8710-1534

Screwdrivers

Description	Part No.
Screwdriver, 3 in. Pozidriv shaft No. 1 pt	8710-0899
Screwdriver, 4 in. Pozidriv shaft No. 2 pt	8710-0900
Screwdriver, Torx T10	5182-3466
Screwdriver, Torx T20	5182-3465

Pliers and Tweezers

Description	Part No.
Needle nose pliers, pointed serrated jaws	8710-0004
Tweezers, 4-3/4 in. long	8710-0007
Truarc pliers	8710-0018

Tube Cutters and Replacement Blades

Description	Unit	Part No.
Precision tubing cutter for 1/16 in. stainless steel tubing		5190-1442
Hi-duty tubing cutter, 1/8 to 1-1/8 in. OD tubing		8710-1707
Hi-duty tubing cutter blades	5/pk	8710-1708
Tubing cutter, 1/8 to 5/8 in. OD tubing		8710-1709
Plastic tubing cutter		8710-1930
Blades for plastic tubing cutter	5/pk	8710-1931

Hex Keys

Description	Part No.
Hex key set: 1.5, 2, 2.5, 3, 4, and 5 mm keys, 1090A (5880/90A)	8710-0641
Hex key, 4 mm, 15 cm long, T-handle	8710-2392
Hex key, 3 mm, 12 cm long, straight handle	8710-2411
Hex key, 2.5 mm, 15 cm long, straight handle	8710-2412
Hex key, 1.5 mm, 10 cm long, straight handle	8710-2393
Hex key, 9/64 in., 15 cm long, T-handle	8710-2394
Hex key, 4.0 mm, 10 cm long, straight handle	5965-0027
Hex key, 2.5 mm, 10 cm long, straight handle	5965-0028
Tool kit hex keys, Rheotool*	5064-8211
Includes 3 hex keys, 4 mm, 1.5 mm, and 9/64 in., with straight or T-handle plus Rheotool	

*These tools are recommended for easier repair and maintenance of LC modules.



Hex Keys, 5064-8211

GC Column Accessories

Capillary Column Installation Kit

The Capillary Column Installation Kit contains:

- Diamond-tipped pencil
- 20x magnifier
- Ferrule removal tool
- Septum removal tool
- Refillable 2 oz. bottle of Snoop



Column installation kit, 430-2000

Description	Part No.
Capillary Column Installation Kit with diamond-tipped cutting pencil	430-2000

Capillary Column Rinse Kit

This kit makes solvent rinsing easy! Solvent rinsing removes many contaminants that accumulate in columns. The contaminants are removed by passing solvents through the column. Only bonded and cross-linked phase columns should be rinsed, or permanent damage to the column will result.



Column rinse kit, 430-3000

Description	Part No.
Capillary Column Rinse Kit	430-3000



Fused silica tubing cutters

Fused Silica Tubing Cutters

We offer a conveniently designed, pencil-shaped tool and a ceramic wafer that allow you to make clean and easy cuts in fused silica, glass and aluminum-clad capillary columns.

Description	Part No.
Diamond-tipped column cutting pencil	420-1000
Ceramic wafer column cutter, 4/pk	5181-8836
Column cutter with rotating diamond blade	5183-4620
Replacement diamond blade (for 5183-4620)	5183-4621



Column cutting tool, 5183-4620

Column Baskets and Hangers

Description	Part No.
13 cm, 5 in. basket for 6850 capillary columns	19091-80060
Column hanger for 5 in. basket	G2630-80800
Column hanger clip kit for 7 in. basket	G1530-61580
Column hanger for 6890, 5890, 5880A	1460-1914



GC Buddy Junior, 5183-4789



Capillary and Megabore ferrule tools



Column ferrule installation tool, 19251-80680



Magnifier, mirror, microprobes

Miscellaneous Tools

Combination GC Tools

Description	Part No.
GC Buddy multi-purpose lab tool	5182-9765
GC Buddy Junior multi-purpose lab tool	5183-4789

Ferrule Tools

Remove ferrules stuck inside fittings. Screw the stainless steel ferrule tool into the ferrule and pull it out. Use the smaller capillary ferrule tool for capillary column ferrules (0.32 mm ID column and smaller). The megabore ferrule tool is used for megabore ferrules. The liner tool can be used to remove polyimide and tubing from inside a megabore liner. The column ferrule installation tool positions a ferrule onto a capillary column for proper installation.

Description	Part No.
Capillary ferrule tool	RFT-2500
Megabore ferrule tool	RFT-5300
Column ferrule installation tool	19251-80680
MS interface column installation tool	G1099-20030

20x Magnifier

Examine column ends for proper cuts. Jagged, rough, or non-perpendicular cuts negatively affect chromatographic performance.

Description	Part No.
20x Magnifier	430-1020

Microprobes

Hardened stainless steel probes remove septum and ferrule pieces stuck in fittings. Five different styles give you all of the angles necessary for getting into those hard-to-reach places.

Description	Part No.
Microprobes	RMP-5005

Mirror

Inspect injection ports, the inside of fittings, and other hard-to-reach places.

Description	Part No.
Mirror	707-0027



Snoop

Snoop

Leak test most pressurized gas systems. We recommend that leak detecting solutions be used with care where there is any possibility of the fluid being aspirated into gas flow streams supplying the column or detector. This squeezable bottle comes with a “Snooper Tube” extendable up to 12 in. (30 cm). Electronic leak detectors are preferred. In their absence, a volatile nonreactive solvent like isopropanol may be used. Use caution to avoid aspiration of materials such as Snoop into the column.

Description	Part No.
Snoop, 8 oz (236 mL) bottle	9300-0311
Snoop, 1 gallon bottle	460-1002

Injection Port Cleaning Kit

If changing the liner and trimming the column does not remove contamination from your injection port, you probably need to clean and flush your injection port. Three stainless steel brushes and a scraper are the ideal tools for removing sample residue and septum particles. The stainless steel brushes have diameters of 5 mm, 1/4 in. and 3/8 in.



Injection port cleaning kit, 480-0003

Description	Part No.
Injection Port Cleaning Kit	480-0003

Miscellaneous Injection Port Tools

Description	Part No.
Septum tool, knurled handle	450-1000
Ferrule removal tool	440-1000
Capillary inlet cleaning wires, 5/pk	5180-4153
Cotton swabs, 100/pk	5080-5400



Septum tool with knurled handle, 450-1000



Capillary inlet cleaning wires, 5180-4153



FID cleaning kit, 9301-0985

FID Cleaning Kit

This easy-to-use maintenance kit improves sensitivity, reduces noise, and decreases detector spiking.

Description	Part No.
FID cleaning kit	9301-0985

12-Piece File Set

This 12-piece file set scores glass, removes burrs from metal tubing, and cleans threads. The files are 5-1/2 in. long.

Description	Part No.
12-Piece File Set	RSF-1200

Chemical Standards

When performing chemical analyses, you can't afford to settle for anything less than the highest standards. That is why Agilent standards are the perfect solution for you. Every Agilent standard must meet the uncompromising parameters of our ISO-9001 registered quality system. Our quality system means the strictest quality control of incoming raw materials and the meticulous validation of analyte concentrations, homogeneity and stability.

You can find chemical standards throughout this catalog. Use the reference chart below to find the chemical standards to best fit your needs.

Chemical Standards

Type	Page No.
GC Qualitative Standards	317
GC/MS Analyzer Kit Standards	335
GC/MS Test and Performance Samples	335
Biodiesel Test Samples	462
Agilent J&W GC Column Test Standards	531
LC Standards	737
LC/MS Standards Kits	794
Polymer Standards for GPC/SEC	981
CE Standards & Reagents	1156
AA and ICP-OES Standards	1220
ICP-MS Standards	1221
UV-Vis Standards & Reagents	1236



Integrators, Integrator Supplies and Cables

Information generation and presentation have never been more important. Agilent understands that data handling supplies are essential. We provide a convenient way to purchase ink cartridges and integrator supplies at the same time as other laboratory supplies so you never run out a crucial moment.



Ink cartridge, 5181-1220

Integrator Cartridges and Printheads

Description	Part No.
Ink cartridge, Agilent 3397A, 3396 Series III, 3396A and B, 3395, 3394	5181-1220
Printhead for 3388A and 5880A	19350-60540

Integrator Paper and Supplies

Paper and Supplies for Agilent 3397A, 3396 Series II, and 3396A/B/95/94

Description	Unit	Part No.
Z-fold paper, sequentially numbered, 8.5 x 11 in., 500 sheets/pk, Inkjet	5/pk	5062-3561
Perforated paper, 8.5 x 11 in. rolls, Inkjet	4/pk	5181-1219
Perforated paper, sequentially numbered, 8.5 x 11 in. rolls, Inkjet	4/pk	5183-2009
Perforated paper, A4 size rolls, Inkjet	4/pk	5181-1255
Replacement paper roll rod		03394-20500
Replacement paper roll brackets	2/pk	03396-40050

Thermal Paper for Agilent 3390/92/93

Description	Unit	Part No.
Thermal printing paper, blue print, 4.209 in. (106.9806 mm) wide x 400 ft	4 rolls/pk	5080-8800

Thermal Paper for Agilent 338X/5830/3370

Description	Unit	Part No.
Z-fold paper, black print, 8.5 in. wide	8 pk/box	9270-0658

Integrators and Accessories

3396 Series III Integrator with BASIC programming

- BASIC programming
- Reintegration/replot
- Negative peak integration
- Industry standard RS-232 communications port
- Offers 256 kb RAM
- Multiple-level calibration
- Instrument Control (INET)

Description	Part No.
3396 Series III Integrator with BASIC programming	3396C
GC Dual-channel Appak-Series III, 5890 and 6890 GC control software for the 3396 Series III Integrator*	G2101A
Integrator Starter Kit Includes 8.0 MB data storage card, Z-fold paper stand, Z-fold paper (500 sheets), and three ink cartridges	G2100A
Integrator Data Storage card, 16 MB	G2105A

*Requires Agilent 5890 GC communications board, option 552 or accessory 19242B

Cables

3396 Series III Cable Sets

Description	Part No.
Series III Integrator General Purpose cables, signal/remote cable pair includes 35900-60630 and 03396-61031	G2108A
INET interface for integrators, provides INET communications and dual-channel output, includes 1 INET cable	G1553A

Cables to Connect 3397A or 3396/95 Series III Integrator

Instrument	Cable Type		
	Analog	Remote	Sample
6890 Series GC (non-INET)	G1530-60570	03396-61010	
5890 GC (non-INET)	35900-60610		
1100/1200 Series LC	35900-60750	03396-61010	03396-60560
General Purpose	35900-60630	03394-60540	

Cables to Connect 3394/95A and 3396A/B Integrator

Instrument	Cable Type	
	Analog	Remote
6890 Series GC	G1530-60570	
	03396-61020	03396-61010
5890 GC	35900-60610	
General Purpose	35900-60630	
	35900-60900	35900-60920

HPIB and GPIB Cables

Description	Part No.
PCI GPIB Card for Win95/98/NT (82350A/B)	G1680-63715
HPIB Cable 2 m (10833B)	10833B-2310
General Purpose Cable GPIO, open end	G1103-61611
HPIB Cable, 8 m (10833G)	10833G-2310
Cable, 6890 to PC 9F/9F RS232	G1530-60600
Crossover Ethertwist Cable, 10 ft	5183-4649
Adapter, extends GPIB connector (10834A)	10834A-2310

Instrument Interface Cables

Description	Part No.
Signal cable, general purpose analog output cable assembly, spade lugs/6 pins	G1530-60560
External event control, cable, 8 pins/spade lugs	G1530-60590
Remote start cable for general use with lug	35900-60670
6890 to PC via RS 232-C, 9 female/25 male user card cable	G1530-60610
General purpose binary-coded decimals cable with spade lugs	G1530-60630
Automatic liquid sampler; remote start/stop cable, 2 m 9 male/9 female	G1530-60930
HPIL cable, 5 m	82167-60003
Remote Y Cable, G1512/5890A to 3396C	G1512-60530
Remote Cable to 5890	35900-60700

SAMPLE PREPARATION



In this Chapter

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- 152** Bond Elut Plexa
- 161** Polymeric SPE
- 166** Silica-Based SPE
- 190** Inorganic SPE
- 193** Specialty SPE
- 202** Diatomaceous Earth Sorbents
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- 206** Bond Elut Accessories
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- 242** **Sample Filtration**

- 248** **TOXI-TUBES**





Application Guide			
Industry	Application	Technique	Product
Pharmaceutical	Bioanalysis	Solid Phase Extraction	Bond Elut Plexa
			Bond Elut Plexa PCX
			Bond Elut Plexa PAX
			Bond Elut
			Mega Bond Elut
			OMIX
			SPEC
		Liquid/Liquid Extraction	Chem Elut
		Protein Precipitation Filtration	Captiva ND ^{Lipids}
			Captiva
Supported Liquid Extraction (SLE)	Chem Elut		
Biotechnology	Protein/Peptide Purification	Lysate Filtration	Captiva
		Micro-volume SPE	OMIX
Clinical and Forensic	Bioanalysis	Solid Phase Extraction	Bond Elut
			Bond Elut Plexa
			Bond Elut Plexa PCX
			SPEC
			OMIX
		Supported Liquid Extraction (SLE)	Chem Elut
		Protein Precipitation Filtration	Captiva ND ^{Lipids}
Captiva			
Environmental Monitoring	Semi-volatiles	Solid Phase Extraction	Bond Elut
			SPEC
	Oils and Grease	Solid Phase Extraction	Bond Elut
			SPEC
	Water Removal		Bond Elut
Na ₂ SO ₄			
Food and Beverage	Pesticides and Herbicides	Solid Phase Extraction	Captiva
			Bondesil Bulk Silica
			QuEChERS
		Supported Liquid Extraction (SLE)	Chem Elut

■ SOLID PHASE EXTRACTION (SPE)



Agilent Bond Elut: Accuracy Starts Here

For over 30 years, Bond Elut has been the most trusted name in solid phase extraction. Years of use by demanding chemists at top companies worldwide have thoroughly documented its many applications and proven its performance. To this day, you will find more literature references for Bond Elut than any other SPE product in the industry.

Bond Elut is manufactured using state-of-the-art automation to guarantee quality and consistency. Optical scanners installed throughout our automated assembly process inspect each Bond Elut tube at multiple points. And during manufacture, 25 different tests are conducted to ensure reproducibility. If an imperfection is spotted, the tube is removed from the assembly line. The result is consistently reliable Bond Elut cartridges, time and time again.

Over 40 different sorbent functionalities are available in a variety of cartridge formats including straight barrel, large reservoir capacity (LRC) and Bond Elut Junior (Jr).

The Bond Elut Difference

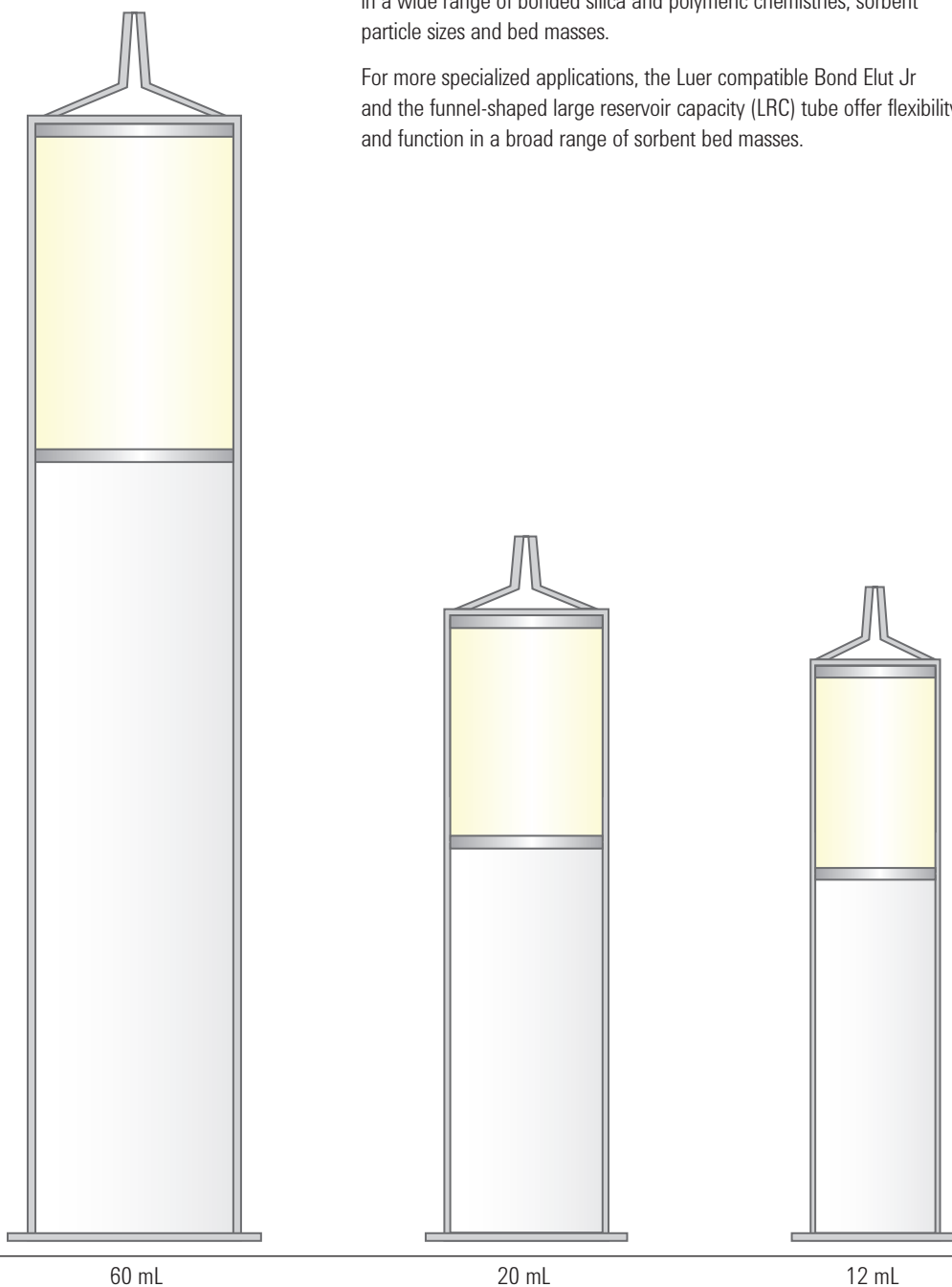
- **Heritage of Reliability:** With years of use in some of the most demanding analytical laboratories in the world, Bond Elut products have a proven track record resulting in a strong publication pedigree
- **Options for Your Needs:** Offering extraction solutions for the widest range of analytes and matrices, with over 40 bonded silica phases for high specificity methods and polymeric phases for rapid method development, Bond Elut has the largest choice of formats and sorbents in the market
- **Innovative Products Designed for Lab Efficiency:** Whether it be fast flow polymeric particles or our patented 96-well plate design, all Bond Elut products are created for ease-of-use and flexibility to meet both manual and automated requirements
- **Technical Support at Every Step:** For your specific applications, or to help solve occasional technical issues, a global team of analytical scientists is on hand to assist
- **World Class Manufacturing and Quality:** Unrivaled manufacturing control, plus exacting ISO 9001: 2000 compliant inspections guarantee the consistent quality of Bond Elut

Sample Preparation Formats

Agilent Offers the Broadest Range of Tube Formats and 96-well Plate Designs

We have a full set of straight barrel SPE tubes ranging from 1-150 mL in a wide range of bonded silica and polymeric chemistries, sorbent particle sizes and bed masses.

For more specialized applications, the Luer compatible Bond Elut Jr and the funnel-shaped large reservoir capacity (LRC) tube offer flexibility and function in a broad range of sorbent bed masses.



Bond Elut 96-well Plates

Bond Elut 96-well plate formats are best in class for flow performance and well-to-well reproducibility. These specially designed plates are available with well depths of 1 mL and 2 mL and in a large range of different sorbent chemistries.



VersaPlate

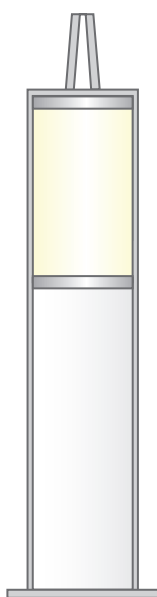
VersaPlate is a highly innovative, flexible design that lets you customize plates. Insert different phases for sorbent screening or insert only enough tubes to match the number of samples to be extracted for minimal waste. VersaPlate can be purchased in a pre-packed format or as loose tubes.

Packed Formats for Automation

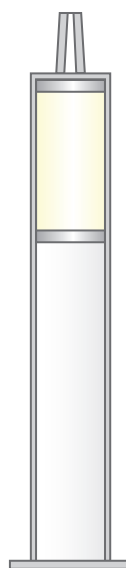
Bond Elut sorbents are also available in packed bed formats for automation platforms, such as the Spark Holland Symbiosis, Gilson ASPEC and Gerstel MPS systems. Agilent's unique OMIX pipette format is also used with a wide range of liquid handling devices, ranging from hand-held pipettors to high-throughput automated systems.



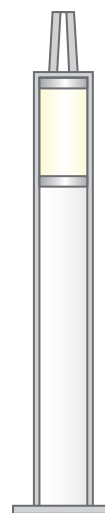
10 mL LRC



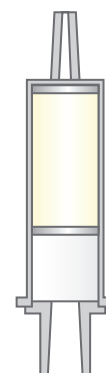
6 mL



3 mL



1 mL



Bond Elut Jr

Cross Reference of Comparable Phases by Manufacturer

Different chemistries and manufacturing processes create sorbents that exhibit differences in selectivity, so there is no universal equivalent for every application. However, the performance of products can be similar in many applications. This table provides suggestions for using Agilent Bond Elut products in comparison to products from other manufacturers.

Polymers			
If you are using...			Try this...
Phenomenex Strata	Waters Oasis	Supelco Supelclean/Discovery	Agilent Bond Elut
Strata-X	HLB		Plexa
SDB-L		ENVI-ChromP	ENV or LMS
Strata-XC	MCX		Plexa PCX
	MAX		Plexa PAX
Silica-Based and Other Sorbents			
If you are using...			Try this...
Phenomenex Strata	Waters Sep-Pak	Supelco Supelclean/Discovery	Agilent Bond Elut
C18-E	tC18	ENVI-18, DSC-C18, LC-18	C18
C18-U	C18		C18 OH
C8	C8	DSC-8, Envi-8, LC-8	C8
	tC2		C2
Phenyl (PH)		DSC-Ph, LC-Ph	PH
Screen-C			Certify
Si-1	Silica	DSC-Si, LC-SI	SI
FL-PR	Florisil	LC and ENVI Florisil	FL
NH2	Amino Propyl	DSC-NH2, LC-NH	NH2
		DSC-Diol, LC-Diol	2OH
CN	Cyano Propyl	DSC-CN, LC-CN	CN-U
	Alumina A, B, N	LC-Alumina A, B, N	Alumina A, B, N
SAX	AccellPlus QMA	DSC-SAX, LC-SAX	SAX
SCX	AccellPlus CM	DSC-SCX, LC-SCX	SCX
		ENVI-Carb	Carbon
		ENVICarb-II/NH2	Carbon/NH2
		ENVICarb-II/PSA	Carbon

Sorbent Specifications

Sorbent Phase	Category	Bonded Functional Group/Base Material	Endcapped	Format	Typical Carbon Loading (%)	Surface Area (m ² /g)	Particle Size (µm) and Shape	Mean Pore Size (Å)
AccuCAT	Mixed Mode	Sulfonic acid (SCX) and quaternary amine (SAX) silica based	No	Packed bed	7.0	500	40 and 120, irregular	60
Alumina (AL-A)	Polar	Aluminium oxide – acidic		Packed bed	0.0		25	
Alumina (AL-B)	Polar	Aluminium oxide – basic		Packed bed	0.0		25	
Alumina (AL-N)	Polar	Aluminium oxide – neutral		Packed bed	0.0		25	
Aminopropyl (NH ₂)	Polar/Anion Exchanger	Aminopropyl/silica based	No	Packed bed	6.7	500	40 and 120, irregular	60
SPEC Aminopropyl (NH ₂)	Polar/Anion Exchanger	Aminopropyl/silica based	No	Monolithic disk		220		70
C1	Non-polar	Methyl/silica based	Yes	Packed bed	4.1	500	40, irregular	60
C2	Non-polar	Ethyl/silica based	Yes	Packed bed	5.6	500	40 and 120, irregular	60
SPEC C2	Non-polar	Dimethyl/silica based	No	Monolithic disk	2.7	220		70
C8	Non-polar	Octyl/silica based	Yes	Packed bed	12.2	500	40 and 120, irregular	60
SPEC C8	Non-polar	Octyl/silica based	Yes	Monolithic disk	5.0	220		
Carbon	Strongly Non-polar	Graphitized carbon	No	Packed bed				
C18	Non-polar	Trifunctional octadecyl/silica based	Yes	Packed bed	17.4	500	40 and 120, irregular	60
SPEC C18	Non-polar	Monofunctional octadecyl/silica based	No	Monolithic disk	8.0	220		70
SPEC C18 AR	Non-polar	Trifunctional octadecyl/silica based	Yes	Monolithic disk	9.0	220		70
C18 EWP	Non-polar	Trifunctional octadecyl/silica based	Yes	Packed bed	6.0	80	40, irregular	500
C18 INT	Non-polar	Trifunctional octadecyl/silica based	Yes	Packed bed	13.0	500	40, irregular	60
C18 LO	Non-polar	Trifunctional octadecyl/silica based	Yes	Packed bed	11.8	500	40, irregular	60
C18 OH	Non-polar	Monofunctional octadecyl/silica based	No	Packed bed	14.9	300	40 and 120, irregular	150
CBA	Cation Exchanger	Carboxylic acid/silica based	Yes	Packed bed	7.4	500	40 and 120, irregular	60

(Continued)

Sorbent Specifications

Sorbent Phase	Category	Bonded Functional Group/Base Material	Endcapped	Format	Typical Carbon Loading (%)	Surface Area (m ² /g)	Particle Size (µm) and Shape	Mean Pore Size (Å)
Certify	Mixed Mode	Octyl and benzenesulfonic acid (SCX)/silica based	No	Packed bed	9.0	500	40 and 120, irregular	60
Certify II	Mixed Mode	Octyl and quaternary amine (SAX)/silica based	No	Packed bed	8.6	500	40 and 120, irregular	60
CH	Non-polar	Cyclohexyl/silica based	Yes	Packed bed	9.6	500	40 and 120, irregular	60
Cyano (CN-E)	Non-polar	Cyanopropyl/silica based	Yes	Packed bed	8.1	500	40 and 120, irregular	60
SPEC Cyano	Polar	Cyanopropyl/silica based	No	Monolithic disk		220		70
SPEC DAU	Application specific	Silica based		Monolithic disk		220		70
DEA	Anion Exchanger	Diethylaminopropyl/silica based	No	Packed bed	8.5	500	40 and 120, irregular	60
Diol (20H)	Polar	Diol/silica based	No	Packed bed	6.8	500	40, irregular	60
ENV	Non-polar	Styrene divinylbenzene		Packed bed			125, spherical	450
EnvirElut 1664	Application specific	Trifunctional octadecyl/silica based	No	Packed bed	18.0	500	40 and 120, irregular	60
FL	Polar	Florisil		Packed bed			200	
Focus	Polar enhanced	Polar functionalized styrene divinylbenzene		Packed bed		640	44, spherical	120
LMS	Non-polar	Styrene divinylbenzene		Packed bed			75, spherical	300
SPEC MP1	Mixed Mode	Non-polar and benzenesulfonic acid (SCX)/silica based		Monolithic disk	6.0	220		70
SPEC MP3	Mixed Mode	Slightly polar and benzenesulfonic acid (SCX)/silica based		Monolithic disk		220		70
NEXUS	Mixed mode	Mixed mode copolymer		Packed bed		575	70, spherical	100/450 Bimodal
PBA	Covalent	Phenylboronic acid/silica based	No	Packed bed	7.9	500	40, irregular	60
PCB	Application specific	Layered phase		Packed bed		500		
PH	Non-polar	Phenyl/silica based	Yes	Packed bed	10.7	500	40 and 120, irregular	60
Plexa	Polar enhanced	Hydrophilic styrene divinylbenzene		Packed bed		550	45, spherical monodisperse	100

(Continued)

Sorbent Specifications

Sorbent Phase	Category	Bonded Functional Group/Base Material	Endcapped	Format	Typical Carbon Loading (%)	Surface Area (m ² /g)	Particle Size (µm) and Shape	Mean Pore Size (Å)
Plexa PCX	Cation Mixed Mode	SCX functionalized hydrophilic styrene divinylbenzene		Packed bed		550	45, spherical monodisperse	100
PPL	Non-polar	Functionalized styrene divinylbenzene		Packed bed		600	125, spherical	150
PRS	Cation Exchanger	Propylsulfonic acid/silica based	No	Packed bed	1.7	500	40, irregular	60
PSA	Anion Exchanger	Ethylenediamine-N-propyl/silica based	No	Packed bed	7.5	500	40 and 120, irregular	60
SPEC PSA	Anion Exchanger	Ethylenediamine-N-propyl/silica based	No	SPEC disk		220		70
SPEC PH	Non-polar	Phenyl/silica based	Yes	Monolithic disk		220		70
SAX	Anion Exchanger	Trimethylaminopropyl/silica based	No	Packed bed	7.5	500	40 and 120, irregular	60
SPEC SAX	Anion Exchanger	Trimethylaminopropyl/silica based	No	Monolithic disk		220		70
SCX	Cation Exchanger	Benzenesulfonic acid/silica based	No	Packed bed	10.9	500	40 and 120, irregular	60
SPEC SCX	Cation Exchanger	Benzenesulfonic acid/silica based	No	Monolithic disk		220		70
SI	Polar	Silica	No	Packed bed		600	40 and 120, irregular	60
SPEC SI	Polar	Silica	No	Monolithic disk		220		70
TCA	Application specific	Ethyl/silica based	Yes	Packed bed		500	40 and 120, irregular	60

Particle Size Specifications

You will note that our most common silica-based Bond Elut packings are described as 40 µm materials, yet if you look at the actual lot analyses, you will see that the actual mean is around 55 µm. We have been making silica-based Bond Elut packings since 1979, using the same diameter silicas; in that time, the models used to estimate irregular particle "diameters" and the testing equipment have changed. We have retained the term "40 µm" however, because there are so many official methods that specify a 40 µm Bond Elut sorbent. As other suppliers attempted to copy the successful Bond Elut product specifications, the term has become an industry standard. You can be assured that the actual average particle in our regular silica Bond Elut is the same now as it was 30 years ago when we first pioneered SPE as a sample prep technology.

Sample Preparation Reference Guide				
Product	Typical Matrices	Primary Extraction Mechanism	Compound Types	Page No.
Bond Elut AccuCAT	Urine, plasma and biological fluids, beverages and food	Strong cation and anion exchange	Catecholamines, acrylamide in liquids and food	187
Bond Elut Alumina	Non-polar organics	Polar	Polar cleanup	191
Bond Elut Atrazine	Water sources	Non-polar	Atrazine and atrazine by-products	196
Bond Elut C1	Urine, plasma, biological fluids	Non-polar, polar (as a normal phase extraction)	Strongly non-polar compounds	173
Bond Elut C18	Aqueous samples, biological fluids	Non-polar	Non-polar compounds, desalting	166
Bond Elut C18 EWP	Aqueous samples, biological fluids	Non-polar	Extra wide pore for larger, macro molecules up to 15 kDa	168
Bond Elut C18 OH	Aqueous samples, biological fluids, non-polar extracts	Non-polar, hydrogen bonding	Vitamin D, fat-soluble compounds, steroids/hormones	169
Bond Elut C2	Aqueous samples, biological fluids	Non-polar	Strongly non-polar compounds	174
Bond Elut C8	Aqueous samples, biological fluids	Non-polar	Non-polar compounds	170
Bond Elut CBA	Aqueous samples, biological fluids	Weak anion exchange	Strong and weak acids	185
Bond Elut Cellulose	Aqueous and non-polar organics	Polar (Hydroxyl)	Polar impurities/compounds	196
Bond Elut CH (cyclohexyl)	Aqueous samples, biological fluids	Non-polar	Non-polar compounds	172
Bond Elut CN-E	Aqueous samples, biological fluids	Non-polar, dipole	Mid-range polarity compounds	176
Bond Elut Carbon	Organic plant and tissue extracts	Wide range non-polar retention	Cleanup of pigments and endogenous plant extracts for pesticide and herbicide analysis	193
Bond Elut Certify	Urine, plasma, saliva, blood, biological fluids	Non-polar and strong cation exchange	Basic drugs, basic drugs of abuse	188
Bond Elut Certify II	Urine, plasma, saliva, blood, biological fluids	Non-polar and strong anion exchange	Acidic drugs, acidic drugs of abuse	189
Bond Elut DEA	Water, biological fluids, non-polar extracts	Weak cation exchange	Weak and strong basic compounds	186
Bond Elut Diol (2OH)	Aqueous, biological fluids, non-polar organics	Polar and non-polar	Polar, weakly non-polar	177
Bond Elut ENV	Water sources	Non-polar	Polar organic molecules, explosive residues	163
Bond Elut Florisil	Non-polar organics	Polar compounds	Organic extracts, non-polar environmental extracts	190
Bond Elut LMS	Urine, plasma, biological fluids	Non-polar	Non-polar compounds	164

(Continued)

Sample Preparation Reference Guide

Product	Typical Matrices	Primary Extraction Mechanism	Compound Types	Page No.
Bond Elut Mycotoxin	Aqueous and polar organic grain extracts (beer, wine, sake)	Ionic cleanup	Mycotoxins (trichothecenes and zearalenones)	198
Bond Elut NEXUS and Bond Elut NEXUS WCX	Horse urine, urine, biological fluids	Non-polar	Drugs of abuse, quaternary drugs, endocrine disruptors	165
Bond Elut NH2	Aqueous, biological fluids, buffered organics	Weak anion exchange	Polar and non-polar strong anions, polar structural isomers	178
Bond Elut PBA	Plasma, urine, aqueous and biological fluids	Covalent bonding	cis-diol-containing compounds, catecholamines, ribonucleotides, amino alcohols, diketo and triketo compounds	200
Bond Elut PCB	Water sources	Non-polar	PCBs	197
Bond Elut PH	Aqueous and biological fluids	Non-polar	Strongly non-polar compounds, aromatics	171
Bond Elut PPL	Water sources, biological fluids	Non-polar, electrostatic	Non-polar compounds, phenols	161
Bond Elut PRS	Aqueous, biological fluids, buffered organics	Cation exchange	Basic compounds (amine + pyridinium containing)	183
Bond Elut PSA	Aqueous, biological fluids, buffered organics	Strong anion exchange	Acidic compounds (fruit acid removal for QuEChERS)	184
Bond Elut Plexa	Aqueous, biological fluids	Non-polar	Non-polar compounds with acidic/neutral fractionation PAHs from water	156
Bond Elut Plexa PAX	Plasma, urine, aqueous and biological fluids	Strong cation exchange	Acidic compounds, carboxylic acid metabolites of drugs, peptides and amino acids	160
Bond Elut Plexa PCX	Aqueous, biological fluids, buffered organics	Mixed mode: non-polar and cation exchange	Basic drugs, basic drugs of abuse	158
Bond Elut SAX	Aqueous, biological fluids	Anion exchange	Weak acidic compounds	180
Bond Elut SCX	Aqueous, biological fluids, buffered organics	Cation exchange	Weak basic compounds	182
Bond Elut SI	Non-polar organics, oils, lipids	Polar	Cleanup of polar impurities	175
EnvirElut	Water sources, extracted soil samples	Non-polar	Pesticide and industrial chemical residues	201
Chem Elut	Aqueous, biological fluids, organic reaction mixtures (scavenging)	Solid supported LLE	Nitrosamines, pesticides, herbicides	202
Hydromatrix	Aqueous, biological fluids, organic reaction mixtures (scavenging)	Solid supported LLE	Nitrosamines, pesticides, herbicides	202



Bond Elut Plexa

The Bond Elut Plexa Family is a new generation of polymeric SPE products, designed for simplicity, improved analytical performance and ease-of-use. Its uniqueness lies in the novel hydroxylated exterior, hydrophobic interior and advanced polymeric architecture.

Bond Elut Plexa

Bond Elut Plexa is a non-polar divinylbenzene-based neutral polymeric sorbent. This sorbent is the best choice for non-ionic extraction of a wide range of acidic, neutral and basic analytes from different matrices.

Bond Elut Plexa PCX

Bond Elut Plexa PCX is a cation exchanger with mixed mode sorbent characteristics and is therefore suitable for the extraction and cleanup of weak bases from biofluids. Bond Elut Plexa PCX demonstrates the same excellent particle size distribution and integrity as Bond Elut Plexa. A highly controlled sulfonation process results in zero fines for Bond Elut Plexa PCX.

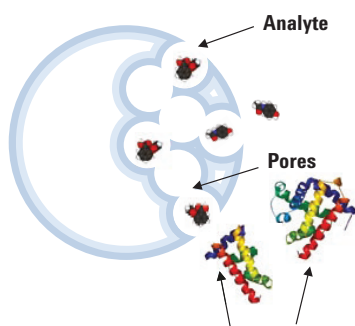
Bond Elut Plexa PAX

Bond Elut Plexa PAX is based on the same innovative base polymer particle technology as the other members of the Plexa SPE family. This advanced material offers excellent flow characteristics due to its monodisperse particle size distribution, affording superior ease-of-use, with minimal clogging of the packed bed. The amide-free particle technology does not provide binding sites for endogenous interferences such as proteins and lipids.

Advanced Polymer Architecture Improves Extraction Performance

LOAD:

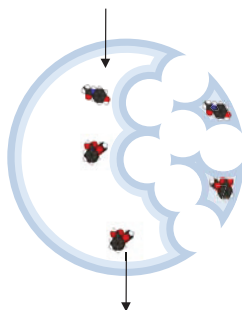
Water-rich, hydrophilic surface allows excellent phase transfer of analytes into the polymer core.



Large endogenous proteins do not bind to the surface of the polymer and cannot access pore structure.

WASH:

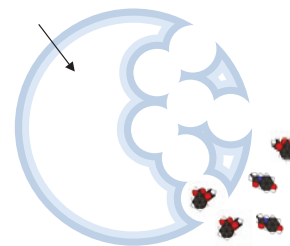
Analytes that have crossed the hydrophilic layers will remain tightly bound in the hydrophobic core.



Interferences wash away without leaching the analytes of interest.

ELUTE:

Specially engineered pore structure allows excellent mass transfer out of the polymer.



Clean extract with high recovery.

Tips & Tools

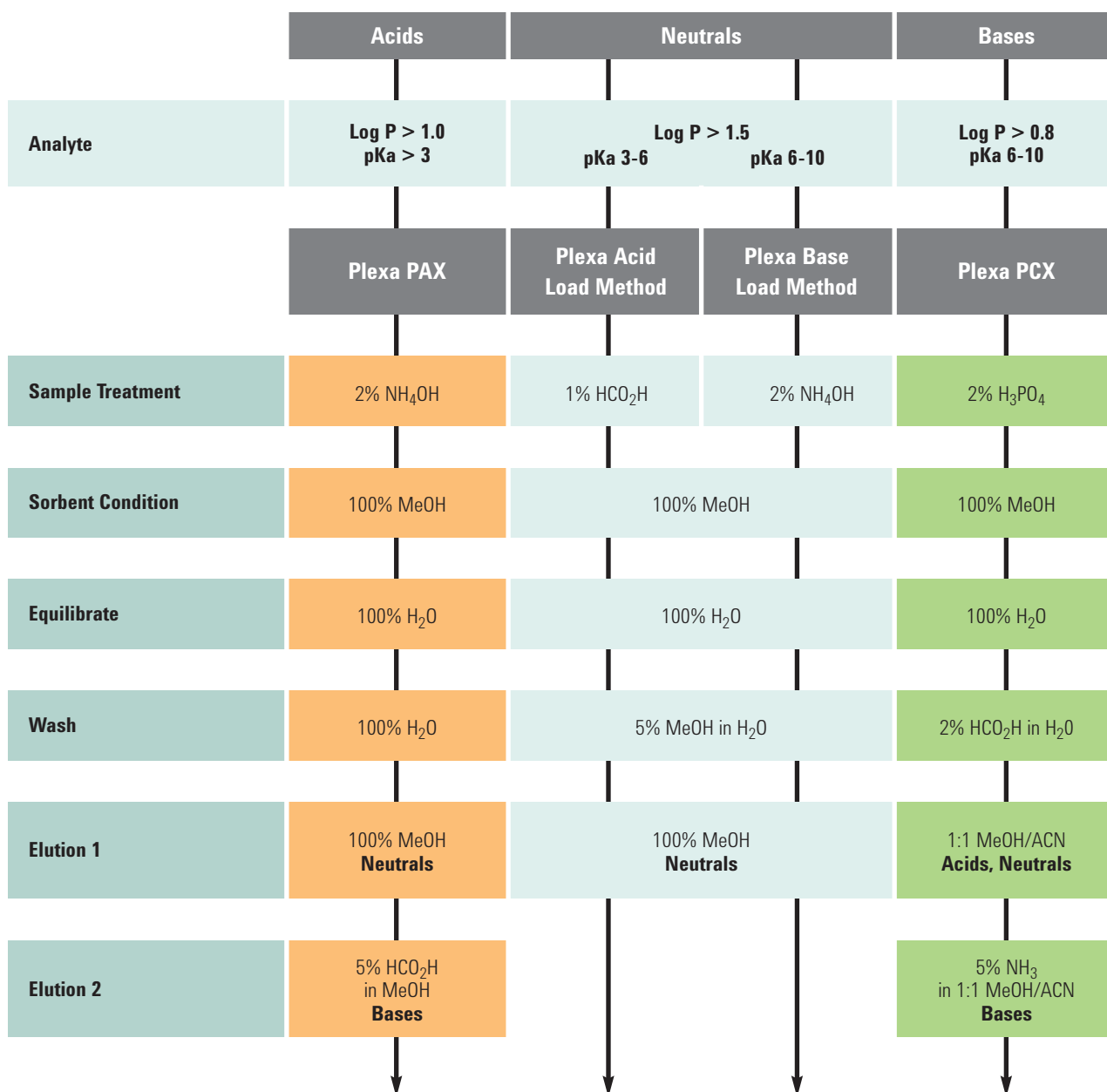
More information is a click away. We have a variety of educational primers, application notes, maintenance guides, and literature available from Agilent for free.

To learn more, visit www.agilent.com/chem/OnlineLibrary



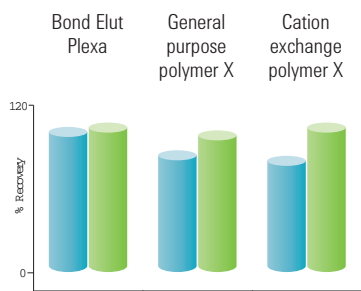
General Protocol for Trouble-Free SPE Applications with Bond Elut Plexa

Regardless of your application or sample type, you will appreciate the difference the Bond Elut Plexa range makes. Plexa delivers simple methods, superior flow characteristics, and improved analytical performance, all leading to easier validation. Simple methods deliver clean extracts and high recoveries from a wide range of acidic, basic and neutral analytes. The advanced polymeric design effectively eliminates the common matrix interferences that cause ion suppression, resulting in improved analytical sensitivity and data quality.



Improved Sensitivity

Plexa improves sensitivity by minimizing ion suppression effects and maximizing recovery



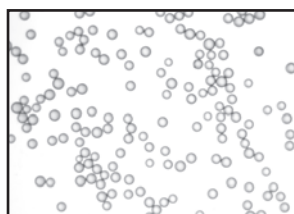
Key

■ Metoprolol recovery calculated as response against spiked mobile phase

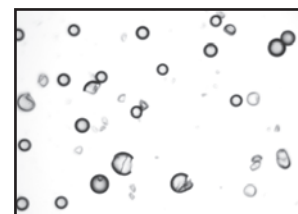
■ Metoprolol recovery calculated as response against an extracted linear curve

Matrix interferences can result in significantly decreased analytical sensitivity due to ion suppression. Bond Elut Plexa gives you higher recoveries in cleaner extracts, which translates into better sensitivity. Plexa delivers high recoveries regardless of whether absolute or relative calculations are used. This indicates that ion suppression is minimized and maximum sensitivity is achieved. Relative recovery calculations (green bars) are routinely used, but mask the effects of ion suppression, which are normalized.

Comparison of particle sizes of non-polar SPE polymers by imaging analysis

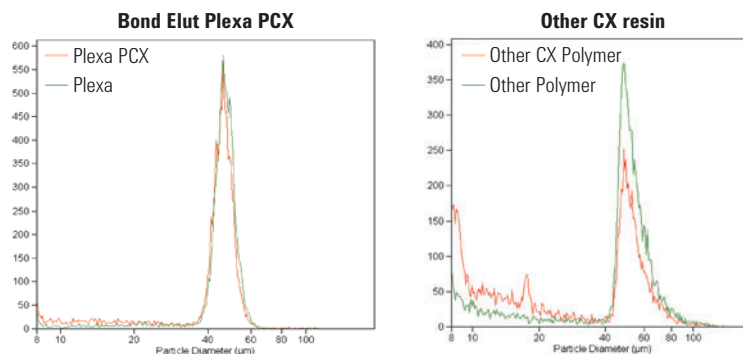


Bond Elut Plexa PCX



Alternative Polymer

Comparison of particle size distributions of non-polar SPE sorbents



The narrow particle size distribution offers reproducible, superior flow characteristics with minimal clogging



Bond Elut Plexa

- Non-polar retention mechanism
- Improved extract cleanliness minimizes sample matrix interferences
- Simple methods are amenable to a very broad range of analytes
- Fast flow, reproducible performance and ease-of-use

Bond Elut Plexa offers simple, easy-to-use methods with general purpose extraction mechanisms to simplify SPE. In addition, Plexa provides performance enhancements due to a unique polymeric architecture with a non-retentive, hydroxylated, amide-free surface and a non-polar PS/DVB core for retaining small molecules. Binding of proteins and lipids on the polymer surface is minimized, resulting in cleaner samples and reduced ion suppression. Plexa is therefore ideal for high-throughput assays requiring validated performance with minimal method development. The standard non-polar retention mechanism is applicable to almost any analyte type, and the performance features operate at the sample loading step, making them largely method independent.

By minimizing the need for extensive method development for multiple sorbents, Bond Elut Plexa simplifies SPE. The water wettable, hydroxylated exterior allows excellent flow of biofluid samples. A gradient of polarity on the polymer surface shunts small analytes to the more hydrophobic center of the polymer bead where they are retained prior to washing and elutions steps.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous, biological fluids	Non-polar	Non-polar compounds with acidic/neutral fractionation PAHs from water

Bond Elut Plexa

Description	Unit	Part No.
Straight Barrel Cartridges		
30 mg, 1 mL	100/pk	12109301
30 mg, 3 mL	50/pk	12109303
60 mg, 1 mL	100/pk	12109601
60 mg, 3 mL	50/pk	12109603
200 mg, 3 mL	50/pk	12109610
200 mg, 6 mL	30/pk	12109206
500 mg, 3 mL	30/pk	12109703
500 mg, 6 mL	30/pk	12259506
Bond Elut Jr		
300 mg, 6 mL	50/pk	12169610B
Bond Elut 96 Round-well Plates		
10 mg, 1 mL	1/pk	A4969010
30 mg, 1 mL	1/pk	A4969030
Bond Elut 96 Square-well Plates		
10 mg, 2 mL	1/pk	A3969010
30 mg, 2 mL	1/pk	A3969030
Mega Bond Elut Plexa		
500 mg, 12 mL	20/pk	327832
Other Formats		
Bond Elut Plexa Prospekt cartridge, 2 mm	96/pk	12221305
Bond Elut Plexa 800 Series cartridge	96/pk	12281305
60 mg, 3 mL, Gerstel format	50/pk	167816G
200 mg, 3 mL, Gerstel format	50/pk	167822G



**Typical Method
for Bond Elut Plexa PCX****Sample:**

100 µL plasma

Pretreatment:Dilute 1:3 with 2% H₃PO₄**Conditioning:**

1. 500 µL MeOH
2. 500 µL H₂O

Washes:

Acidic wash: 500 µL aqueous 2% formic acid

Neutral wash: 500 µL CH₃OH-CH₃CN (1:1, v/v)**Elution:**500 µL CH₃OH-CH₃CN + 5% NH₃ (28-30%)

Volumes stated are for Bond Elut 96 30 mg, 1 mL, P/N A4968030.

Bond Elut Plexa PCX

- Faster flow rates improve productivity
- Extraction cleanliness and reduced ion suppression improve precision
- Simplified, single method for ease-of-use

Bond Elut Plexa PCX is another milestone in the development of simple and robust SPE methods. Plexa PCX uses a polymeric cation exchange resin that combines the outstanding properties of Bond Elut Plexa – superior flow characteristics and improved analytical performance – with strong cation exchange functionalities. This mixed-mode SPE sorbent removes neutral and acidic interferences from the matrix, concentrates basic analytes and therefore improves sensitivity in the determination of basic compounds.

The Plexa PCX particles are near mono-dispersed, resulting in homogenous packing. Reproducible results are the norm, with very good tube-to-tube and well-to-well performance. Ion suppression is reduced because the highly polar, hydroxylated polymer surface is entirely amide-free and does not provide binding sites for endogenous species such as proteins and lipids.

Plexa PCX comes with a simple, single method approach for basic drugs that offers improved recoveries, cleaner extracts and reduced method development time and cost. Flow rate is improved because Plexa PCX particles have much narrower particle size distribution with no fines to cause blockages.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous, biological fluids, buffered organics	Mixed mode: non-polar and cation exchange	Basic drugs, basic drugs of abuse

Bond Elut Plexa PCX

Description	Unit	Part No.
Straight Barrel Cartridges		
30 mg, 1 mL	100/pk	12108301
60 mg, 1 mL	100/pk	12108601
30 mg, 3 mL	50/pk	12108303
60 mg, 3 mL	50/pk	12108603
200 mg, 6 mL	30/pk	12108206
500 mg, 6 mL	30/pk	12258506
Bond Elut 96 Round-well Plates		
10 mg, 1 mL	1/pk	A4968010
30 mg, 1 mL	1/pk	A4968030
Bond Elut 96 Square-well Plates		
10 mg, 2 mL	1/pk	A3968010
30 mg, 2 mL	1/pk	A3968030
Other Formats		
Bond Elut Plexa PCX Prospekt Cartridge, 2 mm	96/pk	12221306
Bond Elut Plexa PCX 800 Series Cartridge	96/pk	12281306

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**Typical Method
for Bond Elut Plexa PAX****Sample:**

100 µL human plasma

Pretreatment:Dilute 1:3 with 2% NH₄OH**Conditioning:**

1. 500 µL MeOH
2. 500 µL H₂O

Washes:

1. 500 µL H₂O
2. 500 µL MeOH

Elution:

500 µL 5% formic acid:MeOH

Volumes stated are for Bond Elut 96
1 mL Well Plate, P/N A4967010.

Bond Elut Plexa PAX

- Mixed mode, non-polar polymeric anion exchanger offers high level of analyte selectivity
- Exclusion of endogenous interferences offers superior cleanliness and minimizes ion suppression
- Simple, single method for ease-of-use, reduces method development time

Bond Elut Plexa PAX sets the new performance standard in analyte cleanup and reproducibility for polar and non-polar acidic analytes. Existing polymeric anion exchange sorbents can exhibit a broad range of ion exchange capacity from batch to batch, leading to method irreproducibility and compromised data. Plexa PAX particles are functionalized using a proprietary process which allows anion exchange loadings to be controlled with a very high degree of reproducibility, giving more robust performance across the lifetime of your compound study or method.

This mixed-mode SPE device comes with a simple, single method for non-polar acidic and polar acidic analytes that offers excellent clean up, even in complex matrices such as plasma. The optimized anion exchange methodology offers clean extracts, high recoveries and low RSDs, reducing method development time, sample repeats and overall cost per sample in the process.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Plasma, urine, aqueous and biological fluids	Strong cation exchange	Acidic compounds, carboxylic acid metabolites of drugs, peptides and amino acids

Bond Elut Plexa PAX

Description	Unit	Part No.
Straight Barrel Cartridges		
30 mg, 1 mL	100/pk	12107301
60 mg, 1 mL	100/pk	12107601
30 mg, 3 mL	50/pk	12107303
60 mg, 3 mL	50/pk	12107603
200 mg, 6 mL	30/pk	12107206
500 mg, 6 mL	30/pk	12257506
Bond Elut 96 Round-well Plates		
10 mg, 1 mL	1/pk	A4967010
30 mg, 1 mL	1/pk	A4967030
Bond Elut 96 Square-well Plates		
10 mg, 2 mL	1/pk	A3967010
30 mg, 2 mL	1/pk	A3967030



Polymeric SPE

Reversed Phase Polymeric SPE

Bond Elut PPL

- Modified styrene-divinylbenzene polymer
- Large particle size allows fast extraction speeds
- High surface area and capacity for polar analytes

Bond Elut PPL is a styrene-divinylbenzene (SDVB) polymer that has been modified with a proprietary non-polar surface. PPL will retain even the most polar classes of analytes, including phenols. The large particle size allows ease of flow for viscous or particulate rich water samples, while the high surface area and strong hydrophobicity ensure reproducible extractions with high recoveries upon elution.

Bond Elut PPL is suitable for EPA Method 528 'Determination of Phenols in Drinking Water by SPE and Capillary GC/MS.'

Typical Matrices	Primary Extraction Mechanism	Compound Types
Water sources, biological fluids	Non-polar, electrostatic	Non-polar compounds, phenols



Bond Elut PPL

Description	Unit	Part No.
Straight Barrel Cartridges		
50 mg, 1 mL	100/pk	12105002
100 mg, 1 mL	100/pk	12105003
100 mg, 3 mL	50/pk	12105004
200 mg, 3 mL	50/pk	12105005
500 mg, 3 mL	50/pk	12105006
500 mg, 6 mL	30/pk	12255001
1 g, 3 mL	50/pk	12102148
1 g, 6 mL	30/pk	12255002

Determination of organophosphates in lake water**Vacuum Manifold:** Vac Elut 20**Vacuum:** 800 mbar**Cartridge:** Bond Elut PPL, 100 mg sorbent in 1 mL cartridge

Condition cartridge with 1 mL methanol, 1 mL ethanol/ acetonitrile (1/1)

Method: 1. Apply 1.5-2.5 L water sample
2. Dry the cartridge using nitrogen
3. Elution with 3 x 333 µL methanol/acetonitrile (1/1)

Analyte	Recovery (%)	LOD (ng/L)
Tris (1-chloro-2-propyl)-phosphate (TCPP)	91	1
Tris (2-chloroethyl)-phosphate (TCEP)	95	2
Tris (1,3-dichloro-2-propyl)-phosphate (TDCP)	99	1
Tri-n-butylphosphate (TnBP)	89	1
Tri-isobutylphosphate (TiBP)	85	2
Tris(2-butoxyethyl)-phosphate (TBEP)	93	3

Recoveries and LODs of organophosphates; extracted from the water sample with SPE

Courtesy: Application Note SI-02094 Determination of Organophosphates in Lake Water

Bond Elut ENV

- Modified styrene-divinylbenzene polymer
- Large particle size allows fast extraction speeds
- High surface area and capacity for polar analytes

Bond Elut ENV, a PS/DVB polymer, is designed for the extraction of polar organic residues. It contains 125 µm spherical particles, advantageous for high volume, fast flow-through applications.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Water sources	Non-polar	Polar organic molecules, explosive residues

Bond Elut ENV

Description	Unit	Part No.
Straight Barrel Cartridges		
50 mg, 1 mL	100/pk	12105012
100 mg, 1 mL	100/pk	12105013
100 mg, 3 mL	50/pk	12105014
200 mg, 3 mL	50/pk	12105015
200 mg, 6 mL	30/pk	12255014
500 mg, 3 mL	50/pk	12105016
500 mg, 6 mL	30/pk	12255011
1 g, 6 mL	30/pk	12255012

Extraction of explosive residues from water

Sorbent Conditioning:	200 mg/3 mL Bond Elut ENV cartridge
Apply Sample:	Adjust 500 mL sample to pH 2 using concentrated HCl
Interference Wash:	500 mL of water sample at a flow rate between 10 and 15 mL/min.
Analyte Elution:	5 mL DI H ₂ O, then dry the cartridge for 3 min 1. 2.5 mL ACN (2 mL of which re-eluted x 4 after 1st elution) 2. 1.5 mL fresh ACN

Compounds	Recoveries (%)
1,3,5-Trinitrobenzene	99.8
Nitrobenzene	92.1
2,4-Dinitrotoluene	97.7
2,6-Dinitrotoluene	86.8
2-Amino-4,6-dinitrotoluene	93.2
4-Amino-2,6-dinitrotoluene	93.3
4-Nitrotoluene	85.3

Bond Elut LMS

- Ultra clean styrene-divinylbenzene polymer
- Optimized 75 µm particle size for reproducible flow
- High capacity and surface area for efficient extraction

Bond Elut LMS polymeric sorbent lets you elute without having to add amine modifiers, buffers, or acids. The elimination of secondary interactions means that elution of analytes can be achieved with pure organic solvents or solvent mixtures of low ionic strength compatible with the HPLC mobile phase. These characteristics are crucial to allow compatibility with LC/MS or other delicate analytical techniques.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Urine, plasma, biological fluids	Non-polar	Non-polar compounds

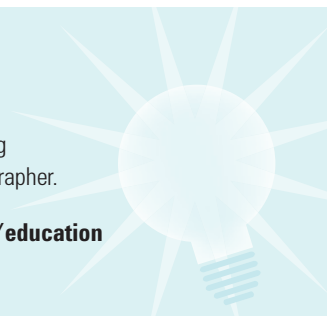
Bond Elut LMS

Description	Unit	Part No.
Straight Barrel Cartridges		
25 mg, 1 mL	100/pk	12105021
100 mg, 1 mL	100/pk	12105023
100 mg, 3 mL	50/pk	12105024
200 mg, 3 mL	50/pk	12105025
500 mg, 3 mL	50/pk	12105026
500 mg, 6 mL	30/pk	12255021
1 g, 6 mL	30/pk	12255022

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Mixed Mode Polymeric SPE

Bond Elut NEXUS and Bond Elut NEXUS WCX

- Large particle size allows excellent flow for viscous samples
- Non-conditioning method saves time and improves throughput
- WCX offers enhanced selectivity for certain analytes such as quaternary amine drugs

Bond Elut NEXUS is an ultra-clean polymeric sorbent which has bi-modal porosity and a high surface area. NEXUS offers a non-polar retention mechanism with no pre-conditioning required. The large particle size makes NEXUS ideal for extractions from highly viscous samples such as horse urine.

Based on the same base polymer technology, Bond Elut NEXUS WCX is a weak cation exchange sorbent that offers extra selectivity for analytes such as quaternary ammonium drugs and anabolic steroids.

References

Wynne, PM, Barry, DC, Vine, JH & Simpson, NKJ (2004) Approaches to the solid phase extraction of equine urine. *Chromatography*, 59, S51-S60.

Wynne, PM, Barry, DC, Vine, JH & Simpson, NKJ (2000) An improved method for the extraction of anabolic steroids from equine urine. In: RB Williams, E Houghton & J Wade (eds) *Proc. 13th Int. Conf. Racing Analysts and Veterinarians*. R & W Publications, Newmarket, UK.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Horse urine, urine, biological fluids	Non-polar	Drugs of abuse, quaternary drugs, endocrine disruptors

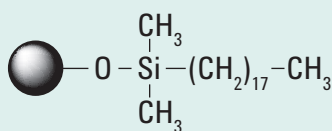
Bond Elut NEXUS and Bond Elut NEXUS WCX

Description	Unit	Part No.
LRC Cartridges		
30 mg, 10 mL	50/pk	12113100
60 mg, 10 mL	50/pk	12113101
Straight Barrel Cartridges		
30 mg, 1 mL	100/pk	12103100
60 mg, 3 mL	100/pk	12103101
60 mg, 3 mL, NEXUS WCX	100/pk	12102157
200 mg, 6 mL	30/pk	12103102
200 mg, 12 mL	20/pk	12253101
500 mg, 12 mL	20/pk	12253102
500 mg, 20 mL	20/pk	12253103

Silica-Based SPE

Reversed Phase (Non-Polar) Silica SPE

Reversed phase sorbents are non-polar and are used to retain (extract) non-polar analytes from polar matrices. For reversed phase sorbents, retention decreases as the eluting solvent becomes more non-polar.



Bond Elut C18

- The most hydrophobic, bonded silica sorbent
- Extremely retentive for non-polar compounds
- Effective for desalting aqueous mixtures

Bond Elut C18 is the most hydrophobic, bonded silica sorbent in the Bond Elut range. It is the most popular SPE sorbent because of its extremely retentive nature for non-polar compounds. C18 is generally regarded as having the broadest spectrum of retention among bonded silica sorbents, since it retains most organic analytes from aqueous matrices. When analyzing small to intermediate molecules, Bond Elut C18 can be used for desalting aqueous matrices prior to ion exchange, as salts pass through the sorbent unretained.

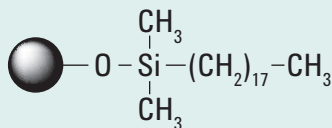
Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous samples, biological fluids	Non-polar	Non-polar compounds, desalting

Bond Elut C18

Description	Unit	40 µm Particle Size	120 µm Particle Size
LRC Cartridges			
100 mg, 10 mL	50/pk	12113001	14113001
200 mg, 10 mL	50/pk	12113024	14113024
500 mg, 10 mL	50/pk	12113027	14113027
Straight Barrel Cartridges			
50 mg, 1 mL	100/pk	12102058	14102058
50 mg, 3 mL	50/pk	12105027	
100 mg, 1 mL	100/pk	12102001	14102001
100 mg, 3 mL	50/pk	12102099	
200 mg, 1 mL	100/pk	12102096	
200 mg, 3 mL	50/pk	12102025	14102025
500 mg, 3 mL	50/pk	12102028	14102028
500 mg, 6 mL	30/pk	12102052	14102052
1 g, 3 mL	50/pk	12102118	
1 g, 6 mL	30/pk	12256001	14256001
1 g, 60 mL	16/pk	12256060	
2 g, 12 mL	20/pk		14256015
5 g, 20 mL	20/pk		14256023
10 g, 60 mL	16/pk		14256031
Bond Elut Jr			
500 mg	100/pk	12162028B	
1 g	100/pk	12166001B	
Other Formats			
Prospekt cartridge, 800 Series	96/pk	12281001	
Prospekt cartridge, 800 Series, 1 mm	96/pk	12281024	
100 mg, 3 mL, Gerstel format	50/pk	161818G	
200 mg, 3 mL, Gerstel format	50/pk	161822G	
500 mg, 3 mL, Gerstel format	50/pk	161832G	

VersaPlate Formats

Description	Particle Size			
	(µm)	25 mg	50 mg	100 mg
Preassembled 96-well plate	40		75401050	7540101C
VersaPlate tubes, 96/pk	40	75501025	75501050	7550101C
	120		75502050	



Bond Elut C18 EWP

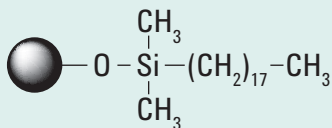
- No exclusion of large molecules
- Good for desalting proteins
- Successful separation of proteins, peptides or nucleotides

Bond Elut EWP is based on standard particle size silica but with 500Å pores to allow more efficient extraction of large molecules (>15,000 MW), which are typically excluded from standard porosity silica phases.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous samples, biological fluids	Non-polar	Extra wide pore for larger, macro molecules up to 15 kDa

Bond Elut C18 EWP

Description	Unit	Part No.
LRC Cartridges		
50 mg, 10 mL	50/pk	12113068
500 mg, 10 mL	50/pk	12113071
Straight Barrel Cartridges		
50 mg, 1 mL	100/pk	12102136
100 mg, 1 mL	100/pk	12102137
500 mg, 3 mL	50/pk	12102139



Bond Elut C18 OH

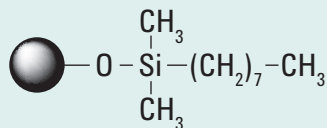
- Silanol activity permits metabolite fractionation
- Tight QC tolerances deliver batch-to-batch reproducibility
- 150Å pore size expands utility to higher molecular weight compounds

Bond Elut C18 OH is a non-encapped version of the octadecyl bonded phases that enables the silanols on the silica surface to be more active. This low-load C18 has well-controlled silanol activity that permits the fractionation of metabolites and enhances retention of basic compounds compared to an encapped C18.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous samples, biological fluids, non-polar extracts	Non-polar, hydrogen bonding	Vitamin D, fat-soluble compounds, steroids/hormones

Bond Elut C18 OH

Description	Unit	Part No.
Straight Barrel Cartridges		
100 mg, 1 mL	100/pk	12102020
500 mg, 3 mL	50/pk	12102046
1 g, 6 mL	30/pk	12256040



Bond Elut C8

- Excellent for strongly-retained analytes
- Polar interactions not significant
- Less retentive than C18

Bond Elut C8 is very similar in property to C18, but is not as retentive for non-polar compounds, due to its shorter hydrocarbon chain, and therefore reduced carbon loading. C8 is an excellent replacement for C18 when analytes are too strongly retained for effective elution. The potential for polar interactions is somewhat higher than for C18 because there is less coverage of the silica surface. These polar interactions are not, however, a significant property of C8.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous samples, biological fluids	Non-polar	Non-polar compounds

Bond Elut C8

Description	Unit	Part No.
Bond Elut Jr		
500 mg	100/pk	12162029B
LRC Cartridges		
100 mg, 10 mL	50/pk	12113002
200 mg, 10 mL	50/pk	12113025
500 mg, 10 mL	50/pk	12113028
Straight Barrel Cartridges		
50 mg, 1 mL	100/pk	12102059
50 mg, 3 mL	50/pk	12105028
100 mg, 1 mL	100/pk	12102002
100 mg, 3 mL	50/pk	12102100
200 mg, 3 mL	50/pk	12102026
500 mg, 3 mL	50/pk	12102029
500 mg, 6 mL	30/pk	12102053
1 g, 6 mL	30/pk	12256002
5 g, 20 mL	20/pk	12256024
10 g, 60 mL	16/pk	12256032

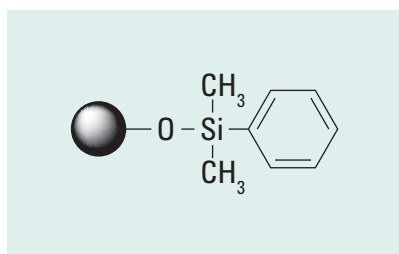
(Continued)

Bond Elut C8

Description	Unit	Part No.
Other Formats		
Prospekt cartridge, 800 Series	96/pk	12281002
Prospekt cartridge, 800 Series, 1 mm	96/pk	12281025
100 mg, 3 mL, Gerstel format	50/pk	161618G
200 mg, 3 mL, Gerstel format	50/pk	161622G
500 mg, 3 mL, Gerstel format	50/pk	161632G

VersaPlate Formats

Description	Particle Size (µm)	50 mg	100 mg
Preassembled 96-well plate	40		7540301C
VersaPlate tubes, 96/pk	40	75503050	7550301C

**Bond Elut PH**

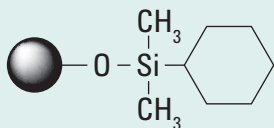
- Added selectivity compared to other non-polar sorbents
- Enhanced retention of planar, conjugated organic molecules
- Similar polarity to C8

Bond Elut PH is a non-polar bonded silica material which exhibits a different selectivity to alkyl or aliphatic functionalized phases such as C8 or cyclohexyl. The electron density present in the aromatic ring affords an enhancement in the retention of conjugated or aromatic ring-containing analytes due to desirable pi-pi interactions.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous and biological fluids	Non-polar	Strongly non-polar compounds, aromatics

Bond Elut PH

Description	Unit	40 µm Particle Size	120 µm Particle Size
LRC Cartridges			
100 mg, 10 mL	50/pk	12113005	14113005
500 mg, 10 mL	50/pk	12113031	14113031
Straight Barrel Cartridges			
50 mg, 1 mL	100/pk	12102062	14102062
100 mg, 1 mL	100/pk	12102005	14102005
500 mg, 3 mL	50/pk	12102032	14102032
1 g, 6 mL	30/pk	12256004	14256004



Bond Elut CH (cyclohexyl)

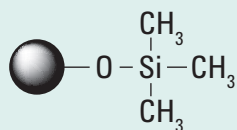
- Non-polar CH with polarity similar to C2
- Retains polar analytes from aqueous matrices
- Good choice when common non-polar sorbents do not provide the required selectivity

Bond Elut CH is a mid-polarity sorbent that exhibits unique selectivities for certain analytes. When employed as a non-polar sorbent, CH has the approximate polarity of a C2 sorbent. Bond Elut CH is often a good choice when non-polar sorbents such as C18, C8, or C2 do not provide the desired selectivity.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous samples, biological fluids	Non-polar	Non-polar compounds

Bond Elut CH (cyclohexyl)

Description	Unit	Part No.
LRC Cartridges		
500 mg, 10 mL	50/pk	12113032
Straight Barrel Cartridges		
50 mg, 1 mL	100/pk	12102063
100 mg, 1 mL	100/pk	12102006
500 mg, 3 mL	50/pk	12102033
1 g, 6 mL	30/pk	12256005
2 g, 12 mL	20/pk	12256039



Bond Elut C1

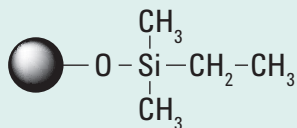
- Least retentive of all alkyl group bonded phases
- Easy retention and release of polar compounds
- Easy retention and release of multi-functional compounds

Due to the methyl group and subsequent low carbon load, Bond Elut C1 is the least retentive of all alkyl group bonded phases for non-polar compounds. However, due to the extensive endcapping of this sorbent to mask polar silanol activity, retention and elution of polar and multi-functional analytes can still be achieved.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Urine, plasma, biological fluids	Non-polar, polar (as a normal phase extraction)	Strongly non-polar compounds

Bond Elut C1

Description	Unit	Part No.
LRC Cartridges		
100 mg, 10 mL	50/pk	12113004
300 mg, 10 mL	50/pk	12113053
500 mg, 10 mL	50/pk	12113030
Straight Barrel Cartridges		
50 mg, 1 mL	100/pk	12102061
100 mg, 1 mL	100/pk	12102004
100 mg, 3 mL	50/pk	12102090
500 mg, 3 mL	50/pk	12102031



Bond Elut C2

- Low carbon load sorbent
- Can be used alongside CN and C8 phases
- Popular for drug extraction from plasma and for flat baselines

Bond Elut C2 is a fairly non-polar sorbent because of the short chain length of the functional group. C2 is often used during the process of method development if analytes are retained too strongly on a C8 or C18 phase. The polarity of C2 is slightly lower than a cyano phase for polar interactions.

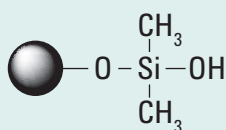
Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous samples, biological fluids	Non-polar	Strongly non-polar compounds

Bond Elut C2

Description	Unit	Part No.
Straight Barrel Cartridges		
50 mg, 1 mL	100/pk	12102060
50 mg, 3 mL	50/pk	12105029
100 mg, 1 mL	100/pk	12102003
100 mg, 3 mL	50/pk	12102117
200 mg, 3 mL	50/pk	12102027
500 mg, 3 mL	50/pk	12102030
500 mg, 6 mL	30/pk	12102115
1 g, 6 mL	30/pk	12256003

Normal Phase (Polar) Silica SPE

Normal phase sorbents are polar and used to retain (extract) polar analytes. For normal phase sorbents, retention decreases as the eluting solvent becomes more polar.



Bond Elut SI

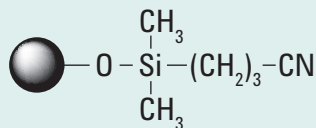
- Highly polar phase retains polar molecules from non-polar matrices
- High purity silica
- Separate compounds with very similar structures

Native silica is generally regarded as the most polar SPE sorbent available. Bond Elut SI is particularly effective at separating compounds with a very similar structure. Applying the analytes in a non-polar solvent, then increasing the solvent polarity by increasing the concentration of a polar modifier, such as THF or ethyl acetate, delivers effective separations.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Non-polar organics, oils, lipids	Polar	Cleanup of polar impurities

Bond Elut SI

Description	Unit	40 μm Particle Size	120 μm Particle Size
LRC Cartridges			
100 mg, 10 mL	50/pk	12113010	14113010
500 mg, 10 mL	50/pk	12113036	14113036
Straight Barrel Cartridges			
50 mg, 1 mL	100/pk	12102068	14102068
100 mg, 1 mL	100/pk	12102010	14102010
500 mg, 3 mL	50/pk	12102037	14102037
1 g, 6 mL	30/pk	12256008	14256008
1.5 g, 3 mL	50/pk	12102119	
2 g, 6 mL	30/pk		14256018
5 g, 20 mL	20/pk		14256026
10 g, 60 mL	16/pk		14256034
Bond Elut Jr			
500 mg	100/pk	12162037B	
1 g	100/pk	12166008B	
Other Formats			
500 mg, 3 mL, Gerstel format	50/pk	167232G	



Bond Elut CN-E

- Ideal for extracting aqueous analytes
- Retention in aqueous and organic matrices
- Useful for many applications

A medium polarity sorbent with many uses, Bond Elut CN-E is ideal for applications in which extremely non-polar compounds would be irreversibly retained on high carbon load sorbents such as C8 and C18. This endcapped version of the cyano sorbent is best utilized when extracting analytes from an aqueous matrix.

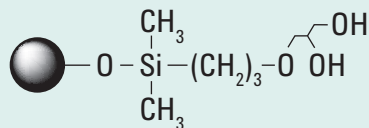
References

Pucci, V, Bugamelli, F, Mandrioli, R, Bartoletti, C, Rossi, N & Raggi, MA (2003) Liquid chromatographic analysis of the cis(Z)- and trans(E)-isomers of clopenthixol in human plasma using a novel solid phase extraction procedure. *J. Chromatogr. B.*, 792, 313-321.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous samples, biological fluids	Non-polar, dipole	Mid-range polarity compounds

Bond Elut CN-E

Description	Unit	Part No.
LRC Cartridges		
100 mg, 10 mL	50/pk	12113007
500 mg, 10 mL	50/pk	12113033
Straight Barrel Cartridges		
50 mg, 1 mL	100/pk	12102064
100 mg, 1 mL	100/pk	12102007
500 mg, 3 mL	50/pk	12102034
5 g, 20 mL	20/pk	12256025



Bond Elut Diol (20H)

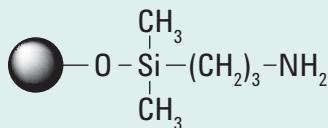
- Provides polar and non-polar modes
- Strong hydrogen bonding with analytes
- Resembles un-bonded silica in its capabilities

Bond Elut Diol resembles un-bonded silica in its tendency for strong hydrogen bonding with analytes. 20H can also be employed in the non-polar mode because the hydrocarbon spacer on its functional group provides enough non-polar character for retention of hydrophobic analytes. Bond Elut Diol is a listed SPE device for the DIN 14333-1 method on benzimidazole fungicides.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous, biological fluids, non-polar organics	Polar and non-polar	Polar, weakly non-polar

Bond Elut Diol (20H)

Description	Unit	Part No.
LRC Cartridges		
100 mg, 10 mL	50/pk	12113009
500 mg, 10 mL	50/pk	12113035
Straight Barrel Cartridges		
50 mg, 1 mL	100/pk	12102067
100 mg, 1 mL	100/pk	12102009
500 mg, 3 mL	50/pk	12102036
1 g, 6 mL	30/pk	12256007



Bond Elut NH2

- Normal phase or anion exchange sorbent
- Weaker anion exchange than SAX
- Amenable to separating structural isomers

Bond Elut NH2 is a weaker anion exchanger than sorbents such as SAX (a quaternary amine sorbent that is always charged) and is therefore a better choice for retention of very strong anions, such as sulfonic acids, which may retain irreversibly on a SAX sorbent. Similar to Diol and SI sorbents, Bond Elut NH2 is excellent for the separation of structural isomers.

References

Schenk, F, Lehotay, S, & Vega, V (2002)
Comparison of solid phase extraction sorbents for cleanup of pesticide residue analysis in fresh fruit and vegetables. J. Sep. Sci., 25, 883-890.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous, biological fluids, buffered organics	Weak anion exchange	Polar and non-polar strong anions, polar structural isomers

Bond Elut NH2

Description	Unit	40 μm Particle Size	120 μm Particle Size
LRC Cartridges			
100 mg, 10 mL	50/pk	12113014	14113014
200 mg, 10 mL	50/pk	12113067	
500 mg, 10 mL	50/pk	12113040	14113040
Straight Barrel Cartridges			
50 mg, 1 mL	100/pk	12102076	14102076
100 mg, 1 mL	100/pk	12102014	
200 mg, 3 mL	50/pk	12102089	
200 mg, 6 mL	30/pk	12102106	
300 mg, 3 mL	50/pk	12102108	
500 mg, 3 mL	50/pk	12102041	14102041
500 mg, 6 mL	30/pk	12256045	
1 g, 3 mL	50/pk	12102107	
1 g, 6 mL	30/pk	12256012	14256012
2 g, 12 mL	20/pk		14256020
5 g, 20 mL	20/pk		14256028
Bond Elut Jr			
500 mg	50/pk	12162041B	
1 g, 3 mL	50/pk	12166012B	
Other Formats			
200 mg, 3 mL, Gerstel format	50/pk	165022G	
500 mg, 3 mL, Gerstel format	50/pk	165032G	

VersaPlate Formats

Description	Particle Size (µm)	50 mg	100 mg
Preassembled 96-well plate	40	75405050	7540501C
VersaPlate tubes, 96/pk	40	75505050	7550501C

The isolation of lipids from serum and tissue**Extraction Method****Matrix:**

Chloroform extract of serum or adipose tissue

Sorbent Conditioning:

Hexane

Apply Sample:

Through Bond Elut NH2 cartridge

Elution 1:**(Neutral lipids)**

(All except fatty acids and phospholipids) – 2:1 chloroform:2 propanol

(Fatty acids)

2% acetic acid in diethyl ether

(Phospholipids)

Methanol

The neutral lipid fraction is then dried down, reconstituted in hexane, and passed through a second NH2 tube conditioned with hexane.

Elution 2:**(Cholesterol esters)**

Hexane

Another Bond Elut NH2 sorbent column is attached below the existing one to trap cholesterol that breaks through the first during triglyceride elution.

Elution 3:**(Triglycerides)**

Hexane containing 1% diethyl ether and 10% methylene chloride

The Bond Elut NH2 tubes are separated, cholesterol is eluted from both, and finally the di- and monoglycerides are eluted from the upper NH2 tube.

Elution 4:**(Cholesterol)**

5% ethyl acetate in hexane

(Diglycerides)

15% ethyl acetate in hexane

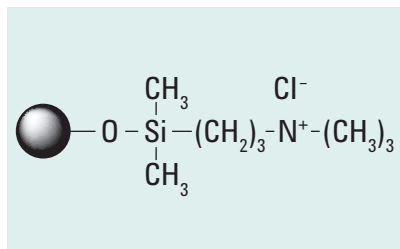
(Monoglycerides)

2:1 chloroform:methanol

Simpson, N & Van Horne, C (eds) (1993) The Handbook of Sorbent Extraction Technology. Varian, Inc., Walnut Creek CA, USA.

Ion Exchange Silica SPE

Ion exchange phases are more dependent on pH, ionic strength, and counter-ion strength than on solvent strength. These phases depend on ionic interactions as the primary retention mechanism.



Bond Elut SAX

- Retains compounds that elute from weak anion exchange sorbents
- Selectivity can be user-modified for increased flexibility
- Minimal non-polar interactions

Bond Elut SAX is a strong anion exchange sorbent ideally suited for the extraction of compounds such as carboxylic acids, which may not retain effectively on weak anion exchange sorbents.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous, biological fluids	Anion exchange	Weak acidic compounds

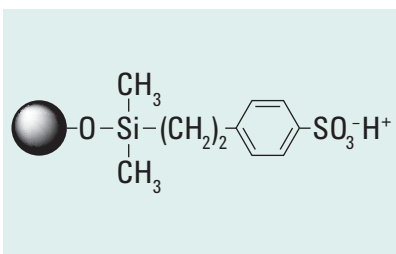


Bond Elut SAX

Description	Unit	40 μm Particle Size	120 μm Particle Size
LRC Cartridges			
100 mg, 10 mL	50/pk	12113017	14113017
500 mg, 10 mL	50/pk	12113043	14113043
Straight Barrel Cartridges			
50 mg, 1 mL	100/pk	12102079	14102079
100 mg, 1 mL	100/pk	12102017	14102017
100 mg, 3 mL	50/pk	12102125	
500 mg, 3 mL	50/pk	12102044	14102044
500 mg, 6 mL	30/pk	12102144	
1 g, 3 mL	50/pk	12102087	
1 g, 6 mL	30/pk	12256013	14256013
2 g, 6 mL	30/pk	12256051	
2 g, 12 mL	20/pk	12256021	14256021
5 g, 20 mL	20/pk	12256029	14256029
10 g, 60 mL	16/pk	12256037	14256037
Bond Elut Jr			
500 mg	100/pk	12162044B	
1 g	100/pk	12166013B	
Other Formats			
Prospekt cartridge, 800 Series	96/pk	12281022	

VersaPlate Formats

Description	Particle Size (μm)	50 mg
Preassembled 96-well plate	40	75408050
VersaPlate tubes, 96/pk	40	75508050



Bond Elut SCX

- Useful for compounds with both cationic and non-polar characteristics
- Superior cleanup from a single sorbent
- Very low pKa ligand elicits strong analyte interaction

Bond Elut SCX is a strong cation exchanger with a very low pKa. Although the pKa is similar to Bond Elut PRS, the presence of the benzene ring in the functional group increases the potential for non-polar interactions. This non-polar characteristic becomes particularly important when conducting ion exchange from aqueous systems, where selectivity towards compounds exhibiting cationic and non-polar character is seen.

References

Codony, R, Compañó, R, Granados, M, Garcia-Regueiro, JA & Dolores Prat, M (2002) Residue analysis of macrolides in poultry muscle by liquid chromatography-electrospray mass spectrometry. *J. Chromatogr. A*, 959, 131-141.

Horie, M, Saito, K, Ishii, R, Yoshida, T, Haramaki, Y & Nakazawa, H (1998) Simultaneous determination of five macrolide antibiotics in meat by high performance liquid chromatography. *J. Chromatogr. A*, 812, 295-302.

Stubbings, G, Tarbin, J, Cooper, A, Shaman, M, Bigwood, T & Robb, P (2005) A multi-residue cation-exchange clean up procedure for basic drugs in produce of animal origin. *Analyt. Chim. Acta*, 547, 262-268.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous, biological fluids, buffered organics	Cation exchange	Weak basic compounds

Bond Elut SCX

Description	Unit	40 μ m Particle Size	120 μ m Particle Size
LRC Cartridges			
100 mg, 10 mL	50/pk	12113013	14113013
500 mg, 10 mL	50/pk	12113039	14113039
Straight Barrel Cartridges			
50 mg, 1 mL	100/pk	12102075	14102075
100 mg, 1 mL	100/pk	12102013	14102013
100 mg, 3 mL	50/pk	12102098	
500 mg, 3 mL	50/pk	12102040	14102040
1 g, 6 mL	30/pk	12256011	14256011
1.5 g, 3 mL	50/pk	12102104	
2 g, 12 mL	20/pk	12256053	14256019
3 g, 6 mL	30/pk	12256054	
5 g, 20 mL	20/pk		14256027
10 g, 60 mL	16/pk		14256035

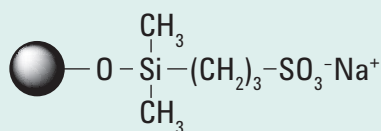
(Continued)

Bond Elut SCX

Description	Unit	40 µm Particle Size	120 µm Particle Size
Bond Elut Jr			
500 mg	100/pk	12162040B	
1 g	100/pk	12166011B	
Other Formats			
200 mg, 3 mL, Gerstel format	50/pk	167022G	

VersaPlate Formats

Description	Particle Size (µm)	50 mg	100 mg
Preassembled 96-well plate	40		7540701C
VersaPlate tubes, 96/pk	40	75507050	7550701C

**Bond Elut PRS**

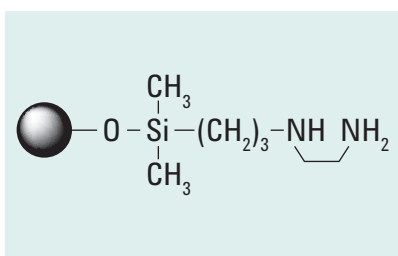
- Strong cation exchange sorbent, also capable of polar and hydrogen bonding interactions
- No appreciable non-polar interactions
- Unique selectivity properties

Bond Elut PRS is a strong cation exchange sorbent that is also relatively high in polarity. With no appreciable degree of hydrophobicity in non-polar solvents, PRS is capable of polar and hydrogen bonding interactions. Due to the very low pKa of PRS, it is recommended for weaker cationic species such as pyridinium compounds.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous, biological fluids, buffered organics	Cation exchange	Basic compounds (amine + pyridinium containing)

Bond Elut PRS

Description	Unit	Part No.
LRC Cartridges		
100 mg, 10 mL	50/pk	12113012
500 mg, 10 mL	50/pk	12113038
Straight Barrel Cartridges		
50 mg, 1 mL	100/pk	12102074
100 mg, 1 mL	100/pk	12102012
200 mg, 3 mL	50/pk	12102094
500 mg, 3 mL	50/pk	12102039
1 g, 6 mL	30/pk	12256010



Bond Elut PSA

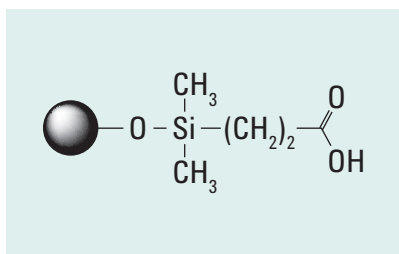
- Alternative choice to Bond Elut NH2 for polar compounds
- Higher ionic capacity than NH2

Bond Elut PSA is an alkylated amine sorbent that contains two different amino functionalities – one secondary and one primary. This gives a slightly higher pKa and ionic capacity compared to Bond Elut NH2. PSA has a significantly higher carbon load than most amino functional sorbents, thus is a better choice for polar compounds, which retain too strongly on Bond Elut NH2.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous, biological fluids, buffered organics	Strong anion exchange	Acidic compounds (Fruit acid removal for QuEChERS)

Bond Elut PSA

Description	Unit	Part No.
LRC Cartridges		
100 mg, 10 mL	50/pk	12113015
500 mg, 10 mL	50/pk	12113041
Straight Barrel Cartridges		
50 mg, 1 mL	100/pk	12102077
100 mg, 1 mL	100/pk	12102015
500 mg, 3 mL	50/pk	12102042
1 g, 6 mL	30/pk	12256140
2 g, 12 mL	20/pk	12256055
Bond Elut Jr		
500 mg	100/pk	12162042B
1 g	100/pk	12166050B



Bond Elut CBA

- Cation exchange with no need for extreme basic conditions
- Wider selectivity range provides more eluent options
- Polar or non-polar depending on matrix or solvent

CBA is a mid-polarity sorbent and weak cation exchanger (pKa 4.8). It can be used with a wider range of counter-ions than lower pKa sorbents like SCX, and will demonstrate easier elution of quaternary amine functionalized analytes.

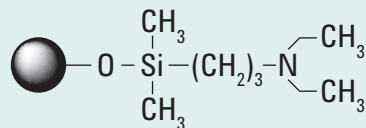
References

Murayama, N. & Sudo, K (1997) High performance liquid chromatographic method for determination of DX-9065a, a novel anticoagulant, in human urine and feces using cation-exchange solid-phase extraction. *J. Chromatogr. Biomed. Appl.*, 692, 389-396.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous samples, biological fluids	Weak anion exchange	Strong and weak acids

Bond Elut CBA

Description	Unit	Part No.
LRC Cartridges		
100 mg, 10 mL	50/pk	12113011
500 mg, 10 mL	50/pk	12113037
Straight Barrel Cartridges		
50 mg, 1 mL	100/pk	12102073
100 mg, 1 mL	100/pk	12102011
200 mg, 3 mL	50/pk	12102097
200 mg, 3 mL	50/pk	12102124
500 mg, 3 mL	50/pk	12102038
1 g, 6 mL	30/pk	12256009
2 g, 12 mL	20/pk	12256058



Bond Elut DEA

- Weak anion exchanger
- More polar than C8 but less polar than C2 or CN
- Alkyl side chains confer moderately non-polar characteristics

Bond Elut DEA bears some resemblance to Bond Elut NH2 in its properties but with a slightly lower capacity as an anion exchange sorbent. DEA has a moderately non-polar character due to the alkyl side chains on the amino functionality. These groups still afford a medium level of polarity, higher than C8 but less polar than C2 or CN-E.

References

Kline, W., Matuszewski, B & Bayne, W (1990) Determination of 4-amino-1-hydroxybutane-1, 1-bisphosphonic acid in urine by automated pre-column derivatization with 2,3-naphthalene dicarboxyaldehyde and high performance liquid chromatography with fluorescence detection. J. Chromatogr. Biomed. Appl., 534, 139-149.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Water, biological fluids, non-polar extracts	Weak cation exchange	Weak and strong basic compounds

Bond Elut DEA

Description	Unit	40 µm Particle Size	120 µm Particle Size
LRC Cartridges			
100 mg, 10 mL	50/pk	12113016	14113016
500 mg, 10 mL	50/pk	12113042	14113042
Straight Barrel Cartridges			
50 mg, 1 mL	100/pk	12102078	14102078
100 mg, 1 mL	100/pk	12102016	14102016
500 mg, 3 mL	50/pk	12102043	14102043

VersaPlate Formats

Description	Particle Size (µm)	50 mg	100 mg
Preassembled 96-well plate	40		7540701C
VersaPlate tubes, 96/pk	40	75507050	7550701C

Mixed Mode Silica SPE

Bond Elut AccuCAT

- SCX and SAX functionalities offer broad analyte extraction potential
- Ultra clean, mixed sorbent bed delivers reproducible extractions
- Compatible with many biological fluids for easy method transfer

Bond Elut AccuCAT cartridges are mixed bed SPE cartridges consisting of a strong cation exchange (SCX) and a strong anion exchange (SAX) sorbent packed into one bed. AccuCAT is effective for the extraction of acidic, basic and neutral analytes from urine and other biological samples. AccuCAT is particularly effective for catecholamine extraction from bio-fluids.

References

Andrzejewski, D, Roach, JAG, Gay, ML and Musser, SM (2004) Analysis of coffee for the presence of acrylamide by LC-MS/MS. *J. Agric. Food Chem.*, 52, 1996-2002.

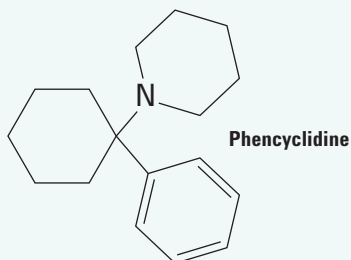
Lenders, JW, Eisenhofer, G, Armando, I, Keiser, HR, Goldstein, DS and Kopin, IJ (1993) Determination of metanephrines in plasma by liquid chromatography with electrochemical detection. *Clin. Chem.*, 39, 97-103.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Urine, plasma and biological fluids, beverages and food	Strong cation and anion exchange	Catecholamines, acrylamide in liquids and food

Bond Elut AccuCAT

Description	Unit	Part No.
LRC Cartridges		
200 mg, 10 mL	60/pk	12282005
600 mg, 10 mL	60/pk	12282001
Straight Barrel Cartridges		
200 mg, 3 mL	60/pk	12282003
200 mg, 6 mL	30/pk	12282004
400 mg, 6 mL	30/pk	12282006
600 mg, 3 mL	60/pk	12282002

Extraction of phencyclidine (PCP) from human urine using Bond Elut Certify



Sorbent Conditioning:

100% MeOH then 0.1 M phosphate buffer, pH 6.0

Sample Treatment:

To 5 mL urine, add 2 mL 0.1 M phosphate buffer, pH 6.0, and matrix spike standard. Vortex, check that pH lies between 5.0 and 7.0. Pass through sorbent at <4 mL/min flow rate.

Interference Wash:

1. 1 mL 1.0 M AcOH then dry sorbent under vacuum for 5 min
2. 6 mL MeOH, dry sorbent for 2 min

Analyte Elution:

2 mL 2% NH₄OH in EtOAc

Bond Elut Certify

- Special mixed-mode sorbent bed
- Broad application range for aqueous extraction
- Bimodal, non-polar and strong cation exchange

The Bond Elut Certify extraction cartridge is a mixed mode sorbent containing non-polar C8 strong cation exchanger functionalities. Certify is most commonly used to extract basic (cationic) drugs from urine and blood, but it is also very effective for extraction of a wide range of compounds from a diverse range of aqueous matrices.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Urine, plasma, saliva, blood, biological fluids	Non-polar and strong cation exchange	Basic drugs, basic drugs of abuse

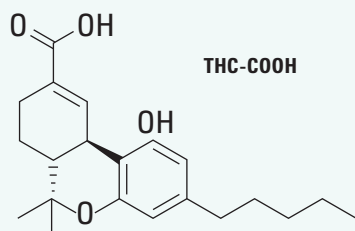
Bond Elut Certify

Description	Unit	40 µm Particle Size	120 µm Particle Size
LRC Cartridges			
130 mg, 10 mL	50/pk	12113050	14113050
200 mg, 10 mL	50/pk	12113054	14113054
300 mg, 10 mL	50/pk	12113052	14113052
Straight Barrel Cartridges			
50 mg, 3 mL	50/pk	12105030	
100 mg, 3 mL	50/pk	12102051	14102051
100 mg, 6 mL	30/pk	12256146	
200 mg, 3 mL	50/pk	12102145	
200 mg, 6 mL	30/pk	12256145	
300 mg, 3 mL	50/pk	12102081	
300 mg, 6 mL	30/pk	12102082	
500 mg, 6 mL	30/pk	12102093	14102093
1 g, 6 mL	30/pk	12102085	14102085
Other Formats			
Prospekt cartridge, 800 Series	96/pk	12281101	

VersaPlate Formats

Description	Particle Size (µm)	25 mg	50 mg	100 mg
Preassembled 96-well plate	40		75409050	7540901C
VersaPlate tubes, 96/pk	40	75509025	75509050	7550901C

Extraction of THC-COOH from human urine using Bond Elut Certify II



Sorbent Conditioning:

100% methanol then 0.1 M acetate buffer, pH 7.0

Sample Treatment:

To 6 mL urine, add 300 μ L 10 M potassium hydroxide and matrix spike standard. Vortex, hydrolyze at 60°C for 15 min, cool. Add 165 μ L glacial acetic acid and 2 mL 95% 0.1 M acetate buffer/5% MeOH, pH 7.0. Adjust sample pH to between 4.5 and 6.5 with glacial acetic acid. Pass through sorbent at < 4 mL/min flow rate.

Interference Wash:

- 10 mL 50:50 H₂O/MeOH, then dry sorbent under vacuum for 10 min
- 2 mL EtOAc, dry sorbent for 0.5 min

Analyte Elution:

2 mL 1% AcOH in 25% EtOAc/75% hexane

Bond Elut Certify II

- Ideal for non-polar and anionic compounds
- Optimized for acidic drug analysis
- Bimodal, non-polar and strong anion exchange

Bond Elut Certify II was developed specifically for the rapid and effective extraction of acidic drugs and metabolites from urine and other biological matrices. Certify II is a mixed-mode cartridge with non-polar C8 and strong anion exchange (SAX) functionalities. It has been optimized for acidic drugs such as 11-nor- Δ -9-tetrahydrocannabinol-carboxylic acid, salicylic acid, ibuprofen, acetaminophen and other compounds that possess both non-polar and anionic characteristics.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Urine, plasma, saliva, blood, biological fluids	Non-polar and strong anion exchange	Acidic drugs, acidic drugs of abuse

Bond Elut Certify II

Description	Unit	40 μ m Particle Size	120 μ m Particle Size
LRC Cartridges			
100 mg, 10 mL	50/pk	12113063	
200 mg, 10 mL	50/pk	12113051	14113051
Straight Barrel Cartridges			
50 mg, 3 mL	50/pk	12105031	
200 mg, 3 mL	50/pk	12102080	14102080
500 mg, 6 mL	30/pk	12102084	14102084
1 g, 6 mL	30/pk	12102088	14102088
Other Formats			
Prospekt cartridge, 800 Series	96/pk	12281102	

Inorganic SPE

The following SPE phases have varying degrees of polarity and surface acidity or basicity. They are primarily used to retain polar analytes. For these phases, solvent retention generally decreases as the solvent becomes more polar.

Bond Elut Florisil

- Pesticide Residue (PR) grade
- For cleanup of polar interferences from non-polar samples
- Economical
- Fast flow, ideal for viscous samples

Florisil is a magnesia-loaded silica gel. Like silica, it is extremely polar in nature and ideal for the isolation of polar compounds from non-polar matrices. The larger particle size of the sorbent enables fast flow for large sample volumes and is therefore an attractive alternative to silica if the sample matrix is particularly viscous.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Non-polar organics	Polar compounds	Organic extracts, non-polar environmental extracts

Bond Elut Florisil

Description	Unit	Part No.
LRC Cartridges		
500 mg, 10 mL	50/pk	12113049
Straight Barrel Cartridges		
100 mg, 1 mL	100/pk	12102024
500 mg, 3 mL	50/pk	12102050
1 g, 3 mL	50/pk	12102109
1 g, 6 mL	30/pk	12256014
1 g, 20 mL	20/pk	12256047
2 g, 12 mL	20/pk	12256022
2 g, 20 mL	20/pk	12256046
5 g, 20 mL	20/pk	12256030
10 g, 60 mL	16/pk	12256038
Bond Elut Jr		
500 mg, 100/pk	100/pk	12162050B
1 g, 100/pk	100/pk	12166014B
Other Formats		
500 mg, 3 mL, Gerstel format	50/pk	164632G

Bond Elut Alumina

- Available in acidic (A), basic (B) and neutral (N) formats
- High extraction efficiency
- Better high pH stability than unfunctionalized silica

Alumina, like silica, is an extremely polar sorbent. The alumina surface tends to be slightly more stable under high pH conditions than unfunctionalized silica. The small particle size of the Bond Elut Alumina range ensures high extraction efficiency even when small bed masses are used.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Non-polar organics	Polar	Polar cleanup

Bond Elut Alumina A

Description	Unit	Part No.
Straight Barrel Cartridges		
50 mg, 1 mL	100/pk	12102069
500 mg, 3 mL	50/pk	12102047
1 g, 6 mL	30/pk	12256043

Bond Elut Alumina B

Description	Unit	Part No.
Straight Barrel Cartridges		
500 mg, 3 mL	50/pk	12102048
1 g, 6 mL	30/pk	12256044
Bond Elut Jr		
500 mg	100/pk	12162048B

Bond Elut Alumina N

Description	Unit	Part No.
LRC Cartridges		
500 mg	50/pk	12113048
Straight Barrel Cartridges		
100 mg, 1 mL	100/pk	12102023
500 mg, 3 mL	50/pk	12102049
20 g, 60 mL	16/pk	12256059
Bond Elut Jr		
500 mg	100/pk	12162049B
1 g	100/pk	12166045B

Bond Elut Sodium Sulfate Drying Cartridges

- Highly effective pre-packed desiccant
- Clean ACS grade, anhydrous sodium sulfate
- Pre-packed for convenience

Simplify sodium sulfate mediated drying steps by using cartridges pre-packed with ACS grade, granular anhydrous sodium sulfate. Available in three formats (LRC, Bond Elut Jr and straight barrels).

Bond Elut Jr cartridges have top and bottom luer fittings allowing easy sample processing when used in conjunction with standard SPE cartridges. Bond Elut LRC cartridges have a large reservoir above the sorbent bed and are suitable for use on any standard SPE vacuum manifold.

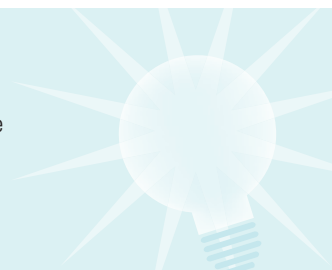
Bond Elut Sodium Sulfate Drying Cartridges

Description	Unit	Part No.
LRC Cartridges		
1 g, 10 mL	100/pk	12131033
Straight Barrel Cartridges		
15 g, 60 mL	100/pk	12132004
Bond Elut Jr		
1.4 g	100/pk	12162052B
2.2 g	100/pk	12162054B
3 g	100/pk	12162051B

Tips & Tools

Agilent offers Bond Elut Adapters compatible with these tube formats.

Turn to page 212.



Specialty SPE

Bond Elut Carbon

- Excellent retention for small organics, including those that are too polar to retain on C18 or polymeric SPE
- Removal of chlorophyll and other pigments leads to fewer chromatographic or mass interferences
- Broader retention and easier elution of analytes across the polarity range, for improved multi-residue analysis

Bond Elut Carbon cartridges are packed with ultra-pure graphitized carbon particles that have been optimized for the absorption of pigments in food, fruits and vegetables, and small organic residues in waste water. The powerful retention mechanisms of these products are appropriate for a broad range of analytes. In addition, careful manufacturing techniques result in lower carbon fines on the wall of the device.

References

Japanese Positive List System for Agricultural Chemical Residues in Food. <http://www.ffcr.or.jp>

EPA Method 535: Measurement of Chloroacetanilide and Other Acetamide Herbicide Degradates In Drinking Water By Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS).

Typical Matrices	Primary Extraction Mechanism	Compound Types
Organic plant and tissue extracts	Wide range non-polar retention	Cleanup of pigments and endogenous plant extracts for pesticide and herbicide analysis

Bond Elut Carbon

Description	Unit	Part No.
Straight Barrel Cartridges		
50 mg, 1 mL	100/pk	126414
100 mg, 1 mL	100/pk	126418
250 mg, 6 mL	30/pk	12102201
500 mg, 6 mL	30/pk	12252201

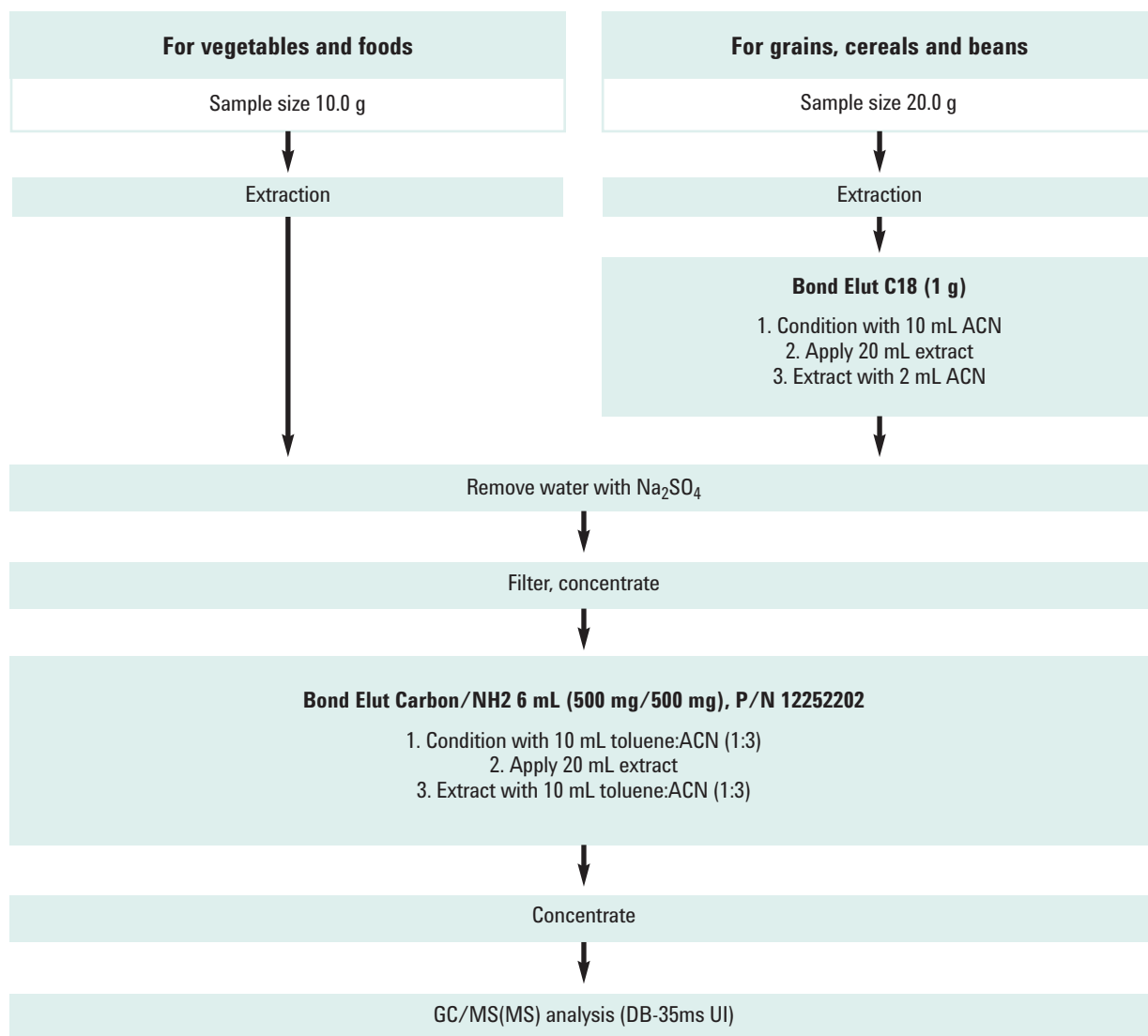
Bond Elut Carbon/NH2

Description	Unit	Part No.
Straight Barrel Cartridges		
500/500 mg, 6 mL	30/pk	12252202
500/500 mg, 20 mL	20/pk	3664325032

Bond Elut Carbon/PSA

Description	Unit	Part No.
Straight Barrel Cartridges		
250/250 mg, 3 mL	50/pk	12102042C250
500/500 mg, 6 mL	30/pk	12102042C500



Method for the simultaneous monitoring of pesticide residues in agricultural products – extraction, refining (cleanup) and quantitative analysis

Bond Elut Atrazine

- Large particle size allows flow of large sample volumes
- Controlled carbon content enhances atrazine selectivity
- Large bed mass offers optimized capacity for atrazine

Bond Elut Atrazine is a specially bonded, low load, high-flow C18 phase designed for atrazine extraction. Methods are fast, reproducible and require minimal organic solvent consumption.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Water sources	Non-polar	Atrazine and atrazine by-products

Bond Elut Atrazine

Description	Unit	120 μ m Particle Size
Straight Barrel Cartridges		
3 g, 20 mL	20/pk	12256111

Bond Elut Cellulose

- High purity micro-granular cellulose with high α -cellulose content
- Stable across a broad pH range
- Extremely low metal content (Fe, Cu <5 ppm)

Bond Elut Cellulose columns use a pure micro-granular cellulose powder that is packed between two 20 μ m polyethylene frits. The cellulose phase is very stable over a wide pH range with extremely low metal content. The combination of surface area and polymeric structure results in a sorbent with excellent capacity. The cellulose media contains numerous hydroxyl groups; because of its polar nature, it is able to accept high loading of many polar substances from aqueous and organic phases.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous and non-polar organics	Polar (Hydroxyl)	Polar impurities/compounds

Bond Elut Cellulose

Description	Unit	Part No.
Straight Barrel Cartridges		
300 g, 3 mL	500/pk	12102095

Bond Elut PCB

- Optimized bed mass affords excellent extraction reproducibility
- Special dual-phase enhances PCB selectivity
- All extractions can be completed with one solvent to simplify procedures

Bond Elut PCB is a specially designed sorbent which allows for the easy extraction of polychlorinated biphenyl (PCB) compounds from a variety of matrices. Desired analytes can be loaded and eluted using a simple, single solvent method prior to analysis by GC/ECD.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Water sources	Non-polar	PCBs

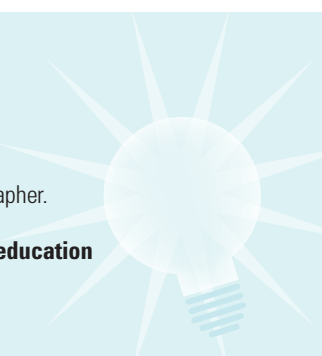
Bond Elut PCB

Description	Unit	Part No.
Straight Barrel Cartridges		
1 g, 3 mL	50/pk	12105032

Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatographer.

For more information, visit www.agilent.com/chem/education



Bond Elut Mycotoxin

- Simple methodology saves time and increases throughput
- Use with a broad range of food matrices
- Economic and time-saving alternative to immunoaffinity techniques

Bond Elut Mycotoxin is a novel sorbent which cleans up food extracts for improved trichothecene and zearalenone analysis. Results are comparable or superior to competing methods, including immunoaffinity columns (IAC) and charcoal/alumina columns. The sorbent is a proprietary silica-based ion exchange material.

The Bond Elut Mycotoxin method for extraction and cleanup is successful with a variety of food and grain sample types, including wheat, corn, durum, oats, bread, muesli and infant food.

Bond Elut Mycotoxin is easy to use and acts in a selective non-retention way – the toxin analytes pass through the cartridge while the food matrix components are retained.

References

Kiötzel, M, Lauber, U & Humpf, H-U (2006) A new solid phase extraction clean-up method for the determination of 12 type A and B trichothecenes in cereals and cereal-based food by LC-MS/MS. *Mol. Nutr. Food Res*, 50, 261-269.

Bretz, M, Beyer, M, Cramer, B & Humpf, H-U (2006) Stable isotope dilution analysis of the fusarium mycotoxins deoxynivalenol and 3-acetyldeoxynivalenol. *Mol. Nutr. Food Res.*, 50, 251-260.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous and polar organic grain extracts (beer, wine, sake)	Ionic cleanup	Mycotoxins (trichothecenes and zearalenones)

Bond Elut Mycotoxin

Description	Unit	Part No.
500 mg, 3 mL	50/pk	12102167
Bond Elut Jr		
500 mg	100/pk	12165001B

General Mycotoxin Methods

For Solids

1. Finely grind 25 g sample and extract with a solution of 100 mL acetonitrile/water (80:20) by blending at high speed for 3 min. For simultaneous determination of zearalenone, spike extract at a level of 50 ng/g sample with zearalenone (ZAN) solution in acetonitrile internal standard. Filter.
2. Pass 4 mL of the filtrate through a Bond Elut Mycotoxin column.
3. Evaporate 2 mL of eluate to dryness at 50°C under a gentle stream of nitrogen.
4. Reconstitute in 0.5 mL ACN/H₂O (1:4; v/v). Inject 10 µL into LC for analysis.

For Beverages

1. Sonicate the beverage sample for 30 min. Filter.
2. Pass 4 mL of the filtrated sample extract through a Bond Elut Mycotoxin cartridge.
3. Evaporate 2 mL of the eluate to dryness at 50°C under a gentle stream of nitrogen.
4. Reconstitute in 0.5 mL ACN/H₂O (20/80; v/v).
5. Inject into LC/MS/MS.

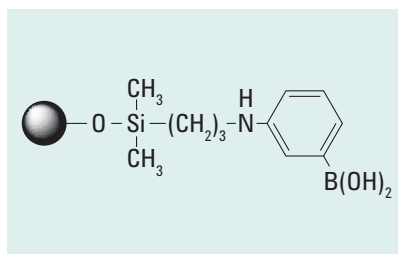
Wheat beer

Mycotoxin	% Recovery		% RSD	
	35 ng/g	350 ng/g	35 ng/g	350 ng/g
DON	92.0	95.5	2.6	1.5
ZEA	116.0	101.9	6.1	1.3
T-2	61.3	60.1	12.6	1.1
HT-2	81.8	76.1	5.6	1.4

Sake wine

Mycotoxin	% Recovery		% RSD	
	35 ng/g	350 ng/g	35 ng/g	350 ng/g
DON	94.3	96.8	7.4	0.5
ZEA	99.3	99.8	1.3	0.8
T-2	101.3	66.0	1.3	0.9
HT-2	113.9	111.0	8.3	1.0

This application shows the optimized extraction and cleanup of type A- and B-trichothecenes [deoxynivalenol [DON], HT-2 toxin [HT-2], T-2 toxin [T-2] and zearalenone (ZEA).



Bond Elut PBA

- Unique phenylboronic acid sorbent
- High specificity for cis-diol compounds
- Amenable for a broad range of bio-molecule applications

Bond Elut PBA is a unique silica SPE sorbent containing a phenylboronic acid functionality that can retain analytes via a reversible covalent bond. This very strong covalent retention mechanism enables high specificity and cleanliness. The boronate group has a strong affinity for cis-diol containing compounds such as catechols, nucleic acids, some proteins, carbohydrates and PEG compounds. Aminoalcohols, alpha-hydroxy amides, keto compounds, and others can also be retained.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Plasma, urine, aqueous and biological fluids	Covalent bonding	cis-diol-containing compounds, catecholamines, ribonucleotides, amino alcohols, diketo and triketo compounds

Bond Elut PBA

Description	Unit	Part No.
LRC Cartridges		
100 mg, 10 mL	50/pk	12113018
Straight Barrel Cartridges		
100 mg, 1 mL	20/pk	12102018
100 mg, 1 mL	100/pk	12102019
500 mg, 6 mL	30/pk	12102105

Generic Method

Condition:

1. 70:30 H₂O:ACN with 1% TFA
2. 50 mM phosphate buffer (pH 10)

Sample Addition:

Sample should be buffered to pH 8.5 with 50 mM phosphate buffer

Interference Wash:

10 mM phosphate buffer (pH 8.5) with 5% ACN

Analyte Elution:

70:30 H₂O:ACN with 1% TFA

Compound Class

Examples

Polyhydroxy	Mannitol, fructose-6-phosphate, CDP-ethanol-amine, glycoproteins
Aromatic O-dihydroxy	Catechols, tannins, epinephrine
α-Hydroxy acids	Lactate, 6-phospho-gluconate
Aromatic O-hydroxy acids and amines	Salicylate, salicylamide
1,3-Dihydroxy	Tris, pyridoxine
Diketo & triketo	Dehydroascorbic acid, benzil, alloxan
Other dihydroxys	Steroids, prostaglandins

EnvirElut

- Extreme purity offers cleanliness in extract
- High capacity allows for the processing of large sample volumes
- Broad compound specificity

EnvirElut sorbents are specially designed for the extraction of a wide range of compounds from aqueous matrices. EnvirElut Herbicides, PAH and Pesticides are available in standard SPE straight barrel cartridges, which can be used on conventional Vac Elut vacuum manifolds.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Water sources, extracted soil samples	Non-polar	Pesticide and industrial chemical residues

EnvirElut

Description	Unit	Part No.
Straight Barrel Cartridges		
50 mg, 3 mL (Herbicide)	50/pk	12272006
100 mg, 6 mL (PAH)	30/pk	12272005
500 mg, 6 mL (Pesticide)	30/pk	12272004

Diatomaceous Earth Sorbents

Chem Elut and Hydromatrix

- High purity sorbent supported liquid extraction (SLE) applications
- Available in pre-packed cartridges or bulk
- Packing method delivers excellent tube-to-tube reproducibility

Chem Elut is an economical broad performance sorbent for rapid, general sample preparation of biological samples such as plasma, serum, whole blood and urine. Chem Elut products are available in buffered and unbuffered formats. The buffered devices can be used for simple scrubbing operations on organic reactions. The base-treated cartridge can remove residual acid compounds from a variety of matrices.

Hydromatrix is a high purity, inert diatomaceous earth sorbent available in 96-well plates and as bulk material, offering end user flexibility and an excellent diversity of applications.

References

Plum, J & Daldrup, T (1986) Detection of digoxin, digitoxin, their cardioactive metabolites and derivatives by high performance liquid chromatography and high performance liquid chromatography radioimmunoassay. *J. Chromatogr. A*, 377, 221-231.

Biondi, PA, Guidotti, L, Montana, M, Manca, F, Brambilla, G & Lucarelli, C (1991) A derivatization procedure suitable for HPLC analysis of clenbuterol. *J. Chromatogr. Sci.*, 29(5), 190-193.

Raou, S, Gremaud, E, Biaudet, J & Turesky, R (1997) Rapid solid-phase extraction method for the detection of volatile nitrosamines in food. *J. Agricultural and Food Chem.*, 45, 4706-4713.

European method for azodyes in manufactures, EN 1471.

Typical Matrices	Primary Extraction Mechanism	Compound Types
Aqueous, biological fluids, organic reaction mixtures (scavenging)	Solid supported LLE	Nitrosamines, pesticides, herbicides

Chem Elut Cartridges

Buffered pH	Volume (mL)	Unit	Part No.
4.5	3	100/pk	12198004
9.0	3	100/pk	12198005
Unbuffered	0.3	100/pk	12198001
	1	100/pk	12198002
	3	100/pk	12198003
	5	100/pk	12198006
	10	100/pk	12198007
	20	100/pk	12198008
	50	50/pk	12198009
	100	25/pk	12198010
	300	15/pk	12198011



Combilute plate, 200 mg, 65401507

Hydromatrix

Description	Part No.
Hydromatrix bulk material, 1 kg	198003
Hydromatrix bulk material, 4 kg	198004

Other Formats

Description	Part No.
Combilute plate, 200 mg	65401507
Preassembled 96-well plate	75430260
VersaPlate tubes, 96/pk	75530260

Bulk SPE

Bondesil Bulk Sorbents

- Ideal for dispersive cleanup techniques
- Advanced bonding offers reproducible batch-to-batch performance
- Multi-kilo quantities available upon request

Bondesil Bulk Sorbents

Description	Particle Size (μm)	Unit	Part No.
2OH (Diol)	40	100 g	12213030
Alumina-N	25	1000 g	12213073
C18	40	10 g	12213011
	40	100 g	12213012
	40	1000 g	12213013
	120	100 g	14213012
	120	1000 g	14213013
C18 OH	40	100 g	12213049
C2	40	100 g	12213006
C8	40	100 g	12213009
CBA	40	100 g	12213033
CN-E	40	100 g	12213061
DEA	40	100 g	12213047
ENV (polymeric)	125	100 g	12216061
EnvirElut	40	100 g	12214016
	40	1000 g	12214019
FL	200	100 g	12214013
	200	1000 g	12214015
NH2	40	10 g	12213020
	40	100 g	12213021
	120	100 g	14213021
PH	40	100 g	12213015
PRS	40	100 g	12213036
PSA	40	10 g	12213023
	40	100 g	12213024
	40	1000 g	12213025
	40	100 g	12213042
SAX	40	100 g	12213042
	40	1000 g	12213043
SCX	40	100 g	12213039
	40	1000 g	12213040
	120	100 g	14213039
SI	40	500 g	12213001

Mega Bond Elut Flash

- Convenient disposable cartridges eliminate the need for packing glass columns
- Flexible "open" tube design for either liquid or solid samples
- Reliable, consistent flow characteristics deliver high-resolution performance

Mega Bond Elut Flash cartridges offer excellent levels of performance and productivity for the purification of organic compounds, but also for scale-up, solid phase extraction. Pre-packed, disposable cartridges offer greater convenience than glass columns that require washing, drying and re-packing after every sample.

Mega Bond Elut Flash

Description	Sorbent Mass (g)	Volume (mL)	Unit	40 μ m Particle Size
C18	1	60	16/pk	12256060
	2	12	20/pk	12256015
	5	20	20/pk	12256023
	10	60	16/pk	12256031
	20	60	16/pk	12256078
	25	150	8/pk	12256079
	50	150	8/pk	12256080
	75	150	8/pk	12256081
NH2	2	12	20/pk	12256020
	5	20	16/pk	12256028
	10	60	16/pk	12256036
	20	60	16/pk	12256074
	25	150	8/pk	12256075
	50	150	8/pk	12256076
	70	150	8/pk	12256077
SCX	20	60	16/pk	12256066
	25	150	8/pk	12256070
	50	150	8/pk	12256072
	70	150	8/pk	12256073
SI	2	12	20/pk	12256018
	5	20	20/pk	12256026
	10	60	16/pk	12256034
	15	60	16/pk	12256068
	20	150	16/pk	12256042
	25	150	8/pk	12256069
	50	150	8/pk	12256067
	70	150	8/pk	12256071



Bond Elut 96 Round-well plates

Bond Elut Accessories

Bond Elut 96 Round-well Plates

- Available with many of our most popular Bond Elut sorbents
- Fast revalidation of cartridge to 96-well SPE methods
- Low-profile, automation-friendly design

Conversion of cartridge-based methods to an automation-friendly 96-well format has never been easier or faster. The same trusted silica-based sorbents in Bond Elut cartridge products are now available in the streamlined Bond Elut 96-well plates. Bond Elut 96 components are specially formulated to offer superior cleanliness, flow reproducibility, and reliability.

Polymeric Sorbents

Description	Loading (mg)	Part No.
Plexa	10	A4969010
	30	A4969030
Plexa PCX	10	A4968010
	30	A4968030
Plexa PAX	10	A4967010
	30	A4967030
LMS	10	A4961010
NEXUS	30	A4962030

All Bond Elut silica 96 round-well plates are 40 µm particle size

Silica Sorbents

Description	Loading (mg)	Part No.
C2	50	A4961150
	100	A496111C
C8	25	A4960325
	50	A4960350
	100	A496031C
C18	25	A4960125
	50	A4960150
	100	A496011C
C18 OH	100	A496291C
CBA	25	A4960625
	50	A4960650
	100	A496061C
CH	25	A4962225
	50	A4962250
	100	A496221C
CN-E	25	A4960425
	50	A4960450
	100	A496041C
CN-U	50	A4961450
Certify	25	A4960925
	50	A4960950
	100	A496091C
PBA	100	A496121C
PH	100	A496151C
NH ₂	25	A4960525
	50	A4960550
	100	A496051C
SAX	100	A496301C
SCX	25	A4960725
	50	A4960750
	100	A496071C

All Bond Elut silica 96 round-well plates are 40 µm particle size



Bond Elut 96 Square-well plate

Bond Elut 96 Square-well Plates

- Enhanced quality for trouble-free high throughput
- Added flexibility for method development
- Automation-friendly to free up operator time

Bond Elut 96 Square-well Plates are specially designed to offer superior cleanliness, flow reproducibility and reliability, ensuring trouble-free, high throughput operation. Conversion of cartridge-based methods to an automation-friendly 96-well plate format has never been easier or faster. The 2 mL wells accommodate the larger processing volumes from older methods, making method transfer and revalidation quick and easy. The large 2 mL well volume adds flexibility when developing new methods, for example, when larger wash volumes or higher sorbent capacities are required. In addition, Bond Elut 96 Square-well is designed to ensure compatibility with existing robots and vacuum manifolds.

Polymeric Sorbents

Description	Loading (mg)	Part No.
Plexa	10	A3969010
	30	A3969030
Plexa PCX	10	A3968010
	30	A3968030
Plexa PAX	10	A3967010
	30	A3967030
LMS	10	A3961010
	25	A3961025
NEXUS	60	A3962060

Silica Sorbents

Description	25 mg	50 mg	100 mg
C8	A3960325	A3960350	A396031C
C18	A3960125	A3960150	A396011C
C18-OH	A3962925	A3962950	A396291C
CBA	A3960625	A3960650	A396061C
Certify	A3960925	A3960950	A396091C
NH2	A3960525	A3960550	A396051C
PH	A3961525	A3961550	A396151C
PBA			A396121C
SAX	A3960825	A3960850	A396081C
SCX	A3960725	A3960750	A396071C

Manifolds and Accessories

Description	Part No.
96-well manifold, acrylic	5133000
96-well manifold, shimset	12236104
Square-well collection plates, 2 mL	5133009
Square-well collection plates, 1 mL	5133008
Square-well collection plates, 350 μ L	5133007
Square-well collection plate cover	WA77040004
Sealing tape pad	12143105

Bond Elut Empty SPE Cartridges

- Made with high purity polypropylene for cleaner extracts
- Uniform batch-to-batch size for consistent performance
- Economical for everyday use

A variety of empty reservoirs is available for packing custom SPE cartridges with bulk Bondesil or other desired sorbents. Cartridges are available from 1 to 60 mL. Order frits separately, or see below for reservoirs with pre-installed frits.

Bond Elut Empty SPE Cartridges

Volume (mL)	Unit	Part No.
1	100/pk	12131007
3	100/pk	12131008
6	100/pk	12131009
12	100/pk	12131010
20	100/pk	12131011
60	100/pk	12131012

Bond Elut Empty SPE Cartridges with Two Frits

- Pre-installed frits for ease-of-use
- Broad range of filtration operations for maximum flexibility
- Customizable packing for specific applications

These clean polypropylene reservoirs contain two polypropylene frits pre-inserted, an ideal configuration for simple filtration. For custom sorbent packing, additional frits can be purchased separately. Available from 1 to 60 mL.

Bond Elut Empty SPE Cartridges with Two Frits

Volume (mL)	Unit	Part No.
1	100/pk	12131013
3	100/pk	12131014
6	100/pk	12131015
12	100/pk	12131016
20	100/pk	12131017
60	100/pk	12131018

20 µm Polypropylene Frits for SPE Cartridges

- Made with high-grade, clean polyethylene for clean extracts
- Pre-cut to correct size for accuracy
- Use with reservoirs or custom packing

These frits are pre-cut to fit into Bond Elut reservoirs for use in filtration applications or for custom SPE sorbent packing.



Polypropylene Frits, 12131021

20 µm Polypropylene Frits for SPE Cartridges

Diameter (mm)	To Fit Tube Size (mL)	Unit	Part No.
6.4	1	100/pk	12131019
9.5	3	100/pk	12131020
12.7	6	100/pk	12131021
15.9	12	100/pk	12131022
20.6	20	100/pk	12131023
27.0	60	100/pk	12131024

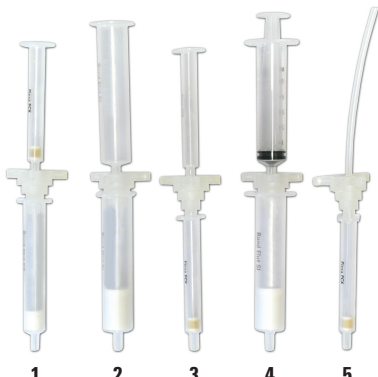
Bond Elut Adapters

- Connect SPE cartridges in series for large samples
- Expand cartridge volume for even more applications
- Transfer large-volume samples to any SPE cartridge

Bond Elut adapters fit on top of any Bond Elut cartridge and contain a female Luer fitting that accommodates the tip of another cartridge, allowing the following configurations:

Bond Elut Adapters

Description	Unit	Part No.
Adapter cap for 1, 3 and 6 mL Bond Elut cartridges	15/pk	12131001
Adapter cap for 12 and 20 mL Bond Elut cartridges	10/pk	12131003
Adapter cap for 60 mL Bond Elut cartridges	10/pk	12131004



Bond Elut Adapter Configurations

Configuration 1: Stack two cartridges to perform multi-sorbent methods

Configuration 2 + 3: Increase any cartridge's volume by stacking an empty reservoir on top of the device.

Configuration 4: Standard Luer-tipped syringes will fit into any Bond Elut adapter. Gentle pressure can then be used to apply conditioning solvents, samples, rinsing solvents and eluents. This configuration is particularly useful for single sample processing, where a vacuum manifold is not required.

Configuration 5: For excessively large sample volumes, 1/8 in. OD tubing can be connected to the end of an adapter and the sample can be drawn directly from the sample container via high vacuum.

Luer Stopcocks

- Control flow rates during SPE
- Improve method reproducibility
- Instant isolation from vacuum reduces accidental tube drying

Luer stopcocks are used to provide independent flow control of each individual Bond Elut cartridge when used with vacuum manifolds. They are made from solvent resistant high-grade polypropylene, are reusable and can be readily cleaned using organic solvents such as methanol or acetone.



Luer stopcocks, 12131005

Luer Stopcocks

Description	Unit	Part No.
Luer stopcocks	15/pk	12131005

ASPEC Adapter Caps

- Enhance the high-throughput compatibility of Bond Elut cartridges
- Converts 1, 3 and 6 mL cartridges for use in Gilson SPE systems
- Specially engineered for leak-free operation

Gilson-engineered caps produce a positive pressure seal with the needle in Gilson ASPEC, ASPEC XL and ASPEC XL4 solid phase extraction systems.



Gilson adapter cap, 12131034

ASPEC Adapter Caps

Description	Unit	Part No.
Gilson adapter cap, 1 mL, yellow	1000/pk	12131034
Gildson adapter cap, 3 mL, blue	1000/pk	12131035

Vac Elut 20 Manifold

- Increased productivity/sample throughput
- Disposable needles eliminate cross contamination
- Rugged, reliable construction

Engineered to increase laboratory productivity, the corrosion-resistant Vac Elut 20 permits simultaneous processing of up to 20 Bond Elut cartridges. The manifold's clear glass base allows careful monitoring of the entire sample collection process. Its compact, linear design requires very little bench space.

The Vac Elut 20 vacuum control valve, vacuum gauge, and quick release valve are mounted on the lid, away from the corrosive solvent stream and within convenient reach. The solvent-resistant polypropylene rack is available in a variety of sizes to accommodate collection tubes commonly used in sample preparation.

To minimize the risk of sample carryover, low-cost, disposable, medical grade polypropylene delivery needles can be easily replaced. Polypropylene extender tips are also available as a replacement for the standard needle valves, ensuring a direct path into the collection tube. Correct sample identification is also ensured by an interlocking fit between the lid and internal test tube rack.

Vac Elut 20 Manifold

Description	Part No.
Vac Elut 20 manifold with collection rack for 10 x 75 mm test tubes	12234105
Vac Elut 20 manifold with collection rack for 13 x 75 mm test tubes	12234101
Vac Elut 20 manifold with collection rack for 13 x 100 mm test tubes	12234101
Vac Elut 20 manifold with collection rack for 16 x 75 mm test tubes	12234102
Vac Elut 20 manifold with collection rack for 16 x 100 mm test tubes	12234103
Racks for Glass Basins	
Standard glass basin	12234505
Collection rack for 10 x 75 mm test tubes	12234517
Collection rack for 13 x 75 mm test tubes	12234507
Collection rack for 13 x 100 mm test tubes	12234508
Collection rack for 16 x 100 mm test tubes	12234510
Replacement Components and Accessories	
Polypropylene delivery needles, 25/pk	12234511
Replacement exit valve for glass basin	12234506
Replacement lid gasket	12234502
Vac Elut 20 lid cover	12234501
Vacuum gauge assembly	12234504



Vac Elut 20 manifold tall glass basin, 12234104

Vac Elut 20 Manifold Tall Glass Basin

- For extractions greater than 10 mL
- Transparent glass base allows you to monitor the whole collection operation
- Simple vacuum adjustment

The Vac Elut 20 with a large glass basin and collection rack accommodates larger 16 x 150 mm test tubes. The same high quality material and features on the standard Vac Elut system are incorporated on this special unit. These collection vessels can be utilized in combinatorial chemistry applications using large boiling tubes for collection of purified synthesis mixtures, or for any SPE extraction in which an elution volume greater than 10 mL is required.

Vac Elut 20 Manifold Tall Glass Basin

Description	Part No.
Vac Elut 20 Manifold with tall glass basin and collection rack for 16 x 150 mm test tubes, complete system	12234104



Vac Elut 12 manifold, 5982-9110

Vac Elut 12 Manifold

Agilent manifolds and accessories complement the quality of our sorbents. Configurations and individual components can be purchased, providing flexibility and increased capability at any stage, from method development to high-throughput operation.

Vac Elut 12 Manifold

Description	Part No.
12-port vacuum manifold processing station Includes rack for 16 x 100 mm tubes	5982-9110

Replacement Parts for Vacuum Manifolds

Description	Part No.
Manifold ball ring/vacuum quick release	5982-9106
Manifold exit valve replacement kit	5982-9107
Manifold vacuum gauge assembly with valve	5982-9108
White cover for 12-port manifold	5982-9111
Sealing gasket for 12-port manifold	5982-9112
Glass chamber for 12-port manifold	5982-9113
12-port rack for 13 x 75 mm tubes	5982-9114
12-port rack for 13 x 100 mm tubes	5982-9115
12-port rack for 16 x 75 mm tubes	5982-9116
12-port rack for 16 x 100 mm tubes	5982-9117

Parts and Disposables for Cartridge Manifolds

Description	Unit	Part No.
Manifold disposable needle tip	20/pk	5982-9100
Manifold stainless steel needle with polypropylene coating	20/pk	5982-9101
Manifold short valve stopcock	20/pk	5982-9102
Manifold long valve stopcock	20/pk	5982-9103
Manifold male luer plugs	25/pk	5982-9104
Manifold needle tip ejector tool		5982-9105
Cartridge stacking adapters	12/pk	5982-9109



Vac Elut SPS 24 manifold

Vac Elut SPS 24 Manifold

- Closed operation prevents cross contamination
- Stainless steel tips deliver maximum extract purity
- Range of rack sizes covers most tube configurations

The Vac Elut SPS 24 allows simultaneous processing of up to 24 SPE cartridges. Like all Vac Elut manifolds, the SPS 24 is made from durable, solvent-resistant materials and engineered to last. The glass sides allow easy viewing of the entire sample collection process.

The ultimate feature of the SPS 24 manifold is its waste diversion funnel, which enables all steps of the SPE procedure to be completed without removing the lid. Since the collection rack is placed inside the unit before extraction begins, splash back and cross contamination are eliminated, while hazardous waste and biohazard exposure are minimized.

Complete with replacement stainless steel delivery tips for maximum extract purity, the Vac Elut SPS 24 system also includes a vacuum controller/release, collection rack, and port sealing plugs. Racks for several different collection tube configurations are available.

Vac Elut SPS 24 Manifold

Description	Part No.
Vac Elut SPS 24 manifold with collection rack for 10 x 75 mm test tubes	12234003
Vac Elut SPS 24 manifold with collection rack for 12 x 75 mm test tubes	12234041
Vac Elut SPS 24 manifold with collection rack for 13 x 100 mm test tubes	12234022
Vac Elut SPS 24 manifold with collection rack for 16 x 100 mm test tubes	12234004
Replacement Components and Accessories	
Collection rack and funnel set for 12 or 15 mL conical tubes	12234027
Collection rack and funnel set for 12 x 75 mm test tubes	12234030
Collection rack and funnel set for 13 x 100 mm test tubes	12234031
Collection rack and funnel set for 16 x 100 mm test tubes	12234028
Elastic lid fasteners, 6/pk	12234034
SPS 24 lid cover	12234025
SPS 24 waste tower repair kit	12234005
Includes base exit tube, hose connector, washer, center tube, 900 connector elbow	
Stainless steel delivery needles, 25/pk	12234038
Waste funnel for 12 x 75 or 13 x 100 mm test tubes, 5/pk	12234032

Vacuum Manifolds for 96-well Plates

- Can handle 96-well fixed position plates or second version to handle 96-well flexible format plate
- Constructed with polypropylene base and polyethylene lid
- Small footprint
- Supplied with on/off valve, vacuum gauge, and fine vacuum control valve
- disposable reservoir tray collects excess sample and wash solvents
- Spacer inserts can be placed into the base so that collection plates of differing heights can be processed (both deep-well and standard microtiter plates), ensuring maximum penetration of the SPE plate into the collection plate and reducing well-to-well contamination
- Solvent resistance gasket in the manifold lid



96-well vacuum manifold base assembly,
5185-5797

Vacuum Manifolds for 96-well Plates

Description	Part No.
96-well vacuum manifold base assembly Includes base, vacuum gauge and needle valve	5185-5797



Base O-ring, 5185-5779



Collection plate spacer in sizes to match the collection plate used

Parts and Disposables for 96-well Plate Manifolds

Description	Unit	Part No.
Base O-ring for 96-well plate manifold		5185-5779
Collection plate spacer for Agilent 1 mL deep-well, 12 mm		5185-5775
Collection plate spacer for microtiter plate and Agilent 0.5 mL shallow well plate, 29 mm		5185-5781
Collection plate spacer for most industry-standard deep-well plates, 2 mm		5185-5780
Disposable reservoir tray for 96-well manifold	25/pk	5185-5782
96-well vacuum manifold base assembly Includes base, vacuum gauge and needle valve		5185-5797
Lid for 96-fixed well vacuum manifold		5185-5798
Lid gasket for 96-well plate manifold		5185-5778
Luer adapters for 96-well flexible cartridge	25/pk	5185-5789
Needle valve for 96-well manifold		5185-5783
On/off valve for 96-well manifold		5185-5785
Vacuum gauge for 96-well manifold		5185-5786
Vacuum outlet (Ni plated) for 96-well manifold		5185-5784

Sealing Mats

Sealing mats help prevent sample contamination or evaporation that can occur when plates are exposed to environmental conditions.

Sealing Mats

Description	Unit	Part No.
96-well plate sealing mats, round	50/pk	5042-1389
96-well plate sealing mats, square	10/pk	5982-9996

Disk SPE

SPEC Disk SPE

- No loose sorbent means no channeling of sample
- Uniform flow and extraction properties offer robust performance
- Low elution volume affords excellent concentration of analyte, improving sensitivity

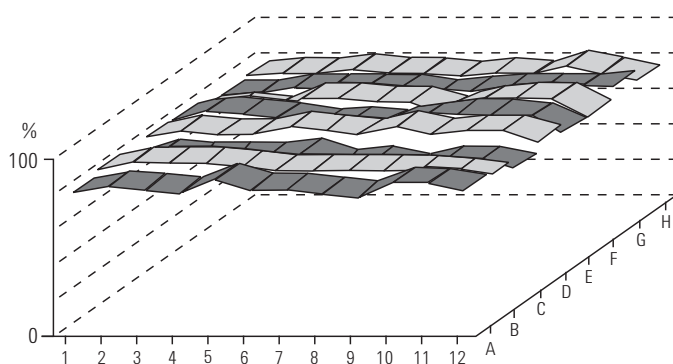
Using an advanced disk design, SPEC delivers superior flow characteristics and trouble-free automation. Due to the low volume of the extraction bed, very low elution volumes can be used. This means that, in some applications, evaporation and reconstitution steps can be eliminated, resulting in accelerated sample processing times. The combination of low bed masses, ultra-clean base materials and a broad toolbox of selectivities delivers higher recoveries free of the matrix interferences that can cause ion suppression.

SPEC provides high recoveries at low elution volumes – as low as 100 μL . This is due to the very high surface area yet small physical volume of the monolithic disk. Overall, extraction efficiency is very high for this format of sample preparation product, and the range of functionalities allows fast method development.

Unique phases available in SPEC 96-well and SPE tube formats

Uniform recovery and reproducibility between wells from the same well plate

- **DAU** – This functionalized SPEC disk is specifically designed for the analysis of drugs of abuse in urine. Its unique sorbent chemistry results in excellent sample cleanup and concentration of samples prior to GC/MS and LC/MS.
- **MP1** – SPEC MP1 is a mixed-mode, non-polar/SCX monolithic disk ideal for analytes with polar functional groups in plasma. The dual retention mechanism results in cleaner extracts. The SCX functionality strongly binds polar basic analytes allowing rigorous washing steps to be employed. Bond Elut Certify offers similar selectivity to SPEC MP1.
- **MP3** – SPEC MP3 is slightly more polar than MP1, making it ideal for hydrophobic analytes that would bind too strongly to MP1. MP3 chemistry is particularly suited to the extraction of opiate alkaloids from biological fluids.



Note the high recovery (y axis) with an average deviation across the 96 wells of just 3.2% (well positions are shown on the x and z axes). SPEC provides the predictable flow characteristics analysts require for true walk-away automated processing. With SPEC you need not worry about clogging, and as an added benefit, the typically low vacuum pressure requirement prevents cross-talk (e.g. spraying of fast running eluates between wells in the collection plate).



SPEC 96-well plate

SPEC 96-well Plates

When used on an automated platform, SPEC 96-well plates offer outstanding flow characteristics. Flow across all 96-well plates is uniform and highly reproducible, meaning your recoveries are too.

SPEC 96-well Plates, 15 mg

Sorbent Phase	Part No.
Silica-based Sorbents	
C18	A59603
C18AR	A59619
C18AR, 30 mg	A5960330
C2	A59601
C8	A59602
CN	A59606
DAU	A596DAU
NH2	A59607
Phenyl	A59610
Ion Exchange Sorbents	
SAX	A59605
SCX	A59604
Mixed Mode Sorbents	
MP1	A59611
MP3	A59620
Method Development Kit	
C2, C8, C18, C18AR, CN, MP1, MP3, PH	A59630

SPEC SPE Cartridges

SPEC functionalities are also available in standard straight barrel tube format, offering flexibility in sample size. Use on any standard vacuum manifold such as the Vac Elut 20 or SPS 24.

SPEC SPE Cartridges, 100/pk

Sorbent Phase	Description	Part No.
C18	15 mg, 3 mL	A5320320
	30 mg, 3 mL	A5320330
C18AR	15 mg, 3 mL	A5321920
	30 mg, 3 mL	A5321930
	35 mg, 10 mL	A5021935
C18/MP3	70 mg, 10 mL	A5022570
C2	30 mg, 3 mL	A5320130
C8	15 mg, 3 mL	A5320220
	30 mg, 3 mL	A5320230
DAS	15 mg, 3 mL	A532DAS
DAU	15 mg, 3 mL	A532DAU
MP1	15 mg, 3 mL	A5321120
	30 mg, 3 mL	A5321130
	35 mg, 10 mL	A5021135
	70 mg, 10 mL	A5021170
MP3	15 mg, 3 mL	A5322020
	30 mg, 3 mL	A5322030
	35 mg, 10 mL	A5020735
NH2	15 mg, 3 mL	A5320720
	70 mg, 10 mL	A5020770
Phenyl	15 mg, 3 mL	A5321020
	30 mg, 3 mL	A5321030
SAX	15 mg, 3 mL	A5320520
	30 mg, 3 mL	A5320530
	35 mg, 10 mL	A5020535



SPEC disks, C8, A74702,
and SPEC SPE Cartridges, C18, A5320320

SPEC Disks and Accessories

Description	Part No.
SPEC disks, C8, 47 mm, 24/pk	A74702
SPEC disks, C18AR, 47 mm, 20/pk	A74819
SPEC disks, C18AR, 90 mm, 12/pk	A79019
SPEC environmental disk manifold	A712
SPEC environmental disk holder, 47 mm	A713
SPEC flask, 1 L, 40/35 mm	A714

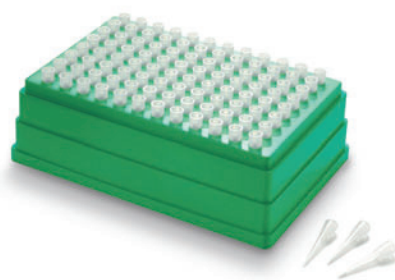
Empore Disk SPE

- Good flow of large sample volumes
- Range of versatile sorbent chemistries
- Available in two disk diameters for better performance

Empore extraction disks provide a high flow rate solution for large volume sample preparation, and are available in a variety of bonded phases and two diameters, 47 and 90 mm. Increasing the diameter of the disk gives better solvent flow rates through the disk.

Empore Disk SPE

Description	Unit	Part No.
Anion extraction disks, 47 mm	20/pk	12145012
Chelating extraction disks, 47 mm	20/pk	12145029
SDB-XC extraction disks, 47 mm	20/pk	12145010
SDB-XC extraction disks, 90 mm	10/pk	12145011
C8 extraction disks, 47 mm	20/pk	12145002
C8 extraction disks, 90 mm	10/pk	12145034
C18 extraction disks, 47 mm	20/pk	12145004
C18 extraction disks, 90 mm	10/pk	12145007



Micro-volume SPE

OMIX Tips

- Fast, uniform flow maximizes productivity and reproducibility
- Minimal peptide losses lead to higher recoveries
- Available in three phases and sizes to deliver better sequence coverage

OMIX tips with monolithic sorbent tip technology offer dependable purification and superior results in proteomics research. Agilent OMIX pipette tips reliably purify and enrich femtomole and picomole levels of peptides and proteins prior to MALDI-TOF or LC/MS/MS. The unique monolithic sorbent technology used in OMIX consistently outperforms other tips by delivering uniform flow and strong analyte-to-surface interactions. The high binding capacity of OMIX delivers high productivity – the 10 μ L tips bind up to 8 μ g of peptide – twice as much as tips from other suppliers. OMIX's superior flow and exceptional binding capacity ensure reliable recovery of your peptides, minimizing peptide loss during multi-aliquot, multi-tip and evaporation steps.

OMIX Tips

Description	Elution Volume	Unit	C4 Part No.	C18 Part No.	SCX Part No.
10 μ L Mini-Bed	0.5 - 2 μ L	1 x 96 tips	A57009MB	A57003MB	A57004MB
		6 x 96 tips	A57009MBK	A57003MBK	
10 μ L	2 - 10 μ L	1 x 96 tips	A5700910	A5700310	A5700410
		6 x 96 tips	A5700910K	A5700310K	
100 μ L	10 - 100 μ L	1 x 96 tips	A57009100	A57003100	A57004100
		6 x 96 tips	A57009100K	A57003100K	

OMIX Tips for Robotic Automation

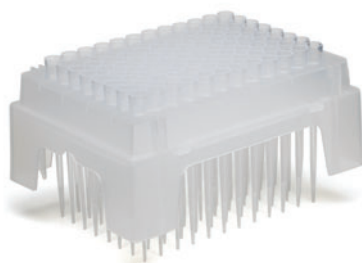
- Fast, uniform flow maximizes productivity and reproducibility
- Small monolithic tip delivers low elution volumes, increasing sensitivity and reducing solvent usage
- Vacuum-free processing improves reproducibility and shortens processing times

OMIX 96-well VersaPlate

OMIX automation-friendly 96-well monolithic SPE plates are specially designed to process small samples. They offer small extraction beds with almost no dead volume. Elution is achieved with microliter solvent volumes, allowing direct injection and improving assay speed and sample throughput. OMIX tips are highly amenable to ADME/DMPK bioanalysis applications.

OMIX 96-well VersaPlate

Description	Part No.
OMIX 96-well VersaPlate, C4 with tubes	A57109
OMIX C4 tubes only	A57109A
OMIX 96-well VersaPlate, C18 with tubes	A57103
OMIX C18 tubes only	A57103A
OMIX 96-well VersaPlate, MP1 with tubes	A57111
OMIX MP1 tubes only	A57111A



OMIX C18 for Tomtec Quadra, A57303SPL



Close-up of OMIX tips for Tomtec Quadra

OMIX Tips for Tomtec Quadra

Tomtec-compatible tips contain a slice of monolithic SPE material, allowing for vacuum-free processing and walk-away automation. With hands-free SPE, the process becomes much more streamlined and reproducible.

OMIX Tips for Tomtec Quadra

Description	Unit	Part No.
OMIX C18	1 x 96 tips	A57303SPL
OMIX C18	5 rack x 96 tips	A57303
OMIX MP1	1 x 96 tips	A57311SPL
OMIX MP1	5 x 96 tips	A57311



OMIX C18 for Hamilton 300 µL, A57403SPL



Close-up of OMIX tips for Hamilton

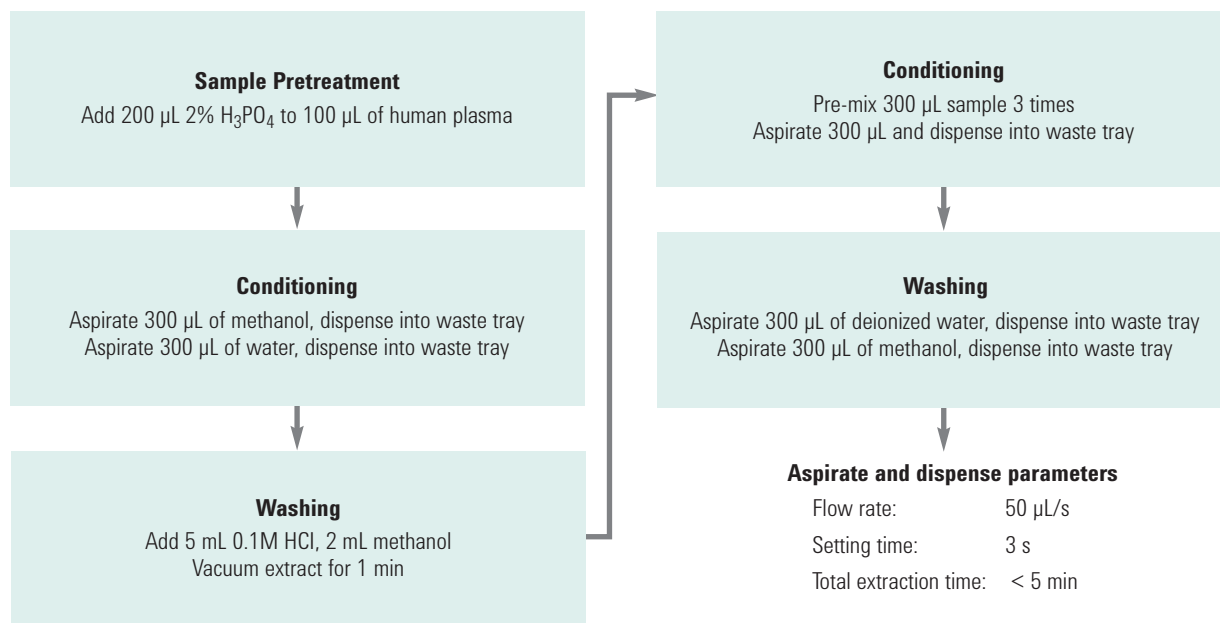
OMIX Tips for Hamilton Microlab STAR Line

Offering excellent versatility and end-user productivity enhancements, these tips have an operating volume of 300 µL, allowing flexibility in sample size. Processing 96 samples can be reduced to just a few minutes in certain applications.

OMIX Tips for Hamilton Microlab STAR Line, 300 µL

Description	Unit	Part No.
OMIX C18	1 x 96 tips	A57403SPL
OMIX C18	5 x 96 tips	A57403
OMIX MP1	1 x 96 tips	A57411SPL
OMIX MP1	5 x 96 tips	A57411

OMIX Tips for Hamilton STAR, MP1, 5 mg



Aspirate and dispense parameters

Flow rate: 50 µL/s
 Setting time: 3 s
 Total extraction time: < 5 min

Albuterol Relative Recoveries

Amount (ng/mL)	% Recovery
48.0	96
46.0	92
49.7	99
46.6	93
49.1	98
47.4	95

Mean recovery 96%, RSD 3%

■ QUECHERS

Agilent's QuEChERS Kits provide an easy way to take advantage of the simple, time-saving QuEChERS method – because they are pre-packaged to give you greater efficiency and reliability.

QuEChERS Kits help you take advantage of the benefits of the QuEChERS method through:

No guesswork or measuring – Pre-packed extraction and dispersive kits are assembled to suit specific food types and screening protocols

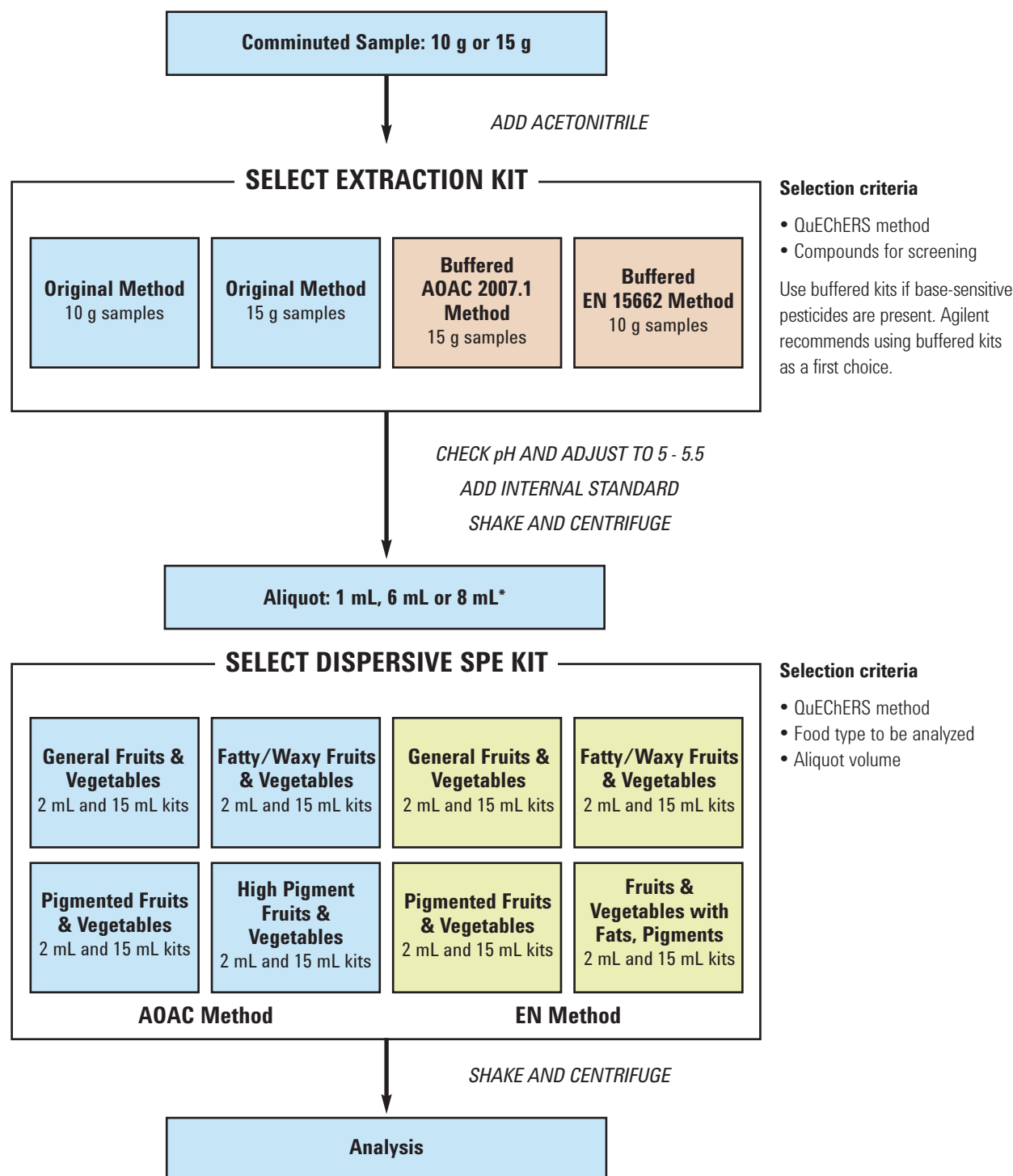
Uniquely packaged extraction kits – Now available with or without 50 mL centrifuge tubes, extraction kits package pre-weighed salts in anhydrous packets, enabling you to add the salts at the appropriate time

Wide selection of dispersive kits – Sorbents and salts for dispersive SPE are supplied in 2 mL or 15 mL centrifuge tubes, for 1 mL, 6 mL or 8 mL aliquot volumes, as specified by the various QuEChERS methodologies

Ceramic homogenizers save 70% of your time per sample – Agilent's ceramic homogenizers can cut your required extraction time from 60 seconds to less than 20 seconds

Agilent Recommended Standard Operating Procedure for QuEChERS

In just 3 easy steps, you can prepare any fruit or vegetable sample for multi-class, multi-residue pesticide analysis.



*Aliquot size is specified by the method, and kits are created for these specific amounts. For pesticides with acidic groups (phenoxycarboxylic acids), analyze directly by LC/MS/MS at this point (skip the dispersive SPE stage). These acidic groups interact with the PSA that is part of the dispersive SPE step.

QuEChERS Extraction Kits

- Available with or without 50 mL centrifuge tubes and caps
- Include MgSO₄, NaCl, or other salts for buffering; pre-weighed in anhydrous packet

Step 1: Extraction

Adding solvent and salts to a small (10 g or 15 g) comminuted fruit or vegetable sample enables you to extract the pesticides of interest into the organic layer. However, adding a food sample with a high percentage of water directly to the salts may create an exothermic reaction that can affect your analyte recoveries. Choose the extraction salt packet based on your method of analysis, AOAC or EN. The buffered extraction salts are amenable for more liable pesticides.

Agilent pre-packages its QuEChERS salts and buffers in anhydrous packages. This allows you to add them after adding your solvent to the sample, as specified in QuEChERS methodologies.

QuEChERS Extraction Kits

Method	Buffered	Contents	Ceramic Homogenizers	With Tubes	Packets Only	
					50/pk	200/pk
AOAC	Yes	6 g MgSO ₄ ; 1.5 g NaAcetate	Yes	5982-5755CH	5982-6755CH	5982-7755CH
			No	5982-5755	5982-6755	5982-7755
Original (10 g samples)	No	4 g MgSO ₄ ; 1 g NaCl	Yes	5982-5550CH	5982-6650CH	5982-7550CH
			No	5982-5550	5982-6650	5982-7550
Original (15 g samples)	No	6 g MgSO ₄ ; 1.5 g NaCl	Yes	5982-5555CH	5982-6555CH	5982-7555CH
			No	5982-5555	5982-6555	5982-7555
EN	Yes	4 g MgSO ₄ ; 1 g NaCl; 1 g NaCitrate; 0.5 g disodium citrate sesquihydrate	Yes	5982-5650CH	5982-6650CH	5982-7650CH
			No	5982-5650	5982-6650	5982-7650
Acrylamides*	No	4 g MgSO ₄ ; 0.5 g NaCl	No	5982-5850		

*Katerina Mastovaka and Steven J. Lehotay have done work to extend the scope of QuEChERS beyond fruits and vegetables(1), using it to extract acrylamides in potato chips and other fried foods.

1: "Rapid Sample Preparation Method for LC-MS/MS or GC-MS Analysis of Acrylamides in Various Food Matrices", J. Agric. Food Chem, 2006, 54, 7001-7008.

QuEChERS Dispersive Kits

Step 2: Dispersive SPE Cleanup

Select the Dispersive SPE kit suited to the type of food being analyzed and the method you are following. In this step, an aliquot of the sample extract from Step One is added to a 2 mL or 15 mL centrifuge tube containing a small amount of SPE sorbent and MgSO₄. The sorbent will pull out interfering matrix materials from the sample, while the MgSO₄ helps remove excess water and improve analyte partitioning. Select kits are now available with ceramic homogenizers (2 per tube). Their part numbers are designated by a CH.

QuEChERS Dispersive Kits



Kit	Size	Unit	AOAC 2007.01 Method	European Method EN 15662	
			Kit Contents Part No.	Kit Contents Part No.	
General fruits and vegetables: Removes polar organic acids, some sugars and lipids	2 mL	100/pk	50 mg PSA	25 mg PSA	
			150 mg MgSO ₄	150 mg MgSO ₄	
			5982-5022	5982-5021	
			5982-5022CH	5982-5021CH	
		15 mL	50/pk	400 mg PSA	150 mg PSA
				1200 mg MgSO ₄	900 mg MgSO ₄
				5982-5058	5982-5056
				5982-5058CH	5982-5056CH
Fruits and vegetables with fats and waxes: Removes polar organic acids, some sugars, more lipids and sterols	2 mL	100/pk	50 mg PSA	25 mg PSA	
			50 mg C18EC	25 mg C18EC	
			150 mg MgSO ₄	150 mg MgSO ₄	
			5982-5122	5982-5121	
				5982-5122CH	5982-5121CH
		15 mL	50/pk	400 mg PSA	150 mg PSA
				400 mg C18EC	150 mg C18EC
				1200 mg MgSO ₄	900 mg MgSO ₄
				5982-5158	5982-5156
				5982-5158CH	5982-5156CH
Pigmented fruits and vegetables: Removes polar organic acids, some sugars and lipids, and carotenoids and chlorophyll; not for use with planar pesticides	2 mL	100/pk	50 mg PSA	25 mg PSA	
			50 mg GCB	2.5 mg GCB	
			150 mg MgSO ₄	150 mg MgSO ₄	
			5982-5222	5982-5221	
				5982-5222CH	5982-5221CH
		15 mL	50/pk	400 mg PSA	150 mg PSA
				400 mg GCB	15 mg GCB
				1200 mg MgSO ₄	900 mg MgSO ₄
				5982-5258	5982-5256
				5982-5258CH	5982-5256CH

Part numbers ending in CH indicate tubes containing ceramic homogenizers.

QuEChERS Dispersive Kits



Kit	Size	Unit	AOAC 2007.01 Method	European Method EN 15662
			Kit Contents Part No.	Kit Contents Part No.
Highly pigmented fruits and vegetables: Removes polar organic acids, some sugars and lipids, plus high levels of carotenoids and chlorophyll; not for use with planar pesticides	2 mL	100/pk		25 mg PSA 7.5 mg GCB 150 mg MgSO ₄ 5982-5321 5982-5321CH
	15 mL	50/pk		150 mg PSA 45 mg GCB 900 mg MgSO ₄ 5982-5356 5982-5356CH
Fruits and vegetables with pigments and fats: Removes polar organic acids, some sugars and lipids, plus carotenoids and chlorophyll; not for use with planar pesticides	2 mL	100/pk	50 mg PSA 50 mg GCB 150 mg MgSO ₄ 50 mg C18EC 5982-5421 5982-5421CH	
	15 mL	50/pk	400 mg PSA 400 mg GCB 1200 mg MgSO ₄ 400 mg C18EC 5982-5456 5982-5456CH	
Other Food Methods Removes biological matrix interferences, including hydrophobic substances (fats, lipids) and proteins	2 mL	100/pk	25 mg C18 150 mg MgSO ₄ 5982-4921 5982-4921CH	
	15 mL	50/pk	150 mg C18 900 mg MgSO ₄ 5982-4956 5982-4956CH	
All Food Types Removes virtually all matrix interfering materials including polar organic acids, lipids, sugars, proteins, carotenoids and chlorophyll	2 mL	100/pk	50 mg PSA 50 mg C18 7.5 mg GCB 150 mg MgSO ₄ 5982-0028 5982-0028CH	
			400mg PSA 400 mg C18 45 mg GCB 1200 MgSO ₄ 5982-0029 5982-0029CH	

Part numbers ending in CH indicate tubes containing ceramic homogenizers.

QuEChERS Ceramic Homogenizers

Ceramic homogenizers increase your overall lab productivity and give you greater confidence in your results. They make analyte extraction easier by:

- Cutting the required extraction time from 60 seconds to as little as 20 seconds – a time savings of 70% per sample
- Maintaining high, reproducible extractions in a third of the time
- Minimizing variance between technicians
- Breaking up salt agglomerates and maintaining a consistent grinding of homogenizing material
- Increasing your overall lab productivity and having greater confidence in your results

The same great ceramic homogenizers available in our QuEChERS Kits are also available for bulk purchase, providing excellent grinding capabilities of the samples.

QuEChERS Ceramic Homogenizers

Description	Unit	Part No.
Ceramic homogenizer for 50 mL tubes	100/pk	5982-9313
Ceramic homogenizer for 15 mL tubes	100/pk	5982-9312
Ceramic homogenizer for 2 mL tubes	200/pk	5982-9311



QuEChERS Bulk Sorbents and Salts

If you prefer to pack your own tubes for QuEChERS, use these high-quality bulk sorbents and salts.

QuEChERS Bulk Sorbents and Salts

Description	Unit	Part No.
Magnesium Sulfate	100 g bottle	5982-8082
Sodium Acetate	100 g bottle	5982-5751
Sodium Chloride	100 g bottle	5982-5750
PSA (Primary Secondary Amine)	25 g bottle	5982-8382
	100 g bottle	5982-5753
C18EC	25 g bottle	5982-1382
	100 g bottle	5982-5752
Graphitized Carbon Black (GCB)	25 g bottle	5982-4482
Si-SAX	25 g bottle	5982-2082

Standards for QuEChERS Products

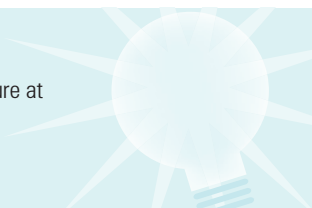
In addition to our industry-leading SampliQ QuEChERS Kits, Agilent makes your analysis easier by providing standards for the most commonly used regulatory methods, including AOAC and EN.

- Save time and inconvenience of making standards
- Available for both GC and LC instruments
- Ready to use for QuEChERS extractions – no dilutions required

Standards for QuEChERS Products

Description	Concentration	Kit Contents	Part No.
HPLC & GC Internal Standard, AOAC Method	1000 µg/mL	Parathion-d10 (diethyl-d10), Alpha-BHC-d6 (alpha-HCH-d6)	5190-0502
QC Solution, AOAC Method	500 µg/mL	Triphenyl phosphate	5190-0503
HPLC Internal Standard, EN Method	100 µg/mL	Tris (1,3-dichloroisopropyl) phosphate, Nicarbazin	5190-0500
GC Internal Standard, EN Method	5000 µg/mL	(2,2',5,5'-tetrachlorobiphenyl), Triphenylmethane, Tris (1,3-dichloroisopropyl) phosphate	5190-0501
QC Surrogate for GC Standard, EN Method	500 µg/mL 1000 µg/mL	(2,2',3,4,4',5'-hexachlorobiphenyl) Anthracene-d10	5190-0499
GC Standard Mix, EN Method	100 µg/mL	Malathion, Methyl parathion, Parathion (ethyl), Chlorpyrifos, Fenitrothion, Dichlorvos, Deltamethrin, Chlorpyrifos-methyl, Heptachlor, Bromopropylate, Gamma-HCH, Aldrin, Dieldrin, Disulfoton, Fenvalerate, Procymidone, Hexachlorobenzene, Lambda-cyhalothrin, 4,4'-DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, 4,4'-DDE, 4,4,-DDD, Alpha-BHC, Beta-BHC	5190-0497

For more information on QuEChERS, download the brochure at www.agilent.com/chem/quechersbrochure



■ CAPTIVA FILTRATION



Captiva's unique dual-depth filtration media provides complete removal of precipitated proteins and outstanding resistance to sample clogging, with no loss of analytes. All Captiva components are ultra clean, and rigorously tested to ensure against non-specific binding. With Captiva, your plasma samples are processed quickly and reliably. Captiva is easily automated for enhanced productivity and excellent for sample storage.

Time-consuming sample transfer steps required with conventional precipitation are now a thing of the past. With Captiva, clean, clear filtrates are ready for injection in minutes – this user-friendly filtration device is simple and streamlined with an easy-to-follow 3-step process. And because Captiva samples are pellet-free, you can sample directly from the collection plate.

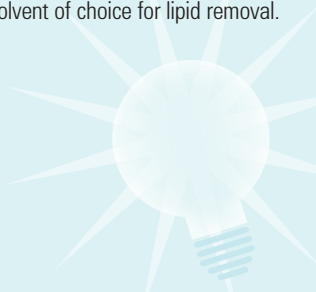
The Captiva range includes:

- Captiva ND^{Lipids}, the non-drip filtration plate for lipid and protein depletion
- Captiva 96-well filter plates for preparing precipitated proteins for LC/MS
- Captiva filter cartridges, all the usual Captiva benefits in a standard SPE cartridge format



Tips & Tools

Using Captiva ND^{Lipids} with methanol is an excellent replacement for acetonitrile as the precipitation solvent. Methods with methanol show better removal of lipids than with acetonitrile. Converting to methanol is advantageous when the supply or cost of acetonitrile is restrictive. Methanol can now be your solvent of choice for lipid removal.



Captiva ND^{Lipids}

- More precise and reproducible quantitation with removal of phospholipids and proteins
- Increased productivity due to extended column lifetimes and cleaner MS ion sources
- Simple 3-step procedure

Captiva ND^{Lipids} is as simple and easy-to-use as a standard protein precipitation plate. The non-drip 96-well filtration plate is specially designed to effectively remove phospholipids from biofluids. Captiva ND^{Lipids} removes lipids, proteins, surfactants and other matrix interferences from plasma extracts. Ion suppression is significantly reduced for enhanced sensitivity and precision during trace analysis. The depletion of lipid compounds also gives you better peak shapes and reproducible retention times so that standard operating procedures are easily validated. In addition, the fast, in-well precipitation technology of Captiva ND^{Lipids} ensures high sample throughput and helps reduce instrument downtime, with virtually no need for method development on a wide range of analytes.

Captiva ND^{Lipids}

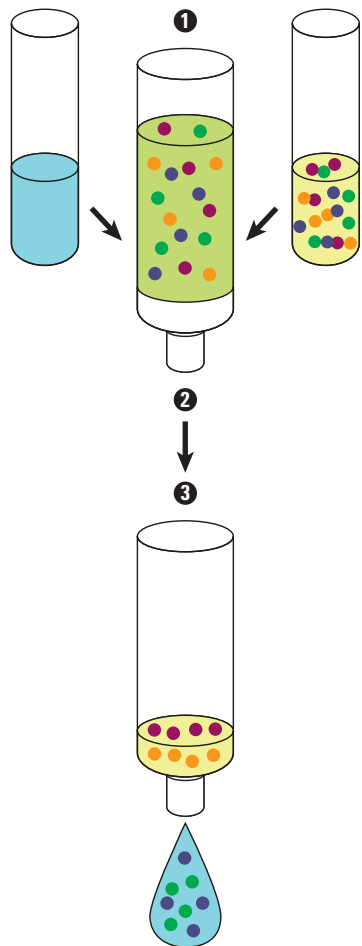
Description	Part No.
Captiva ND ^{Lipids} 96-well filtration starter kit Includes 1 CaptiVac vacuum collar, 2 Captiva ND ^{Lipids} filter plates, 2 Captiva 96 deep-well 1 mL collection plates and 2 Captiva collection plate pierceable covers	A59640002SK
Captiva ND ^{Lipids} 96-well filtration replacement kit Includes 2 Captiva ND ^{Lipids} filter plates, 2 Captiva 96 deep-well 1 mL collection plates and 2 Captiva collection plate pierceable covers	A59640002RK
Captiva ND ^{Lipids} 96-well filter plate, 1 mL well	A59640002I
Captiva ND ^{Lipids} 96-well filter plates, 1 mL well, 5/pk	A59640002V
DuoSeal 96 96-well plate seals, 10/pk	A8961008

Simple and Easy-to-Use Captiva ND^{Lipids}

Easy 3-Step Procedure

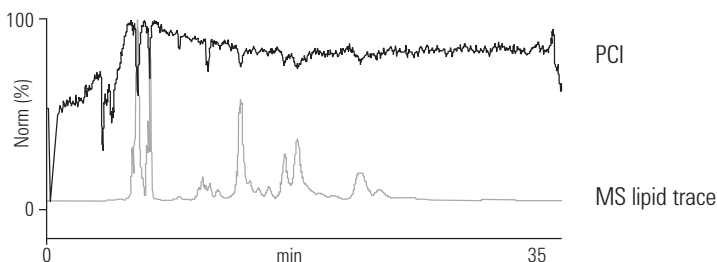
1. Add precipitation solvent and plasma sample in desired ratio into the 96-well plate
2. Precipitate
3. Filter

- Key
- Salts
 - Proteins
 - Lipids
 - Analyte

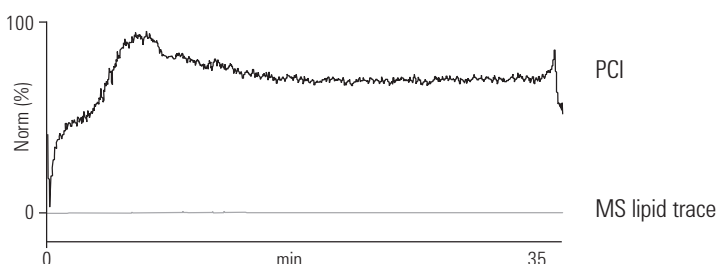


Post-column infusion of albuterol before treatment with Captiva ND^{Lipids}

Note that the ion-suppression features (top trace) correlate with the elution of phospholipids (bottom trace).

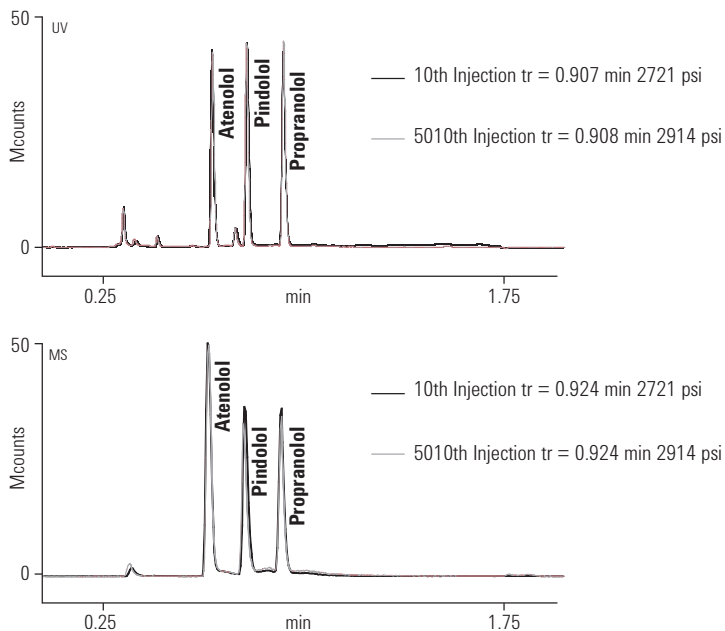


Same experiment after protein and lipid depletion with Captiva ND^{Lipids}



Ion suppression is dramatically reduced and the lipids are almost non-detectable.

Longevity Study Illustrating Prolonged Column Lifetime When Using Captiva ND^{Lipids}



No significant changes in back pressure, retention time, and peak shape with Captiva ND^{Lipids} after 10 and 5010 injections for LC/MS or LC/MS/MS bioanalysis (top = UV detection; bottom = MS detection).

Captiva 96-well Filter Kits

- The industry standard for centrifugation-free protein precipitation
- Fast and reliable processing improves productivity
- Starter kits contain everything you need

Faster than centrifugation and easily automated, Captiva's unique dual-depth filtration media provide complete removal of precipitated proteins and outstanding resistance to sample clogging. With Captiva, your plasma samples are processed quickly and reliably, and you can avoid fibrinogen clogging forever. The plates are also excellent for sample storage. All Captiva components are ultra clean, and rigorously tested to ensure against non-specific binding. Starter kits contain everything you need to get up and running with minimum fuss. Replacement kits include everything you need to replenish your Captiva system.



Captiva 96-well filter kit

Captiva 96-well Filter Kits

Pore Size (µm)	Filter Material	Part No.
Starter Kits		
0.2	Polypropylene	A5960002SK
0.45	Polypropylene	A5960045SK
10	Glass fiber	A596401000SK
Includes 1 CaptiVac vacuum collar, 5 Captiva filter plates, 10 DuoSeal 96 96-well plate seals, 5 Captiva 96 deep-well 1 mL collection plates, 5 Captiva collection plate pierceable covers		
Replacement Kits		
0.2	Polypropylene	A5960002K
0.45	Polypropylene	A5967045K
	Polyvinylidene fluoride and polypropylene	A5960045K
Includes 5 Captiva filter plates, 10 DuoSeal 96 96-well plate seals, 5 Captiva 96 deep-well 1 mL collection plates, 5 Captiva collection plate pierceable covers		



Captiva 96-well Filter Plates

- Protect HPLC columns from clogging to reduce instrument downtime
- Clean and clear filtrates offer improved sensitivity
- High analyte recovery with simple robust methods allows faster method development

Filtration is simple, versatile, and necessary to prevent clogging of valuable HPLC columns. Captiva 0.2 μm and 0.45 μm depth filter plates are ideal for preparing precipitated protein samples for LC/MS analysis. Captiva 10 μm and 20 μm glass fiber filter plates are designed for clarifying highly particle-laden samples, such as freshly thawed plasma and hepatocyte filtration, preventing sample transfer problems from pipette tip clogging. They are perfect for automated systems and for use with DuoSeal 96 96-well seals.

Captiva 96-well Filter Plates, 5 x 96 well

Pore Size (μm)	Filter Material	Part No.
0.2	Polypropylene	A5960002
0.45	Polyvinylidene fluoride and polypropylene	A5967045
	Polypropylene	A5960045
10	Glass fiber	A596401000
20	Polypropylene	A596002000
	Polypropylene	A596002000B
	Bulk Pack, 100 x 96 well	



Captiva 96-well Collection Plates and Cover

- Designed for Captiva filtration, SPEC and Bond Elut 96 applications
- Standard 1 mL format offers compatibility with further automation or liquid handling
- Silicone cover preserves sample integrity

Captiva 96-well collection plates are specially designed for use with Captiva filtration plates, SPEC SPE 96-well plates and Bond Elut 96-well plates. The 1 mL capacity provides the volume needed to collect all of your filtrate or eluate. Captiva pierceable 96-well silicone covers are easily applied to completely seal the plates, ensuring no sample loss due to spillage or evaporation and no sample contamination. The silicone is specially designed for 96-well auto injectors, providing easy piercing and removal.



Captiva 96-well collection plate, A696001000

Captiva 96-well Collection Plates and Cover

Description	Unit	Part No.
Captiva 96-deep well collection plate, 1 mL	10/pk	A696001000
Captiva pierceable 96-well collection plate cover	10/pk	A8961007
DuoSeal 96	10/pk	A8961008

Captiva Filter Cartridges

- Standard SPE format
- Ideal for LC/MS samples
- Avoid sample transfer problems

Captiva filter cartridges bring all of the benefits of Captiva filtration to the standard SPE cartridge format. The 0.2 μm and 0.45 μm filter cartridges are ideal for preparing precipitated protein samples for LC/MS analysis. The Captiva 10 μm glass fiber filter cartridge is designed for clarifying highly particle-laden samples, such as freshly thawed plasma, preventing sample transfer problems due to pipette tip clogging.



Captiva filter cartridges, glass fiber, A500401000

Captiva Filter Cartridges

Pore Size (μm)	Filter Material	Volume (mL)	Unit	Part No.
0.2	Polyvinylidene fluoride and polypropylene	3	100/pk	A5300002
0.45	Polyvinylidene fluoride and polypropylene	3	100/pk	A5307045
10	Glass fiber	10	100/pk	A500401000



CaptiVac vacuum collar, A796

CaptiVac Vacuum Collars

- Pre-aligned for trouble-free operation
- Vacuum sealed for maximum efficiency
- Simple, cost effective solution

For use with Captiva Filtration and SPEC 96-well Plates, this patented vacuum collar is a completely transparent device that joins Captiva or SPEC plates directly onto our collection plate. The unique design of the Captiva collar forms a pre-set, pre-aligned vacuum seal between the filtration and collection plate, which positions the outlet tips at a specified distance inside each well, so as to prevent cross contamination of samples.

CaptiVac Vacuum Collars

Description	Part No.
CaptiVac vacuum collar	A796
CaptiVac gasket kit, 5/pk	A796G

■ SAMPLE FILTRATION

Various methods of sample filtration can be used to clarify samples that need further analysis or where particulate matter may cause a problem. Agilent provides a range of standard and economy syringe filters conveniently housed in inert polymeric housings for easy use and disposal, as well as the innovative Mini-UniPrep Syringeless Filters from Whatman.



2-in-1 Filter

Syringe Filters

Membrane syringe filters are used most often to clarify small-volume sample solutions prior to HPLC and ion chromatography. The membrane filters are contained in an inert polymeric housing. No glue or binders are used in their construction to ensure that no extractables are present. The housing is designed to spread the sample solution over the entire surface of the membrane so that maximum membrane capacity is used. Syringe filters are ready-to-use and are quite convenient. You merely attach the Luer-tipped syringe filled with the sample solution to the housing and push the sample through the pre-cleaned filters.

Why Filter Your Samples for HPLC?

- To protect your column against plugging (blockage) from sample particulate matter
- To protect your injection valve components from possible damage, scratching and increased wear by sample particulate matter
- To minimize downtime



How to Select the Right Membrane Syringe Filter

Filter types should be selected based on sample volume. All filter inlets are female Luer-compatible, have inert polypropylene or polycarbonate housings and come in three diameters:

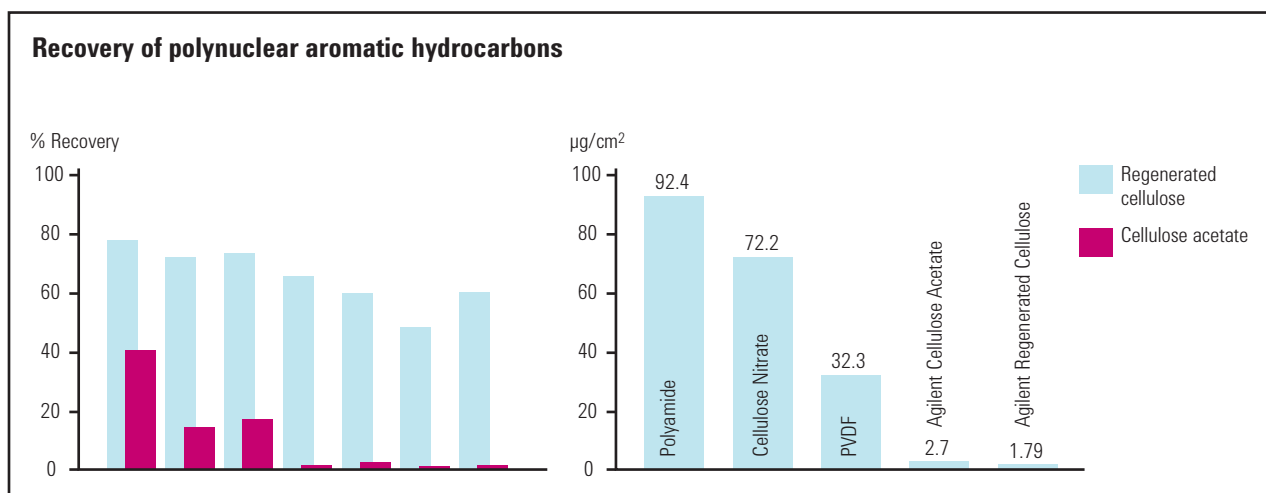
- 30 mm filters are designed for larger sample volumes or for solvent filtration and offer increased filtration speed. The holdup volume is less than 50 μL .
- 25 mm Econofilters offer a moderately wide cross-sectional area (4.2 cm^2) with a holdup volume of less than 50 μL .
- 13 mm filters are ideal for most applications and offer the best compromise between holdup volume and sample volume. Sample volumes are typically in the 1-10 mL range and the holdup volume is less than 10 μL .

Porosity should be determined by the size of potential particulates in your sample. Finer porosities require more pressure to filter.

Two porosities are available: 0.45 μm pores to remove particles that are detrimental to most columns and 0.20 μm pores to remove the smallest particles.

Membrane Filters

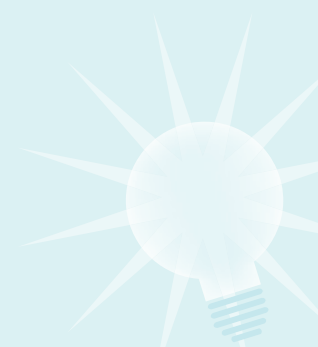
When selecting membrane filters, solvent compatibility is the most important criterion. The chemical resistance table lists the most popular solvents used in HPLC along with the compatible membrane types.



Regenerated cellulose membranes are recommended for general HPLC sample preparation, as well as filtration of aqueous biological samples and organic solvents. PTFE membranes are compatible with almost all solvents, acids and bases. Cellulose nitrate is primarily used for pre-filters. Cellulose acetate membranes are not compatible with organic solvents. They are specially recommended for proteins and protein-related samples.

Why Purchase Agilent Syringe Filters?

Agilent offers the most popular sizes, porosities and membrane types at attractive pricing. All of our syringe filters are pre-sterilized by gamma irradiation, and our regenerated cellulose filters are batch-tested under HPLC conditions.



Chemical Resistance Table for Membrane Filters

Substances	Membrane filters				
	Cellulose nitrate	Cellulose acetate	Regenerated cellulose	Nylon	PTFE
1,4-Dioxane	-	-	+	N/A	0
Acetic acid, 10% & 25%	+	0	+	-	+
Acetone	-	-	+	+	+
Acetonitrile	-	-	+	+	-
Alcohols (i-Propanol, 1-Hexanol, Cyclohexanol)	+	+	+	+	+
Aliphatic hydrocarbons	+	+	+	+	+
Aromatic hydrocarbons	+	+	+	N/A	+
Carboxylic acid	+	+	+	-	+
Cyclohexane	0	0	+	+	+
Diethylether	0	0	+	+	0
Dimethyl formamide	-	-	0	+	+
Dimethyl sulfoxide	-	-	0	N/A	+
Ethanol = <98%	-	+	+	+	+
Ethyl acetate	-	-	+	+	+
Formic acid, 25%	+	0	+	-	+
Hexane	+	+	+	+	+
Hydrochloric acid, 25%	+	-	+	-	+
Methanol	-	+	+	0	+
Nitric acid, 25%	0	0	+	-	+
Phosphoric acid, 45%	0	0	0	0	+
Potassium hydroxide, 1 M	-	-	0	-	+
Salt solutions, aqueous	+	+	+	+	+
Sodium hydroxide, 1 M	-	0	-	-	+
Tetrahydrofuran	-	-	+	+	0
Toluene	+	+	+	+	+
Trichloroacetic acid, 10%	+	-	-	0	+
Trichloroethane	+	0	+	0	+
Xylene	+	+	+	+	+

Code for Table: + = Resistance, 0 = Limited resistance, - = Not resistant, N/A = Not available

Premium Syringe Filters

Agilent premium syringe filters are high-quality, ready-to-use, tested and certified for the absence of UV-absorbing substances at typical HPLC wavelengths with water, methanol and acetonitrile.

Premium Membrane Filters, 100/pk

Description	Diameter (mm)	Pore Size (μm)	Part No.
PTFE with Luer tip	30	0.2	3150-0753
PTFE with Luer tip	30	0.45	3150-0754
PTFE with Luer tip	13	0.45	5185-5836
PTFE with mini tip	13	0.45	5185-5837
Cellulose Acetate with Luer tip	30	0.45	5061-3363



Regenerated cellulose filters, 5061-3364

Premium Regenerated Cellulose Membrane Filters, 100/pk

Description	Diameter (mm)	Pore Size (μm)	Part No.
Luer tip	30	0.2	5061-3354
Luer tip	30	0.45	5061-3364
Luer tip	13	0.2	5064-8222
Luer tip	13	0.45	5064-8221
Mini tip	13	0.2	5061-3366
Luer tip	13	0.45	5061-3365

Econofilters

High quality econofilters are shipped in large packs and are ideal for busy labs that need fast, efficient filtration at a reasonable price.



Membrane Econofilters, 5185-5830

Membrane Econofilters, 200/pk

Description	Diameter (mm)	Pore Size (μm)	Part No.
Regenerated cellulose	25	0.2	5185-5830
Regenerated cellulose	25	0.45	5185-5831
Nylon	25	0.2	5185-5832
Nylon	25	0.45	5185-5833
PTFE	25	0.2	5185-5834
PTFE	25	0.45	5185-5835

Pre-Filters (Standalone)

Pre-filters have a 100% borosilicate glass fiber membrane that is chemically inert and resistant to most solvents. The high surface area of the rigid fiber structure provides outstanding particle retention capacity while maintaining low flow resistance. The GF-53 will retain coarse particles down to approximately 3 μm in diameter and the GF-92 down to approximately 2 μm in diameter. They can be used standalone or in a series with a membrane filter.

Pre-Filters (Standalone), 100/pk

Description	Part No.
Glass fiber (GF-53)	5042-1393
Glass fiber (GF-92)	5042-1370

2-in-1 Filters

2-in-1 filters are recommended for difficult-to-filter samples because they have a two-layered filter in a single housing. The coarse, top layer pre-filter removes larger particulates before getting to the membrane filter, requiring less force to push liquid sample through the filter, thereby providing higher throughput, and saving time, sample and money.

2-in-1 Filters, 100/pk

Description	Diameter (mm)	Pore Size (μm)	Part No.
Glass Fiber/Cellulose Nitrate	30	0.45	5042-1391
Glass Fiber/Regenerated Cellulose	30	0.45	5042-1392

Syringes for Sample Filters, 10/pk

Description	Part No.
Disposable syringes, 20 mL	5062-8534



Mini-UniPrep Syringeless Filters

Agilent is pleased to offer Mini-UniPrep Syringeless Filters from Whatman. The Mini-UniPrep is a pre-assembled, disposable filtration device, ideal for removing particulate matter from samples. This small filter performs the functions of syringe filters, disposable syringes, vials, septa and caps in one small package, and protects your valuable HPLC column from contamination.

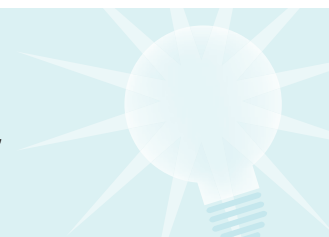
- Ideal for samples that undergo demanding HPLC analysis
- Equivalent in size to standard 12 x 32 mm vial, with a filtering capacity of 0.5 mL
- Innovative design reduces costs, materials, time to prepare samples, and is environmentally-responsible
- Compatible with all Agilent 1100 and 1200 Series autosamplers and manual injectors

Mini-UniPrep Syringeless Filters, 100/pk

Description	Part No.
0.45 μ m PTFE For aggressive samples	5190-1415
0.45 μ m Nylon For aqueous and organic samples, pH 3-10	5190-1416
0.45 μ m PP For solvent-based samples, low water breakthrough values	5190-1417
0.45 μ m regenerated cellulose For aqueous or organic solvents, very low non-specific protein binding membrane	5190-1418
0.20 μ m PTFE For aggressive samples	5190-1419
0.20 μ m Nylon For aqueous and organic samples, pH 3-10	5190-1420
0.20 μ m PP For solvent-based samples, low water breakthrough values	5190-1421
0.20 μ m regenerated cellulose For aqueous or organic solvents, very low non-specific protein binding membrane	5190-1422

Tips & Tools

For more information, including chemical compatibilities, visit www.agilent.com/chem/miniuniprep





TOXI-TUBES

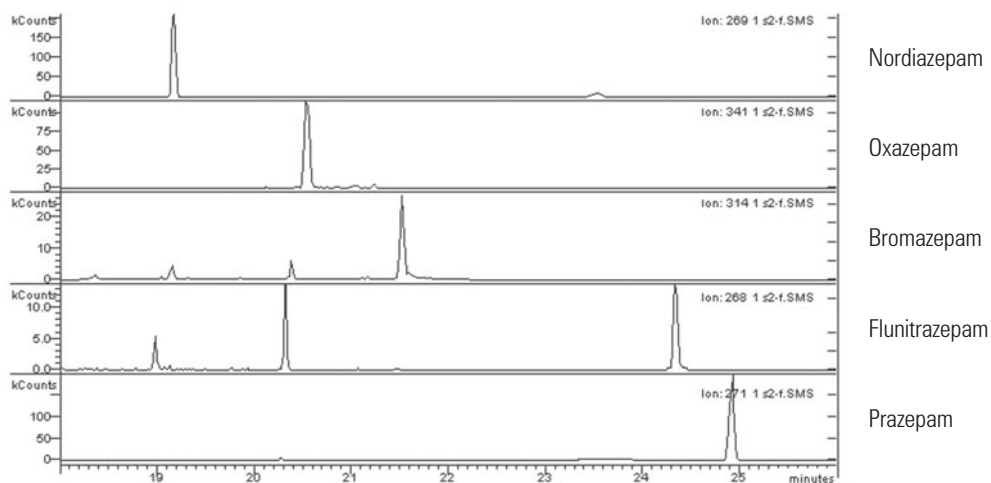
- Boost LC/MS and GC/MS efficiency with fast, simple drug extractions
- Reduce risk of system downtime and increase throughput by reducing column changes
- Quick, easy, clean extraction of drugs from samples

Use the quickest, easiest, and cleanest liquid/liquid extraction procedure available to increase your GC/MS and LC/MS efficiency. TOXI-TUBES give you a clean one-step process for extracting a broad range of drugs from biological or non-biological specimens.

TOXI-TUBES

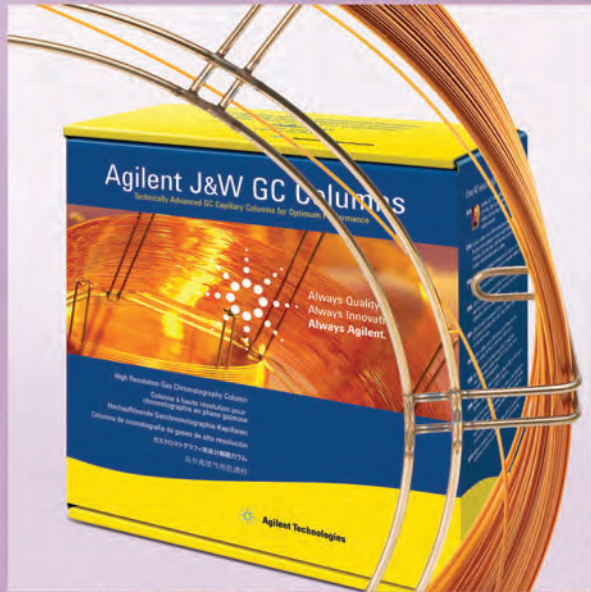
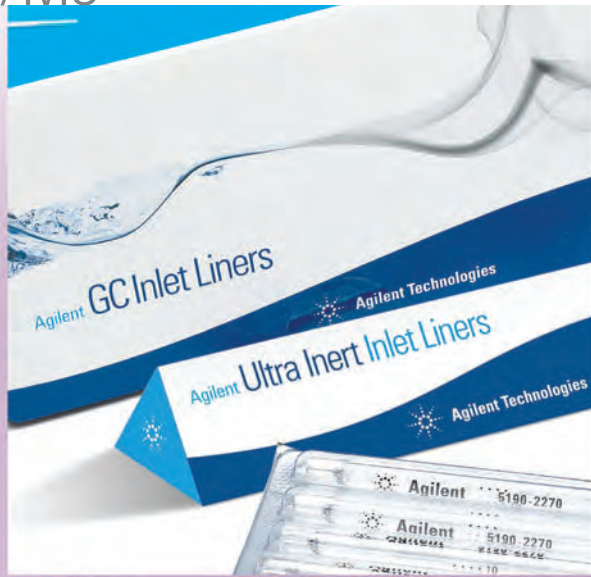
Description	Use With	Unit	Part No.
TOXI-TUBES A Pre-measured solution of buffering salts (pH 9) and organic solvents	Organic bases and neutral drugs	100/pk	A109A100
TOXI-TUBES B Pre-measured solution of buffering salts (pH 4.5) and organic solvents	Acidic and neutral drugs	100/pk	A109B100

Selected profiles of five benzodiazepines extracted from a whole blood sample using TOXI-TUBES A. Each drug was spiked at 50 ng/mL in blood.



Benzodiazepine	Recovery Ratio (%)	
	Whole Blood	Urine
Nordiazepam	75.5	88.2
Oxazepam	72.0	85.9
Bromazepam	67.8	91.2
Flunitrazepam	72.7	89.8
Prazepam	74.7	93.2

GC AND GC/MS



In this Chapter

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- 254 GC General Supplies
- 280 GC Instrument Parts and Supplies
- 318 GC/MS Parts and Supplies
- 337 GC Parts and Supplies for Varian Instruments

Agilent J&W GC and GC/MS Columns

- 359 Ultra Inert Columns
- 362 Guard Columns
- 364 Low-bleed GC/MS Columns
- 392 Polysiloxane Polymers Columns
- 430 Polyethylene Glycol (PEG) Columns
- 442 PLOT Columns
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GC and GC/MS Applications

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- 617 Foods, Flavors and Fragrance Applications
- 641 Industrial Chemical Applications
- 671 Life Science Applications
- 686 Petroleum Applications





GC and GC/MS Maintenance Schedule

Item	Typical Schedule	Actions/Comments
Gas Management		
Gas purifiers (carrier gas and detector gas)	Every 6 to 12 months	Replacement schedule is based on capacity and grade of gas. In general, replace non-indicating traps every 6 to 12 months or when indicating traps start to change color. Replace indicating traps when indicating material is starting to change color.
Internal split vent trap	Every 6 months*	Replace to prevent material backing up into EPC control and to avoid costly repair.
External split vent trap	Every 6 months*	Replace to prevent sample analytes from escaping into the laboratory environment.
Flow meter calibration	Every 1 to 2 years	Re-calibrate electronic flow meters – follow recommended schedule for the unit (shown on the calibration certificate).
Sample Introduction and Inlets		
Syringes and/or syringe needles	Every 3 months*	Replace syringe if dirt is noticeable in the syringe, if it cannot be cleaned, if the plunger doesn't slide easily, or if clogged. Replace needle if septa wear is abnormal or the needle becomes clogged.
Inlet liner	Weekly*	Check often. Replace when dirt is visible in the liner or if chromatography is degraded.
Liner O-rings	Monthly*	Replace with every liner change.
Inlet septum	Daily*	Check often. Replace when signs of deterioration are visible (gaping holes, fragments in inlet liner, poor chromatography, low column pressure, etc.)
Inlet hardware	Every 6 months Every year	Check for leaks and clean. Check parts and replace when parts are worn, scratched, or broken.
Inlet gold or stainless steel seal	Monthly*	For highest level of reproducibility, change inlet seal with every liner change, but minimally replace monthly or when scratched, corroded, or if there is build-up of non-volatile sample components.

*Schedule is an approximation of average usage requirements. Frequency may vary widely based upon application and sample type.

(Continued)

GC and GC/MS Maintenance Schedule		
Item	Typical Schedule	Actions/Comments
Columns		
Front-end maintenance	Weekly-monthly*	Remove 1/2 to 1 m from the front of the column when experiencing chromatographic problems (peak tailing, decreased sensitivity, retention time changes, etc.). Replace inlet liner and septum, and clean inlet as necessary. Guard column may be useful for increasing column lifetime.
Solvent rinse	As needed	Perform when chromatography degradation is due to column contamination. Only for bonded and cross-linked phases.
Replacement	As needed	Replace when trimming and/or solvent rinsing no longer restore chromatographic performance.
Ferrules	As needed	Replace when changing columns and inlet/detector parts.
Detectors		
FID/NPD jets and collector	As needed	Clean when deposits are present. Replace when they become scratched, bent, or damaged, or when having difficulty lighting FID or keeping flame lit.
NPD bead	As needed	Replace when signal drifts or there is a dramatic change in sensitivity.
FID	Every 6 months	Measure hydrogen, air, and makeup gas flows.
TCD	As needed	Thermally clean by "baking-out" when a wandering baseline, increased noise, or a change in response is present. Replace when thermal cleaning does not resolve the problem.
ECD	Every 6 months or as needed	Wipe test. Thermally clean by "baking-out" when baseline is noisy, or the output value is abnormally high. Replace when thermal cleaning does not resolve the problem.
FPD	Every 6 months or as needed	Measure hydrogen, air, and makeup gas flows. Clean/replace FPD windows and seals when detector sensitivity is reduced.
NCD and SCD	Every 3 months*	Change pump oil, oil coalescing filter and chemical trap.
Mass Selective Detectors		
Tune MSD	As needed	Keep plenty of PFTBS (P/N 05971-60571) on hand.
Check the calibration vial	Every 6 months	Vial can be refilled without venting the system.
Replace the foreline pump oil	Every 6 months	Check the fluid weekly. Change when the fluid becomes discolored or every 6 months.
Replace the diffusion pump fluid	Every year or as needed	Check the fluid weekly. Too little fluid will cause the pump to run at a higher temperature, resulting in degradation and loss of high vacuum. Change when the fluid is discolored or contains particulates.
Clean the ion source	As needed	Clean when performance deteriorates to remove contamination and to restore the electrostatic properties of the ion lens system. Replace scratched parts to maintain optimal performance.

*Schedule is an approximation of average usage requirements. Frequency may vary widely based upon application and sample type.

■ PARTS AND SUPPLIES

NEW!

Bulk GC Supplies



Single taper splitless liner, no wool, 5190-2270



Certified gold plated seal kit, 5190-2209



Certified non-stick fluorocarbon O-ring, 5190-2269



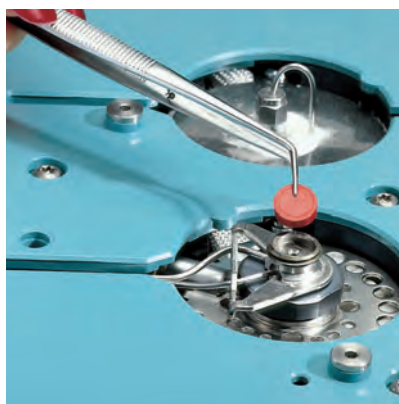
Non-stick BTO septa, 5190-3157

Ideal for high usage laboratories, our bulk supplies provide the quality and consistency of Agilent chromatography supplies in convenient and economical packaging. We currently offer Agilent inlet liners, septa, gold inlet seals, and liner O-rings in bulk packaging.

- Economical and convenient packaging
- Overall cost of ownership reduced
- Same great quality Agilent products

Bulk GC Supplies

Description	Unit	Part No.
Single taper split liner, low pressure drop	100/pk	5190-2275
Single taper splitless liner, no wool	100/pk	5190-2270
Single taper splitless liner, glass wool	100/pk	5190-2271
Double taper splitless liner, no wool	100/pk	5190-2272
Certified gold plated seal kit, includes washer	10/pk	5190-2209
Certified non-stick fluorocarbon O-ring	100/pk	5190-2269
Non-stick fluorocarbon O-ring for Flip Top	100/pk	5190-2268
Non-stick BTO septa, 11 mm	400/pk	5190-3157
Non-stick Advanced Green septa, 11 mm	400/pk	5190-3158



Inlet Septa

Septa are available for a variety of different applications and have different upper temperature limits. Lower temperature septa are usually softer, seal better, and can withstand more punctures (injections) than their high-temperature counterparts. If septa are used above their recommended temperatures, they can leak or decompose, causing sample loss, lower column flow, decreased column life and ghosting. To minimize problems:

- Use within the recommended temperature range
- Change regularly
- Install the retainer nut "finger-tight"
- Use septum purge when available
- Use autoinjectors
- Use sharp syringe needles



Premium Non-Stick Septa

Agilent premium non-stick inlet septa are designed and manufactured to provide a reliable non-contaminating seal. Our tri-fold blister pack ensures that each septum remains clean and ready to use.

- Proprietary plasma treatment prevents sticking and unnecessary inlet cleaning
- Innovative blister packaging keeps each septum clean and ready for use
- Center point guides the needle for easy penetration, less coring and longer life
- Precision molding assures accurate fit in the inlet
- Each batch is tested for bleed on Agilent 6890 GC-FID
- Premium formulations selected for sealing and chromatographic cleanliness
- No need to bake septa before using

Summary of Premium Inlet Septum Characteristics

Septum Type	Bleed	Lifetime	Temperature Limits
Non-Stick BTO (Bleed and Temperature Optimized)	◆◆◆	◆	to 400°C injection port temp
Non-Stick Advanced Green	◆◆	◆◆	to 350°C
Non-Stick Long-Life	◆	◆◆◆	to 350°C

◆◆◆ = best ◆◆ = very good ◆ = good



BTO septa, 5183-4757

Non-Stick Bleed and Temperature Optimized (BTO) Septa

- Extended temperature range, lowest bleed
- Maximum injection port temperature 400°C
- Plasma treatment eliminates sticking in the injection port
- Pre-conditioned; ready to use
- Blister packaging for cleanliness and convenience
- Ideal for use with low-bleed, "Mass Spec" capillary columns

Non-Stick Bleed and Temperature Optimized (BTO) Septa

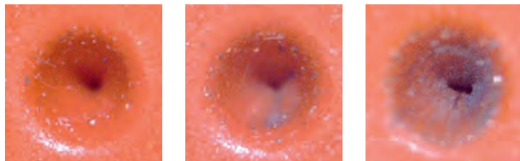
Description	Unit	Part No.
11 mm septa	50/pk	5183-4757
11 mm septa	100/pk	5183-4757-100
11 mm septa	400/pk	5190-3157
5 mm septa through-hole for on-column, in glass jar	50/pk	5183-4758

Comparison of Coring, With and Without CenterGuide (30x magnification)



High-Temperature Septa without CenterGuide

Major coring before 100 autoinjections



Agilent BTO Septa with CenterGuide

Very little coring, even after 700 autoinjections



Advanced green septa, 5183-4759

Non-Stick Advanced Green Septa

- True long-life, high temperature green septa
- More injections per septum
- Plasma treatment eliminates sticking in the injection port
- Maximum injection port temperature 350°C
- High-performance alternative to competitors' "green" septa
- Blister packaging for cleanliness and convenience

Non-Stick Advanced Green Septa

Description	Unit	Part No.
11 mm septa	50/pk	5183-4759
11 mm septa	100/pk	5183-4759-100
11 mm septa	400/pk	5190-3158
5 mm septa through-hole for on-column, in glass jar	50/pk	5183-4760



Long-life septa, 5183-4761

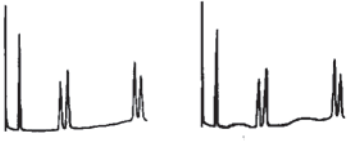


Non-Stick Long-Life Septa

- The preferred septa for autosamplers
- Pre-pierced for extended life and reduced coring
- Ideal for overnight runs
- Up to 400 injections per septum
- Plasma treatment eliminates sticking
- Maximum injection port temperature 350°C
- Soft, 45 durometer, easy on autosampler needles
- Blister packaging for cleanliness and convenience

Non-Stick Long-Life Septa

Description	Unit	Part No.
11 mm septa	50/pk	5183-4761
11 mm septa	100/pk	5183-4761-100
5 mm septa through-hole for on-column, in glass jar	50/pk	5183-4762

Septa Troubleshooting

Symptom	Possible Causes	Remedy
<p>Extra Peaks/Humps</p> 	Septum bleed	Turn off injector heater. If extra peaks disappear, use septum specified for higher temperature or analyze at lower inlet temperature.
<p>Baseline Change After Large Peak</p> 	Large leak at septum during injection and for a short time thereafter (common with large diameter needles)	Replace septum and use smaller diameter needles.
<p>Retention Times Prolonged</p> 	Carrier gas leaks at septum or column connection	Check for leaks. Replace septum or tighten connections if necessary.



General Purpose Septa

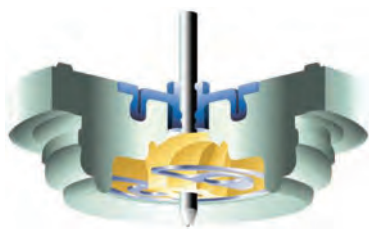
Agilent's general purpose septa are made from an enhanced injection-molded silicone rubber. The septa material, gray in color, is specified to withstand over 200 automatic injections at an injection port temperature of 350°C.

General Purpose Septa

Description	Unit	Part No.
Gray Septa		
11 mm septa	50/pk	5080-8896-50
11 mm septa	100/pk	5080-8894-100
9.5 mm (3/8 in.) septa*	50/pk	5080-8728-50
9.5 mm (3/8 in.) septa*	100/pk	5080-8728-100
5 mm through hole septa for on-column inlets, automatic or manual injections**	25/pk	5181-1260
5 mm septa for high column backpressure, on-column inlets**	25/pk	5181-1261

*for 5700 series and 5830/40 GCs

**5 mm septa are packaged in glass jars



Merlin Microseal

- Low bleed, longer life alternative to standard septa for split/splitless injection
- Has a lifetime of more than 2000 injections, depending on samples and operating conditions
- Greatly reduced instrument downtime for septa changes and injection port liner changes due to septa particulates
- Two distinct sealing mechanisms: double O-ring type seal around the syringe needle and spring assisted duckbill to seal the injection port

Merlin Microseal

Description	Part No.
High Pressure Merlin Microseal	
High pressure Merlin Microseal starter kit Includes microseal septum and nut	5182-3442
Merlin Microseal high pressure septum	5182-3444
Microseal high pressure nut	5182-3445
High sample volume septum kit Contains Merlin high pressure Microseal, six 23-gauge syringes, 500 vials and caps	5181-8839
Merlin Microseal Standard Pressure	
Merlin Microseal kit, original low pressure system Includes nut and septum	5181-8816
Merlin Microseal kit, original low pressure system Includes nut and 2 septa	5181-8833
Merlin Microseal septum, stainless steel, rubber (30 psi)	5181-8815
Microseal PTFE nut liners, 2/pk	5182-0853
Merlin Microseal manual syringe, 5 μ L, 23 gauge	5182-3438
Merlin Microseal manual syringe, 10 μ L, 23 gauge	5182-3439
Syringe, 5 μ L, 23 gauge	9301-0892
Syringe, standard plunger, 10 μ L, 23 gauge	9301-0713



For in-depth information about maintaining your GC/MS, request "Maintaining Your Agilent GC and GC/MS Systems" from your Agilent Representative (**publication number 5990-5451EN**).

Inlet Liners

NEW!

Agilent Ultra Inert Liners



Agilent ultra inert liners are the perfect companion to Agilent J&W Ultra Inert GC columns. They provide reproducible inertness liner after liner, maintained through a sequence of samples, and for a range of analytes. Agilent's ultra inert liners were developed – and are manufactured and certified – using a suite of tests specifically designed to ensure batch-to-batch uniformity.

- Exceptional batch-to-batch liner uniformity
- Low to no bleed or background contamination
- Superior coverage, allowing use of glass wool even with highly active compounds

Only ultra inert liners are delivered in Agilent's exclusive touchless packaging with a pre-cleaned, conditioned and non-stick plasma treated O-ring pre-installed. Touchless packaging aids in removal of the old liner, and easy installation of the new, clean, preconditioned liner – without risk of contamination from touching.

Agilent Ultra Inert Liners

Description	Volume (µL)	ID (mm)	1/pk	5/pk	25/pk
Split Inlet Liners					
Straight, ultra inert liner with glass wool	990	4	5190-2294	5190-3164	5190-3168
Splitless Inlet Liners					
Single taper, ultra inert liner	900	4	5190-2292	5190-3162	5190-3166
Single taper, ultra inert liner with glass wool	900	4	5190-2293	5190-3163	5190-3167
Universal Inlet Liners					
Low pressure drop, ultra inert liner with glass wool	870	4	5190-2295	5190-3165	5190-3169

Agilent MS Certified Liners

Agilent MS certified split and splitless liners are manufactured and tested to our highest level of scrutiny to assure reproducibility.

We have built years of experience into MS certified liners to provide the quality and consistency needed for critical applications, especially those using esterification agents for trace level analysis, such as toxicology or drugs of abuse applications.

- Geometrical dimensions and tolerances of the glass are controlled by Statistical Process Control (SPC) with 100% Go-No-Go check
- Glass wool is pre-qualified with mass spectrometry, then inserted using a unique manufacturing procedure to improve reproducibility
- Deactivated MS certified liners are treated with Agilent's proven proprietary deactivation process developed to last longer than other commercially available treatment
- Random samples of MS certified liners are tested using both FID and MSD analysis of challenging probes to evaluate acid/base deactivation, response linearity, peak symmetry, bleed and background noise
- Each Agilent MS certified liner is traceable by the lot codes silk screened on the liner

Agilent MS Certified Liners



MS certified single taper split liner, 5188-6576



MS certified straight split liner, 5188-6574



Single taper, glass wool splitless liner,
5062-3587/5188-6568

Description	Volume (μL)	ID (mm)	1/pk	5/pk	25/pk
Split Inlet Liners					
Single taper, MS certified liner with restriction to hold glass wool	870	4	5188-6576		
Straight, MS certified liner with glass wool	990	4	5188-6574	5188-6569	
Splitless Inlet Liners					
Single taper, MS certified liner with glass wool	900	4	5188-6568	5188-6567	5188-6566

Agilent Split Liners

Agilent single taper split liners are made to strict dimension specifications for optimal inlet performance and feature the tightest tolerances for OD, ID, taper, and glass wool placement. For ease-of-use and reproducibility, the liners have a positioning bead, a restriction to secure the position of the glass wool, and a feature to consistently self-position to the recommended height. The liners also feature Agilent's proprietary deactivation.

Agilent Split Liners



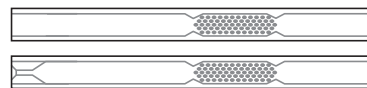
Single taper split liner, 5183-4647, 5183-4711



Straight split liner, 19251-60540



Straight split liner with cup, glass wool, and packing, 18740-60840



Focus liners, 210-4004-5, 210-4022-5

Tips & Tools

Agilent recommends part number 5183-4647 as the top split liner choice for:

- Highest run-to-run area reproducibility
- Least discrimination for wide boiling point range samples
- Use with widest range of conditions and sample types
- Easy self-adjusting installation

Description	Volume (µL)	ID (mm)	1/pk	5/pk	25/pk	100/pk
Single Taper Split Liners						
Single taper, glass wool, deactivated, low pressure drop	870	4	5183-4647	5183-4701	5183-4702	5190-2275
Single taper, MS certified liner with restriction to hold glass wool	870	4	5188-6576			
Single taper, glass wool, deactivated	870	4	5183-4711	5183-4712	5183-4713	
Straight Split Liners						
Straight, glass wool, non-deactivated	990	4	19251-60540	5183-4691	5183-4692	
Straight, MS certified liner with glass wool	990	4	5188-6574	5188-6569		
Straight, with cup (for manual injections)	800	4	18740-80190	5183-4699	5183-4700	
Straight split liner with cup, glass wool, and packing (for manual injections, not recommended for use with EPC)	800	4	18740-60840	5183-4697	5183-4698	
Focus Liners						
Deactivated with glass wool	935	4		210-4004-5		
Tapered, deactivated with glass wool	880	4		210-4022-5		
SPME Liners						
Deactivated, for SPME	70	0.75		5188-6471		

Agilent Splitless Liners

Agilent's proprietary deactivation is important for splitless liners because of the longer sample/liner contact time in splitless mode.

Agilent Splitless Liners

Description	Volume (µL)	ID (mm)	1/pk	5/pk	25/pk	100/pk
Single Taper Splitless Liners						
Single taper, deactivated	900	4	5181-3316	5183-4695	5183-4696	5190-2270
Single taper, inert	900	4	5181-3316i			
Single taper, glass wool, deactivated	900	4	5062-3587	5183-4693	5183-4694	5190-2271
Single taper, MS certified liner with glass wool	900	4	5188-6568	5188-6567	5188-6566	
Double Taper Splitless Liners						
Double taper, deactivated	800	4	5181-3315	5183-4705	5183-4706	5190-2272
Straight Splitless Liners						
Straight, deactivated, quartz	250	2	5181-8818	5183-4703	5183-4704	
Straight, non-deactivated, quartz	250	2	18740-80220	5183-4707	5183-4708	
Straight, non-deactivated	990	4	210-3003	210-3003-5		
Direct Inlet Liners						
Straight, non-deactivated (for gas samples, headspace, or purge & trap)	140	1.5	18740-80200	5183-4709	5183-4710	



Single taper splitless liner, 5181-3316/5181-3316i



Single taper, glass wool splitless liner, 5062-3587/5188-6568



Double taper splitless liner, 5181-3315



Straight, non-deactivated, quartz splitless liner, 18740-80220/5181-8818



Straight, non-deactivated splitless liner, 210-3003



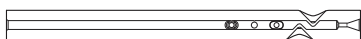
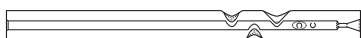
Direct inject liner, 18740-80200

NEW!

Agilent Dimpled Liners

- Single tapered liner
- Agilent proprietary deactivation
- Blocked line of sight to column
- No glass wool
- Optimized for cold splitless or solvent vent
- Recommended for heavy matrix samples, such as pesticides in food extracts

The 2 mm dimpled liner was designed for use in the Agilent MultiMode Inlet for the analysis of heavy matrix samples, such as food safety extracts. Cold splitless injection mode is recommended. Sample residue collects and spreads within the body of the liner – not reaching the taper, bottom of the inlet, or the GC column. This extends the number of analyses before the liner needs to be replaced, improving productivity while reducing inlet maintenance and cost of ownership.



Single taper dimpled splitless liner, 5190-2296

Agilent Dimpled Liners

Description	Volume (µL)	ID (mm)	Part No.
Dimpled splitless single taper, deactivated	200	2	5190-2296

Agilent Direct Connect Liners

Agilent's Direct Connect Liners provide maximum recovery and minimal decomposition of active compounds for methods requiring splitless injection, such as EPA Method 8270. They are best for relatively clean samples containing active analytes, such as water extracts. The liners directly connect with the column, similar to press-fit connectors, to aid complete transfer of sample onto the column, eliminating the problem of inlet discrimination and further increasing sensitivity.



Single taper direct connect liner, G1544-80730



Dual taper direct connect liner, G1544-80700

Direct Connect Liners

Description	Part No.
Single taper direct connect liner, splitless, 4 mm ID, Agilent proprietary deactivation	G1544-80730
Dual taper direct connect liner, splitless, 4 mm ID, Agilent proprietary deactivation	G1544-80700
Single taper direct connect liner, splitless, 4 mm ID, deactivated, inert	G1544-80731



Liner O-rings in dial packaging

Liner O-Rings

- Liners are sealed in the inlet with O-rings or graphite seals
- Graphite seals are used when inlet temperatures exceed 350°C
- Fluorocarbon O-ring seals are easier to replace than graphite that deforms and flakes apart

Only Agilent Fluorocarbon Liner O-rings are:

- Pre-cleaned, then conditioned to eliminate out-gassing of contaminants, which is especially important for trace, ECD and MSD analyses
- Plasma treated for a non-stick, contaminant-free surface that won't stick to the inlet metal surface
- Packaged for convenience and cleanliness in a novel dial package that delivers 1 clean O-ring at a time

Liner O-Rings

Description	Unit	Part No.
Certified non-stick fluorocarbon O-ring	10/pk	5188-5365
	100/pk	5190-2269
Graphite O-ring for splitless liner	10/pk	5180-4173
Graphite O-ring for split liner	10/pk	5180-4168
Non-stick fluorocarbon liner O-ring for Flip Top	10/pk	5188-5366
	100/pk	5190-2268
High temperature PTV inlet liner fluorocarbon O-ring	10/pk	5188-5311



Vespe/Graphite ferrules, 5181-3323

Capillary Column Ferrules and Nuts

Using the wrong ferrule or a worn-out ferrule to seal your column connection can result in inconsistent and unreliable chromatography. An improper ferrule can cause leaks, which allow air and other contaminants to enter the instrument through the column seal, causing major interference with column and detector performance.

For optimum performance, ferrules should be replaced every time the column is replaced and when performing column maintenance.

To minimize problems, follow these general techniques for ferrule installation:

- Don't overtighten – finger tighten the column nut, then use wrench to tighten
- Maintain cleanliness
- Bake out ferrules prior to use (Vespe and Vespe/Graphite only)
- Avoid contamination, such as fingerprint oils
- Inspect used ferrules with magnifier for cracks, chips, or other damage before reusing them
- Change ferrules when new columns or injector/detector parts are installed

Caution: Agilent capillary column ferrules are manufactured to tolerances specific for Agilent J&W HP and DB brand columns. Fused silica tubing used for Agilent J&W VF columns has slightly different tolerances for the outer diameter.



For more information about capillary column compatibility, please visit www.agilent.com/chem/gcsupplies



For the most reliable seals, please refer to the table below for the recommended ferrules for your Agilent GC column.

Ferrule Compatibility

Column ID	DB and HP		VF	
	Graphite	Graphite/Vespe	Graphite	Graphite/Vespe
0.25	500-2114	5181-3323	CR211104	CR213104
0.32	5080-8853	5062-3515	CR211105	CR213105
0.53	5080-8773	5062-3512	CR211108	CR213108

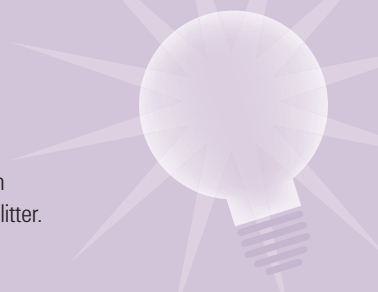
Ferrule Selection Recommendations

Ferrule/Seal Type	Upper Temp. Limit	Usages	Advantages	Limitations
Graphite (100%)	450°C	<ul style="list-style-type: none"> • General purpose for capillary columns • Suitable for FID and NPD • Recommended for high temperature and cool on-column applications 	<ul style="list-style-type: none"> • Easy-to-use stable seal • Higher temperature limit • Can be removed easily 	<ul style="list-style-type: none"> • Not for MS or oxygen-sensitive detectors • Soft, easily deformed or destroyed • Possible system contamination
Vespel/Graphite (85%/15%)	350°C	<ul style="list-style-type: none"> • General purpose for capillary columns • Recommended for MS and oxygen-sensitive detectors • Most reliable leak-free connection 	<ul style="list-style-type: none"> • Mechanically robust • Long lifetime 	<ul style="list-style-type: none"> • Not reusable • Flows at elevated temperature • Must re-tighten frequently
Vespel (100%)	280°C	<ul style="list-style-type: none"> • Isothermal operation • Can be reused or removed easily • Excellent sealing material when making metal or glass connections 	<ul style="list-style-type: none"> • Mechanically robust • Long lifetime • Can be reused or removed easily 	<ul style="list-style-type: none"> • Leaks after temperature cycle • Flows at elevated temperature • Must re-tighten frequently

Tips & Tools

100% Vespel ferrules should only be used for isothermal applications.

SiTite ferrules are required for leak-tight seals with the Ultimate Union, Deans Switch, and Effluent Splitter.





Graphite ferrules, 5080-8853



Vespel ferrule, 5181-3322



Vespel/Graphite ferrule, 5062-3514

Capillary Column Ferrules and Nuts

Ferrule ID (mm)	Column ID (mm)	Unit	Part No.
General Purpose Graphite Ferrules (Short)			
0.5	0.1, 0.2, 0.25, 0.32	10/pk	5080-8853
0.4	0.05, 0.25	10/pk	500-2114
0.8	0.45, 0.53	10/pk	500-2118
1.0	0.53	10/pk	5080-8773
85% Vespel, 15% Graphite Ferrules (Short)			
0.4	0.1, 0.2, 0.25	10/pk	5181-3323
0.5	0.32	10/pk	5062-3514
0.8	0.45, 0.53	10/pk	5062-3512
Preconditioned 85% Vespel, 15% Graphite Ferrules (Long)*			
0.3	0.1	10/pk	5062-3507
0.4	0.1, 0.2, 0.25	10/pk	5062-3508
0.5	0.32	10/pk	5062-3506
0.8	0.53	10/pk	5062-3538
100% Vespel, High Performance Ferrules (Short)**			
0.4	0.1, 0.2, 0.25	10/pk	5181-3322
0.5	0.32	10/pk	5062-3513
0.8	0.45, 0.53	10/pk	5062-3511
Specialty Ferrules, 85% Vespel, 15% Graphite			
Two Hole			
0.3		10/pk	5181-3388
0.4	0.1, 0.2, 0.25	10/pk	5062-3580
0.5	0.32	10/pk	5062-3581
No hole			
		10/pk	5181-3308
High Temperature PTV Inlet, SS/Graphite			
0.4	0.32	10/pk	5188-5315
0.4	0.53	10/pk	5188-5314

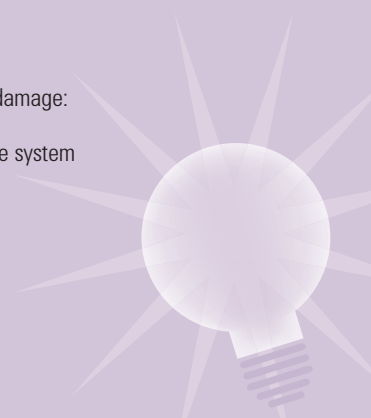
*These ferrules are recommended for use with Agilent GC/MS transfer lines with P/N 05988-20066 MS interface column nut.

**These ferrules are recommended for use in isothermal analysis only.

Tips & Tools

Look for the following signals that indicate ferrule damage:

- Background noise from oxygen diffusing into the system
- Column bleed catalyzed by oxygen
- Sample degradation
- Sample loss
- Increase in detector signal/noise
- Poor retention time reproducibility





SilTite metal ferrules, 5188-5361



Universal column nut, 5181-8830



MS interface column nut, 05988-20066

SilTite Metal Ferrules

Description	Unit	Part No.
For use with 0.25 mm ID capillary columns	10/pk	5188-5361
For use with 0.32 mm ID capillary columns	10/pk	5188-5362
For use with 0.53 mm ID capillary columns	10/pk	5188-5363
For use with 1/16 in. OD stainless steel tubing Includes 2 column nuts	10/pk	5184-3571

Column Nuts

Description	Part No.
Short Nuts	
Universal column nut, 1/16 in. hex, 2/pk	5181-8830
Finger tight column nut for 530 μ m columns*	5020-8293
Finger tight column nut for 320 μ m columns and smaller*	5020-8292
Blanking plug, finger tight style	5020-8294
6850 column nut, 2/pk	5183-4732
Extended column nut, VI inlet	G3504-20504
High Temperature SimDis PTV inlet, 4 mm hex	5188-5312
Long Nuts	
MS interface column nut, female	05988-20066
Inlet column nut for long or long two-hole ferrules	05921-21170
Accessories	
Open end wrench, 1/4 and 5/16 in.	8710-0510

*For use with graphite ferrules only

Straight Ferrules

Description	Unit	Part No.
1/4 in. PTFE	10/pk	0100-1378
1/4 in. Graphite	10/pk	0100-1324
1/8 in. Graphite	10/pk	0100-1325
1/8 in. 85% Vespel/15% Graphite	10/pk	0100-1332
1/16 in. PTFE	10/pk	0100-1375
1/16 in. Graphite	10/pk	0100-1326
1/16 in. VG-2 Vespel, 40% Graphite	10/pk	0100-1379
6.4 mm Vespel		0100-1104
1/4 in. 85% Vespel/15% Graphite	10/pk	0100-1331

Reducing Ferrules

Description	Unit	Part No.
1/8 to 1/16 in. Vespel	10/pk	0100-1342
1/8 to 1/16 in. VG-1 Vespel, 15% Graphite	10/pk	0100-1344
1/16 in. to 0.4 mm VG-2 Vespel, 40% Graphite	10/pk	0100-1381

Ferrules for LTM Rapid Heating/Cooling System

Description	Unit	Part No.
For use with 0.25-0.4 mm ID LTM columns	5/pk	5190-1437
For use with 0.4-0.5 mm ID LTM columns	5/pk	5190-1438
For use with 0.5-0.8 mm ID LTM columns	5/pk	5190-1439

Ferrules and Nuts for NCD and SCD

Description	Part No.
Spare column nut and ferrule kit	G6600-80018





Capillary Flow Technology Supplies

Agilent offers a family of GC accessories based on our proprietary Capillary Flow Technology. These accessories increase system productivity and performance:

- QuickSwap MS Interface provides vent-free removal of columns
- Deans Switch device simplifies the analysis of complex samples
- Purged Effluent Splitter for inert, leak-free column effluent splitting



Ultimate Union

Ultimate Union

The Ultimate Union is part of Agilent's Capillary Flow Technology family, providing extremely low dead volume column connections. Like the QuickSwap, Deans Switch and Purged Effluent Splitter, the Ultimate Union uses special fittings and SilTite ferrules to create an inert, leak-free and robust seal that doesn't need re-tightening after temperature cycles.

Each Agilent Ultimate Union kit contains:

- 1 Union (your choice of deactivated or non-deactivated)
- 2 Internal nuts
- 1 Swaging nut
- 1 Oven wall clip

Kits do not include SilTite ferrules. Please order ferrules for your column ID separately. SilTite ferrules include 2 transfer line nuts.



Internal nut, G2855-20530



Tee, inert, G3184-60065

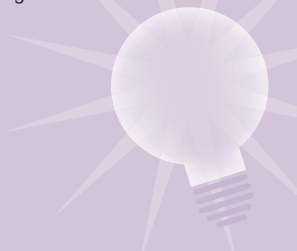
Ultimate Union Kits, Fittings and Ferrules

Description	Part No.
Ultimate union kit, deactivated	G3182-61580
Ultimate union kit, non-deactivated	G3182-61581
Internal nut	G2855-20530
Swaging nut	G2855-20555
SilTite metal ferrules, 0.10-0.25 mm ID capillary columns	5188-5361
SilTite metal ferrules, 0.32 mm ID capillary columns	5188-5362
SilTite metal ferrules, 0.53 mm ID capillary columns	5188-5363
Tee, inert	G3184-60065

Tips & Tools

Agilent's QuickSwap Interface Restrictors can increase the productivity of your Agilent 5975 inert MSD system.

Turn to page 326.



Fittings, Ferrules and Supplies

For leak-free, low dead volume and inert column connections with capillary flow accessories, such as the Deans Switch or QuickSwap MS Interface, use only SilTite ferrules and specified nuts. For Capillary Flow devices, use deactivated fused silica tubing. Do not use tubing that has been coated with stationary phase.

Fittings, Ferrules and Supplies

Description	Unit	Part No.
Internal nut		G2855-20530
Swaging nut		G2855-20555
Tee, inert		G3184-60065
Column storage fitting		G2855-20590
SilTite metal ferrules, 0.10-0.25 mm ID capillary columns	10/pk	5188-5361
SilTite metal ferrules, 0.32 mm ID capillary columns	10/pk	5188-5362
SilTite metal ferrules, 0.53 mm ID capillary columns	10/pk	5188-5363
Ferrule pre-swaging tool		G2855-60200

Column/Retention Gap Installation Supplies

Description	Part No.
250 µm retention gap, one 5 m piece	160-2255-5
320 µm retention gap, one 5 m piece	160-2325-5
530 µm retention gap, one 5 m piece	160-2535-5
Fused silica, deactivated, 0.15 mm x 1 m	160-2625-1
Fused silica, deactivated, 0.15 mm x 5 m	160-2625-5
Fused silica, deactivated, 0.15 mm x 10 m	160-2625-10

Press-fit Capillary Column Connectors

In the past it was necessary to use press-fit connectors with specific dimensions to connect columns of those dimensions. Modern press-fit connectors are "laser-milled" to provide highly reproducible taper angles throughout the length of the press-fit, ensuring an excellent seal. Now the only choice you have to make is between a glass union for standard applications, and fused silica unions or deactivated quartz unions for applications demanding maximum inertness.



Glass press-fit connections



Quartz splitter

Glass and Fused Silica Press-fit Connectors

Description	Unit	Part No.
Glass union, universal, 2-way	25/pk	705-0825
Fused silica union, universal, 2-way	5/pk	705-0905
Fused silica union, universal, 2-way	25/pk	705-0925
Fused silica union, universal, 3-way		705-0903
Polymide sealing resin, 5 g		500-1200

Quartz Press-fit Connectors/Splitters

Description	Unit	Part No.
Quartz column connector, 0.1 to 0.53 mm	5/pk	5181-3395
Deactivated quartz column connector	5/pk	5181-3396
Quartz splitter		5181-3397
Quartz deactivated splitter		5181-3398

Mechanical Capillary Column Connectors

Description	Unit	Part No.
Connector, body and nut		5061-5801
Ferrules for Connectors		
Vespel, 0.2 to 0.53 mm ID tubing	2/pk	5061-5804
Vespel, 0.32 to 0.32 mm ID tubing	2/pk	5061-5805
Vespel, 0.32 to 0.53 mm ID tubing	2/pk	5061-5806
Fused silica, undeactivated 530 μ m tubing, 10 m		160-2530-10



Graphpak connector for Agilent capillary detectors



Graphpak divider for simultaneous sampling



Capillary injection port connector, 5021-7170

Graphpak Capillary Column Connectors (2.5 mm)*

Column ID (mm)	Connector ID (mm)	Part No.
Capillary Detector Port Connector		
0.32/0.25	0.4	5021-7166
0.53	0.7	5021-7164
Capillary Divider for Simultaneous Sampling		
0.32/0.25	0.53	5021-7148
0.53	0.7	5021-7146
Capillary Injection Port Connector		
0.2	0.3	5021-7169
0.32/0.25	0.4	5021-7170
0.53	0.7	5021-7168

*The 2.5 mm Graphpak is not compatible with the Graphpak 2M used for the PTV.

Note: Order ferrules in addition to the connector to fit your column. Ferrules must be ordered separately.

Ferrules for Connectors

Column ID (mm)	ID (mm)	Unit	Part No.
0.2	0.3	10/pk	5021-7136
0.32/0.25	0.4	10/pk	5021-7137
0.53	0.7	10/pk	5021-7134
Graphpak plug ferrule		10/pk	5021-7133
Replacement Graphpak column nut		5/pk	5062-3525

Valves and Loops



General purpose gas sampling valves

Gas Sampling General Purpose Valves

Description	Part No.
6-port replacement valve WE series, 400 psi, 225°C	5062-9508
6-port replacement valve WE series, Hastelloy C, 400 psi, 225°C	5062-9509
10-port replacement valve WE series, 400 psi, 225°C	5062-9510
10-port replacement valve WE series, Hastelloy C, 400 psi, 225°C	5062-9511
6-port replacement valve WT series, 300 psi, 350°C	0101-0584
10-port replacement valve WT series, 300 psi, 350°C	0101-0585



General purpose liquid sampling valves

Liquid Sampling General Purpose Valves

Description	Part No.
0.2 µL replacement valve UWP series, 1,000 psi, 175°C	0101-0636
0.5 µL replacement valve UWP series, 1,000 psi, 175°C	0101-0637
1.0 µL replacement valve UWP series, 1,000 psi, 175°C	0101-0638
0.5 µL replacement valve UW series, 5,000 psi, 75°C	0101-0639

Parts for Interfacing Capillary Columns to W-Series Valves

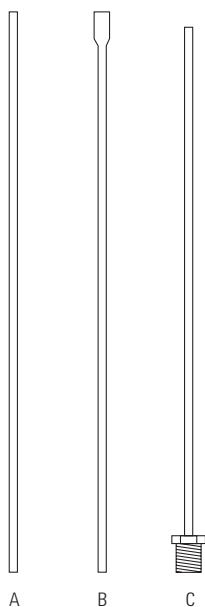
Description	Part No.
Stainless steel bulkhead ZDV union, for interfacing 530 μm columns with 1/16 in. transfer line	0100-1515
Stainless steel bulkhead ZDV union, for interfacing 320 μm columns with 1/16 in. transfer line	0100-1527
Polymide ferrule, 1/16 in.	0100-1512
Polyimide liner for 530 μm columns	0100-1513
Polyimide liner for 320 μm columns	0100-1514
1/16 in. stainless steel counterbored nut	0100-1511
Installation tool for liners	18900-20850



Front ferrules, stainless steel, 5181-1292

Valve Supplies

Description	Part No.
1/16 in. stainless steel nut	5181-1291
1/16 in. front ferrule, stainless steel	5181-1292
Straight metering valve, 1/16 in., stainless steel, for LSVs as a sample-out restrictor or as a flow-balancer for 10-100 mL/min	0101-0355
Micrometering valve, for flow balancing gas flows of 2-50 mL/min	0101-0633
Air actuator	19325-60660
Solenoid valve for controlling actuator	05890-61090
Solenoid valve for controlling actuator, for GCs after serial number 3223A43573	05890-61095
Angle metering valve, 1/16 in., stainless steel	0101-0403



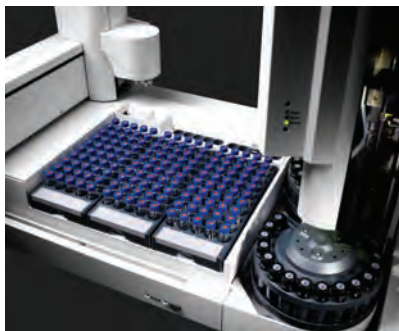
Valve Loops for GC (Includes loop, nut and ferrule, 1/16 in.)

Description	Part No.
Sample loop, 0.25 cc	0101-0303
Sample loop, 0.50 cc	0101-0282
Sample loop, 1.00 cc	0101-0299
Sample loop, 2.00 cc	0101-0300
Sample loop, 5.00 cc	0101-0301
Sample loop, 10.00 cc	0101-0302
A. Tube, 1/16 in. stainless steel, 280 mm long	18900-20250
Tube, 1/16 in. stainless steel, 400 mm long	18900-20280
Tube, 1/16 in. stainless steel, 375 mm long	18900-20281
Tube, 1/16 in. stainless steel, 560 mm long	18900-20300
B. Tube, 1/16 in. with 1/8 in. flare, stainless steel, 360 mm long	1530-2163
Tube, 1/16 in. with 1/8 in. flare, stainless steel, 520 mm long	1530-2167
C. Tube, 1/16 in. with 1/8 in. bulkhead fitting, 520 mm long	07675-80050
Tube, 1/16 in. with 1/8 in. bulkhead fitting, nickel, 460 mm long	18900-80255

Replacement Rotors for Gas Sampling Valves

Description	Part No.
6-port replacement rotor WE series, 400 psi, 225°C	5181-7459
10-port replacement rotor WE series, 400 psi, 225°C	5181-7460
6-port replacement rotor WT series, 300 psi, 350°C	1535-4952
10-port replacement rotor WT series, 300 psi, 350°C	1535-4954

Sample Introduction Systems



7693A Automatic Liquid Sampler

7693A Automatic Liquid Sampler Replacement Parts and Supplies

To support the higher productivity, performance, and flexibility offered by the 7693A ALS, Agilent has expanded its supplies offering. Agilent Blue Line autosampler syringes are specifically designed to support the 7693A, while increasing plunger life and reducing costly downtime. For cost-conscious laboratories, economical shell vials and caps provide quality at an attractive price. Additional accessories, such as color-coded sample trays and vial caps, add to system ease-of-use.

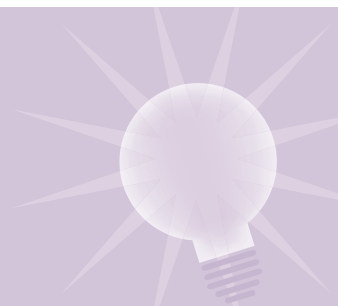
7693A Replacement Parts and Supplies

Description	Unit	Part No.
Gripper finger caps	16/pk	G4514-60710
Injector mounting post		G4513-20561
Dual parking post for autosampler		05890-61525
Needle support insert, standard		G4513-40525
Needle support insert, on-column		G4513-40529
Vial rack, set of 3 Includes 12 label tags (4 colors)		G4514-67505
Vial rack label kit		G4525-60701
Vial rack label kit, red	3/pk	G4525-60702
Vial rack label kit, yellow	3/pk	G4525-60703
Vial rack label kit, green	3/pk	G4525-60704

Tips & Tools

Agilent Blue Line autosampler syringes are designed to support the 7693A.

Turn to page 64.



Shell Vials for 7693A Automatic Liquid Sampler

Description	Unit	Part No.
Clear, glass shell vials and caps	200/pk	5190-1570

Wash Vials (also for standards, diluents)

Description	Unit	Part No.
4 mL wash vials with fill markings and caps	25/pk	5182-0551
Diffusion caps for 4 mL vials	12/pk	07673-40180
Septa for 4 mL vials*	144/pk	9301-1031

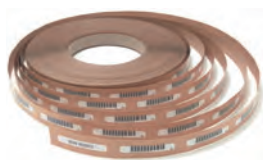
*Septa for 4 mL vials should only be used for sample storage



Automatic Liquid Sampler Supplies

Automatic Liquid Sampler Supplies

Description	Unit	Part No.
4 mL wash vial with screw caps	144/pk	9301-0723
Diffusion caps for 4 mL vials	12/pk	07673-40180
Septa for 4 mL vials	144/pk	9301-1031
4 mL wash vials with fill markings and caps	25/pk	5182-0551
Screw for mounting syringe		07673-20570
Quadrant tray (4 tray sections)		18596-40015
7673 Basic Supply Kit		07673-60840
Contains 10 μ L syringes (6/ea), 23/26 gauge needles, 4 mL vials with diffusion caps (144/pk), 2 mL automatic sampler vials with screw caps (1,000/pk), GC septa (25/pk), vial racks (5/pk)		



Bar code reader labels

Bar Code Reader Labels

Description	Part No.
Labels numbered (1,000/roll)	
1 to 1,000	5958-9450
1,001 to 2,000	5958-9441
2,001 to 3,000	5958-9442
3,001 to 4,000	5958-9443
4,001 to 5,000	5958-9444
5,001 to 6,000	5958-9445



7697A Headspace Sampler

7697A Headspace Sampler Supplies

The new 7697A Headspace Sampler from Agilent utilizes advanced designs based on our industry-leading gas chromatography architecture. The headspace sampling technique allows introduction of volatile compounds to the GC or GC/MS from virtually any sample matrix, while leaving unwanted components in a disposable sample vial. With up to 111 sample vial positions and removable vial racks, the 7697A supports nearly continuous operation to satisfy even the busiest laboratory.

- Built-in legendary Agilent pneumatics for superior control and easier setup
- Proven valve and loop sampling technology
- Fully-automatic sample vial leak checking and available bar code reader help ensure greater confidence in results method compatibility
- Instrument control software that is fully integrated in Agilent data systems
- Resource conserving programmable instrument scheduler

7697A Headspace Replacement Parts and Supplies

Description	Part No.
Tray vial racks	G4556-60019
Vial rack label	G4556-90500
Universal/external split vent trap with 3 cartridges, 1/8 in. Swagelok fitting	RDT-1020
Leak test kit	G4556-67010
Includes instruction sheet, no-hole ferrule, 1/8 in. nylon tube fitting plug, headspace leak test vial, 1/16 in. stainless steel ZDV plug, 11 mm low bleed septa (5/pk)	
Sample probe, deactivated SN 1030	G4556-60690
Sample probe, deactivated SN 2000	G4556-60125
6-port valve, replacement rotor, WT series, 300 psi, 350°C	1535-4952

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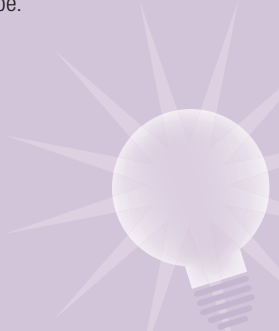


7697A Headspace Sampler

The transfer line heater assembly is 1 m in length and accommodates the following tubing types:

- Fused silica capillary of 0.25 mm, 0.32 mm, and 0.53 mm ID with maximum OD of 0.67 mm
- Metal capillary of 0.53 mm ID, such as Agilent UltiMetal or ProSteel, with maximum OD of 0.67 mm

For one transfer line, a piece of fused silica or ProSteel approximately 1 m in length is required in addition to one ferrule and one nut and reducing union. Order a ProSteel sleeve to protect the transfer line when operating above 200°C. ProSteel operated above 200°C in the transfer line without the sleeve can permanently bind to the heated conduit tube.



7697A Headspace Replacement Parts and Supplies

Description	Part No.
Transfer Line Components	
Deactivated fused silica, 5 m length	
0.25 mm	160-2255-5
0.32 mm	160-2325-5
0.45 mm	160-2455-5
0.53 mm	160-2535-5
ProSteel deactivated stainless steel, 5 m length	
0.53 mm	160-4535-5
Polyimide sleeve for ProSteel	4177-0607
Polyimide, Valcon ferrule, 5/pk	
1/32 in. for tubing OD 0.50 ≤ 0.80 mm	0100-2595
1/32 in. for tubing OD 0.25 ≤ 0.40 mm	0100-2610
Nut and reducing union for 6 port valve and transfer line connection	0100-2594
Septum nut, transfer line, split/splitless and multimode inlets	G3452-60835
Sampling Loops, SN 2000	
Sample loop, 0.025 mL	G4556-80101
Sample loop, 0.05 mL	G4556-80102
Sample loop, 0.10 mL	G4556-80103
Sample loop, 0.50 mL	G4556-80105
Sample loop, 1.00 mL	G4556-80106
Certified sample loop, 1.00 mL	G4556-80126
Sample loop, 3.00 mL	G4556-80108
Certified sample loop, 3.00 mL	G4556-80128
Sample loop, 5.00 mL	G4556-80109
Sampling Loops, SN 1030	
Sample loop, 0.025 mL	G4556-80111
Sample loop, 0.05 mL	G4556-80112
Sample loop, 0.10 mL	G4556-80113
Sample loop, 0.50 mL	G4556-80115
Sample loop, 1.00 mL	G4556-80116
Sample loop, 3.00 mL	G4556-80118
Sample loop, 5.00 mL	G4556-80119

Vials and Caps for 7697A

Description	Unit	Part No.
Vial kit	100/pk	5182-0840
20 mL Headspace crimp top, flat bottom vials, silver aluminum one-piece crimp caps with safety feature, PTFE/white silicone septa		
Headspace crimp top, flat bottom vials, 10 mL	100/pk	5182-0838
Headspace crimp top, flat bottom vials, 20 mL	100/pk	5182-0837
Silver aluminum crimp caps with 20 mm, PTFE/silicone septa	100/pk	5183-4477
20 mm electronic crimper		5062-0208
Ergonomic manual crimper for 20 mm caps		5040-4669



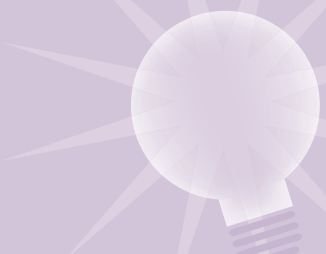
G1888A Headspace unit

G1888A Network Headspace Sampler Supplies

Description	Part No.
Stainless Steel Sample Loops	
Certified sample loop, 1 mL, deactivated	5190-2265
Certified sample loop, 3 mL, deactivated	5190-2266
Sample loop, 1 mL, deactivated	2321700003
Sample loop, 3 mL, deactivated	2321700004
Probes and Unions	
Sample probe, deactivated	2322700011
M6 union, brass	2302533140
Union, zero dead volume, deactivated	2307230001
Union	2307232901
Transfer Line Needles and Unions	
Needle only, headspace transfer line, deactivated 0.5 mm OD	2322590004
Needle only, headspace transfer line, deactivated 0.7 mm OD	2322590005
Strain relief septum nut	6410090050
Tubing	
Tubing, solenoids to 6-port valve, deactivated	0410105017
Tubing, probe to 6-port valve, deactivated	1300502506
Standards	
OQ/PV Headspace Sample	5182-9733
Contains 0.2-0.3% t-butyl disulfide, 1,2-dichlorobenzene, and nitrobenzene in ethanol	
PM Kits	
G1888A PM kit with 1 mL loop	G1888-60702
G1888A PM kit with 3 mL loop	G1888-60703
G1888A enhanced PM kit	G1888-60704

Tips & Tools

For a complete selection of headspace vials, turn to page 49.

**7694 Headspace Sampler Supplies**

Description	Part No.
Needles	
Needle only, headspace transfer line, deactivated 0.5 mm OD	2322590004
Needle for transfer line, 0.25 mm ID, 0.5 mm OD, nickel	301-016-HSP
Needle only, headspace transfer line, deactivated 0.7 mm OD	2322590005
Needle for transfer line, 0.4 mm ID, 0.8 mm OD, nickel	301-015-HSP
Needle assembly vial probe, deactivated	301-220-HSP
Needle assembly (vial probe)	301-013-HSP
Fittings	
Zero dead volume union	325-045-HSP
Transfer line nut	19258-20830
Transfer line ferrule	19258-20870
Union FF 6MB, 5-piece set	325-062-HSP
Union T6 MB, 5-piece set, brass	325-132-HSP
Union T5 MA	325-185-HSP
Valves	
Valve, solenoid vent Kalrez	3600500001
Valve, solenoid vial pressurization	3600500002
Tubing and Transfer Lines	
Sample loop, 1 mL, deactivated	2321700003
Sample loop, 1 mL, nickel	321-055-HSP
Sample loop, 3 mL, deactivated	2321700004
Sample loop, 3 mL, nickel	321-056-HSP
Tube, needle, 6-port valve, deactivated	301-212-HSP
Tube, needle, 6-port valve, nickel	301-169-HSP
Tube, vent-valve stainless steel	301-170-HSP
Sensor tube, 125 mm PTFE	321-057-HSP
Restrictor, stainless steel	321-002-HSP
Transfer line, deactivated, 1 m	301-211-HSP
Transfer line, 1 m, nickel	301-152-HSP
Transfer line, 80 cm, nickel	301-011-HSP
Repair, Leak Test, and OQ/PV Supplies	
Strain relief septum nut	301-205-HSP
Oven adaptor for 10 mL vials	301-017-HSP
Tray adaptors for 10 mL vials, 25/pk	300-301-HSP
Headspace leak test kit	G1888-60701
OQ/PV Headspace Sample	5182-9733

G1883A Network Headspace Supplies

Description	Part No.
Needles	
Needle only, headspace transfer line, deactivated 0.5 mm OD	2322590004
Needle for transfer line, 0.25 mm ID, 0.5 mm OD, nickel	301-016-HSP
Needle only, headspace transfer line, deactivated 0.7 mm OD	2322590005
Needle for transfer line, 0.4 mm ID, 0.8 mm OD, nickel	301-015-HSP
Needle assembly vial probe, deactivated	232-2790012-EHS
Needle assembly vial probe, nickel	232-2790010-EHS
Fittings	
Union elbow M5	998-0000053-EHS
Transfer line nut	19258-20830
Transfer line ferrule	19258-20870
Union FF 6MB, 5-piece set	325-062-HSP
Union T6 MB, 5-piece set, brass	325-132-HSP
Union T5 MA	325-185-HSP
Valves	
Restrictor, stainless steel	321-002-HSP
Valve, solenoid vent Kalrez	3600500001
Valve, solenoid vial pressurization	3600500002
Tubing and Transfer Lines	
Sample loop, 1 mL, deactivated	2321700003
Sample loop, 1 mL, nickel	321-055-HSP
Sample loop, 3 mL, deactivated	2321700004
Sample loop, 3 mL, nickel	321-056-HSP
Oven adaptor for 10 mL vials	301-017-HSP
Tube, needle, 6-port valve, deactivated	301-212-HSP
Tube, needle, 6-port valve, nickel	301-169-HSP
Tube, vent-valve stainless steel	301-170-HSP
Sensor tube, 125 mm PTFE	321-057-HSP
Transfer line, deactivated, 1 m	301-211-HSP
Transfer line, 1 m, nickel	301-152-HSP
Transfer line, 80 cm, nickel	301-011-HSP
Repair, Leak Test, and OQ/PV Supplies	
Strain relief septum nut	301-205-HSP
Headspace leak test kit	G1888-60701
OQ/PV Headspace Sample	5182-9733



Stratum PTC Sample Concentrator



Trap, BTEX + MTBE, 5188-8813

Teledyne Tekmar Purge and Trap Supplies

Glassware for Teledyne Tekmar Purge and Trap Concentrators, 1/2 in. Mount

Description	Part No.
5 mL frit sparger (glassware only)	5182-0852
5 mL frit sparger kit with fittings	5182-0846
25 mL frit sparger (glassware only)	5182-0851
25 mL frit sparger kit with fittings	5182-0845
5 mL fritless sparger (glassware only)	5182-0850
5 mL fritless sparger kit with fittings	5182-0844
25 mL fritless sparger (glassware only)	5182-0849
25 mL fritless sparger kit with fittings	5182-0796
5 mL needle sparger (glassware only)	5182-0848
5 mL needle sparger kit	5182-0795
25 mL needle sparger (glassware only)	5182-0847
25 mL needle sparger kit	5182-0794

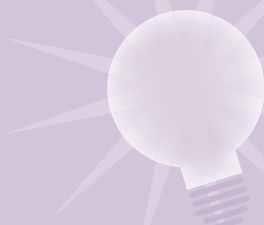
Traps for Teledyne Tekmar Stratum Purge and Trap Concentrator

Description	Part No.
Trap, BTEX + MTBE	5188-8813
Trap #5, OV-1/Tenax/Silica Gel/Charcoal	5188-8814
Trap #8, Carbopak B/Carbosieve S-III	5188-8815
Trap #9, Proprietary	5188-8816
Trap, Tenax/Silica Gel/Carbosieve S-III	5188-8817
Strat-Trap, Tenax/Silica Gel, #2	5188-8818
Strat-Trap, Tenax/Silica Gel/Charcoal, #3	5188-8819
Strat-Trap, OV-1/Tenax, #7	5190-1445
Strat-Trap, Tenax, #1	5190-1446
Trap, VOCARB 3000	5188-8820
Trap, VOCARB 4000	5188-8821
Trap, BTEX	5188-8822

Stratum traps are U-shaped

Tips & Tools

Compared to a frit sparger, the fritless sparger may be the better choice when a water sample has a tendency to foam. This sparger is not appropriate for soil samples, which tend to clog the capillary tube.



Atomx VOC Autosampler Supplies

Description	Part No.
Antifoam agent, Antifoam 1520, 10 mL	5190-2235
Syringe with side port, 27 mL	5190-2234
Vessel, amber IS, 15 mL	5190-2233
Frit sparge glassware kit, 25 mL	5190-2232
Fritless sparge glassware kit, 25 mL	5190-2231

Traps for Teledyne Tekmar Velocity Purge and Trap Concentrator

Description	Part No.
Trap, Vocarb 3000 (K Trap)	5182-0775
Trap, Vocarb 4000 (I Trap)	5182-0774
Trap, Tenax (A Trap)	5182-0783
Trap, Tenax/Silica Gel/Charcoal (C Trap)	5182-0781
Trap, BTEX	5182-0773
DryFlow moisture trap	14-8911-003

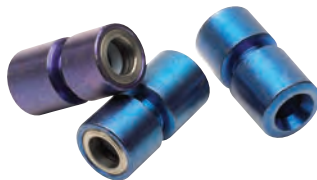
Velocity traps are straight



Markes Thermal Desorption system



Sampling tube, MKI-UTD-5105



Silcosteel difflok cap, MKI-MTD-1204

Markes Thermal Desorption

Agilent now offers a comprehensive line of supplies for Markes Thermal Desorption (TD) instrumentation. Thermal desorption allows the introduction of volatile and semi-volatile compounds from a wide range of sample matrices, directly into a GC or GC/MS.

Markes Thermal Desorption Supplies

Description	Unit	Part No.
O-rings, Markes 7 mm cold trap seals	10/pk	MKI-U-COV07
O-rings, Markes 6 mm cold trap seals	10/pk	MKI-U-COV06
PTFE filter disks, 5.1 mm Markes TD	10/pk	MKI-U-DISK1
PTFE filter disks, 6.3 mm Markes TD	10/pk	MKI-U-DISK3
Spare general purpose carbon cold trap		MKI-U-T11GPC
Sampling tube, Tenax TA, Markes Unity		MKI-UTD-5105
Quick fit connectors, Markes Unity	10/pk	MKI-C-QSC10
Stainless steel Difflok cap, Markes Unity	10/pk	MKI-MTD-1169
Silcosteel Difflok cap, Markes Unity	10/pk	MKI-MTD-1204
O-ring insertion tool, Markes Unity TDI		MKI-Z-0285
O-ring extraction tool, Markes Unity TDI		MKI-Z-0351
Cold trap alignment tool, Markes Unity		MKI-UTD-5064
Cold trap, air toxics, C ₂ -C ₁₄ , Unity 2		MKI-U-T3ATX-2S
Cold trap, air toxics, C ₂ -C ₁₄ , Unity		MKI-U-T3ATX
Cold trap, materials emissions, Unity		MKI-U-T12ME
Cold trap, GP Carbon, C _{4/5} -C _{30/32} , Unity 2		MKI-U-T11GPC-2S
O-rings, 010 Markes Unity	10/pk	MKI-U-COV10
Cold trap, materials emissions, Unity 2		MKI-U-T12ME-2S
Empty stainless steel TD tubes	10/pk	C-TBE10
Tenax stainless steel tubes, preconditioned/capped	10/pk	C-TBP1TC
Empty glass TD tubes	10/pk	C-GT010
PTFE inserts	10/pk	C-PL010
Long term TD tube storage caps	10/pk	C-CF020
Cap-LOK Tool for long term storage caps		C-CPLOCK
Diffusive sampling caps	10/pk	C-DF010
Bio-VOC breath samplers	10/pk	C-BIO10
Disposable card mouth piece for Bio-VOC	10/pk	C-B010M
Tenax TA 34-60 Mesh, 10 g		C-TNXTA

(Continued)



Markes Thermal Desorption Supplies

Description	Unit	Part No.
General purpose hydrophobic tubes, stainless steel Preconditioned and capped with 1/4 in. brass storage caps. For pumped sampling n-C ₅ to n-C ₂₀ .	10/pk	C-HY010C
Tenax/S'carb 'Sulphur' tubes Preconditioned and capped with 1/4 in. brass storage caps. For odor and landfill gas analysis.	10/pk	C-102SSC
Carbograph 1 stainless steel tubes Preconditioned and capped with 1/4 in. brass storage caps. For pumped sampling C ₅ to C ₁₄ , plus diffusion of BTX.	10/pk	C-TBP1C1C
Carb X stainless steel tubes Preconditioned and capped with 1/4 in. brass storage caps. For pumped/diffusion of 1.3-butadiene & benzene.	10/pk	C-TBP1CXC
Air toxics (TO-17) stainless steel tubes Preconditioned and capped with 1/4 in. brass storage caps. For pumped sampling VOCs n-C ₃ to n-C ₁₂ .	10/pk	C-AT010C
Universal stainless steel tubes Preconditioned and capped with 1/4 in. brass storage caps	10/pk	C-UN010C
Glass tubes with 1 cm Tenax For direct liquid injection	10/pk	C-G1CM10
Glass air toxics (TO-17) tubes Pre-packed with 2 carbon-based sorbents; preconditioned and capped with 1/4 in. brass storage caps	10/pk	C-GAT010C
CRS BTX Standards, 1 µg	10/pk	C-BTX1UG

Inlet Systems

7890 Turn Top Inlet System



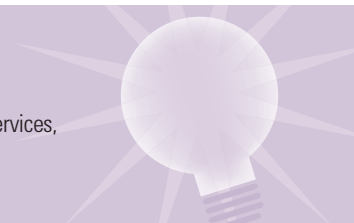
Convenient new turn top design is built into every 7890 Split/Splitless and Multimode Inlet, allowing you to change liners in less than 30 seconds without special tools or training.

7890 Turn Top Inlet System

Description	Unit	Part No.
Turn top		G3430-40035
Split ring		0510-1306
Certified non-stick fluorocarbon O-ring	10/pk	5188-5365
	100/pk	5190-2769

Tips & Tools

To learn more about Agilent's complete portfolio of services, please visit www.agilent.com/chem/services





Flip Top Inlet Sealing System

Agilent's Flip Top Inlet Sealing System is the faster, smarter way to change inlet liners on Agilent 6890, 6850 and 5890 GC systems.

- Cuts liner replacement time to as little as 30 seconds
- Eliminates frustrating searches for special wrenches or tools
- Improves inlet ergonomics – no more handling of heated parts, no more burns or scrapes
- Decreases downtime and increases productivity
- Minimizes exposure to ambient air, extending column life
- Easily installed by user in 15 minutes

Available exclusively from Agilent, the Flip Top has a levered arm that attaches to any 6890/6850/5890 insert weldment and locks to the injection port using an adapter ring screwed onto the inlet. Once installed, simply lift the arm of the Flip Top which releases the insert weldment from the injection port, and allows instant access to the liner. The process is simply reversed to reseal the weldment to the port.



Flip Top Inlet Sealing System installation kit,
5188-2717

Flip Top Inlet Sealing System

Description	Unit	Part No.
Flip Top Inlet Sealing System For 6890, 6850, 5890 only; not compatible with 7890		5188-2717
Non-stick fluorocarbon liner O-ring for Flip Top	10/pk	5188-5366
	100/pk	5190-2268



QuickPick Splitless PM Kit, 5188-6497



QuickPick Purged Packed PM Kit, 5188-6498



Split Vent Trap PM Kit, 5188-6495

Agilent Inlet Convenience Kits

Convenience kits are an easy way to get all the supplies you need using one part number. Agilent's new PM kits include septa, liners, O-rings, gold seals and traps.

Agilent Inlet Convenience Kits

Description	Part No.
QuickPick Split Inlet PM Kit Includes 5 non-stick BTO septa, 1 split liner, 1 non-stick liner O-ring, and inlet gold seal kit	5188-6493
QuickPick Split Vent and Inlet PM Kit Includes 5 non-stick BTO septa, 1 split liner, 1 non-stick liner O-ring, inlet gold seal kit, and split vent trap with 2 O-rings	5188-6496
QuickPick Splitless Inlet PM Kit Includes 5 non-stick BTO septa, 1 splitless liner, 1 non-stick liner O-ring, and inlet gold seal kit	5188-6494
QuickPick Splitless Vent and Inlet PM Kit Includes 5 non-stick BTO septa, 1 splitless liner, 1 non-stick liner O-ring, inlet gold seal kit, and split vent trap with 2 O-rings	5188-6497
QuickPick Purged Packed Inlet PM Kit Includes 5 non-stick BTO septa, 1 O-ring, 1 ferrule, and 1 disposable glass liner	5188-6498
Internal split vent trap PM kit for split/splitless, volatiles, and PTV septumless inlet split vent line Includes 1 cartridge and 2 O-rings	5188-6495

Split/Splitless Inlet Seals

To ensure that you have a consistent and inert surface to properly seal the inlet and prevent sample degradation, Agilent has revolutionized production of the gold inlet seal. Unlike traditional machined seals, the new format Agilent Gold Inlet Seal has a very reproducible smooth surface, eliminating traces of machining grooves that can be the source of minute leaks. With Agilent's proprietary metal injection molding (MIM) manufacturing process, every gold inlet seal provides a high quality, leak-free seal so critical for reproducible results.

Our new package keeps the gold seal clean and scratch-free. For your added convenience, an inlet washer is provided with each inlet seal.

Split/Splitless Inlet Seals



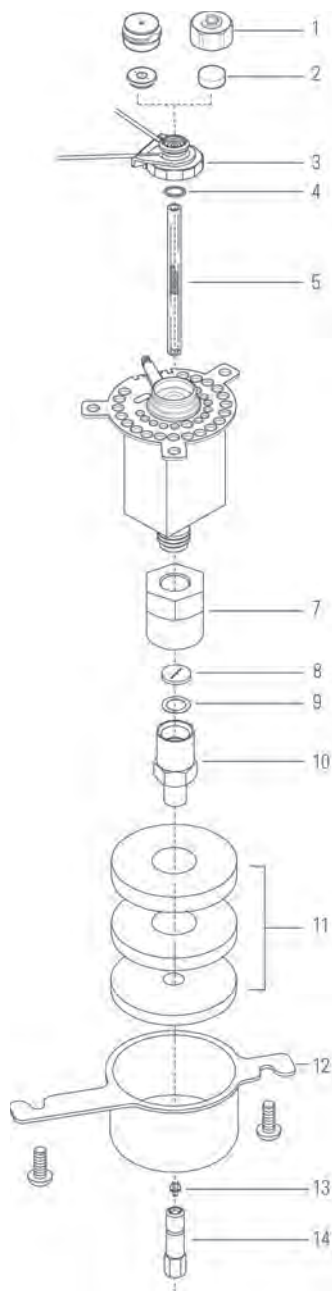
Gold plated seal kit, 5188-5367

Description	Unit	Part No.
Certified gold plated seal kit, includes washer		5188-5367
	10/pk	5190-2209
Gold plated seal with cross*		5182-9652
Stainless steel seal		18740-20880

*Use with total flow rates above 200 mL/min

Split/Splitless Inlets

The combined split/splitless inlet is the most popular inlet for capillary column gas chromatography. Because it can be used in either split or splitless mode, it provides a very effective combination that can cover most analysis requirements.



Split/Splitless Inlet assembly

7890/6890/6850 Split/Splitless Inlet Supplies

Item	Description	Unit	Part No.
	QuickPick Split Inlet PM Kit		5188-6493
	QuickPick Split Vent and Inlet PM Kit		5188-6496
	QuickPick Splitless Inlet PM Kit		5188-6494
	QuickPick Splitless Vent and Inlet PM Kit		5188-6497
1	Headspace septum retainer nut		18740-60830
	Septum retainer nut		18740-60835
	Strain relief septum nut		301-205-HSP
2	11 mm Certified BTO septa	50/pk	5183-4757
	For complete offering of premium septa, see pages [4177]		
3	7890 Insert Weldment		
	Top insert weldment assembly, standard		G3452-60730
	Top insert weldment assembly, headspace		G3452-60100
	Top insert, AC gang fitting weldment		G3430-60011
	Top insert assembly, valve		G3480-67585
6890 Insert Weldment	S/SL insert weldment		G1544-60585
	Used with large charcoal canister type filter, for 6890/6850		
	S/SL insert assembly for G1540A with valved system option		G1580-60585
	This insert assembly uses the large charcoal canister split vent filter, for 6890/6850		
	Similar to G1544-60575 except carrier lines separated for interface to valved systems of a G1540A instrument		G1580-60575
	Original standard EPC using 1/4 in. split vent filter		G1544-60575
	Similar to G1544-60575 except allows insertion of 1/4 in. chemical filters to clean carrier gas for ECD operation		G1544-80580
	Insert Weldment Standard manual pneumatics		19251-60575

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7890/6890/6850 Split/Splitless Inlet Supplies

Item	Description	Unit	Part No.
4	Certified non-stick fluorocarbon O-ring	10/pk	5188-5365
	Graphite O-ring for split liner	10/pk	5180-4168
	Graphite O-ring for splitless liner	10/pk	5180-4173
5	Split liner, single taper, low pressure drop, glass wool	1/pk	5183-4647
		25/pk	5183-4702
	Splitless liner, single taper, without glass wool	1/pk	5181-3316
		25/pk	5183-4696
For complete offering of liners, see pages [4173]			
6	Split vent trap kit		G1544-60610
	Replacement cartridge		G1544-80530
	Includes 2 cartridges and 4 O-rings		
	Split vent trap PM kit		5188-6495
	Includes 1 cartridge and 2 O-rings		
7	Retaining nut		G1544-20590
8	Stainless steel seal		18740-20880
	Certified gold plated seal kit, includes washer ¹		5188-5367
	Replacement for 18740-20885		
	Gold plated seal with cross ²		5182-9652
9	Washers, 0.375 OD	12/pk	5061-5869
10	Reducing nut		18740-20800
11	Insulation kit, 3 pieces		5188-5241
12	Lower insulation cover		19243-00070
13	Ferrules		
For complete offering of ferrules, see pages [8580]			
14	Universal column nut	2/pk	5181-8830
	6850 column nut	2/pk	5183-4732
	Split/splitless septum nut angled wrench		19251-00100
	Flip Top Inlet Sealing System		5188-2717
	For 6890, 6850, 5890 only; not compatible with 7890		
	Capillary Inlet Evaluation Sample (Split Mode)		8500-4789



Item 6, split vent trap, G1544-60610



Reducing nut, 18740-20800

¹Use with total inlet flow rates below 200 mL/min²Use with total flow rates above 200 mL/min

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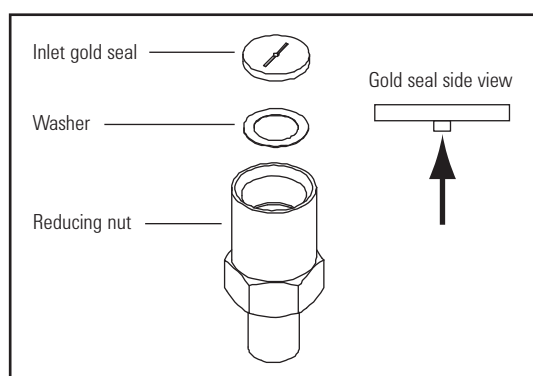
7890/6890/6850 Split/Splitless Inlet Supplies



Gold plated seal kit, 5188-5367

Item	Description	Unit	Part No.
	Capillary Inlet Supplies Kit, Includes:		5181-8838
	Certified gold plated seal kit, includes washer		5188-5367
	Liner, split, straight, glass wool, non-deactivated	5 each*	19251-60540
	Liner, splitless, single-taper, glass wool, deactivated	2 each*	5062-3587
	Certified non-stick fluorocarbon O-ring	10/pk*	5188-5365
	Liner, direct, 2 mm ID, deactivated		5181-8818
	11 mm Certified BTO septa	50/pk*	5183-4757
	Capillary inlet cleaning wires	5/pk*	5180-4153

*Quantity when part ordered individually



Gold seal on the split/splitless inlet

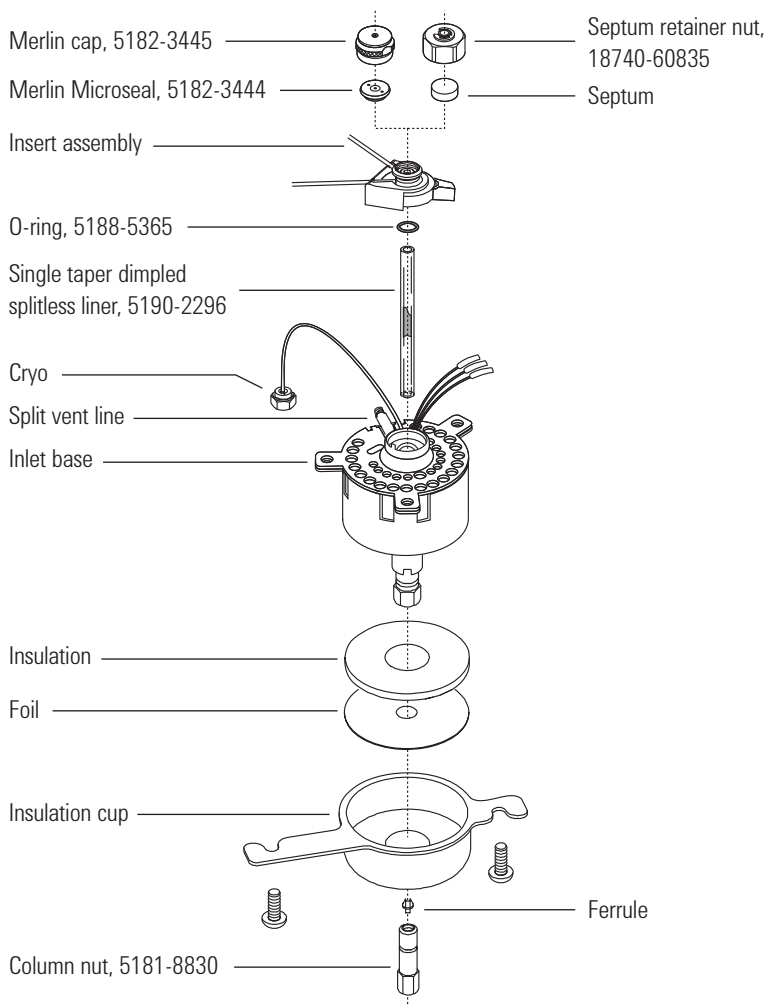
Multimode Inlet

Agilent's premium inlet – two inlets in one for maximum performance and flexibility for the 7890A

Whether you need to increase your system sensitivity with large volume injection capabilities, analyze thermally labile compounds or inject dirty samples, the Multimode Inlet delivers the performance and flexibility you need.

Tips & Tools

The multimode inlet and the split/splitless inlet use the same supplies including septa, liners, and O-rings. Please refer to split/splitless inlet ordering information for more details. Turn to pages 296–298.



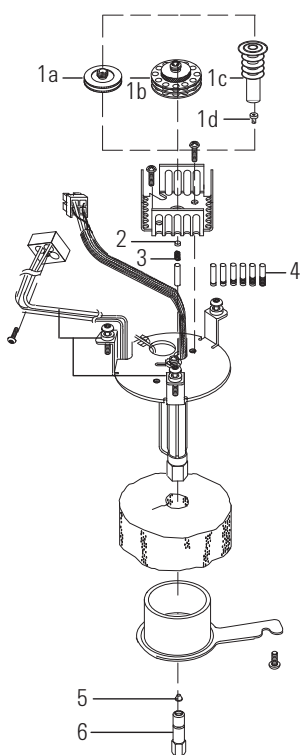
Exploded Parts View of the Multimode Inlet

Cool On-Column Inlets

Cool on-column injection is superior in many ways to other sample introduction techniques.

Advantages include:

- Elimination of sample discrimination
- Elimination of sample alteration
- Solvent focusing of early eluting solutes
- High analytical precision



Cool On-Column Inlet assembly

7890/6890 Cool On-Column Inlet Supplies

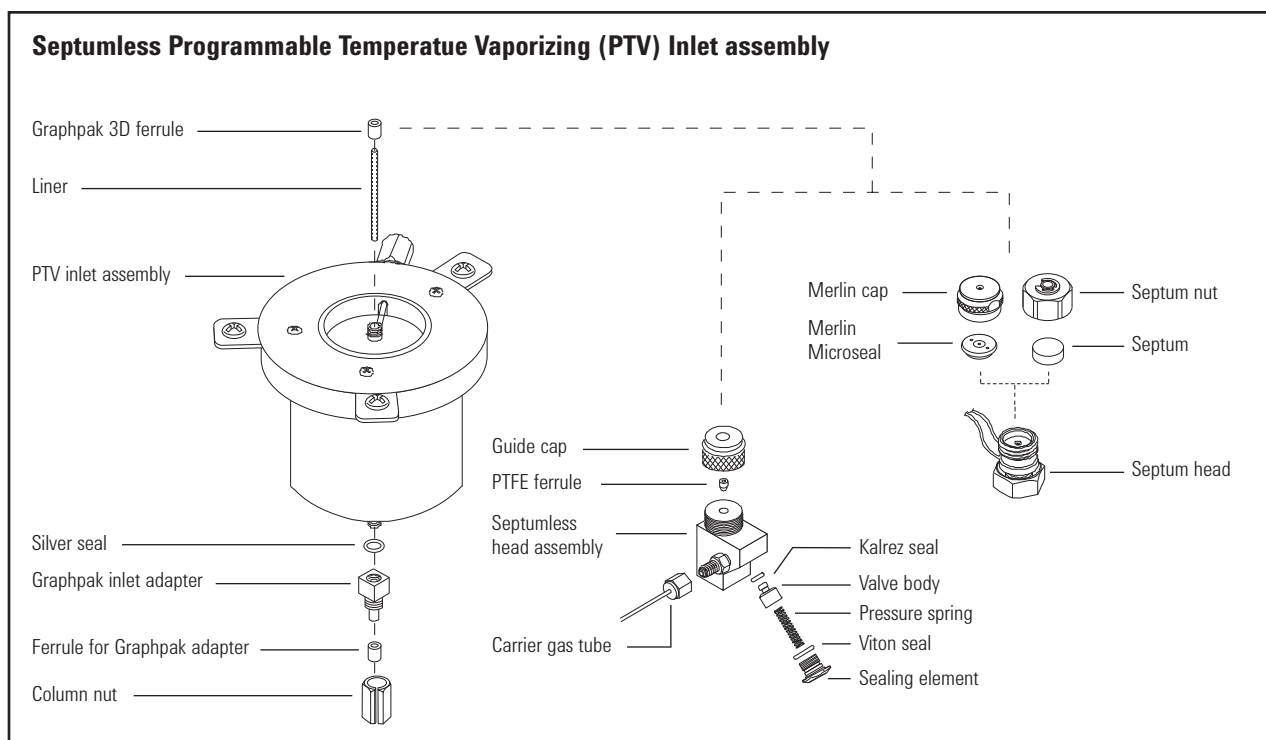
Item	Description	Unit	Part No.
Automatic Injection			
1a	Septum nut for 320 µm columns		19245-80521
1b	Septum nut base for 530 µm assembly		G1545-80520
2	5 mm Advanced Green septa	50/pk	5183-4760
	5 mm BTO septa	50/pk	5183-4758
Manual Injection			
1c	Cooling tower assembly		19320-80625
1d	Duck bill	10/pk	19245-40050
	Fused silica syringe needles	6/pk	19091-63000
	On-column syringe, fused silica (barrel only)		9301-0658
Common Supplies			
3	Spring		19245-60760
4	Inserts for capillary columns		
	For 200 µm columns, 1 ring		19245-20510
	For 250 µm columns, 6 rings		19245-20515
	For 320 µm columns, 5 rings		19245-20525
	For 530 µm columns, no rings		19245-20580
	For 530 µm Al clad columns, 4 rings		19245-20780
5	320 µm, 0.5 mm ID graphite ferrule		5080-8853
6	Universal column nut	2/pk	5181-8830

Programmed Temperature Vaporizer (PTV) Inlets

PTV inlets combine the benefits of split, splitless and on-column inlets. The sample is usually injected into a cool liner, so syringe needle discrimination does not occur. Then the inlet temperature is increased to vaporize the sample. The user programs vent times and temperature to achieve the equivalent of split or splitless transfer of sample vapors to the column. PTV injection is considered the most universal sample introduction system because of its flexibility.

7890/6890 Septumless PTV Inlet Supplies

Description	Column ID (mm)	Unit	Part No.
Microseal high pressure nut			5182-3445
Merlin Microseal			5182-3444
Septumless head			G2617-60507
Septum head			G2618-80500
Septum retainer nut			18740-60835
PTV inlet assembly			G2617-60506
PTV LC ₂ cooling jacket			G2617-60508
PTV LN ₂ cooling jacket			G2619-60501
Silver seal		5/pk	5182-9763
Graphpak 2M inlet adapter	0.20		5182-9754
	0.25-0.33		5182-9761
	0.53		5182-9762
Ferrules for Graphpak 2M inlet	0.20		5182-9756
	0.25		5182-9768
	0.32		5182-9769
	0.53		5182-9770
Replacement Graphpak column nut			5062-3525
PTV insulation block			G2617-20510
PTV Cryo insulator			G2617-60510
Teflon ferrule (needle seal)		10/pk	5182-9748
Kalrez seal			5182-9759
Valve body			5182-9757
Pressure spring			5182-9758
Viton seal		5/pk	5182-9775
Sealing element			5182-9760
CO ₂ Cryo inline filter			3150-0602
Service kit for septumless head			5182-9747
Contains Kalrez seal, valve body, and pressure spring			
Graphpak 3D ferrules		5/pk	5182-9749
Assembly tool for Graphpak 3D ferrules			G2617-80540



Programmable Temperature Vaporizing (PTV) Liners

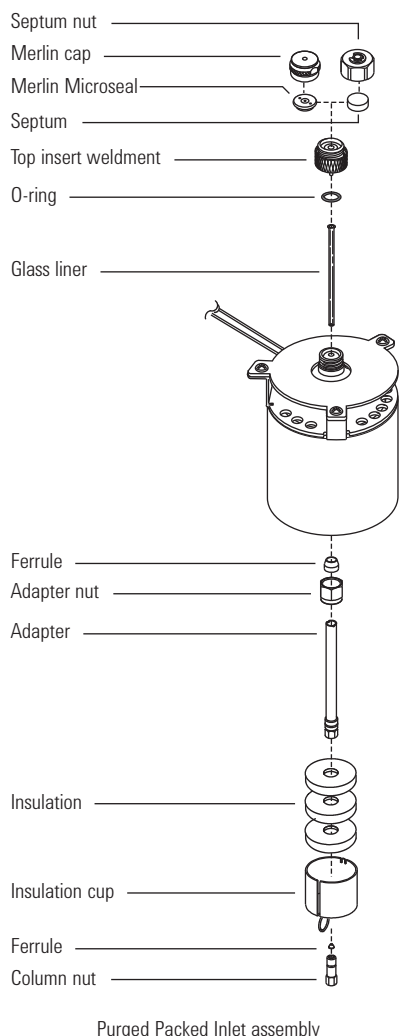
Description	ID (mm)	Volume (µL)	Part No.
Liners for Septumless PTV Inlet, G3501A, G3502A, G3503A			
PTV liner, single baffle, glass wool, deactivated	2	180	5183-2038
PTV liner, single baffle, deactivated	2	200	5183-2036
PTV liner, multi baffled, deactivated	1.8	150	5183-2037
PTV liner, sintered glass, deactivated	1.5	112	5190-1426
Liners for High Temperature PTV Inlet, G3506A			
PTV liner, high temperature, quartz	3.4	713	5188-5313
PTV liner, high temperature, borosilicate	3.4	668	5188-5356

Syringes for Septumless and High Temperature PTV Inlets

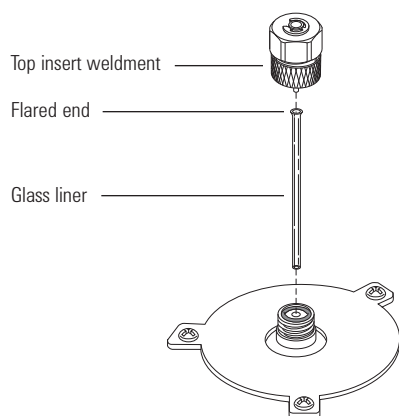
Volume (µL)	Description	Needle	Part No.
0.5	Removable	23/70/HP	5182-9651
5	Straight, fixed	23/42/HP	9301-0892
10	Straight, fixed	23/42/HP	9301-0713
50	Straight, fixed, for large volume injections	23/42/HP	5183-0318
100	Straight, fixed, for large volume injections	23/42/HP	5183-2058

Purged Packed Inlets

Packed column analysis is frequently done when high efficiency separations are not needed or when gases are analyzed by gas-solid chromatography. Purged packed inlets are simple in both design and use. Few parameters need to be set, and all carrier gas flow flushes through the inlet into the column in the standard configuration.



Purged Packed Inlet assembly



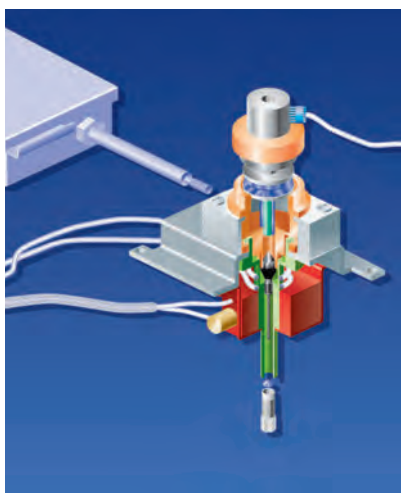
Glass Liner on Purged Packed Inlet

7890/6890/6850 Purged Packed Inlet Supplies

Description	Unit	Part No.
QuickPick Purged Packed Inlet PM Kit		5188-6498
Includes 5 non-stick BTO septa, 1 O-ring, 1 ferrule, and 1 disposable glass liner		
Merlin Microseal		5182-3444
Microseal high pressure nut		5182-3445
Septum retainer nut		18740-60835
11 mm Certified BTO septa	50/pk	5183-4757
Top insert weldment		19243-80570
O-ring, Fluorocarbon	12/pk	5080-8898
Disposable glass liner, 170 µL internal volume	25/pk	5080-8732
Disposable glass insert, deactivated, 170 µL internal volume	5/pk	5181-3382
Ferrule, 1/4 in. Vespel	10/pk	5080-8774
1/4 in. nut, brass	10/pk	5180-4105
530 µm column adapter for use with glass liners		19244-80540
1/8 in. column adapter for use with glass liners		19243-80530
1/4 in. column adapter for use with glass liners		19243-80540
Insulating cup		19234-60720
Universal column nut	2/pk	5181-8830

Nuts and Ferrules for 1/8 in. Packed Columns

Description	Unit	Part No.
1/8 in. stainless steel nut and ferrule set	20/pk	5080-8751
1/8 in. brass nut and ferrule set	20/pk	5080-8750
Vespel/graphite ferrule, 1/8 in.	10/pk	0100-1332



Flame Ionization Detector (FID)

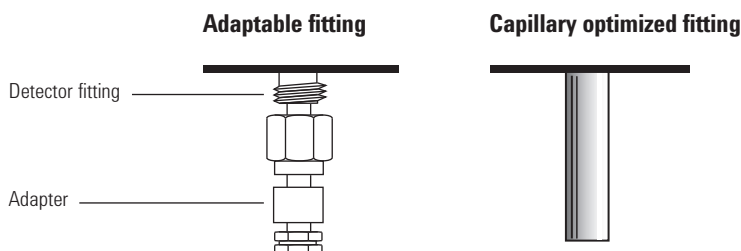
FID Jet Identification and Selection

Before ordering parts for FID maintenance, determine which type of FID is installed on your GC. The FID is available in two versions:

- Dedicated, Capillary Optimized: for capillary columns only
- Adaptable: for packed or capillary columns

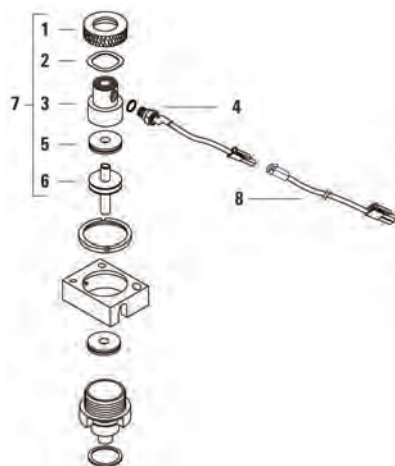
To determine the type of FID installed on your GC, open the oven door and examine the fitting at the base of the detector. Compare to the following diagram.

Hint: Adaptable jets are longer than dedicated capillary jets.



FID Jets

Description	Jet Tip ID	Length (mm)	Part No.
Jets for capillary optimized fittings			
Capillary	0.29 mm (0.011 in.)	42.8	G1531-80560
Capillary, high temperature Use with simulated distillation	0.47 mm (0.018 in.)	42.8	G1531-80620
Jets for adaptable fittings			
Capillary	0.29 mm (0.011 in.)	61.5	19244-80560
Capillary, high temperature Use with simulated distillation	0.47 mm (0.018 in.)	61.5	19244-80620
Packed	0.46 mm (0.018 in.)	63.5	18710-20119
Packed, wide-bore Use with high-bleed applications	0.76 mm (0.030 in.)	63.5	18789-80070



Flame Ionization Detector (FID) assembly

7890/6890/6850 Flame Ionization Detector (FID) Supplies

Item	Description	Unit	Part No.
	PTFE chimney (optional)		19231-21050
1	Collector nut		19231-20940
2	Spring washer	10/pk	5181-3311
3	Ignitor castle		19231-20910
	Hastelloy ignitor castle (optional)		19231-21060
4	Ignitor glow plug assembly		19231-60680
5	Collector insulator		G1531-20700
6	Collector body		G1531-20690
	Hastelloy collector body		G1531-21090
7	FID collector assembly		G1531-60690
	FID collector cleaning brush	2/pk	8710-1346
	Collector housing		G1531-20740
	FID retainer nut wrench 5880, 5890, 6890		19301-00150
	1/4 in. nut driver for FID jet, drilled shaft		8710-1561
8	FID ignitor cable for 6890/6850 only		G1531-60680
	FID ignitor cable, 7890A only		G3431-60680
	FID performance evaluation sample kit This sample is used for the HP 5880, 5890 and 6890 with a FID or TCD. Solution of 0.033% C14, C15, and C16 normal alkanes in hexane. Three 0.5 mL ampoules.		18710-60170
	FID MDL test sample for 7890 only 3 x 0.5 mL ampoules. Contains 2.36 mg/L n-Tridecane, 2.36 mg/L n-Tetradecane, 23.6 mg/mL n-Penta-decane, 23.6 mg/mL n-Hexadecane in iso-octane		5188-5372

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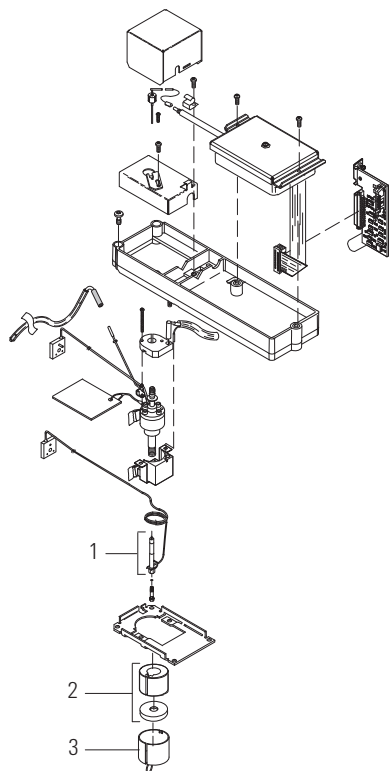
FID cleaning kit, 9301-0985

7890/6890/6850 Flame Ionization Detector (FID) Supplies

Item	Description	Unit	Part No.
	O-rings	12/pk	5080-4978
	FID/NPD adapter for capillary column		19244-80610
	FID/NPD 1/8 in. packed column		19231-80520
	FID/NPD 1/4 in. packed column		19231-80530
	1/4 in. nut driver for FID jet, drilled shaft		8710-1561
	FID collector cleaning brush	2/pk	8710-1346
	FID Supplies Kit, Includes:		5182-3450
	Jet, packed standard 0.018 in. ID tip	3 each	18710-20119
	FID and TCD sample	2 each	18710-60170
	Ignitor glow plug assembly	2 each	19231-60680
	Jet, 0.011 in. ID tip, capillary adaptable	3 each	19244-80560
	FID flow measuring insert	2 each	19301-60660
	Cleaning wires for 0.03 in. ID jet	5/pk	5180-4150
	Cleaning wire for 0.018 in. ID/530 µm jet For use with 0.018 and 0.011 in. ID jets	5/pk	5180-4152
	Cleaning wire for 0.011 in. ID jet	5/pk	19301-20720
	Capillary inlet cleaning wires	5/pk	5180-4153
	FID cleaning kit		9301-0985

Electron Capture Detector (ECD)

The Agilent micro ECD is the most sensitive on the market, with a detection zone volume 10 times smaller than any other ECD. The replaceable liner serves as a physical stop for the column, ensuring reproducible column installation and decreasing column contamination of the cell.



Electron Capture Detector (ECD) assembly

7890/6890/6850 Electron Capture Detector (ECD) Supplies

Item	Description	Part No.
1	Standard ECD makeup gas adapter*	G1533-80565
	Micro ECD makeup gas adapter	G2397-80520
	Micro ECD mixing liner, also compatible with standard ECD design	G2397-20540
	Gigabore liner for standard ECD, polyamide coating, not compatible with micro ECD	19233-20625
	ECD makeup gas adapter, 7890 only	G3433-63000
2, 3	Insulating cup	19234-60720
	ECD adapter end cap	19233-20755
	Vespel ferrule, 1/4 in.	5080-8774
	1/4 in. nut, brass	5180-4105
	Electron Capture Detector sample	18713-60040
	ECD test sample	5183-0379
	Micro ECD wipe test kit	18713-60050

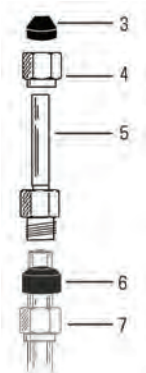
*Includes one each of P/N 19233-20625 and 19233-20755

Thermal Conductivity Detector (TCD)

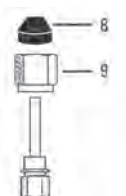
The TCD compares the thermal conductivities of two gas flows – pure carrier gas (also called the reference gas) and carrier gas plus sample components (also called column effluent).



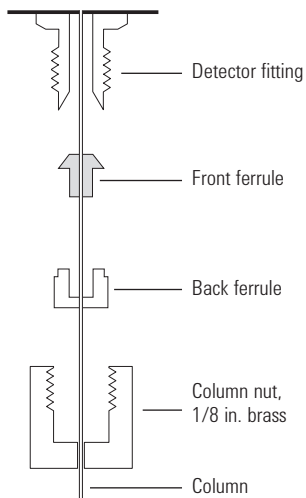
1/8 in. SS packed column



1/4 in. SS packed column



Standard design



7890/6890/6850 Thermal Conductivity Detector (TCD) Supplies

Item	Description	Unit	Part No.
For 1/8 in. SS Packed Column Installation			
1	Vespel/graphite ferrule, 1/8 in.	10/pk	0100-1332
2	1/8 in. nut, brass	10/pk	5180-4103
For 1/4 in. SS Packed Column Installation			
3	Vespel/graphite ferrule, 1/8 in.	10/pk	0100-1332
4	1/8 in. nut, brass	10/pk	5180-4103
5	1/4 in. packed column adapter		G1532-20710
6	Vespel ferrule, 1/4 in.	10/pk	5080-8774
7	1/4 in. nut, brass	10/pk	5180-4105
For Capillary Column Installation (Standard)			
	TCD capillary column adapter		G1532-80540
8	Vespel/graphite ferrule, 1/8 in.	10/pk	0100-1332
9	1/8 in. nut, brass	10/pk	5180-4103
	Universal column nut	2/pk	5181-8830
	6850 column nut	2/pk	5183-4732
	530 μ m, 1.0 mm ID graphite ferrule	10/pk	5080-8773
	320 μ m, 0.5 mm ID graphite ferrule	10/pk	5080-8853
	TCD sample		18711-60060
	FID and TCD sample		18710-60170

TCD Ferrules

Column ID (mm)	Back Ferrules	Front Ferrules 10/pk
0.53	5182-3477	5182-9673
0.32	5182-3477	5182-9676
0.25/0.2/0.1	5182-3477	5182-9677
No hole	5182-3477	5182-9679
TCD back ferrule for 1/8 in. detector fitting, 10/pk		5180-4103

Determining the TCD Electronic Pressure Control (EPC)

If you have a 6890A or 6890A Plus GC, you may have an older design EPC flow manifold for the TCD. The older design requires removal of sheet metal panels to attach the TCD reference flow gas supply inside the GC. The new "Minifold" design allows TCD reference gas to be connected directly to the back of the GC. Replacement TCD filament block assemblies have different part numbers depending on the EPC design type.

Once you have determined the type of EPC module, consider ordering a passivated filament block assembly, which is recommended for fatty acid analysis or reactive/acidic samples.

TCD Filament Block Assemblies

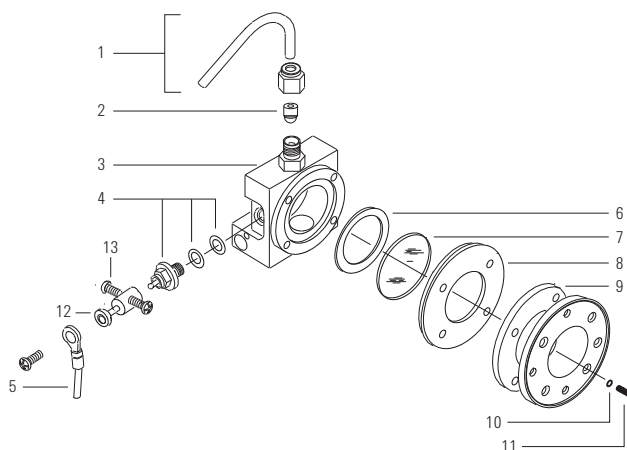
Instrument	Passivated	Applications	Specifications	EPC Design	Part No.
7890A	Yes	Standard TCD Analysis Gases/Hydrocarbons	Complete Detector Assembly Includes detector palette and heater/sensor assembly	Original	G3432-60220
7890A	Yes	Standard TCD Analysis Gases/Hydrocarbons	Complete Detector Assembly Includes detector palette and heater/sensor assembly Third detector, side mounted	Original	G3432-60221
6890	No	Standard TCD Analysis Gases/Hydrocarbons	Filament Block Only Must reuse heater/sensor	Original	G1532-60675
6890	No	Standard TCD Analysis Gases/Hydrocarbons	Filament Block Only Must reuse heater/sensor	Minifold	G1532-60685
6890	Yes	Recommended for Fatty Acid Analysis	Filament Block Only Must reuse heater/sensor	Original	G1532-60690
6890/6850	Yes	Recommended for Fatty Acid Analysis	Filament Block Only Must reuse heater/sensor	Minifold	G1532-60695
6890/6850	No		Complete Detector Assembly Includes detector palette and heater/sensor assembly	Minifold	G2630-61230

Flame Photometric Detector (FPD)

In 2005, Agilent released an improved FPD with minimum detectable levels (MDL) of 3.6 pg/s for sulfur and 60 fg/s for phosphorus. This is more than a 5 times improvement for sulfur. The updated design is based on a one-piece, deactivated transferline jet assembly and improved optics. Upgrade kits are available.

7890/6890/6850 FPD Ignitor and Heat Shield Assembly

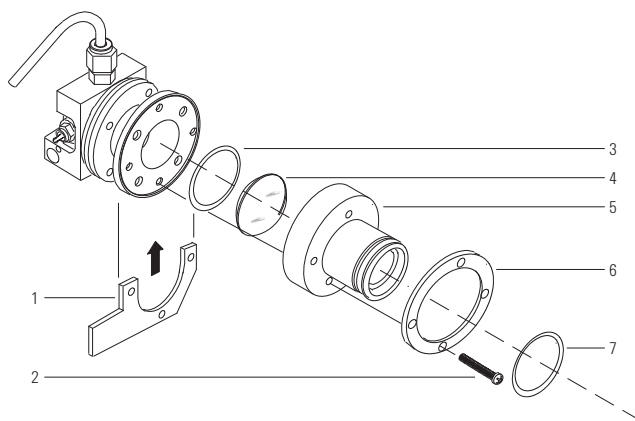
Item	Description	Part No.
1	FPD Exit Tube Assembly	
	Aluminum	19256-60700
	Stainless steel	19256-20705
2	Vespel ferrule, 1/4 in., 10/pk	5080-8774
3	Emission chamber	
	FPD, single	19256-80560
	FPD, dual	19256-80600
5	FPD ignitor replacement kit	19256-60800
	O-ring, size 2-010	0905-1610
	Spacer, ignitor	19256-20590
	Glow plug	0854-0141
5	Ignitor cable assembly	G1535-60600
6	Heat shield gasket, white	19256-80045
7	First heat shield window	19256-80030
8	Heat shield disk	19256-20580
9	Stainless steel coupling	19256-20550
10	Lock washer (4 required)	2190-0584
11	Screw, M3 x 12 mm, T10 (4 required)	0515-1084
12	Collar	19256-20690
13	Screw, M3 x 66 mm, T10	0515-0680
	FPD check out sample	5188-5953
	FPD sample	5188-5245



FPD ignitor and heat shield assembly

FPD Lens Assembly

Item	Description	Part No.
1	Clamp	19256-00090
2	Screw, M3 x 25 mm (4 required)	0515-0683
3	Window O-ring, inner, 0.926 in. ID, orange	5061-5886
4	Convex lens	1000-1438
5	Lens housing	19256-20900
6	Flange ring	19256-00200
7	Fluorocarbon Elastomer O-ring, brown, 1.239 in. ID	5061-5890



FPD lens assembly

FPD Photomultiplier Tube (PMT) and Bracket Assemblies

Description	Part No.
Chimney back cover	G1535-80520
Heator/sensor assembly	G1535-60610
Transfer line support bracket	19256-00320
Bracket/support	G1535-00010
Sulfur filter, 7890 and late model 6890*	1000-1437
Sulfur filter, blue, early model 6890*	19256-80000
Phosphorus filter, yellow	19256-80010
Filter spacer (used only with sulfur filter)	19256-20910
PMT housing assembly	19256-60510
Dual FPD chimney front	G1535-00030

*Please contact Agilent technical support for assistance in selecting the correct sulfur filter for your 6890 FPD detector.



BloS NPD bead assembly, G3434-60806

Nitrogen Phosphorus Detector (NPD)

NPD Beads

The NPD for the 7890/6890 GC features a ceramic bead selective for nitrogen and phosphorous compounds. Agilent offers three beads:

- BloS bead
- White ceramic bead
- Black ceramic bead

Compared to the white ceramic bead, the new BloS bead provides:

- Superior bead lifetime
- Faster attainment of stable operation at initial start-up, as well as more stable operation throughout bead's lifetime
- Superior sensitivity and selectivity for phosphorous-containing compounds
- Similar sensitivity and selectivity for nitrogen-containing compounds
- Superior immunity to moisture

The white ceramic bead exhibits some tailing for phosphorous compounds. The black ceramic bead does not exhibit peak tailing and typically has a longer lifetime than the white bead; however, it is less sensitive.

All Agilent NPD beads are preconditioned, self-aligning for installation and include a proof-of-performance chromatogram.

NPD Beads

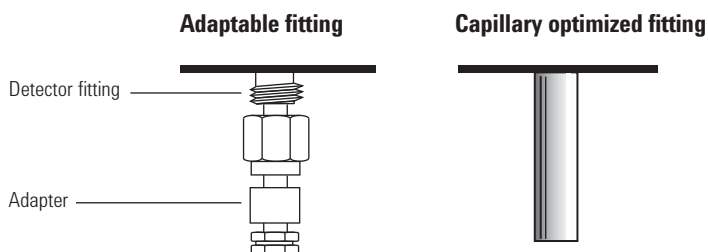
Description	Part No.
BloS NPD bead assembly	G3434-60806
NPD white ceramic bead assembly	G1534-60570
NPD black ceramic bead assembly	5183-2007

NPD Jet Identification and Selection

Before ordering parts for NPD maintenance, determine which type of NPD is installed on your GC. The NPD is available in two versions:

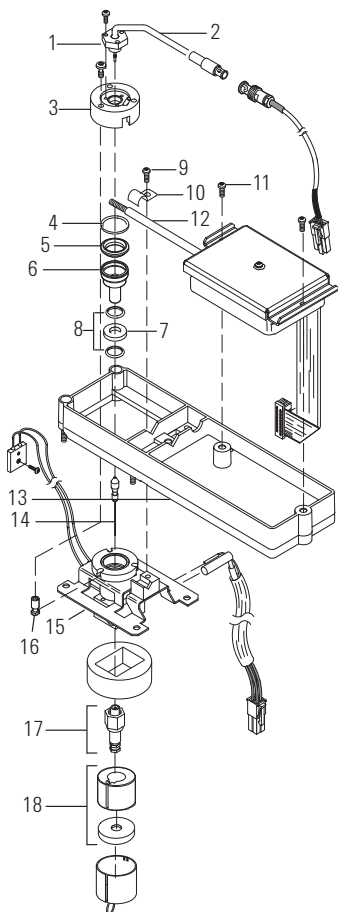
- Dedicated, Capillary Optimized: for capillary columns only
- Adaptable: for packed or capillary columns

Hint: Adaptable jets are longer than dedicated capillary jets.



NPD Jets

Description	Jet Tip ID	Length (mm)	Part No.
Jets for capillary optimized fittings			
Capillary with extended jet (recommended)	0.29 mm (0.011 in.)	51.5	G1534-80580
Capillary	0.29 mm (0.011 in.)	42.8	G1531-80560
Capillary, high temperature	0.47 mm (0.018 in.)	42.8	G1531-80620
Jets for adaptable fittings			
Capillary with extended jet (recommended)	0.29 mm (0.011 in.)	70.5	G1534-80590
Capillary	0.29 mm (0.011 in.)	61.5	19244-80560
Capillary, high temperature	0.47 mm (0.018 in.)	61.5	19244-80620
Packed	0.46 mm (0.018 in.)	63.5	18710-20119



Nitrogen Phosphorus Detector (NPD) assembly

7890/6890/6850 Nitrogen Phosphorus Detector (NPD) Supplies

Item	Description	Part No.
1	Screws, M3 x 0.5, 8 mm (Pozidriv)	0515-0655
2	NPD white ceramic bead assembly NPD black ceramic bead assembly	G1534-60570 5183-2007
3	Lid weldment	G1534-80510
4	Metal C-ring, top	0905-2580
5	Alumina insulator, upper	G1534-40020
6	Collector funnel	G1534-20530
7	Alumina insulator, lower	G1534-40030
8	Metal C-ring, bottom	0905-1284
9	Screw, M4 x 07, 10 mm	0515-2495
10	J-Clamp	1400-0015
11	Screw, M4 x 07, 10 mm	0515-2495
12	NPD interconnect assembly	G1534-60610
13	Mounting pallet	G1531-40020
14	Jet, 0.011 in./0.29 mm ID tip, capillary dedicated Jet, 0.011 in. ID tip, capillary adaptable Jet, packed standard 0.018 in. ID tip	G1531-80560 19244-80560 18710-20119
15	Base weldment, capillary NPD for 6890/6850 only Base weldment, packed NPD for 6890/6850 only Base weldment, capillary NPD, 7890A Base weldment, packed NPD, 7890A	G1534-80500 G1534-80540 G3434-67500 G3434-67540
16	Lid stop NPD ceramic insulator kit Includes items 4, 5, 7, and 8	G1534-20590 5182-9722
17	FID/NPD adapter for capillary column FID/NPD 1/8 in. packed column FID/NPD 1/4 in. packed column	19244-80610 19231-80520 19231-80530
18	Insulating cup Vespel ferrule, 1/4 in., 10/pk 530 µm, 1.0 mm ID graphite ferrule, 10/pk 320 µm, 0.5 mm ID graphite ferrule, 10/pk 1/4 in. nut, brass, 10/pk Universal column nut, 2/pk Nitrogen Phosphorus Detector sample	19234-60720 5080-8774 5080-8773 5080-8853 5180-4105 5181-8830 18789-60060

Nitrogen and Sulfur Chemiluminescence Detectors



Nitrogen Chemiluminescence Detector (NCD)

The Agilent 355 Sulfur Chemiluminescence Detector (SCD) is the most sensitive and selective chromatographic sulfur detector available for the analysis of sulfur compounds.

The Agilent 255 Nitrogen Chemiluminescence Detector (NCD) is a nitrogen-specific detector that produces a linear and equimolar response to nitrogen compounds based on a chemiluminescent reaction of NO with ozone. Even complex sample matrices can be analyzed with little or no interference.



Dual plasma burner accessory kit, G6600-60038



Replacement oil coalescing filter, G6600-80042



Replacement oil coalescing filter for oil mist filter, G6600-80044



Replacement odor filtration element, G6600-80045

Nitrogen Chemiluminescence Detector (NCD) Supplies

Description	Part No.
Dual plasma burner accessory kit Includes ferrules, fittings and quartz tube	G6600-60038
PM Kit, dry piston pump Includes dry piston seal, 6 Moleculite vacuum pump traps and 1 set of ceramic tubes	G6600-67006
PM Kit, DP RV5 oil pump Includes 6 chemical traps for ozone destruction, 3 oil coalescer elements and 4 (1 qt) bottles of synthetic oil	G6600-67007
PM Kit, dry piston pump Includes 4 chemical traps for ozone destruction and 2 repair kits for pump	G6600-67008
12-month maintenance kit Includes 6 qt oil, 12 chemical traps, 4 oil filter elements, 2 sets of ceramic tubes, and 2 O-rings	G6600-67009
Replacement oil coalescing filter	G6600-80042
Oil mist filter for RV5 pump	G6600-80043
Replacement oil coalescing filter for oil mist filter	G6600-80044
Replacement odor filtration element	G6600-80045
O-ring, 1.3614 in. ID	G6600-80050
O-ring, 1.301 in. ID	G6600-80051
Dual plasma quartz tube	G6600-80063
Mobil 1 synthetic oil	G6600-85001
Oil, Edwards Ultragrade for RV3 and RV5 pumps	G6600-85002
Spare column nut and ferrule kit	G6600-80018



Sulfur Chemiluminescence Detector (SCD)



PM kit, G6600-67008



Dual plasma burner accessory kit, G6600-60037



Oil mist filter, G6600-80043

Sulfur Chemiluminescence Detector (SCD) Supplies

Description	Part No.
PM Kit, dry piston pump Includes dry piston seal, 6 Moleculite vacuum pump traps and 1 set of ceramic tubes	G6600-67006
PM Kit, dry piston pump Includes 4 chemical traps for ozone destruction and 2 repair kits for pump	G6600-67008
12-month maintenance kit Includes 6 qt oil, 12 chemical traps, 4 oil filter elements, 2 sets of ceramic tubes, and 2 O-rings	G6600-67009
Dual plasma burner accessory kit	G6600-60037
Mobil 1 synthetic oil	G6600-85001
Oil mist filter for RV5 pump	G6600-80043
Oil, Edwards Ultragrade for RV3 and RV5 pumps	G6600-85002
O-ring, 1.301 in. ID	G6600-80051
Ozone destruction chemical trap	G6600-85000
Replacement oil coalescing filter for oil mist filter	G6600-80044
Sulfur chemiluminescence test sample	G2933-85001
Sulfur trap For carrier H ₂ and air gases; one required for each cylinder of gas (3 total)	G2933-85003
Spare column nut and ferrule kit	G6600-80018

Miscellaneous Instrument Parts and Supplies

Description	Part No.
Oven exhaust deflector for 6890	G1530-80650
Oven exhaust deflector for 6850	G2630-60710

GC Standards

GC Qualitative Standards

Description	Part No.
Qualitative Simulated Distillation Standards	
Boiling Point Calibration Sample No. 1	5080-8716
Low Boiling Point Calibration Sample No. 220	5080-8768
Boiling Point Calibration Sample No. 320	5080-8769
PolyWax 500, 1 g, neat	5188-5316
PolyWax 655, 1 g, neat	5188-5317
Qualitative Petrochemical Standards	
Alcohol in Gasoline Sample	18900-60640
Natural Gas Sample	5080-8756
Transformer Gas Sample	5080-8759
Refinery Gas Sample	5080-8755
Reference Gas Oil No. 1, Batch 2	5060-9086
Miscellaneous Qualitative Standards	
Nickel Catalyst Test Sample	19354-60510
Nickel Catalyst refill	5080-8761
MIDI System Calibration Standard	19298-60500
Oral Fluids Analyzer Test Sample	G1540-85010



GC/MS Parts and Supplies

Your mass spectrometer is a sensitive, specialized device that delivers a higher level of functionality than other GC detectors. To continue achieving optimal results, it is critical to maintain your system properly by performing the essential tasks within this section. Some of the benefits of maintaining your GC/MSD include:

- Less downtime for repairs
- Longer lifetime for your MSD system
- Reduction in overall operating costs

It is advisable to keep a log book of system performance, Autotune, and maintenance operations performed. This makes it easier to identify variations from normal performance and to take corrective action.

Maintenance Schedule

Task	Every week	Every 6 months	Every year	As needed
Tune the MSD				◆
Change injection port liners	◆			
Check the foreline pump oil level	◆			
Gas ballast the foreline pump	◆			
Check the calibration vial		◆		
Replace the foreline pump oil		◆		
Check the diffusion pump fluid	◆			
Replace the diffusion pump fluid			◆	
Replace the dry pump diaphragm seals (MVP55)				◆
Replace the dry pump tip seals (IDP3)			◆	
Replace the traps and filters			◆	
Clean the ion source				◆
Change the carrier gas trap(s) and purifier				◆
Replace worn out parts				◆
Lubricate seals (where appropriate)				◆
Replace column				◆



For in-depth information about maintaining your GC/MS, request "Maintaining Your Agilent GC and GC/MS Systems" from your Agilent Representative (**publication number 5990-5451EN**).



MSD Contamination

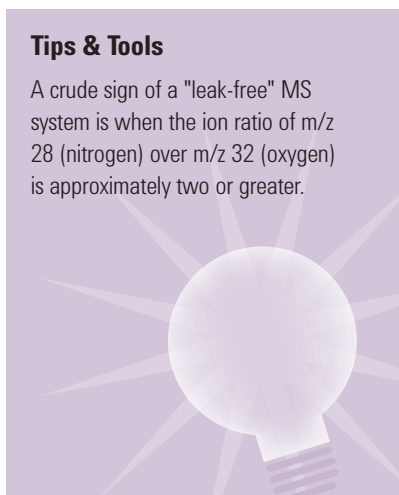
Contamination is usually identified by excessive background in the mass spectra, which can come from the GC or MSD. The source of contamination can sometimes be determined by identifying the contaminants. Some contaminants are much more likely to originate in the GC, while others are likely to originate in the MSD.

MSD Contamination Identification

The following table lists some of the more common contaminants, the ion characteristics of those contaminants, and the likely sources of those contaminants.

Tips & Tools

A crude sign of a "leak-free" MS system is when the ion ratio of m/z 28 (nitrogen) over m/z 32 (oxygen) is approximately two or greater.



Common Contaminants

Ions (m/z)	Compound	Possible Source
13, 14, 15, 16	Methane	Cl gas
18, 28, 32, 44 or 14, 16	H ₂ O, N ₂ , O ₂ , CO ₂ , CO ₂ or N, O	Residual air and water, air leaks, outgassing from Vespel ferrules
31, 51, 69, 100, 119, 131, 169, 181, 214, 219, 264, 376, 414, 426, 464, 502, 576, 614	PFTBA and related ions	PFTBA (tuning compound)
31	Methanol	Cleaning solvent
43, 58	Acetone	Cleaning solvent
78	Benzene	Cleaning solvent
91, 92	Toluene or Xylene	Cleaning solvent
105, 106	Xylene	Cleaning solvent
151, 153	Trichloroethane	Cleaning solvent
69	Foreline pump fluid or PFTBA	Foreline pump oil vapor or calibration valve leak
73, 147, 207, 221, 281, 295, 355, 429	Dimethylpolysiloxane	Septum bleed or methyl silicone column coating
77, 94, 115, 141, 168, 170, 262, 354, 446	Diffusion pump fluid	Diffusion pump fluid and related ions
149	Plasticizer (phthalates)	Vacuum seals (O-rings) damaged by high temperatures, use of vinyl or plastic gloves
Peaks spaced 14 amu apart	Hydrocarbons	Fingerprints, foreline pump oil

Cleaning and Maintenance Supplies

Description	Part No.
One Year Maintenance Kit (for diffusion pump systems) Includes Big Universal Trap for He (1/8 in.), abrasive sheets (5/pk), lint-free cloths (15/pk), cotton swabs (100/pk), SantoVac Ultra, 18.5 mL (2 each), rough pump oil (1 L), filament assembly, octafluoronaphthalene (OFN)	5183-2096
Nylon gloves, lint-free, large, 1 pair	8650-0030
Nylon gloves, lint-free, small, 1 pair	8650-0029
Lint-free industrial wipes, 100% cotton, 9 x 9 in., 300/pk	9310-4828
Ion source cleaning kit Includes lint-free cloths (15/pk), abrasive sheets (5/pk), cotton swabs (100/pk), lint-free nylon gloves, abrasive Alumina powder	5181-8863
Cloths, lint-free, 15/pk	05980-60051
Cotton swabs, 100/pk	5080-5400
Abrasive sheets, aluminum oxide green lapping paper, 600 mesh, 5/pk	5061-5896
Alumina powder, abrasive, 1 kg	8660-0791
PFTBA sample, certified, 10 g, 5.32 mL	8500-0656
Replacement glass bulb for PFTBA and PFDTD test sample	G3170-80002
Replacement glass vial for PFTBA and PFDTD test sample	05980-20018
Activated alumina, absorbent pellets for Edwards rough pump traps, non-LC/MS, 1 lb can	8500-1233
MSD Tool Kit, 5975/5973 Includes source hold tool, lint-free cloth, cotton swabs, lint-free nylon gloves, abrasive sheets, wrenches and driving tools	G1099-60566
MSD Tool Kit, 5972/5971 Includes small cleaning rod, large cleaning rod, source hold tool, cotton swabs, lint-free nylon gloves, abrasive sheets, wrenches and driving tools	05971-60561
MS Interface Supplies	
MS interface column nut, female	05988-20066
Inlet column nut for long or long two-hole ferrules	05921-21170
Universal column nut, 2/pk	5181-8830
MS interface column installation tool for 5973 and 5975	G1099-20030
Column installation tool for 5975T	G3880-20030

(Continued)



MS interface column nut, 05988-20066



Universal column nut, 5181-8830



Column installation tool, G1099-20030

Cleaning and Maintenance Supplies

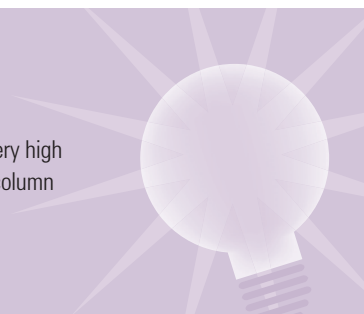
Description	Part No.
Tools	
Screwdriver, 3 in. Pozidriv shaft No. 1 pt, fits no. 2-4 screws	8710-0899
Screwdriver, 4 in. Pozidriv shaft No. 2 pt, fits no. 5-10 screws	8710-0900
Open end wrench, 1/4 and 5/16 in.	8710-0510
Hex nut driver, 5.5 mm	8710-1220
Screwdriver, Torx T20	8710-1615
Screwdriver, Torx T15	8710-1622
Screwdriver, Torx T10	5182-3466
Ferrules	
0.4 mm Vespel/Graphite ferrule for 200/250 μ m columns, 10/pk	5062-3508
0.5 mm Vespel/Graphite ferrule for 320 μ m columns, 10/pk	5062-3506
250 μ m Vespel/Graphite ferrule, 10/pk	5181-3323
SilTite metal ferrules for 1/16 in. OD tubing, 10/pk Includes 2 column nuts	5184-3571
SilTite metal ferrules, 1/16 in. x 0.4 mm ID, 10/pk Includes 2 column nuts	5184-3569
SilTite metal ferrules, 1/16 in. x 0.5 mm ID, 10/pk Includes 2 column nuts	5184-3570
Ferrule pre-swaging tool	G2855-60200
Plug for microfluidic manifold or unions	G2855-60570



Vespel/Graphite ferrules, 5181-3323

Tips & Tools

Even preconditioned ferrules can shrink slightly at very high temperatures. If leak problems persist upon a new column installation, check this fitting first.





Electron Impact (EI) Ion Source

Ion Source

The ion source operates by electron ionization (EI) or chemical ionization (CI). The sample enters the ion source from the GC/MSD interface. Electrons emitted by a filament enter the ionization chamber, guided by a magnetic field. The high-energy electrons interact with the sample molecules, ionizing and fragmenting them. The positive voltage on the repeller pushes the positive ions into the lens stack, where they pass through several electrostatic lenses. These lenses concentrate the ions into a tight beam, which is directed into the mass filter.

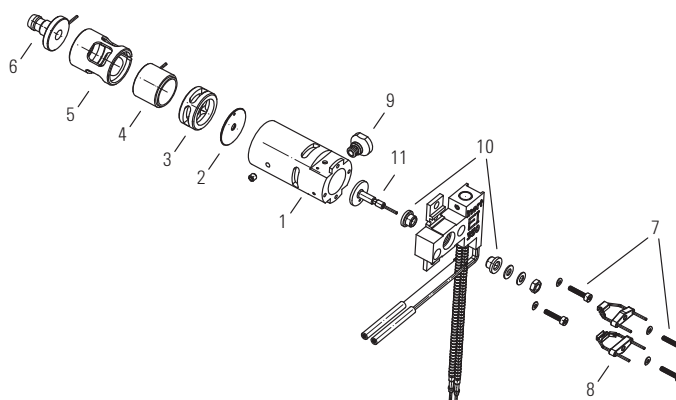
Electron Impact (EI) Ion Source

The recommended cleaning material for the EI ion source is abrasive, aluminum oxide powder.

Do not immerse filaments or lens insulators in solvent. If insulators are dirty, clean them with a cotton swab dampened with reagent-grade methanol. If that does not clean the insulators, replace them.

5975/5973 MSD Electron Impact Ion Source Parts (EI)

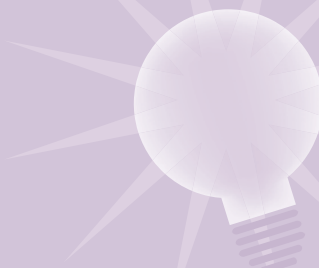
Item	Description	Part No.	Inert Part No.
1	Ion source body	G1099-20130	G2589-20043
2	Drawout plate, 3 mm	05971-20134	G2589-20100
	Drawout plate, 6 mm	G3163-20530	G2589-20045
3	Drawout cylinder	G1072-20008	G1072-20008
4	Ion focus lens	05971-20143	05971-20143
5	Lens insulator	G3170-20530	G3170-20530
6	Entrance lens	G3170-20126	G3170-20126
7	Cap screw, gold plated	G1999-20021	G1999-20021
8	High temperature filament	G2590-60053	G2590-60053
9	Transfer line socket	G1099-20136	G1099-20136
10	Repeller insulator	G1099-20133	G1099-20133
11	Repeller	G1099-20132	G2589-20044



5975/5973 MSD Electron Impact (EI) ion source assembly

Tips & Tools

It is good practice to replace scratched lenses and other ion source parts regularly. Scratched source parts lead to poor performance.

**5972/5971/GCD MSD Ion Source Parts (EI)**

Description	Part No.
Entrance lens	05971-20126
Lens insulator	G3170-20530
Ion focus lens	05971-20143
Drawout cylinder	G1072-20008
Drawout plate, 3 mm	05971-20134
Set screw	0515-1446
Repeller assembly	05971-60170
Screw for filament on the source	0515-1046
Transfer line tip, gold plated	05971-20305

Warnings & Caution

Important: Do not abrasively or ultrasonically clean the insulators.

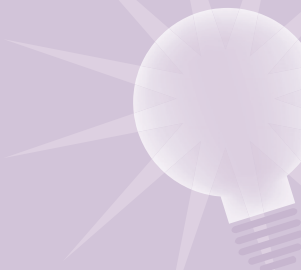
Abrasively clean the surfaces that contact the sample or ion beam. Use an abrasive slurry of alumina powder and reagent-grade methanol on a cotton swab. Use enough force to remove all discoloration. Polishing the parts is not necessary; small scratches will not harm performance. Abrasively clean discoloration where electrons from filaments enter the source body.

Take care to avoid contaminating cleaned and dried parts. Put on new, clean gloves before handling the parts. Do not put the cleaned parts on a dirty surface. Place them only on clean, lint-free cloths.



Tips & Tools

Visual appearance is not an accurate guide to cleanliness of the CI ion source. The CI ion source can show little or no discoloration, yet still need cleaning.



Chemical Ionization (CI) Ion Source

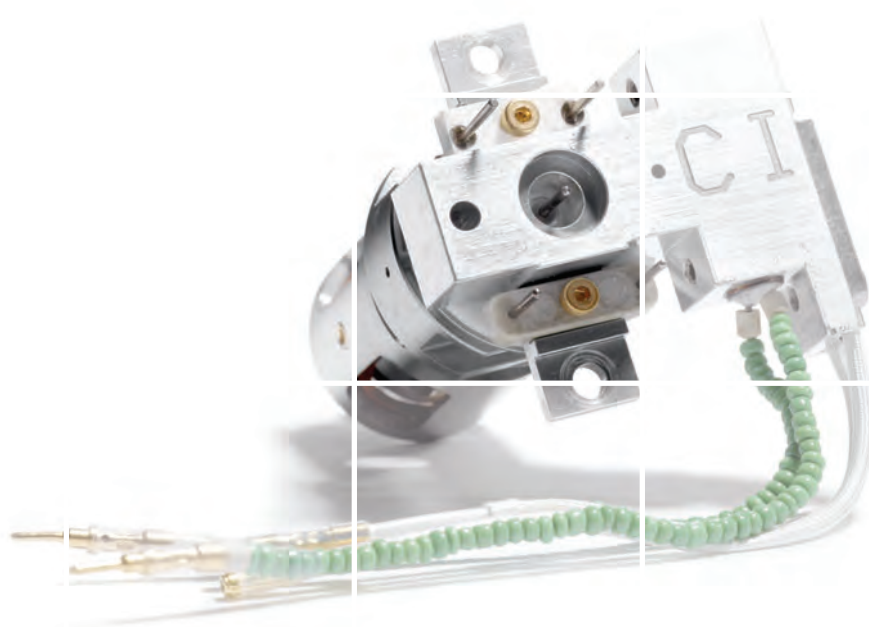
Because the CI ion source operates at much higher pressures than the EI ion source, it will probably require more frequent cleaning than the EI ion source.

The source should be cleaned whenever there are performance anomalies that are associated with a dirty ion source. Let analytical performance be your guide.

When cleaning the CI ion source, concentrate on the CI repeller, ion source body, and drawout plate. Be sure to clean the 0.5 mm diameter holes in the ion source body and drawout plate.

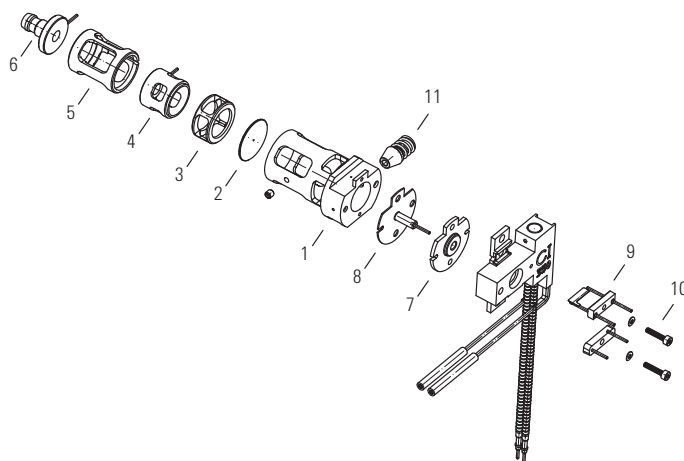
Cleaning the ion source is very similar to cleaning the EI ion source. Use the same EI cleaning procedure with the following exceptions:

- The CI ion source may not look dirty, but deposits left by chemical ionization are very difficult to remove. Clean the CI ion source thoroughly.
- Use a round wooden toothpick to gently clean out the electron entrance hole in the source body and the ion exit hole in the drawout plate.
- Do not use halogenated solvents. Use hexane for the final rinse.



5975/5973 MSD Chemical Ionization Ion Source Parts (CI)

Item	Description	Part No.
1	Source body	G1999-20430
2	Drawout plate	G1999-20446
3	Drawout cylinder	G1999-20444
5	Ion focus lens	G1999-20443
4	Lens insulator	G3170-20540
6	Entrance lens	G3170-20126
7	Repeller insulator	G1999-20433
8	Repeller	G1999-20432
9	High temperature filament	G1099-80053
10	Cap screw, gold plated	G1099-20021
11	Interface tip seal/spring	G1999-60412



5975/5973 MSD Chemical Ionization (CI) ion source assembly

QuickSwap MS Interface Restrictors

Agilent's QuickSwap Capillary Flow Technology module and pre-swaged fused silica tubing restrictors can increase the productivity of your Agilent 5973N and 5975 Inert MSD Systems, allowing you to change columns without venting the MSD. QuickSwap not included.

These restrictors are prefabricated for convenience and ease-of-use. For applications requiring other restrictor sizes, Agilent offers a wide variety of deactivated fused silica tubing, SilTite ferrules and swaging tools.

QuickSwap MS Interface Restrictors

Description	ID (mm)	Unit	Part No.
QuickSwap restrictor	0.092	4/pk	G3185-60361
QuickSwap restrictor	0.100	4/pk	G3185-60362
QuickSwap restrictor	0.110	4/pk	G3185-60363
QuickSwap restrictor	0.120	4/pk	G3185-60364
QuickSwap restrictor variety pack, 2 each of the above ID restrictors			G3185-60300

SilTite Metal Ferrules

Description	Unit	Part No.
For use with 0.25 mm ID capillary columns	10/pk	5188-5361
For use with 0.32 mm ID capillary columns	10/pk	5188-5362
For use with 1/16 in. OD stainless steel tubing Includes 2 column nuts	10/pk	5184-3571
For use with 0.53 mm ID capillary columns	10/pk	5188-5363



Filament assembly (EI), G3170-60050

MSD Filaments

Like the filaments in an incandescent light bulb, the ion source filaments will eventually burn out. Certain practices will reduce the chance of early failure.

- When setting up data acquisition parameters, set the solvent delay so that the analyzer will not turn on while the solvent peak is eluting
- When the software prompts 'Override solvent delay at the beginning of a run' always select 'No'
- Higher emission current will reduce filament life
- If you control your MSD from the Edit Parameters screen, always select 'MS Off' before changing any of the filament parameters

MSD Filaments

Description	5975 Series	5975T Series	5973 Series	5972 Series	5971 Series
Filament assembly (EI)	G3170-60050		G3170-60050	G3170-60050	05971-60140
Filament assembly (CI)	G1099-80053		G1099-80053		
Micro ion vacuum gauge	G3170-80001				
Triode gauge tube for measuring vacuum			0960-0897		
Ion gauge controller		G3880-80010			
Ion gauge tube		G3880-80011			

Tips & Tools

It is very useful to switch from one filament to the other every three months so that when a filament fails, you know the other will fail soon. This will allow you to change both filaments at the same time. Since the GC/MS system is already vented, it's a good idea to replace other supplies in the flowpath at the same time as the filaments.





Electron multiplier replacement horn

MSD Electron Multipliers and Replacement Horn

The lifetime of an electron multiplier is directly related to the current that flows through it and the extent of contamination or condensation that it experiences. Replace the electron multiplier or replacement horn when voltage is over 2500 V. To maximize electron multiplier life:

- Maintain the best possible vacuum, especially in the analyzer manifold
- Use extreme caution and be conservative with venting, pumpdown, and all vacuum system procedures to keep pump fluid background to a minimum
- After venting, allow four hours for pumpdown and thermal equilibration before scanning
- Actively look for background contamination and leaks and repair them immediately
- Don't tune excessively – PFTBA can result in higher background over an extended period of time
- Replace the electron multiplier if vacuum is poor or voltage is over 2500 V

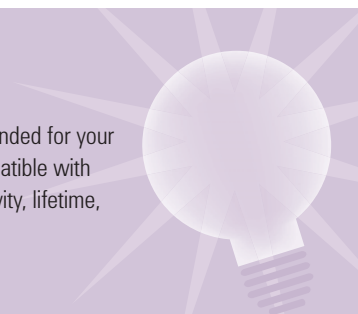
MSD Electron Multipliers and Replacement Horn

Description	5975 Series	5973 Series	5972/5971 Series
Electron multiplier replacement horn	05971-80103	05971-80103	05971-80103
Use with electron multipliers with "straight" horns			
Triple axis detector assembly*	G3170-80100		
Triple axis electron multiplier	G3170-80103		
EM signal wire, low noise detector	G3170-80008		
High energy dynode		G1099-80001	
Electron multiplier			05971-80102

*Included on 5975 triple axis detector systems

Tips & Tools

The Agilent multipliers and horns listed are recommended for your MSD. Other manufacturers' products may be incompatible with Agilent instruments and can result in reduced sensitivity, lifetime, and noise problems.





Foreline Pump

Vacuum Systems and Pumps

Diffusion Pump

It is not necessary to change the diffusion pump fluid more than once a year, unless you observe symptoms that suggest a problem with the fluid. The MSD must be vented in order to check the diffusion pump fluid (except for the 5975/5973). Therefore, the best time to check the fluid is when the instrument is already vented for other maintenance.

Foreline Pump

The oil in the foreline or rough pump should be replaced on average once every six months, but can vary depending upon applications. If a foreline trap is present, the molecular sieves should also be replaced after an oil change.

Avoid contact with the pump oil. The residue from some samples may be toxic. Dispense of used oil properly.

Pump Oils

Description	Part No.
Foreline pump oil, Inland 45, 1 L	6040-0834
High vacuum grease, 25 g	6040-0289
Diffusion pump fluid, 18.5 mL	6040-0809*
IDP Series tip seal kit for 5975T	IDP3TS

*2 required for 5975 and 5973 Series



7000A Triple Quadropole GC/MS Parts and Supplies

Engineered from the ground up for ease-of-use and routine high performance operation, the 7000A Triple Quadropole GC/MS delivers advanced high-speed GC/MS/MS quantitation for ultra-trace analysis of even the most complex samples. Combined with the Agilent 7890 GC, the result is an optimally robust GC/MS/MS system.

Gas Filters

Description	Part No.
Chemical Ionization Gas Purifier	G1999-80410
Big Universal Trap, 1/8 in. fittings, Helium (Ar/Me)	RMSH-2
Big universal trap, 1/8 in. fittings, Nitrogen	RMSN-2
Mounting clip	UMC-2

Foreline Pump Supplies

Description	Part No.
Diffusion pump fluid, 18.5 mL	6040-0809
Foreline pump oil, P3, 0.5 L	6040-0621
Rough pump inlet flange	0905-1463
Oil return kit	3162-1057
Pump oil drip pan	G1946-00034
Oil mist exhaust filter	G1099-80039
Oil mist filter for RV5 pump	G6600-80043



Low noise EM horn, G3170-80103



Filament assembly (EI), G3170-60050

Maintenance Supplies

Description	Part No.
Abrasive sheets	5061-5896
Alumina powder, abrasive, 1 kg	8660-0791
Cloths, lint-free	05980-60051
Lint-free industrial wipes, 100% cotton	9310-4828
Cotton swabs	5080-5400
Nylon gloves, lint-free, large	8650-0030
Nylon gloves, lint-free, small	8650-0029
High vacuum grease, 25 g	6040-0289
Electron multiplier replacement horn	05971-80103
Low noise EM horn	G3170-80103
Filament assembly, high temperature (EI)	G3170-60050
Filament assembly (CI)	G1099-80053
Micro ion vacuum gauge	G3170-80001
Replacement glass bulb for PFTBA and PFDTD test sample	G3170-80002



240-MS Ion Trap Parts and Supplies

The Agilent 240-MS Ion Trap delivers unparalleled capabilities for both research and routine applications. Advanced ionization, including positive and negative chemical ionization, improves selectivity and limits of detection. Enhanced scanning techniques ensure compound confirmation. The MS/MS and MSⁿ reduce matrix influences and provide more detailed structural information. The software comes with a full complement of productivity, reporting, and regulatory compliance tools.

- Accurate identification and quantification of trace analytes
- Unsurpassed sensitivity (200 femtogram OFN full scan)
- Choice of internal or external ionization configurations
- Powerful MS/MS and CI options
- Low maintenance and high reliability
- Intuitive software for increased productivity

240-MS Ion Trap Parts and Supplies

Description	Part No.
Manifold O-ring	393010924
Transfer line inner O-ring	393010920
Transfer line outer O-ring	393010918
Internal filaments (2 filaments on one disk)	392017401
Internal transfer line tip	393171201
External filament (single filament)	393161001
Electrode, end cap, Silchrom	393164493
Electrode set kit, Silchrom, DFC (inert) tested Includes 2 end cap electrodes, 1 RF electrode, cleaning instructions	9300003590
Electrode, RF, Silchrom	393167593
Spacer, RF, Silco-quartz	393053502
Electron multiplier	393175101
Transfer line assembly upgrade field kit Contains a complete transfer line and side-mounted block for vacuum manifold	393101291
EPA volatile kit for EPA methods 524.2 & 8260B	393082491
ChromatoProbe microvials, 100/pk	392567111

240-MS Ion Trap Parts and Supplies

Description	Part No.
GC/MS Standards	
Evaluation standard (Internal EI & CI) 2 pg/ μ L OFN, 5 pg/ μ L	393112601
Test standard for external EI (5 pg/ μ L OFN)	393112702
Benzophenone CI sensitivity standard 50 pg/mL	392030500
Test standard for external NCI (1 pg/ μ L DFB)	393113001
Tuning calibration compound PFTBA (FC-43)	392035300
GC/MS column test mix	392027300
Vacuum Supplies	
Oil mist exhaust filter, DS42	393847701
Oil mist eliminator	2735000500
Replacement cartridge for oil exhaust filter, 2/pk	2710100200
Foreline (roughing) pump oil, 1 L	8829951700
Premium foreline (roughing) pump oil, 1 L	8829953800
IDP-3 dry scroll pump tip seal maintenance kit	2710100400
IDP-3 dry scroll replacement module	2710100500





220-MS Parts and Supplies

The 220-MS is a high sensitivity, flexible gas chromatograph/mass spectrometer that delivers outstanding qualitative and quantitative data in a range of applications. This simple and robust system is easy to operate and maintain.

- Accurately identify and quantify trace analytes
- Take advantage of powerful CI and MS/MS upgrades for advanced applications
- Spend less time on maintenance and more time on analysis

220-MS Parts and Supplies

Description	Part No.
Electron multiplier assembly	393031501
Exit end cap electrode, chrome	393050292
Exit end cap electrode, SilChrom	393050293
Filament end cap electrode, chrome	393050392
Filament end cap electrode, SilChrom	393050393
RF ring electrode, chrome	393050492
RF ring electrode, SilChrom	393050493
Complete set of SilChrom electrodes and Silco-quartz spacers	393001991
Spacer, RF, quartz	393053501
Spacer, RF, Silco-quartz	393053502
Filament disk assembly with wire connectors	393060191
Filament disk assembly	392043700
User must solder on 3 wire connectors	
Thermocouple vacuum gauge	2722990700
Mass spectrometer expendable supplies kit for 2x0MS	393011391
Includes PFTBA calibration compound, cal-gas glass chamber, capillary injector nut, O-rings, cotton tipped applicators, end cap insulator, vacuum pump oil	
GC/MS Standards	
Hexachlorobenzene EI sensitivity standard 100 pg/mL	392027500
Benzophenone CI sensitivity standard 50 pg/mL	392030500
Tuning calibration compound PFTBA (FC-43)	392035300
Hexachlorobenzene EI sensitivity standard 2 pg/mL	392047100
GC/MS column test mix	392027300



MS standards

GC/MS Standards

GC/MS Analyzer Kit Standards

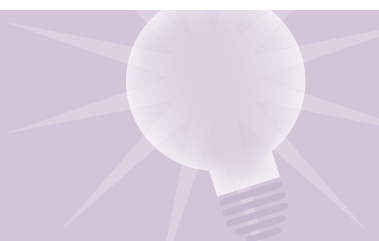
Description	Part No.
GC/MS semivolatiles analyzer checkout mixture	5190-0473
GC/MS pesticide analyzer internal standard	5190-0472
Pesticide analyzer checkout solution	5190-0468
Pesticide checkout standard, 100 µg/L, 3 x 1 mL	5190-0494
GC/MS toxicology checkout mixture	5190-0471
Residual solvent revised method 467, class C	5190-0493
Residual solvent revised method 467, class 1	5190-0490
Butanetriol internal standard #1 for biodiesel	5982-0024
Tricaprin internal standard #2 for biodiesel	5982-0025

MS Test and Performance Samples

	Description	Part No.	5975 Series	5973 Series	5972 Series	5971 Series	GCD	7000 Series
Tuning Samples								
El Tune	PFTBA sample, certified, 10 g, 5.32 mL	8500-0656	◆	◆	◆	◆	◆	◆
Cl Tune	PFTBA MS Sample Kit, 0.942 g, 0.5 mL	05971-60571	◆	◆			◆	◆
	PFDTD calibrant	8500-8510	◆	◆				◆
Performance Verification Samples								
EI	OFN, 1 pg/μL	5188-5348	◆	◆				
	Hexachlorobenzene 10 pg/μL, 1 ng/μL	8500-5808			◆			
	Methyl stearate (in methanol); 1 ng/μL, 2 ea	05990-60075				◆		
	Sample A, 10 ng/μL	05970-60045					◆	◆
Negative Mode Cl	OFN, 100 fg/μL	5188-5347	◆					
Positive Mode Cl	Benzophenone, 100 pg/μL	8500-5440	◆	◆	◆	◆		◆
Checkout Samples								
HighMass	PHFT, 100 pg/μL	5188-5357	◆					
Semi-Volatile	GC/MS tuning standard, DFTPP	8500-5995	◆	◆	◆	◆	◆	
Volatile	p-Bromofluorobenzene (BFB), 25 μg/mL	8500-5851	◆	◆	◆	◆	◆	
Evaluation sample	Solution of dodecane, biphenyl, p-cholorodiphenyl, and Methyl palmitate in isooctane. Six 1.0 mL ampoules: 4 at 10 ng/μL, 1 at 100 ng/μL, 1 at 100 pg/μL.	05970-60045	◆	◆	◆	◆		

Tips & Tools

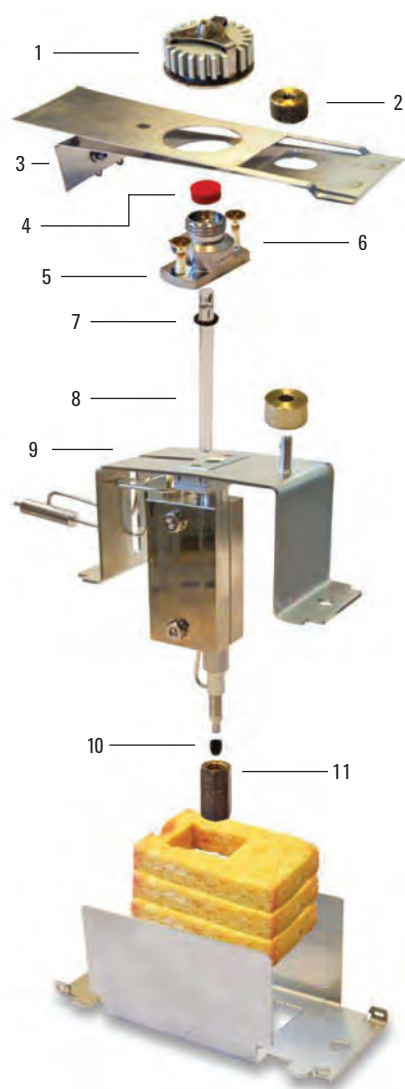
Each GC/MS has a specific test and performance sample. Refer to the chart above for the exact sample. All volumes are approximately 0.5-1 mL unless otherwise specified.



GC Parts and Supplies for Varian Instruments

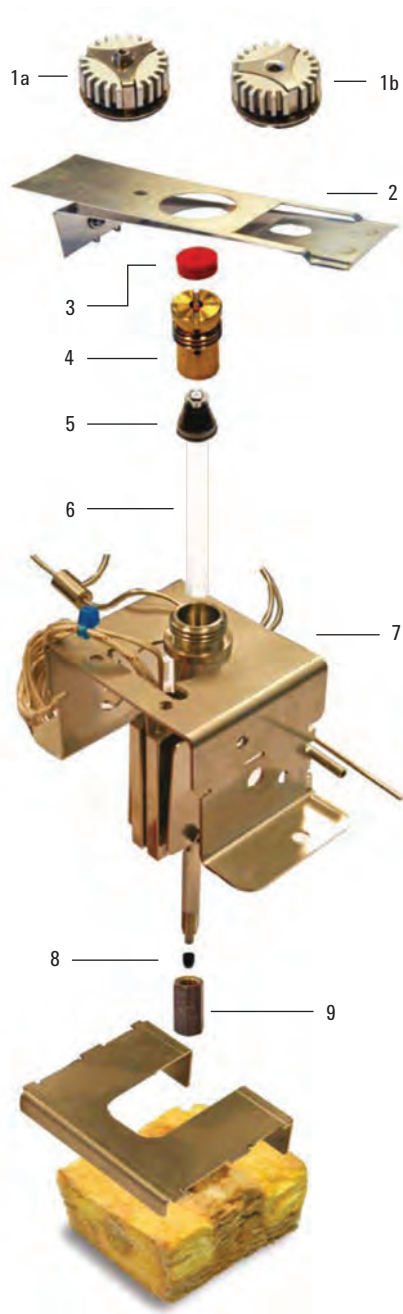
Agilent now provides replacement parts and supplies for GC instruments formerly manufactured by Varian. The following section includes ordering information for GC injectors, detectors and GC/MS systems.

Injector Replacement Parts and Supplies



1177 Split/Splitless Injector

Item	Description	Part No.
1	Injector nut	392597501
	Injector nut wrench	390842300
2	Knob	392597101
3	Automatic start switch	390820601
4	Septum, 9 mm	
	BTO	8010-0217
	Long Life	8010-0233
	Advanced Green	8010-0201
	Septum pick	7200008400
5	Septum purge head	
	EFC21 (stainless steel)	392597301
	EFC21 (UltiMetal)	392597303
	EFC25 or Manual Pneumatics	392597302
6	Purge head screw	391866308
7	Graphite liner O-ring, splitless, 6.5 mm	8004-0202
	Viton liner O-ring, 6.3 mm	8004-0201
8	Glass liner	8004-0165
9	Injector body	
	Stainless steel	392599401
	UltiMetal	392599411
	Manual	392599501
10	For replacement ferrules, see Agilent's new line of CrossLab Supplies	
11	Bottom nut	8004-0311

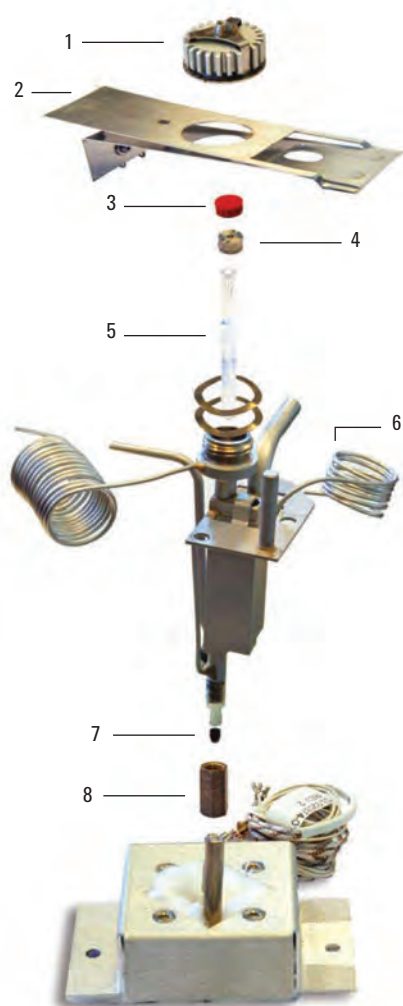


1079 Large Volume Injector (LVI)

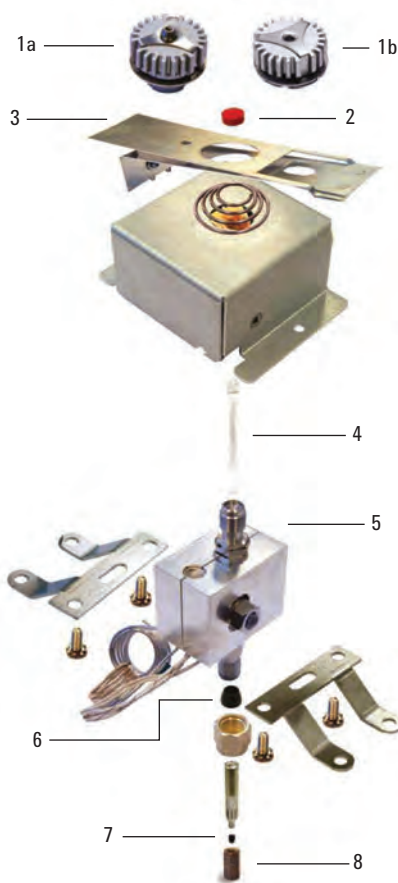
Item	Description	Part No.
1a	Injector nut	394966601
1b	Injector nut	394966601
	Injector nut wrench	390842300
2	Automatic start switch	390820601
3	Septum, 11.5 mm	
	BTO	8010-0225
	Long Life	8010-0241
	Advanced Green	8010-0209
	Septum pick	7200008400
4	Septum support	391867600
5	Insert ferrule	8004-0204
6	Glass liner	8004-0164
7	Injector body, EFC type	
	Stainless steel	392544001
	UltiMetal	392544011
8	For replacement ferrules, see Agilent's new line of CrossLab Supplies	
9	Bottom nut	8004-0311

To learn more about Agilent CrossLab and to request your copy of the Agilent CrossLab product catalog, visit www.agilent.com/chem/CrossLab



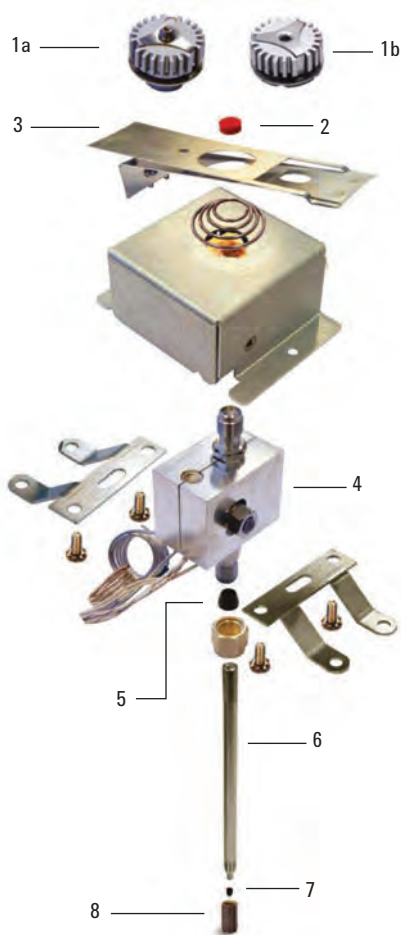
**1093 Cool On-Column (COC) Injector**

Item	Description	Part No.
1	Injector nut	394966601
	Injector nut wrench	390842300
2	Automatic start switch	390820601
3	Septum, 11.5 mm	
	BTO	8010-0225
	Long Life	8010-0241
	Advanced Green	8010-0209
	Septum pick	7200008400
4	Septum support	391821100
5	Glass liner	
	Default	8004-0162
	High performance	8004-0167
	On-column	8004-0166
6	Screw	391866306
7	Graphite/Vespel ferrule	8004-0217
	Graphite ferrule	8010-0305
8	Bottom nut	
	Brass	8004-0311
	Stainless steel	8004-0312



1061 Packed/530 µm Capillary Column Injector

Item	Description	Part No.
1a	Injector nut	390812700
1b	Injector nut	392595501
	Injector nut wrench	390842300
2	Septum, 9.5 mm	
	BTO	8010-0219
	Long Life	8010-0235
	Advanced Green	8010-0203
	Septum pick	7200008400
3	Automatic start switch	390820601
4	Glass liner	8004-0168
5	Injector body, EFC23	392548301
6	Graphite/Vespel ferrule	8004-0217
	Graphite ferrule	8010-0305
7	For replacement ferrules, see Agilent's new line of CrossLab Supplies	
8	Bottom nut	8004-0311



1041 Packed/Wide Bore On-Column (PWOC) Injector

Item	Description	Part No.
1a	Injector nut	390812700
1b	Injector nut	392595501
	Injector nut wrench	390842300
2	Septum, 9.5 mm	
	BTO	8010-0219
	Long Life	8010-0235
	Advanced Green	8010-0203
	Septum pick	7200008400
3	Automatic start switch	390820601
4	Injector body, EFC type	392548201
5	Graphite/Vespel ferrule	8004-0217
	Graphite ferrule	8010-0305
6	Injector insert, stainless steel	392543101
7	For replacement ferrules, see Agilent's new line of CrossLab Supplies	
8	Bottom nut	8004-0311

Detector Replacement Parts and Supplies

Thermal Conductivity Detector (TCD)

Description	Part No.
Adapter TCD/DEFC capillary make-up	392585291
Adapter TCD/DEFC reference gas kit	392585292
Adapter TCD capillary make-up, MPC, 3800	392560591
TCD DEFC 14 (Non-H ₂), 2 channels	392561290

Flame Ionization Detector (FID)

Description	Part No.
Tube collector	394958700
Lower FID insulator 17311	2100003200
FID flame tip jet, 0.010 in.	200187500
FID flame tip jet with nut, 0.020 in.	200193800
Crunch washer, 25/pk	1500334701

Tips & Tools

To learn more about Agilent's complete portfolio of services, please visit www.agilent.com/chem/services



Pulsed Flame Photometric Detector (PFPD)

Description	Part No.
Photomultiplier tube (PFPD) #R647-08	392517100
O-Ring, silicone, 0.53 in. ID, PFPD	2740292400
PFPD light pipe	392515500
Sapphire window assembly	392514500
Sapphire window washer	392514300
Wrench, PFPD combustor support	392519200
Seal, combustor support	392513800
Combustor holder (2 mm)	392517800
Combustor Sulfur (2 mm), cleaned	392517600
Holder, combustor, 3 mm, cleaned	392517901
Combustor Phosphorus, 3 mm, cleaned	392517700

PFPD Filter Assemblies

Description	Part No.
Arsenic (As)	392515105
Manganese (Mn)	392544391
Nitrogen (N)	392511901
Sulfur and Phosphorus (S and P)	392515104
Phosphorus (P)	392515102
Sulfur (S)	392515101
Tin (Sn)	392515103

PFPD Nitrogen Mode Maintenance

Description	Part No.
Photomultiplier tube, Nitrogen R-5070A	392512800
O-Ring, 0.987 in. ID	2740236100
PFPD filter assembly, Nitrogen	392511901
PFPD light pipe	392515500
Sapphire window assembly	392514500
Sapphire window washer	392514300

Thermionic Specific Detector (TSD)

Description	Part No.
TSD bead probe, unconditioned and untested	390607400
TSD bead probe, conditioned and tested	390607401
Upper TSD insulator #17310 TSD	2100003100
O-Ring, 30/pk	2740928202
TSD collector assembly	390607900
Lower FID insulator #17311	2100003200
Crunch washer, 25/pk	1500334701
FID flame tip jet with nut, 0.020 in.	200193800
Flow tube assembly	200187600

GC/MS System Replacement Parts and Supplies

210/220/225 GC/MS Systems

Description	Part No.
Electron multiplier assembly	393031501
Exit end cap electrode, chrome	393050292
Exit end cap electrode, SilChrom	393050293
Filament end cap electrode, chrome	393050392
Filament end cap electrode, SilChrom	393050393
RF ring electrode, chrome	393050492
RF ring electrode, SilChrom	393050493
Complete set of SilChrom electrodes and Silco-quartz spacers	393001991
Spacer, RF, quartz	393053501
Spacer, RF, Silco-quartz	393053502
Filament disk assembly with wire connectors	393060191
Filament disk assembly User must solder on 3 wire connectors	392043700
Thermocouple vacuum gauge	2722990700
Mass spectrometer expendable supplies kit for 2xOMS Includes PFTBA calibration compound, cal-gas glass chamber, capillary injector nut, O-rings, cotton tipped applicators, end cap insulator, vacuum pump oil	393011391
GC/MS Standards	
Hexachlorobenzene EI sensitivity standard 100 pg/mL	392027500
Benzophenone CI sensitivity standard 50 pg/mL	392030500
Tuning calibration compound PFTBA (FC-43)	392035300
Hexachlorobenzene EI sensitivity standard 2 pg/mL	392047100
GC/MS column test mix	392027300

240 GC/MS and 4000 GC/MS Systems

Description	Part No.
Manifold O-ring	393010924
Transfer line inner O-ring	393010920
Transfer line outer O-ring	393010918
Internal filaments (2 filaments on one disk)	392017401
Internal transfer line tip	393171201
External filament (single filament)	393161001
Electrode, end cap, SilChrom	393164493
Electrode set kit, SilChrom, DFC (inert) tested Includes 2 end cap electrodes, 1 RF electrode, cleaning instructions	9300003590
Electrode, RF, SilChrom	393167593
Spacer, RF, Silco-quartz	393053502
Electron multiplier	393175101
Transfer line assembly upgrade field kit Contains a complete transfer line and side-mounted block for vacuum manifold	393101291
EPA volatile kit for EPA methods 524.2 & 8260B	393082491
ChromatoProbe microvials, 100/pk	392567111
GC/MS Standards	
Evaluation standard (Internal EI & CI) 2 pg/ μ L OFN, 5 pg/ μ L	393112601
Test standard for external EI (5 pg/ μ L OFN)	393112702
Benzophenone CI sensitivity standard 50 pg/mL	392030500
Test standard for external NCI (1 pg / μ L DFB)	393113001
Tuning calibration compound PFTBA (FC-43)	392035300
GC/MS column test mix	392027300
Vacuum Supplies	
Oil mist exhaust filter, DS42	393847701
Oil mist eliminator	2735000500
Replacement cartridge for oil exhaust filter, 2/pk	2710100200
Foreline (roughing) pump oil, 1 L	8829951700
Premium foreline (roughing) pump oil, 1 L	8829953800
IDP-3 dry scroll pump tip seal maintenance kit	2710100400
IDP-3 dry scroll replacement module	2710100500

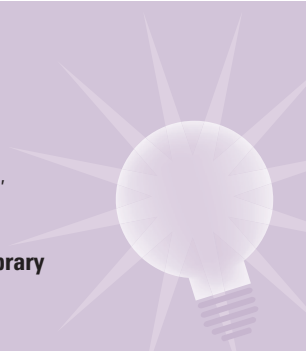
Saturn 2000 Series MS Systems

Description	Part No.
Mass spectrometer expendable supplies kit for 2x0MS Includes PFTBA calibration compound, cal-gas glass chamber, capillary injector nut, O-rings, cotton tipped applicators, end cap insulator, vacuum pump oil	393011391
Electron multiplier assembly	393031501
Filament disk assembly with wire connectors	393060191
Filament disk assembly User must solder on 3 wire connectors	392043700
Exit end cap electrode, SilChrom	393050293
Filament end cap electrode, SilChrom	393050393
RF ring electrode, SilChrom	393050493
Exit end cap electrode, chrome	393050292
Filament end cap electrode, chrome	393050392
RF ring electrode, chrome	393050492
Spacer, RF, quartz	393053501
Spacer, RF, Silco-quartz	393053502
Complete set of SilChrom electrodes and Silco-quartz spacers	393001991
GC/MS Standards	
Tuning calibration compound PFTBA (FC-43)	392035300
Benzophenone Cl sensitivity standard 50 pg/mL	392030500
Hexachlorobenzene El sensitivity standard 2 pg/mL	392047100
Hexachlorobenzene El sensitivity standard 100 pg/mL	392027500
GC/MS column test mix	392027300

Tips & Tools

More information is a click away. We have a variety of educational primers, application notes, maintenance guides, and literature available from Agilent for free.

To learn more, visit www.agilent.com/chem/OnlineLibrary



■ AGILENT J&W GC AND GC/MS COLUMNS



A legacy of confidence: The continuing story of Agilent J&W GC Columns

In 2000, Agilent Technologies, the inventor of low-bleed HP-5ms columns, merged with J&W Scientific, the creator of DB-5ms – the first GC stationary phase to use arylene technology for lower column bleed.

Thanks to this partnership, you can find both the renowned HP and DB column families under the Agilent J&W name. And they're all brought to you by Agilent Technologies – a company with over 40 years of gas chromatography experience.

In 2010, a new chapter began with the addition of Varian, Inc.

This key acquisition enabled Agilent to expand its GC column portfolio to include three highly respected column families:

- FactorFour GC columns employ advanced proprietary manufacturing techniques to ensure low background and high signal-to-noise values for your routine or trace analysis.
- Select GC columns offer guaranteed performance for specific methods and applications.
- PoraBOND GC columns are highly retentive Porous Layer Open Tubular (PLOT) columns. Because they do not shed any particles, they can improve the quality of your data for volatile compounds.



The Agilent J&W column difference

Low bleed and high inertness for sensitivity and performance

Column bleed can decrease data integrity, reduce uptime, and shorten column life, while column activity contributes to severe peak tailing, compound loss, and degradation of active compounds, all of which raise detection limits and reduce method linearity.

Agilent J&W columns have the widest range of GC/MS and Ultra Inert stationary phases proven to deliver consistent column inertness, exceptionally low column bleed, and high upper temperature limits to ensure accurate peak identification and quantification, improved sensitivity, and extended linearity.

Better precision for better results and greater productivity

Every Agilent J&W GC column adheres to tight retention factor (k) specifications, promoting consistent retention and separation. They also feature narrow retention indexes and a high number of theoretical plates per meter, both of which provide narrow peaks, improve the resolution of closely eluting peaks, and simplify data interpretation.

The industry's tightest quality control specifications

Agilent's stringent testing ensures reliable qualitative and quantitative results – even for your most challenging compounds. For example, we measure peak height ratios for acids and bases to achieve top performance for the widest range of analytes.

In 2008, Agilent also ushered in a new era of column inertness QC testing with the industry's most rigorous test probe mixture.

Tighter GC Column Performance Criteria

Feature	Advantage	Benefit
Narrow Retention Index and Retention Factor Window	• Highest level of column-to-column reproducibility	• Confidence in analytical results
	• Minimal method adjustment when changing columns	• Improved sample throughput, reduced downtime
	• Specify J&W chemistry for intra-company methodologies	• Confidence in method transfer and intra-company results
Increased Plates per Meter	• Highest level of "resolving power" • Improved sample throughput	• Accurate quantification • Potentially shorter run times
Lowest Bleed	• Increased analytical sensitivity for all detectors	• Improved detection limits • Reliable compound identification
	• Fast baseline stabilization	• Minimized conditioning time
	• Faster column exchange	• Increased sample throughput
	• Excellent thermal stability	• Increased column lifetime, reduced downtime • Increased sample throughput
Highest Degree of Inertness	• Better peak shape for active compounds • Minimum compound adsorption	• Improved detection limit, more accurate quantification, and more instrument uptime • More accurate quantification for trace samples and unknown sample screening



Agilent J&W Ultra Inert GC Capillary Columns

The only GC columns that deliver on the promises of consistent column inertness and exceptionally low column bleed

Agilent J&W Ultra Inert GC columns give you outstanding sensitivity and peak shape, allowing you to confidently perform trace-level analysis of acids, bases, and other active compounds.

Like all Agilent columns, Ultra Inert GC columns undergo tight QC testing procedures. However, Ultra Inert columns must also pass through a more difficult set of test parameters, including:

- A demanding test probe mixture that contains compounds with low molecular weights, low boiling points, and no steric shielding of active functional groups, which prevents masking effects and reveals true column quality.
- Testing at lower isothermal temperatures (65°C vs. 120°C for GC/MS columns). Lower-temperature testing decreases the kinetic energy of probes in the mobile phase, preventing molecules from sweeping past active sites on the column. This allows a true evaluation of column surface activity and ensures consistent column inertness.

Together, these conditions enhance the opportunity for solute/column interactions, and expose column deficiencies that traditional GC/MS testing might not detect.

Agilent J&W High Efficiency GC Capillary Columns

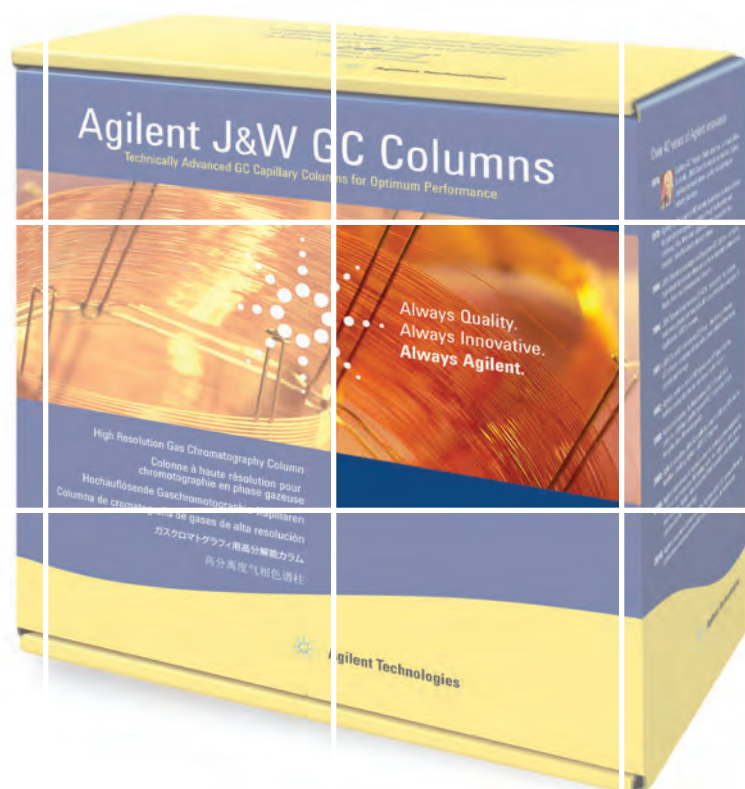
High efficiency, high throughput, and high resolution without the high costs

This leading-edge column technology is ideal for applications that require faster run times, such as high-throughput screening, fast process monitoring, and fast method development. In fact, Agilent High Efficiency columns can reduce your sample run time by 50% or more without compromising resolution.

Unlike other manufacturers' 0.1 mm ID columns, Agilent High Efficiency Capillary GC columns are compatible with all standard-pressure capillary GC and GC/MS instruments – without expensive high-pressure modifications. They also give you:

- The flexibility to choose between helium and hydrogen carrier gases. You can stay with a helium carrier if you wish to simplify method development, or switch to a hydrogen carrier to further reduce your analysis time.
- The ability to separate samples using less carrier gas, which can lead to longer intervals between cylinder changes, increased uptime, and a lower cost per sample.

In addition, these flexible columns easily adapt to a wide variety of environmental, petrochemical, flavor/fragrance, clinical toxicology, and pharmaceutical sample matrices.



Agilent J&W FactorFour GC Columns

Low-bleed performance for all areas of GC and GC/MS analysis

With Agilent J&W FactorFour columns, you get the throughput you need to analyze more compounds in less time – and the analytical accuracy you need to get the right results every time. They are manufactured from detailed specifications and high-quality materials to ensure the reproducibility, low bleed, and high inertness that today's applications demand.

FactorFour columns are available in a variety of general and application-specific phases – including VF-WAXms, the only GC/MS-compatible Wax column – to meet your lab's every requirement.

Double your sample throughput and reduce your cost per analysis with FactorFour 0.15 mm ID columns

In addition to standard dimensions, FactorFour columns are available in an extended range of 0.15 mm ID choices specifically designed to reduce run times and increase throughput.



Agilent J&W LTM Column Modules

Shorten analytical cycle times and boost your high speed gas chromatography capabilities

Agilent J&W LTM column modules combine a high quality fused silica capillary column with heating and temperature sensing components for a low thermal mass column assembly. The LTM column module contains a patented design which heats and cools the column very efficiently for significantly shorter analytical cycle times compared to conventional air-bath GC oven techniques, while simultaneously using less power.

Agilent offers LTM technology for our popular 7890 and 6890 Series GC systems, as well as the new 5875T GC/MS.

All LTM column modules are packaged with:

- Two 1 m guard columns (one each for the inlet and detector) made from deactivated fused silica tubing of the same ID as the analytical column
- Five non-reusable ferrules that fit the dimensions of the analytical and guard columns

Tips & Tools

Agilent LTM column module technology is compatible with metal capillary columns. However, LTM modules are generally not recommended for fast GC applications because of their poor cooling performance compared to fused silica capillaries.





Agilent J&W LTM Column Modules for 7890 and 6890 GC Systems

This groundbreaking column technology is designed specifically for Agilent 7890A and 6890 series gas chromatographs, and delivers:

- The capacity to run up to four column modules simultaneously – with four different temperature programs – to maximize your productivity
- Rapid temperature programming rates of up to 1800°C/min for higher analysis speeds
- Faster cooling times – as low as one minute or less – to decrease idling and downtime
- Shorter analytical cycle times than conventional air-bath GC oven techniques
- Excellent retention time repeatability and performance – comparable to conventional GC
- Strong synergy with Agilent Capillary Flow Technology, which can enhance your ability to perform multi-dimensional and comprehensive GC
- The ability to use the same 6890/7890 GC injectors and detectors with little change to your existing methods

Most Agilent J&W Capillary GC columns – including Wall Coated Open Tubular (WCOT) and Porous Layer Open Tubular (PLOT) columns – can be used for LTM column modules.

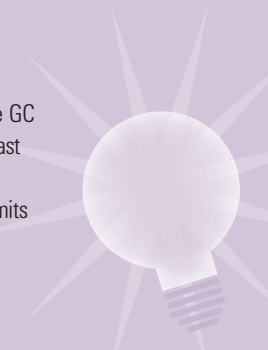
Module assemblies are available in two sizes that deliver equal chromatographic quality:

- 5 inch diameter (standard): features faster cooling speeds, and is recommended for most applications. The 5 inch format allows two column modules to be installed per Agilent LTM system, and can be used with any capillary GC column up to 30 m long.
- 3 inch diameter (small): enables multidimensional GC applications by allowing up to four column modules to be installed per Agilent LTM system. The 3 inch format is limited to capillary GC columns with a 0.32 mm or smaller ID, and is not recommended for fragile capillary columns or PLOT columns.

Module sizes can also be mixed; for example, you can use one 5 inch module with either one or two 3 inch modules.

Tips & Tools

LTM column modules should never be programmed beyond the GC column temperature limits recommended by Agilent. For very fast ramping applications (e.g. 600°C/min), limiting the maximum temperatures to 10-20°C below the GC column temperature limits can increase the lifetime of the column modules.



NEW!

Agilent J&W LTM Column Modules for 5975T Transportable GC/MS Systems

This groundbreaking column technology is designed specifically for Agilent 5975T GC/MS systems. These modules include integrated 3 inch LTM capillary column toroid assembly with heated transfer lines, cooling fan assembly and sheet metal enclosure. Replacement column toroid assemblies are also available. Benefits of the LTM column modules include:

- Rapid temperature programming rates of up to 1200°C/min
- Faster heating and cooling times – as low as one minute or less – for more rapid analytical cycle times than standard air-bath GC oven techniques
- Excellent retention time repeatability and performance comparable to conventional GC
- Less power consumption for longer in-field operation
- Integrated module design to facilitate easy column module change in the field

The entire assembly is leak tested and ready for installation into your Agilent 5975T instrument. LTM column modules for the 5975T include:

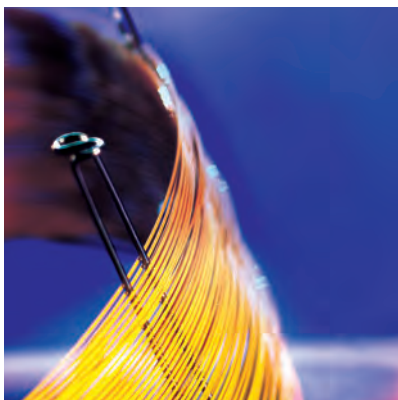
- 2 heated transfer lines
- Transferline base assembly
- 3 inch LTM column toroid assembly
- 2 ultimate unions
- Cooling fan assembly
- Sheet metal enclosure

For more information, visit www.agilent.com/chem/LTMcol



Agilent J&W LTM Column Modules for 5975T Transportable GC/MS Systems

Phase	ID (mm)	Length (m)	Film (µm)	Toroid Assembly	Column Module
DB-5ms Ultra Inert	0.18	20	0.18	221-5522UULTM	G3900-63014
	0.25	15	0.25	222-5512UULTM	G3900-63031
		30	0.25	222-5532UULTM	G3900-63005
HP-5ms Ultra Inert	0.18	20	0.18	29091S-577UULTM	G3900-63039
	0.25	15	0.25	29091S-431UULTM	G3900-63038
		30	0.25	29091S-433UULTM	G3900-63001
DB-1	0.25	30	0.25	222-1032LTM	G3900-63002
DB-1ms	0.18	20	0.18	221-0122LTM	G3900-63009
	0.25	15	0.25	222-0112LTM	G3900-63016
		30	0.25	222-0132LTM	G3900-63017
DB-1ht	0.25	15	0.10	222-1111LTM	G3900-63018
		30	0.10	222-1131LTM	G3900-63019
HP-1ms	0.18	20	0.18	29091S-677LTM	G3900-63040
	0.25	30	0.10	29091S-833LTM	G3900-63041
		15	0.25	29091S-931LTM	G3900-63042
DB-5ms	0.18	20	0.18	221-5522LTM	G3900-63013
	0.25	15	0.25	222-5512LTM	G3900-63030
		30	0.25	222-5532LTM	G3900-63004
DB-5ht	0.25	15	0.10	222-5731LTM	G3900-63033
		30	0.10	222-5711LTM	G3900-63032
HP-5ms	0.25	30	0.25	29091S-433LTM	G3900-63007
DB-35ms	0.18	20	0.18	221-3822LTM	G3900-63011
	0.25	15	0.25	222-3812LTM	G3900-63026
		30	0.25	222-3832LTM	G3900-63027
DB-17ms	0.18	20	0.18	221-4722LTM	G3900-63012
	0.25	15	0.25	222-4712LTM	G3900-63028
		30	0.25	222-4732LTM	G3900-63029
DB-225ms	0.25	15	0.25	222-2912LTM	G3900-63022
		30	0.25	222-2932LTM	G3900-63023
DB-1701	0.25	30	0.25	222-0732LTM	G3900-63003
DB-WAX	0.25	15	0.50	222-7013LTM	G3900-63034
		30	0.50	222-7033LTM	G3900-63035
HP-INNOWax	0.18	20	0.18	29091N-577LTM	G3900-63036
	0.25	30	0.25	29091N-133LTM	G3900-63008
DB-FFAP	0.25	15	0.25	222-3212LTM	G3900-63024
		30	0.25	222-3232LTM	G3900-63025
DB-608	0.18	20	0.18	221-6822LTM	G3900-63015
DB-VRX	0.18	20	1.00	221-1524LTM	G3900-63006
	0.25	30	1.40	222-1534LTM	G3900-63021
DB-624	0.18	20	1.00	221-1324LTM	G3900-63010
	0.25	30	1.40	222-1334LTM	G3900-63020
HP-VOC	0.20	30	1.12	29091R-303LTM	G3900-63037



Choosing a Capillary GC Column

The first step should always be to refer to what has already been done. Our chemists have put together a variety of resources to help you find the right column for your analysis.

- **Chromatograms** – Find some of the more common chromatograms with column recommendations and method parameters for your reference in this catalog. For a more extensive chromatogram library and a compound search function, go to www.agilent.com/chem, then click Library.
- **Method Guides** – We've evaluated the most common Environmental/EPA methods, ASTM methods, USP methods and general compound analyses and compiled simple guides which specify the best column recommendation for these methods.
- **Retention Data Lists** – We've analyzed hundreds of compounds on several different phases to help you determine which column will be the best choice for your list of compounds.
- **Column Selection Guide** – Our *Agilent J&W GC Column Selection Guide* gives you helpful hints for choosing a stationary phase, selecting the right column dimensions, developing temperature programs and determining the right inlet and detector for the application. To order this guide, use publication number 5989-6159EN.

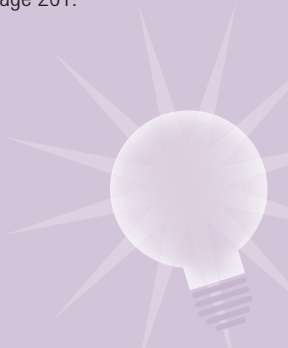
Our Technical Support Chemists have more than 100 years of combined experience running samples and developing methods. We are the gas chromatography column experts and we are at your disposal.

Send in questions via the Technical Support form on our website www.agilent.com/chem, via email at gc-column-support@agilent.com, or contact your local Agilent office or Authorized Agilent Distributor.

Tips & Tools

Agilent Ultra Inert Liners are the perfect companion to Agilent J&W Ultra Inert GC Columns, providing reproducible inertness liner after liner, maintained through a sequence of samples, and for a range of analytes.

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Agilent J&W Ultra Inert Capillary GC Columns

- Individually tested with a unique, demanding test probe mixture
- Consistent column inertness performance
- Exceptionally low column bleed
- Great peak shapes for challenging active analytes
- Excellent signal-to-noise ratios
- Minimum compound adsorption or degradation
- Support of 0.18 mm ID column configuration for higher sample throughput

Ultra Inert Chromatograms

Environmental

Trace Level Polycyclic Aromatic Hydrocarbon (PAH) Analyses	Page 589
US EPA Method 8270 Short Mix	Page 589
US EPA Method 551.1	Page 590

Life Sciences

Benzodiazepines I	Page 671
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Food, Flavors and Fragrances

Lavender Oil Characterization	Page 622
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DB-1ms Ultra Inert

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.18	20	0.18	-60 to 325/350	121-0122UI	
0.25	15	0.25	-60 to 325/350	122-0112UI	122-0112UIE
	30	0.25	-60 to 325/350	122-0132UI	122-0132UIE
	60	0.25	-60 to 325/350	122-0162UI	
0.32	15	0.25	-60 to 325/350	123-0112UI	
	30	0.25	-60 to 325/350	123-0132UI	

HP-1ms Ultra Inert

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.18	20	0.18	-60 to 325/350	19091S-677UI	19091S-677UIE
0.25	15	0.25	-60 to 325/350	19091S-931UI	19091S-931UIE
	30	0.25	-60 to 325/350	19091S-933UI	19091S-933UIE
		0.50	-60 to 325/350	19091S-633UI	
		1.00	-60 to 325/350	19091S-733UI	19091S-733UIE
0.32	15	0.25	-60 to 325/350	19091S-911UI	
	25	0.52	-60 to 325/350	19091S-612UI	
	30	0.25	-60 to 325/350	19091S-913UI	19091S-913UIE
		1.00	-60 to 325/350	19091S-713UI	

DB-35ms Ultra Inert

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.18	20	0.18	50 to 340/360	121-3822UI
0.25	15	0.25	50 to 340/360	122-3812UI
	30	0.25	50 to 340/360	122-3832UI
0.32	15	0.25	50 to 340/360	123-3812UI
	30	0.25	50 to 340/360	123-3832UI

DB-5ms Ultra Inert

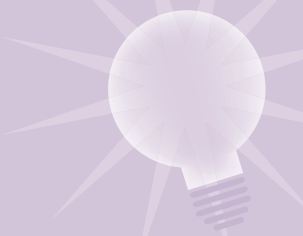
ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.18	20	0.18	-60 to 325/350	121-5522UI		121-5522UILTM	221-5522UILTM
		0.36	-60 to 325/350	121-5523UI		121-5523UILTM	
	40	0.18	-60 to 325/350	121-5542UI			
0.25	15	0.25	-60 to 325/350	122-5512UI		122-5512UILTM	222-5512UILTM
		1.00	-60 to 325/350	122-5513UI		122-5513UILTM	
	25	0.25	-60 to 325/350	122-5522UI		122-5522UILTM	
	30	0.25	-60 to 325/350	122-5532UI	122-5532UIE	122-5532UILTM	222-5532UILTM
		0.50	-60 to 325/350	122-5536UI		122-5536UILTM	
		1.00	-60 to 325/350	122-5533UI	122-5533UIE	122-5533UILTM	
	50	0.25	-60 to 325/350	122-5552UI			
60	0.25	-60 to 325/350	122-5562UI				
	1.00	-60 to 325/350	122-5563UI				
0.32	30	0.25	-60 to 325/350	123-5532UI	123-5532UIE	123-5532UILTM	
		0.50	-60 to 325/350	123-5536UI		123-5536UILTM	
		1.00	-60 to 325/350	123-5533UI		123-5533UILTM	
	60	1.00	-60 to 325/350	123-5563UI			

HP-5ms Ultra Inert

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
HP-5ms Ultra Inert							
0.18	20	0.18	-60 to 325/350	19091S-577UI		19091S-577UILTM	29091S-577UILTM
0.25	15	0.25	-60 to 325/350	19091S-431UI		19091S-431UILTM	29091S-431UILTM
		30	0.25	-60 to 325/350	19091S-433UI	19091S-433UIE	19091S-433UILTM
	60	0.50	-60 to 325/350	19091S-133UI		19091S-133UILTM	
		1.00	-60 to 325/350	19091S-233UI	19091S-233UIE	19091S-233UILTM	
0.32	30	0.25	-60 to 325/350	19091S-413UI		19091S-413UILTM	
		1.00	-60 to 325/350	19091S-213UI		19091S-213UILTM	

Tips & Tools

Column contamination from sample matrix components is the number one cause of column failure. Use Agilent DuraGuard GC columns with built-in guard if you do not want to use column connectors.



Guard Columns

- Columns with "built-in" guard columns, no press-fit connectors
- Minimize front-end contamination and increase column lifetime
- Aid in focusing sample onto the front of the column for better peak shape
- Minimize MSD contamination originating from the column (when used in transfer line)

Guard columns (or retention gaps) are often added to the front of the analytical column to protect against contamination, or to act as a band-focusing device for liquid samples introduced by on-column and splitless injection techniques.

When resolution or response in a chromatogram diminishes, remove a coil from the guard column so that peak shapes will improve. By removing a coil, the column length is shortened and peaks will elute somewhat faster. For best results, check the integration time windows of your data system.

DuraGuard

DuraGuard columns of different phases and dimensions are available through Agilent Technologies' custom column shop. Any DB polysiloxane or GC/MS phase can be made as a DuraGuard column with 0.18 mm ID or larger fused silica tubing. Ask for a custom column quote using part number 100-2000. Specify the phase, ID, length, and film thickness of analytical column, and desired length of DuraGuard.

DuraGuard

Phase	ID (mm)	Length (m)	Film (μm)	Guard Length (m)	Part No.
DB-1	0.25	30	0.25	10	122-1032G
DB-XLB	0.25	30	0.25	10	122-1232G
DB-5ms	0.25	30	0.25	10	122-5532G
			0.50	10	122-5536G
			1.00	10	122-5533G
		60	0.25	10	122-5562G
	0.32	30	1.00	10	123-5533G
	0.53	30	0.50	10	125-5537G
DB-5.625	0.18	20	0.36	5	121-5622G5
	0.25	30	0.25	5	122-5631G5
DB-1701	0.53	30	1.00	10	125-0732G
DB-624	0.53	30	3.00	5	125-1334G5

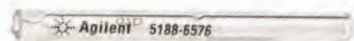
EZ-Guard

EZ-Guard columns combine a FactorFour column with a built-in guard column. The first five or ten meter section of the EZ-Guard column (guard length depends on the column you select) is not coated with stationary phase, but has been deactivated. The lack of a column connection between the guard and analytical section results in a 100% leak-free column.

Every EZ-Guard column features a unique uncoated and deactivated outlet section, approximately 100 cm long, which acts as an integrated transfer line. This provides a shorter stabilization time with all types of detectors. The absence of a stationary phase in the last part of the column significantly reduces background noise. The impact of water, oxygen or other polar or aggressive components that move through the end of the column at high temperature will also be greatly reduced.

EZ-Guard

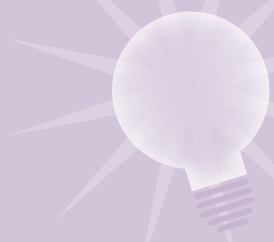
Phase	ID (mm)	Length (m)	Film (μm)	Guard Length (m)	Part No.
VF-1ms	0.20	12	0.33	5	CP9023
			0.25	5	CP9010
			0.25	10	CP9011
VF-5ms	0.25	15	0.25	5	CP9021
			0.25	5	CP9012
			0.25	10	CP9013
			0.50	5	CP9014
			0.50	10	CP9015
			0.25	5	CP9016
			0.25	10	CP9020
VF-Xms	0.25	30	0.10	10	CP9022
			0.25	5	CP9018
			0.25	10	CP9019
VF-17ms	0.25	30	0.25	5	CP9024
			0.25	10	CP9025
VF-1701ms	0.25	30	0.25	5	CP9176
			0.25	10	CP9177
VF-35ms	0.25	30	0.25	5	CP9026
			0.25	10	CP9027



Tips & Tools

Agilent MS Certified Liners are lot-tested with MSD and FID for superior acid/base deactivation, response linearity and peak symmetry.

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Low-bleed GC/MS Columns

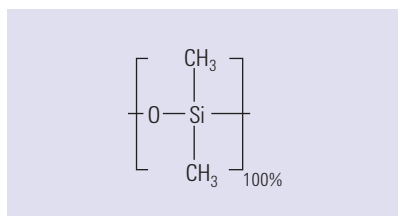
There is a rapidly increasing population of benchtop GC/MS instruments in analytical laboratories that analyze a widening range of trace level, higher temperature samples. These samples require increasingly inert, lower bleed, higher temperature columns. In response to this growing need, Agilent Technologies designed several "ms" columns to chromatograph a broader range of low level samples and generate lower bleed even at higher temperatures.

What makes an Agilent J&W low bleed column unique?

What makes an Agilent J&W low bleed column exceptional? Unique polymer chemistry and proprietary surface deactivation, both of which have contributed to columns that adhere to the tightest quality control specifications in the industry for bleed, inertness, selectivity and efficiency. Agilent J&W "ms" columns utilize special surface deactivation and siloxane chemistries which enhance the chromatographic performance of siloxane polymers.

While some of the GC/MS phases utilize different polymer chemistries, their selectivity mimics the standard polysiloxane phases and offers the advantages of low column bleed and, in some cases, extended temperature ranges.

The mass spectrum of septum bleed can look very much like GC column bleed, so the two are often confused. An easy way to tell the two apart: column bleed will be a rise in the baseline, not peaks. If you see bleed peaks, these generally come from lower quality septa or septa being used beyond their operating limits. To minimize septa contributions to background bleed, use quality Agilent BTO, Long Life, or Advanced Green septa.



Structure of DB-1ms

DB-1ms

- 100% Dimethylpolysiloxane
- Identical selectivity to DB-1
- Non-polar
- Very low bleed characteristics, ideal for GC/MS
- Improved acid performance compared to standard 100% Dimethylpolysiloxane columns
- Improved signal-to-noise ratio for better sensitivity and mass spectral integrity
- 340/360°C upper temperature limit
- Excellent general purpose column
- Bonded and cross-linked
- Solvent rinsable

DB-1ms Chromatograms

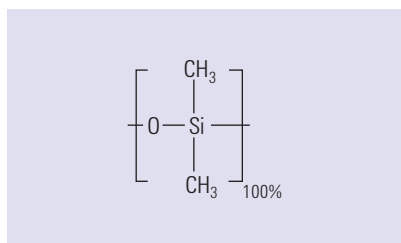
Life Sciences

Drug Screen

Page 673

DB-1ms

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.10	10	0.10	-60 to 340/360	127-0112		127-0112LTM	
		0.40	-60 to 340/360	127-0113		127-0113LTM	
	20	0.10	-60 to 340/360	127-0122		127-0122LTM	
		0.40	-60 to 340/360	127-0123		127-0123LTM	
0.18	20	0.18	-60 to 340/360	121-0122	121-0122E	121-0122LTM	221-0122LTM
0.20	12	0.33	-60 to 340/350	128-0112		128-0112LTM	
	25	0.33	-60 to 340/350	128-0122	128-0122E	128-0122LTM	
0.25	15	0.25	-60 to 340/360	122-0112	122-0112E	122-0112LTM	222-0112LTM
		0.10	-60 to 340/360	122-0131		122-0131LTM	
	30	0.25	-60 to 340/360	122-0132	122-0132E	122-0132LTM	222-0132LTM
		0.25	-60 to 340/360	122-0162			
0.32	15	0.25	-60 to 340/360	123-0112		123-0112LTM	
		0.10	-60 to 340/360	123-0131		123-0131LTM	
	30	0.25	-60 to 340/360	123-0132		123-0132LTM	
		0.25	-60 to 340/360	123-0162			



Structure of HP-1ms

HP-1ms

- 100% Dimethylpolysiloxane
- Identical selectivity to HP-1
- Non-polar
- Low bleed characteristics
- Excellent general purpose column
- Improved signal-to-noise ratio for better sensitivity and mass spectral integrity
- Bonded and cross-linked
- Solvent rinsable

HP-1ms Chromatograms

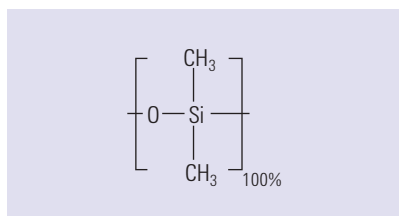
Environmental

Nitrogen Containing Herbicides (EPA Method 507)

Page 586

HP-1ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.18	20	0.18	-60 to 325/350	19091S-677	19091S-677E	19091S-677LTM	29091S-677LTM
0.20	25	0.33	-60 to 325/350	19091S-602	19091S-602E	19091S-602LTM	
0.25	15	0.25	-60 to 325/350	19091S-931	19091S-931E	19091S-931LTM	29091S-931LTM
		30	0.10	-60 to 325/350	19091S-833		19091S-833LTM
		0.25	-60 to 325/350	19091S-933	19091S-933E	19091S-933LTM	29091S-433LTM
		0.50	-60 to 325/350	19091S-633		19091S-633LTM	
		1.00	-60 to 325/350	19091S-733	19091S-733E	19091S-733LTM	
0.32	60	0.25	-60 to 325/350	19091S-936	19091S-936E		
	15	0.25	-60 to 325/350	19091S-911		19091S-911LTM	
		0.52	-60 to 325/350	19091S-612		19091S-612LTM	
	25	0.25	-60 to 325/350	19091S-913	19091S-913E	19091S-913LTM	
		1.00	-60 to 325/350	19091S-713		19091S-713LTM	
30	0.25	-60 to 325/350	19091S-916				



Structure of VF-1ms



Column shown with EZ-GRIP

VF-1ms

- Lowest guaranteed bleed specification for trace analysis with MS
- Wide range of applications ensures near universal applicability
- Highly inert for accurate analysis, even at trace levels

VF-1ms is a highly inert, non-polar, low bleed GC column providing increased sensitivity over a broad array of applications. The 100% dimethylpolysiloxane phase delivers a guaranteed bleed specification of 1 pA @ 325°C (30 m, 0.25 mm, 0.25 µm).

The VF-1ms comes with an EZ-GRIP to simplify installation, coupling and operation of capillary columns. For guaranteed performance, the retention index, efficiency, selectivity and bleed is measured and specified on the test report supplied with every column.

VF-1ms is also available with 0.15 mm ID for fast GC and GC/MS that can double sample throughput when compared to 0.25 and 0.32 mm ID columns.

VF-1ms Chromatograms

Food, Flavors and Fragrances

Triglycerides C28-C54	Page 639
Separation of TMS-derivatized sugars	Page 630

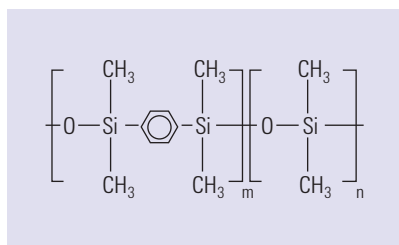
VF-1ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.10	10	0.10	-60 to 325/350	CP8900	
		0.40	-60 to 325/350	CP8901	
	20	0.10	-60 to 325/350	CP8902	
		0.40	-60 to 325/350	CP8903	
0.15	10	0.15	-60 to 325/350	CP9030	
	15	0.15	-60 to 325/350	CP5881	
	20	0.15	-60 to 325/350	CP9031	
		0.60	-60 to 325/350	CP9032	CP903215

(Continued)

VF-1ms

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.20	12	0.33	-60 to 325/350	CP8904	
	25	0.33	-60 to 325/350	CP8905	
0.25	15	0.10	-60 to 325/350	CP8906	CP890615
		0.25	-60 to 325/350	CP8907	CP890715
		1.00	-60 to 325/350	CP8908	CP890815
	25	0.25	-60 to 325/350	CP8909	
		0.40	-60 to 325/350	CP8910	
	30	0.10	-60 to 325/350	CP8911	CP891115
		0.25	-60 to 325/350	CP8912	CP891215
		1.00	-60 to 325/350	CP8913	CP891315
	50	0.25	-60 to 325/350	CP8914	
		0.40	-60 to 325/350	CP8915	
60	0.25	-60 to 325/350	CP8916	CP891615	
	1.00	-60 to 325/350	CP8917	CP891715	
0.32	15	0.10	-60 to 325/350	CP8918	CP891815
		0.25	-60 to 325/350	CP8919	
		1.00	-60 to 325/350	CP8920	CP892015
	25	0.25	-60 to 325/350	CP8921	
		0.40	-60 to 325/350	CP8922	
	30	0.10	-60 to 325/350	CP8923	
		0.25	-60 to 325/350	CP8924	
		0.50	-60 to 325/350	CP8925	
		1.00	-60 to 325/350	CP8926	
	50	0.25	-60 to 325/350	CP8927	
		0.40	-60 to 325/350	CP8928	
	60	0.25	-60 to 325/350	CP8929	
		1.00	-60 to 325/350	CP8930	
	0.53	15	0.50	-60 to 325/350	CP8965
1.50			-60 to 325/350	CP8967	
30		0.50	-60 to 325/350	CP8968	
		1.00	-60 to 325/350	CP8969	
		1.50	-60 to 310/335	CP8970	



Structure of DB-5ms

DB-5ms

- Phenyl Arylene polymer virtually equivalent to a (5%-Phenyl)-methylpolysiloxane
- Non-polar
- Very low bleed characteristics, ideal for GC/MS
- Excellent inertness for active compounds
- Improved signal-to-noise ratio for better sensitivity and mass spectral integrity
- Bonded and cross-linked
- Solvent rinsable
- MSD testing and certification available
- Exact replacement of HP-5TA
- Close equivalent to USP Phase G27
- Test mix available

DB-5ms Chromatograms

Environmental

Diesel Fuel	Page 570
EPA Air Analysis Method TO-15 (1 ppbV Standard)	Page 612
EPA Method 525.2	Page 598
EPA Method 8061 (Phthalate Esters)	Page 599
Formaldehyde, 50ppb	Page 613
Organochlorine Pesticides II EPA Method 8081A	Page 575
Organophosphorous Pesticides I, EPA Method 8141A	Page 583
Phenols	Page 601
Sulfur in Air	Page 613

Industrial Chemicals

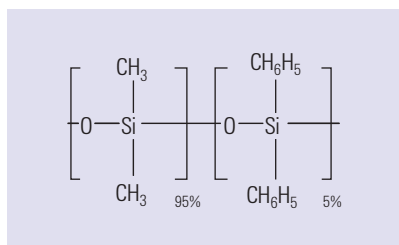
Amines and Nitriles	Page 646
Phenols II	Page 666
Polyethyleneamines	Page 646
Substituted Anilines	Page 665

Life Sciences

Narcotics	Page 679
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DB-5ms

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid	
0.18	20	0.18	-60 to 325/350	121-5522	121-5522E	121-5522LTM	221-5522LTM	
		0.36	-60 to 325/350	121-5523		121-5523LTM		
	40	0.18	-60 to 325/350	121-5542				
0.20	12	0.33	-60 to 325/350	128-5512		128-5512LTM		
	25	0.33	-60 to 325/350	128-5522		128-5522LTM		
	50	0.33	-60 to 325/350	128-5552				
0.25	15	0.10	-60 to 325/350	122-5511		122-5511LTM		
		0.25	-60 to 325/350	122-5512		122-5512LTM	222-5512LTM	
		0.50	-60 to 325/350	122-5516		122-5516LTM		
		1.00	-60 to 325/350	122-5513		122-5513LTM		
	25	0.25	-60 to 325/350	122-5522		122-5522LTM		
		0.40	-60 to 325/350	122-552a		122-552aLTM		
	30	0.10		-60 to 325/350	122-552A		122-552ALTM	
			0.25	-60 to 325/350	122-5532	122-5532E	122-5532LTM	222-5532LTM
		0.50	-60 to 325/350	122-5536	122-5536E	122-5536LTM		
		1.00	-60 to 325/350	122-5533	122-5533E	122-5533LTM		
		50	0.25	-60 to 325/350	122-5552			
	60	0.10	-60 to 325/350	122-5561				
		0.25	-60 to 325/350	122-5562	122-5562E			
		1.00	-60 to 325/350	122-5563				
	0.32	15	0.10	-60 to 325/350	123-5511		123-5511LTM	
0.25			-60 to 325/350	123-5512		123-5512LTM		
1.00			-60 to 325/350	123-5513	123-5513E	123-5513LTM		
25		0.52	-60 to 325/350	123-5526		123-5526LTM		
30		0.10		-60 to 325/350	123-5531		123-5531LTM	
			0.25	-60 to 325/350	123-5532	123-5532E	123-5532LTM	
		0.50	-60 to 325/350	123-5536		123-5536LTM		
		1.00	-60 to 325/350	123-5533		123-5533LTM		
60		0.10	-60 to 325/350	123-5561				
		0.25	-60 to 325/350	123-5562				
		0.50	-60 to 325/350	123-5566				
		1.00	-60 to 325/350	123-5563				
0.53	15	1.50	-60 to 300/320	125-5512		125-5512LTM		
	30	0.50	-60 to 300/320	125-5537		125-5537LTM		
		1.00	-60 to 300/320	125-553J		125-553JLTM		
		1.50	-60 to 300/320	125-5532		125-5532LTM		



Structure of HP-5ms

HP-5ms

- (5%-Phenyl)-methylpolysiloxane
- Identical selectivity to HP-5
- Non-polar
- Very low bleed characteristics, ideal for GC/MS
- Excellent inertness for active compounds including acidic and basic compounds
- Improved signal-to-noise ratio for better sensitivity and mass spectral integrity
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G27

HP-5ms Chromatograms

Environmental

Chlorinated Pesticides, EPA Method 508	Page 578
Nitrogen/Phosphorus Containing Pesticides, EPA Method 507	Page 582
Organohalide Pesticides in Water, EPA Method 505	Page 578
Semivolatiles Compounds, EPA Method 8270	Page 597

Food, Flavors and Fragrances

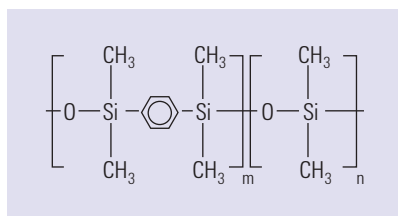
Fragrance Allergens	Page 618
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Industrial Chemicals

Trace Active Amines, 10 ng on-column	Page 645
Phenols I	Page 666

HP-5ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.18	20	0.18	-60 to 325/350	19091S-577		19091S-577LTM	
0.20	12	0.33	-60 to 325/350	19091S-101		19091S-101LTM	
	25	0.33	-60 to 325/350	19091S-102	19091S-102E	19091S-102LTM	
	50	0.33	-60 to 325/350	19091S-105			
0.25	15	0.10	-60 to 325/350	19091S-331		19091S-331LTM	
		0.25	-60 to 325/350	19091S-431		19091S-431LTM	
		1.00	-60 to 325/350	19091S-231		19091S-231LTM	
	30	0.10	-60 to 325/350	19091S-333		19091S-333LTM	
		0.25	-60 to 325/350	19091S-433	19091S-433E	19091S-433LTM	29091S-433LTM
		0.50	-60 to 325/350	19091S-133		19091S-133LTM	
		1.00	-60 to 325/350	19091S-233	19091S-233E	19091S-233LTM	
	60	0.10	-60 to 325/350	19091S-336			
0.25		-60 to 325/350	19091S-436	19091S-436E			
0.32	25	0.52	-60 to 325/350	19091S-112	19091S-112E	19091S-112LTM	
	30	0.10	-60 to 325/350	19091S-313		19091S-313LTM	
		0.25	-60 to 325/350	19091S-413	19091S-413E	19091S-413LTM	
		0.50	-60 to 325/350	19091S-113		19091S-113LTM	
		1.00	-60 to 325/350	19091S-213		19091S-213LTM	
	60	0.25	-60 to 325/350	19091S-416			



Structure of VF-5ms

VF-5ms

- Excellent selectivity for aromatic compounds
- Minimal column bleed improves sensitivity
- Individual test certificates guarantee performance

VF-5ms is a highly inert 5% phenyl-methyl column for increased sensitivity, accuracy and instrument uptime. The columns have the lowest guaranteed bleed specification of 1 pA @ 325°C (30 m, 0.25 mm, 0.25 µm). VF-5ms has a slightly higher polarity than VF-1ms, resulting in a better selectivity for aromatic compounds. This selectivity, combined with superior inertness, also makes these columns applicable for a wide range of semi-polar and even polar components, such as phenols.

VF-5ms is also available with 0.15 mm ID for fast GC and GC/MS that can at least double sample throughput when compared to 0.25 and 0.32 mm ID columns.

VF-5ms Chromatograms

Environmental

High resolution phenol analysis by GC/MS

Page 602

Food, Flavors and Fragrances

Pesticides in sunflower oil

Page 640

VF-5ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	
0.10	10	0.40	-60 to 325/350	CP8934		
	20	0.40	-60 to 325/350	CP8933		
0.15	10	0.15	-60 to 325/350	CP9034	CP903415	
	15	0.15	-60 to 325/350	CP9035		
	20	0.15	0.30	-60 to 325/350	CP9037	
			0.60	-60 to 325/350	CP9038	
			0.15	-60 to 325/350	CP9039	CP903915
	40	0.60	-60 to 325/350	CP9040		
0.20	12	0.33	-60 to 325/350	CP8935	CP893515	
	25	0.33	-60 to 325/350	CP8936	CP893615	
	50	0.33	-60 to 325/350	CP8937		

(Continued)

VF-5ms

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	15	0.10	-60 to 325/350	CP8938	
		0.25	-60 to 325/350	CP8939	
		0.50	-60 to 325/350	CP8963	
		1.00	-60 to 325/350	CP8940	
	25	0.25	-60 to 325/350	CP8941	CP894115
		0.40	-60 to 325/350	CP8942	
	30	0.10	-60 to 325/350	CP8943	CP894315
		0.25	-60 to 325/350	CP8944	CP894415
		0.50	-60 to 325/350	CP8945	
		1.00	-60 to 325/350	CP8946	
	50	0.25	-60 to 325/350	CP8947	
	60	0.10	-60 to 325/350	CP8948	CP894815
0.25		-60 to 325/350	CP8960	CP896015	
1.00		-60 to 325/350	CP8949		
0.32	15	0.10	-60 to 325/350	CP8950	
		0.25	-60 to 325/350	CP8951	
		1.00	-60 to 325/350	CP8952	
	25	0.52	-60 to 325/350	CP8953	
	30	0.10	-60 to 325/350	CP8954	CP895415
		0.25	-60 to 325/350	CP8955	CP895515
		0.50	-60 to 325/350	CP8956	
		1.00	-60 to 325/350	CP8957	CP895715
	50	0.25	-60 to 325/350	CP8958	
		0.40	-60 to 325/350	CP8959	
	60	0.25	-60 to 325/350	CP8961	CP896115
		1.00	-60 to 325/350	CP8962	
0.53	15	0.50	-60 to 325/350	CP8971	
		1.00	-60 to 325/350	CP8972	
		1.50	-60 to 325/350	CP8973	
	30	0.50	-60 to 325/350	CP8974	
		1.00	-60 to 325/350	CP8975	
		1.50	-60 to 310/335	CP8976	

DB-XLB

- Exceptionally Low Bleed
- Low polarity
- Extended temperature limit of 340/360°C
- Unique selectivity
- Excellent inertness for active compounds
- Ideal for confirmational analyses
- Excellent for pesticides, herbicides, PCBs and PAHs
- Ideal for GC/MS
- MSD testing and certification available
- Bonded and cross-linked
- Solvent rinsable

Note: "DB-XLB is designed for inhibiting column bleed at high temperatures.

It also appears to have inadvertently inherited an exceptional ability for separating many PCB congeners when used with MS detection. This stellar performance was maximized after careful optimization of the column dimensions, temperature programs, and carrier gas flow conditions."

(Frame, G. Analytical Chemistry News & Features, Aug. 1, 1997, 468A-475A)

DB-XLB Chromatograms

Environmental

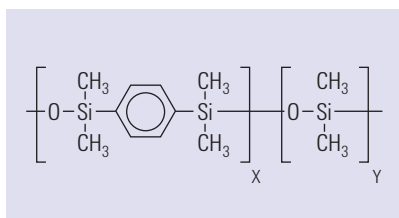
Aroclors 1016-1268 (without 1221)	Page 592
CLP Pesticides	Page 574
CLP Pesticide Analysis	Page 573
Congeners in DIN Method PCBs	Page 593
EPA Method 552.2	Page 603
Herbicides I	Page 585
PBDEs	Page 592
PCBs by EPA Method 8082	Page 594
Pesticides, EPA 508.1	Page 577
Phenols	Page 601
Phenoxy Acid Herbicides – Methyl Derivatives, EPA 8151A	Page 584

Food, Flavors and Fragrances

Ylang Ylang Oil	Page 626
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DB-XLB

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890
						LTM Module
0.18	20	0.18	30 to 340/360	121-1222	121-1222E	121-1222LTM
	30	0.18	30 to 340/360	121-1232		121-1232LTM
0.20	12	0.33	30 to 340/360	128-1212	128-1212E	128-1212LTM
	25	0.33	30 to 340/360	128-1222		128-1222LTM
0.25	15	0.10	30 to 340/360	122-1211		122-1211LTM
		0.25	30 to 340/360	122-1212		122-1212LTM
	30	0.10	30 to 340/360	122-1231		122-1231LTM
		0.25	30 to 340/360	122-1232		122-1232LTM
		0.50	30 to 340/360	122-1236		122-1236LTM
	60	1.00	30 to 340/360	122-1233		122-1233LTM
		0.25	30 to 340/360	122-1262	122-1262E	
0.32	30	0.25	30 to 340/360	123-1232		123-1232LTM
		0.50	30 to 340/360	123-1236		123-1236LTM
	60	0.25	30 to 340/360	123-1262		
0.53	15	1.50	30 to 320/340	125-1212		125-1212LTM
	30	1.50	30 to 320/340	125-1232		125-1232LTM



Structure of VF-Xms



Column shown with EZ-GRIP

VF-Xms

- High arylene modified phase for accurate results
- Isothermal applications up to 340°C for a broad application range
- Ideal for confirmational analysis for ultimate confidence

The VF-Xms has the lowest bleed of all FactorFour columns. VF-Xms delivers the ultimate in sensitivity and signal-to-noise ratio, and is the low bleed, more polar alternative to the VF-5ms. Compared to non-polar "ms" type phases, VF-Xms provides exceptionally high selectivity for pesticides and delivers high resolution in the shortest analysis time.

The VF-Xms comes with an EZ-GRIP, simplifying installation, coupling and operation of capillary columns. For guaranteed performance, the retention index, efficiency, selectivity and bleed is measured and specified on the test report supplied with each column.

VF-Xms Chromatograms

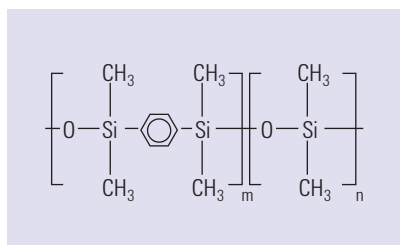
Environmental

Analysis of Polycyclic Aromatic Hydrocarbons

Page 570

VF-Xms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.15	20	0.15	30 to 340/360	CP9041	
0.20	12	0.33	30 to 340/360	CP8800	
		25	0.33	30 to 340/360	CP8801
0.25	15	0.10	30 to 340/360	CP8802	
		0.25	30 to 340/360	CP8803	
	30	0.10	30 to 340/360	CP8805	
		0.25	30 to 340/360	CP8806	CP880615
		0.50	30 to 340/360	CP8807	
	60	1.00	30 to 340/360	CP8808	
0.25		30 to 340/360	CP8809		
0.32	15	0.25	30 to 340/360	CP8810	
		1.00	30 to 340/360	CP8811	
	30	0.10	30 to 340/360	CP8812	
		0.25	30 to 340/360	CP8813	
		0.50	30 to 340/360	CP8814	
		1.00	30 to 340/360	CP8815	
60	0.25	30 to 340/360	CP8816		
	0.53	15	1.50	30 to 325/340	CP8817
30		1.50	30 to 325/340	CP8818	



Structure of DB-35ms

DB-35ms

- Virtually equivalent to a (35%-Phenyl)-methylpolysiloxane
- Mid-polarity
- Very low bleed characteristics, ideal for GC/MS
- Extended temperature limit of 340/360°C
- Excellent inertness for active compounds
- Ideal for confirmational analyses
- Bonded and cross-linked
- Solvent rinsable
- Replaces HP-35ms
- Close equivalent to USP Phase G42

DB-35ms Chromatograms

Environmental

CLP Pesticides	Page 574
EPA Method 552.2	Page 603
Organochlorine Pesticides I EPA Method 8081A	Page 575
Organophosphorous Pesticides I, EPA Method 8141A	Page 583
PCBs by EPA Method 8082	Page 594
Pesticides, EPA 508.1	Page 577
Phenoxy Acid Herbicides – Methyl Derivatives, EPA 8151A	Page 584

Industrial Chemicals

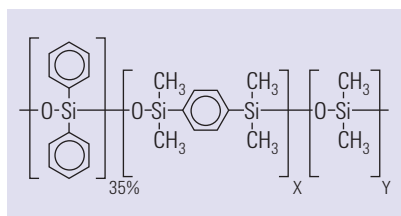
Anilines	Page 665
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Life Sciences

Barbiturates	Page 677
Benzodiazepines II	Page 677

DB-35ms

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.18	20	0.18	50 to 340/360	121-3822	121-3822E	121-3822LTM	221-3822LTM
0.20	15	0.33	50 to 340/360	128-3812		128-3812LTM	
	25	0.33	50 to 340/360	128-3822		128-3822LTM	
0.25	15	0.25	50 to 340/360	122-3812		122-3812LTM	222-3812LTM
	30	0.15	50 to 340/360	122-3831		122-3831LTM	
		0.25	50 to 340/360	122-3832	122-3832E	122-3832LTM	222-3832LTM
	60	0.25	50 to 340/360	122-3862			
0.32	15	0.25	50 to 340/360	123-3812		123-3812LTM	
	30	0.25	50 to 340/360	123-3832	123-3832E	123-3832LTM	
0.53	30	0.50	50 to 320/340	125-3837		125-3837LTM	
		1.00	50 to 320/340	125-3832		125-3832LTM	



Structure of VF-35ms

VF-35ms

- Ideal for dual column confirmational analysis for ultimate confidence
- High maximum temperature for broad applicability
- Stabilized arylene-modified equivalent of a 35% phenylmethyl phase for longevity

The VF-35ms is a medium polarity column, which is the ideal choice for trace environmental and chemical analyses, and as a confirmation column. The VF-35ms uses FactorFour technology to produce a low bleed, highly stable column with a programmable maximum temperature of 360°C.

VF-35ms is also available with 0.15 mm ID for fast GC and GC/MS that can double sample throughput when compared to 0.25 and 0.32 mm ID columns.

VF-35ms Chromatograms

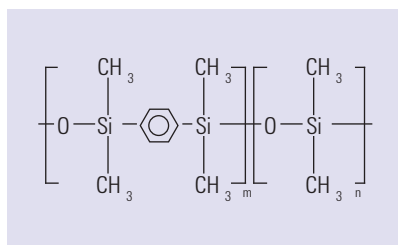
Environmental

Organochlorine pesticides to EPA 625 via GC/MS

Page 588

VF-35ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.15	10	0.15	40 to 340/360	CP5887	
	15	0.15	40 to 340/360	CP5888	
	20	0.15	40 to 340/360	CP5889	
0.20	15	0.33	40 to 340/360	CP8872	
	25	0.33	40 to 340/360	CP8873	
0.25	15	0.25	40 to 340/360	CP8874	
		0.10	40 to 340/360	CP8875	
	30	0.15	40 to 340/360	CP8876	
		0.25	40 to 340/360	CP8877	CP887715
		0.50	40 to 340/360	CP8878	CP887815
		1.00	40 to 340/360	CP8879	
60	0.25	40 to 340/360	CP8880		
0.32	15	0.25	40 to 340/360	CP8881	
		0.25	40 to 340/360	CP8882	
	30	0.50	40 to 340/360	CP8883	CP888315
		1.00	40 to 340/360	CP8884	
60	0.25	40 to 340/360	CP8885		
0.53	15	1.00	40 to 325/350	CP8886	
		0.50	40 to 325/350	CP8887	
	30	1.00	40 to 325/350	CP8888	



Structure of DB-17ms

DB-17ms

- Virtually equivalent to (50%-Phenyl)-methylpolysiloxane
- 320/340°C upper temperature limit
- Very low bleed mid-polarity column, ideal for GC/MS
- Excellent inertness for active compounds
- Enhanced mass spectral integrity
- Bonded and cross-linked
- Solvent rinsable
- Best column for CLP pesticides

DB-17ms Chromatograms

Environmental

PAHs	Page 600
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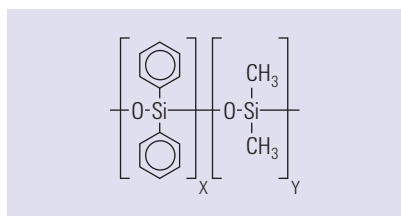
Life Sciences

Hallucinogens	Page 678
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Tocopherols	Page 678
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DB-17ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.18	20	0.18	40 to 320/340	121-4722	121-4722E	121-4722LTM	221-4722LTM
0.25	15	0.15	40 to 320/340	122-4711		122-4711LTM	
		0.25	40 to 320/340	122-4712		122-4712LTM	222-4712LTM
	30	0.15	40 to 320/340	122-4731		122-4731LTM	
		0.25	40 to 320/340	122-4732	122-4732E	122-4732LTM	222-4732LTM
		0.25	40 to 320/340	122-4762			
0.32	15	0.25	40 to 320/340	123-4712		123-4712LTM	
	30	0.25	40 to 320/340	123-4732		123-4732LTM	



Structure of VF-17ms

VF-17ms

- Deactivation technology improves data quality
- Ideal EPA confirmation column for ultimate confidence
- Bonded and cross-linked to allow solvent rinsing, reducing replacement costs

VF-17ms is a 50% phenyl, 50% dimethylpolysiloxane, medium polarity, low bleed column for increased sensitivity, accuracy and instrument uptime. VF-17ms is often referenced in environmental and clinical methods. The use of new deactivation technology improves column stability, resulting in improved repeatability and column lifetimes. VF-17ms has a very low bleed specification at 2 pA @ 325°C (0.25 mm x 30 m x 0.25 µm).

VF-17ms is also available with 0.15 mm ID for fast GC and GC/MS that can double sample throughput when compared to 0.25 and 0.32 mm ID columns.

VF-17ms Chromatograms

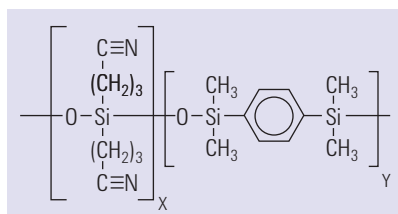
Environmental

Organochlorine pesticides

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VF-17ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.10	10	0.20	40 to 330/360	CP8977	
0.15	10	0.15	40 to 330/360	CP5882	
	15	0.15	40 to 330/360	CP5883	
	20	0.15	40 to 330/360	CP5884	
0.25	15	0.25	40 to 330/360	CP8979	
		0.50	40 to 330/360	CP8980	
	30	0.15	40 to 330/360	CP8981	
		0.25	40 to 330/360	CP8982	CP898215
		0.50	40 to 330/360	CP8983	
	60	0.25	40 to 330/360	CP8984	
0.32	15	0.15	40 to 330/360	CP8986	
		0.25	40 to 330/360	CP8987	
	30	0.25	40 to 330/360	CP8990	CP899015
		0.50	40 to 330/360	CP8991	
0.53	15	0.25	40 to 330/360	CP8994	
		1.00	40 to 330/360	CP8996	
		1.50	40 to 310/340	CP8998	
	30	0.50	40 to 330/360	CP9000	
		1.00	40 to 310/340	CP9001	
		1.50	40 to 310/340	CP9002	



Structure of VF-23ms

VF-23ms

- 100% bonded phase permits column rinsing to enhance column lifetime
- Fast run times improve productivity
- Operating temperature up to 260°C expands the application range

The VF-23ms column has a high polarity and highly substituted cyanopropyl low bleed phase. VF-23ms features a unique combination of high polarity and low bleed to enable more accurate analysis of very polar analytes. The enhanced stabilization of the VF-23ms permits splitless injection, column rinsing and temperatures up to 260°C to be used. Compared to other 23ms type phases, this expands the range of possible applications by enabling the analysis of higher molecular weight compounds.

VF-23ms is also available with 0.15 mm ID for fast GC and GC/MS that can double sample throughput when compared to 0.25 and 0.32 mm ID columns.

VF-23ms Chromatograms

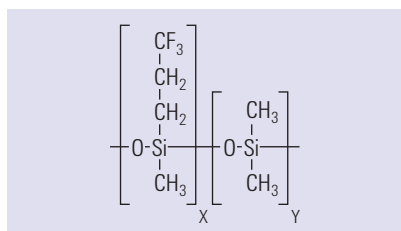
Food, Flavors and Fragrances

Fast screening of FAME isomers in butter

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VF-23ms

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.10	10	0.10	40 to 260/260	CP8819	
0.15	15	0.15	40 to 260/260	CP5886	
	20	0.15	40 to 260/260	CP9042	
	40	0.15	40 to 260/260	CP5885	
0.25	15	0.25	40 to 260/260	CP8820	CP882015
	30	0.15	40 to 260/260	CP8821	CP882115
		0.25	40 to 260/260	CP8822	CP882215
	60	0.15	40 to 260/260	CP8823	
		0.25	40 to 260/260	CP8824	CP882415
0.32	15	0.25	40 to 260/260	CP8825	
	30	0.15	40 to 260/260	CP8826	
		0.25	40 to 260/260	CP8827	
	60	0.15	40 to 260/260	CP8828	
		0.25	40 to 260/260	CP8829	
0.53	15	0.50	40 to 245/245	CP8830	
	30	0.50	40 to 245/245	CP8831	



Structure of VF-200ms

VF-200ms

- Superior deactivation delivers symmetrical peaks to improve data accuracy
- Ultra-low background noise for trace analysis maximizes sensitivity
- Ideal for sensitive and selective detector systems for enhanced productivity

The VF-200ms is designed with a unique selectivity for compounds rich in dipole-dipole interactions, resulting from the electrophilic nature of the trifluoropropyl stationary phase. VF-200ms is especially suited for electron rich, high dipole moment compounds like ketones, aldehydes, nitro- or chloro-containing compounds, PAHs, unsaturated compounds, silanes and CFCs. VF-200ms, as with all FactorFour columns, offers superior surface deactivation and thereby symmetrical peak shapes. The high inertness of the VF-200ms leads to more accurate peak identification and reliable analysis. The VF-200ms trifluoropropyl phase has very high temperature stability and can be used routinely up to 350°C.

VF-200ms is also available with 0.15 mm ID for fast GC and GC/MS that can double sample throughput when compared to 0.25 and 0.32 mm ID columns.

VF-200ms Chromatograms

Industrial Chemicals

Fast separation of silanes

Page 670

VF-200ms

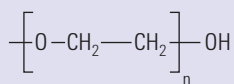
ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.15	10	0.15	0 to 325/350	CP5893	
		0.15	0 to 325/350	CP5891	
		0.60	0 to 325/350	CP5892	
0.25	15	0.25	0 to 325/350	CP8855	CP885515
		0.50	0 to 325/350	CP8856	
	30	0.10	0 to 325/350	CP8857	
		0.25	0 to 325/350	CP8858	
		0.50	0 to 325/350	CP8859	CP885915
		1.00	0 to 325/350	CP8860	CP886015
60	0.25	0 to 325/350	CP8861		
0.32	15	0.25	0 to 325/350	CP8862	
		0.25	0 to 325/350	CP8863	
	30	0.50	0 to 325/350	CP8864	
		1.00	0 to 325/350	CP8865	CP886515
0.53	15	1.00	0 to 300/325	CP8866	
		0.50	0 to 300/325	CP8867	
	30	1.00	0 to 300/325	CP8868	CP886815

DB-225ms

- Virtually equivalent to (50%-Cyanopropylphenyl)-methylpolysiloxane
- Mid/high polarity
- Excellent for separations of cis- and trans-fatty acid methyl esters (FAMES)
- Low bleed
- Bonded and cross-linked
- Solvent rinsable
- Close equivalent to USP Phase G7

DB-225ms Chromatograms**Environmental**Tetrachlorodibenzo-p-furans Page 591**Food, Flavors and Fragrances**FAMES II Page 633**DB-225ms**

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.25	15	0.25	40 to 240	122-2912		122-2912LTM	222-2912LTM
	30	0.25	40 to 240	122-2932	122-2932E	122-2932LTM	222-2932LTM
	60	0.25	40 to 240	122-2962			
0.32	30	0.25	40 to 240	123-2932		123-2932LTM	



Structure of VF-WAXms

VF-WAXms

- Specially designed for MS for more accurate results with polar compounds
- Operating temperature range of 20°C to 250°C for maximum flexibility
- Better signal-to-noise ratio for trace analyses improves productivity

The VF-WAXms is a high performance column for applications in the food, flavors and fragrances markets, and especially where trace analyses are required. These applications often require higher temperatures to analyze polar compounds, and therefore need an ultra-stable wax as a stationary phase. The very low bleed of VF-WAXms provides increased sensitivity, extended column lifetime and greater accuracy, even at higher temperatures.

Advanced coating technology means that VF-WAXms columns are highly inert. Such inertness gives better chromatograms, enhancing critical pair separation. With the introduction of the VF-WAXms column, wax applications such as food, flavors and fragrances can now benefit from the use of GC/MS detectors. Impurities can easily be identified using an MS detector when a wax column is required for separation. Significantly improved performance is achieved with VF-WAXms columns, yet the typical selectivity of PEG is unchanged.

VF-WAXms is also available with 0.15 mm ID for fast GC and GC/MS that can double sample throughput when compared to 0.25 and 0.32 mm ID columns.

VF-WAXms Chromatograms

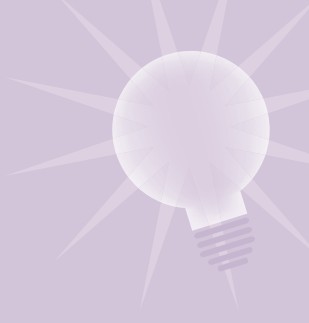
Food, Flavors and Fragrances

Acids

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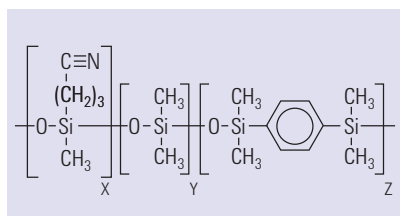
Tips & Tools

As a special MS-type phase, the VF-WAXms column generates less bleed, and therefore less noise and higher signal-to-noise ratios for critical components.



VF-WAXms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.10	10	0.10	20 to 250/260	CP9219	
		0.20	20 to 250/260	CP9218	
	20	0.10	20 to 250/260	CP9229	CP9229I5
0.15	10	0.15	20 to 250/260	CP9200	
	15	0.15	20 to 250/260	CP9201	
	20	0.15	20 to 250/260	CP9220	
	30	0.15	20 to 250/260	CP9202	
0.25	15	0.25	20 to 250/260	CP9203	
		0.50	20 to 250/260	CP9221	
	25	0.20	20 to 250/260	CP9204	
		0.25	20 to 250/260	CP9205	CP9205I5
	60	0.50	20 to 250/260	CP9222	
		1.00	20 to 240	CP9206	
		0.25	20 to 250/260	CP9207	
0.32	15	0.50	20 to 250/260	CP9224	
		1.00	20 to 250/260	CP9208	
		0.25	20 to 250/260	CP9212	CP9212I5
	30	0.50	20 to 250/260	CP9210	
		1.00	20 to 240	CP9211	
		0.25	20 to 250/260	CP9214	
	60	0.50	20 to 240	CP9225	CP9225I5
		1.00	20 to 230	CP9213	
		1.00	20 to 250/260	CP9226	CP9226I5
0.53	15	2.00	20 to 240	CP9227	
		1.00	20 to 240	CP9215	
	30	2.00	20 to 230	CP9216	
		1.00	20 to 230	CP9228	
	60	2.00	20 to 220	CP9217	
		1.00	20 to 230	CP9217	



Structure of VF-624ms and VF-1301ms

VF-624ms and VF-1301ms

- Improved signal-to-noise ratio for more accurate trace analysis
- Eliminate ghost peaks and unstable baselines for best data accuracy
- Enhanced selectivity eliminating co-eluters such as benzene and 1,2-dichloroethane for improved productivity

The VF-624ms and VF-1301ms are the world's first ultra-low bleed 6% cyanopropyl/phenyl, 94% PDMS GC columns. VF-624ms columns set a new standard for the analysis of volatile organic compounds. Improved phase technology reduces bleed, thereby increasing signal-to-noise ratios. These columns are especially suited for analyzing solvents according to EPA Methods 524, 624 and 8260, as well as USP 467.

The ultra low bleed, thin film, VF-1301ms column has a similar selectivity and is suitable for semi-volatile organic solvents, as well as PCBs and pesticides.

VF-624ms and VF-1301ms are also available with 0.15 mm ID for fast GC and GC/MS that can boost sample throughput when compared to 0.25 and 0.32 mm ID columns.

VF-624ms and VF-1301ms Chromatograms

Environmental

FactorFour cyano columns eliminate unstable baselines

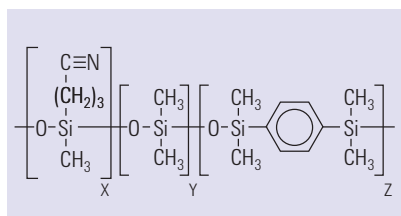
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VF-624ms

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.15	15	0.84	-40 to 280/300	CP9101	CP910115
	20	0.84	-40 to 280/300	CP9100	
	30	0.84	-40 to 280/300	CP9109	
	40	0.84	-40 to 280/300	CP9110	
0.25	30	1.40	-40 to 280/300	CP9102	CP910215
	60	1.40	-40 to 280/300	CP9103	CP910315
0.32	30	1.80	-40 to 280/300	CP9104	CP910415
	60	1.80	-40 to 280/300	CP9105	CP910515
0.53	30	3.00	-40 to 280/300	CP9106	CP910615
	60	3.00	-40 to 265/280	CP9107	
	75	3.00	-40 to 265/280	CP9108	

VF-1301ms

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.10	10	1.00	-40 to 280/300	CP9066	
0.15	15	0.15	-40 to 280/300	CP9050	
	20	0.15	-40 to 280/300	CP9051	
0.25	15	1.00	-40 to 280/300	CP9052	
	30	0.25	-40 to 280/300	CP9053	
		1.00	-40 to 280/300	CP9054	
	60	0.25	-40 to 280/300	CP9055	
		1.00	-40 to 280/300	CP9056	
0.32	15	0.25	-40 to 280/300	CP9057	
		1.00	-40 to 280/300	CP9058	
	30	0.25	-40 to 280/300	CP9059	
		1.00	-40 to 280/300	CP9060	CP9060I5
	60	1.00	-40 to 280/300	CP9061	
0.53	15	1.00	-40 to 280/300	CP9062	
	30	1.00	-40 to 280/300	CP9063	
		1.50	-40 to 280/300	CP9064	



Structure of VF-1701ms

VF-1701ms

- Highly inert for difficult analytes such as p,p'-DDT to improve productivity
- Column deactivation for more accurate trace analysis
- Eliminate ghost peaks and unstable baselines for more reliable data

The VF-1701ms is the world's first ultra-low bleed 14% cyanopropyl/phenyl, 86% PDMS GC column for pesticides, PCBs and semi-volatile organic compounds. Improved phase technology delivers increased inertness and reduced bleed, resulting in more accurate trace analysis. The bleed specification is 2 pA @ 280°C for a 0.25 mm x 60 m x 0.25 μm ID column.

VF-1701ms is also available with 0.15 mm ID for fast GC and GC/MS that can double sample throughput when compared to 0.25 and 0.32 mm ID columns.

VF-1701ms Chromatograms

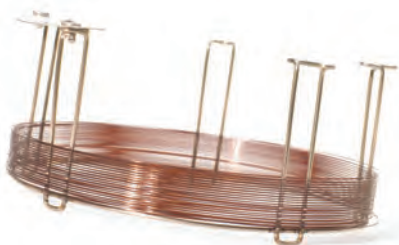
Environmental

Analysis of pesticides using EPA 8081 with ECD

Page 576

VF-1701ms

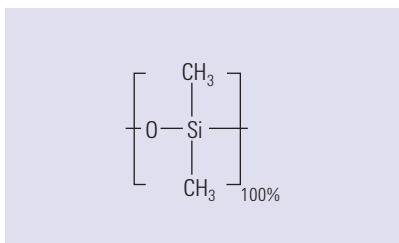
ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.10	10	0.20	-20 to 280/300	CP9140	
		0.40	-20 to 280/300	CP9141	
	20	0.10	-20 to 280/300	CP9142	
0.15	15	0.10	-20 to 280/300	CP9175	
		0.15	-20 to 280/300	CP9143	
		0.60	-20 to 280/300	CP9144	
	20	0.15	-20 to 280/300	CP9145	
		0.60	-20 to 280/300	CP9146	
0.25	15	0.15	-20 to 280/300	CP9147	
		0.25	-20 to 280/300	CP9148	
		1.00	-20 to 280/300	CP9149	CP9149I5
	30	0.15	-20 to 280/300	CP9150	
		0.25	-20 to 280/300	CP9151	CP9151I5
		1.00	-20 to 280/300	CP9152	CP9152I5
	60	0.15	-20 to 280/300	CP9153	
		0.25	-20 to 280/300	CP9154	CP9154I5
		0.50	-20 to 280/300	CP9155	CP9155I5
		1.00	-20 to 280/300	CP9156	
0.32	15	0.15	-20 to 280/300	CP9157	
		0.25	-20 to 280/300	CP9158	
		1.00	-20 to 280/300	CP9159	
	30	0.10	-20 to 280/300	CP9160	
		0.15	-20 to 280/300	CP9161	
		0.25	-20 to 280/300	CP9162	
		1.00	-20 to 280/300	CP9163	
	60	0.15	-20 to 280/300	CP9164	
		0.25	-20 to 280/300	CP9165	
		1.00	-20 to 280/300	CP9166	CP9166I5
0.53	15	1.00	-20 to 280/300	CP9167	
	30	0.10	-20 to 280/300	CP9168	
		0.25	-20 to 280/300	CP9169	
		0.50	-20 to 280/300	CP9170	
		1.00	-20 to 280/300	CP9171	
		1.50	-20 to 280/300	CP9172	
	60	1.00	-20 to 280/300	CP9173	
		1.50	-20 to 265/280	CP9174	



Polysiloxane Polymers Columns

Polysiloxanes are the most common stationary phases. They are available in the greatest variety and are stable, robust and versatile. Standard polysiloxanes are characterized by the repeating siloxane backbone. Each silicon atom contains two functional groups. The type and amount of the groups distinguish each stationary phase and its properties.

With the merger of Agilent and J&W Scientific there were many similar columns with the same type of polymer. In some cases the manufacturing and QC processes were exactly the same. In these cases the DB version was kept. In the cases where the HP and the DB columns had any manufacturing or QC differences, we opted to keep both phases available, as in the case of DB-1 and HP-1. Each of these columns is a high-quality product made to meet exacting quality control testing. However, there may be some subtle performance differences. For example the DB-35 and the HP-35 have slightly different selectivities. Therefore, we are still offering both DB and HP versions for our customers who have methods already developed on these columns.



Structure of DB-1

DB-1

- 100% Dimethylpolysiloxane
- Non-polar
- Excellent general purpose column
- Wide range of applications
- Low bleed
- High temperature limit
- Bonded and cross-linked
- Solvent rinsable
- Wide range of column dimensions available
- Equivalent to USP Phase G2

DB-1 Chromatograms**Environmental**

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DB-1

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.05	10	0.05	-60 to 325/350	126-1012		126-1012LTM
		0.05	-60 to 325/350	126-10SP		
		0.20	-60 to 325/350	126-1013		126-1013LTM
0.10	5	0.12	-60 to 325/350	127-100a		127-100aLTM
	10	0.10	-60 to 325/350	127-100A	127-1012E	127-100aLTM
		0.40	-60 to 325/350	127-1013	127-1013E	127-1013LTM
	20	0.10	-60 to 325/350	127-101A	127-1022E	127-1022LTM
		0.40	-60 to 325/350	127-1023	127-1023E	127-1023LTM
	40	0.20	-60 to 325/350	127-1046	127-1046E	
		0.40	-60 to 325/350	127-1043		
0.15	10	1.20	-60 to 325/350	12A-1015		12a-1015LTM
0.18	10	0.18	-60 to 325/350	121-1012	121-1012E	12A-1015LTM
		0.20	-60 to 325/350	121-101A		121-101aLTM
		0.40	-60 to 325/350	121-1013	121-1013E	121-1013LTM
	20	0.18	-60 to 325/350	121-1022	121-1022E	121-101aLTM
		0.40	-60 to 325/350	121-1023		121-1023LTM
40	0.40	-60 to 325/350	121-1043	121-1043E		
0.20	12	0.33	-60 to 325/350	128-1012		128-1012LTM
	25	0.33	-60 to 325/350	128-1022		128-1022LTM
	30	0.8	-60 to 325/350	128-1034		128-1034LTM
	50	0.33	-60 to 325/350	128-1052		
0.25	15	0.10	-60 to 325/350	122-1011		122-1011LTM
		0.25	-60 to 325/350	122-1012		122-1012LTM
		1.00	-60 to 325/350	122-1013		122-1013LTM
	25	0.25	-60 to 325/350	122-1022		122-1022LTM
	30	0.10	-60 to 325/350	122-1031		122-1031LTM
		0.25	-60 to 325/350	122-1032	122-1032E	122-1032LTM*
		0.50	-60 to 325/350	122-103E		122-103ELTM
		1.00	-60 to 325/350	122-1033	122-1033E	122-1033LTM
	50	0.25	-60 to 325/350	122-1052		
	60	0.10	-60 to 325/350	122-1061		
		0.25	-60 to 325/350	122-1062		
		0.50	-60 to 325/350	122-106E		
		1.00	-60 to 325/350	122-1063		
		100	0.50	-60 to 325/350	122-10AE	
150	1.00	-60 to 325/350	122-10G3			

*Also available as LTM column toroid assembly for Agilent 5975T, 0.25 mm x 30 m, 0.25 µm, P/N 222-1032LTM

(Continued)

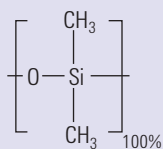
DB-1

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.32	10	0.5	-60 to 325/350	123-100E		123-100ELTM
	15	0.10	-60 to 325/350	123-1011		123-1011LTM
0.25		-60 to 325/350	123-1012		123-1012LTM	
1.00		-60 to 325/350	123-1013		123-1013LTM	
3.00		-60 to 280/300	123-1014		123-1014LTM	
5.00		-60 to 280/300	123-1015		123-1015LTM	
25		0.12	-60 to 325/350	123-1027		123-1027LTM
	0.25	-60 to 325/350	123-1022		123-1022LTM	
	0.52	-60 to 325/350	123-1026		123-1026LTM	
	1.05	-60 to 325/350	123-102F		123-102FLTM	
30	0.10	-60 to 325/350	123-1031		123-1031LTM	
	0.25	-60 to 325/350	123-1032		123-1032LTM	
	0.50	-60 to 325/350	123-103E		123-103ELTM	
	1.00	-60 to 325/350	123-1033	123-1033E	123-1033LTM	
	1.50	-60 to 300/320	123-103B		123-103BLTM	
	3.00	-60 to 280/300	123-1034		123-1034LTM	
	5.00	-60 to 280/300	123-1035		123-1035LTM	
50	0.25	-60 to 325/350	123-1052			
	0.52	-60 to 325/350	123-1056			
	1.05	-60 to 325/350	123-105F			
	1.20	-60 to 325/350	123-105C			
	5.00	-60 to 280/300	123-1055			
60	0.10	-60 to 325/350	123-1061			
	0.25	-60 to 325/350	123-1062	123-1062E		
	0.50	-60 to 325/350	123-106E			
	1.00	-60 to 325/350	123-1063	123-1063E		
	1.50	-60 to 300/320	123-106B	123-106BE		
	2.00	-60 to 280/300	123-106G			
	3.00	-60 to 280/300	123-1064	123-1064E		
	5.00	-60 to 280/300	123-1065	123-1065E		

(Continued)

DB-1

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.45	30	1.27	-60 to 325/350	124-1032		124-1032LTM
		2.55	-60 to 260/280	124-1034		124-1034LTM
0.53	5	0.88	-60 to 325/350	125-100a		125-100aLTM
		2.65	-60 to 325/350	125-100A		125-100ALTM
		5.00	-60 to 325/350	125-1005		125-1005LTM
	7.5	1.50	-60 to 325/350	125-1002		125-1002LTM
	10	2.65	-60 to 260/280	125-10HB	125-10HBE	125-10HBLTM
		5.00	-60 to 260/280	125-10H5		125-10H5LTM
	15	0.15	-60 to 340/360	125-1011	125-1011E	125-1011LTM
		0.25	-60 to 320/340	125-101K		125-101KLTM
		0.50	-60 to 300/320	125-1017		125-1017LTM
		1.00	-60 to 300/320	125-101J		125-101JLTM
		1.50	-60 to 300/320	125-1012	125-1012E	125-1012LTM
		3.00	-60 to 260/280	125-1014		125-1014LTM
		5.00	-60 to 260/280	125-1015		125-1015LTM
	25	1.00	-60 to 300/320	125-102J		125-102JLTM
		5.00	-60 to 260/280	125-1025		125-1025LTM
	30	0.10	-60 to 340/360	125-1039		125-1039LTM
		0.25	-60 to 320/340	125-103K	125-103KE	125-103KLTM
		0.50	-60 to 300/320	125-1037		125-1037LTM
		1.00	-60 to 300/320	125-103J		125-103JLTM
1.50		-60 to 300/320	125-1032		125-1032LTM	
2.65		-60 to 260/280	125-103B		125-103BLTM	
3.00		-60 to 260/280	125-1034	125-1034E	125-1034LTM	
5.00		-60 to 260/280	125-1035	125-1035E	125-1035LTM	
50	5.00	-60 to 260/280	125-1055			
60	1.00	-60 to 300/320	125-106J	125-106JE		
	1.50	-60 to 300/320	125-1062	125-1062E		
	3.00	-60 to 260/280	125-1064			
	5.00	-60 to 260/280	125-1065	125-1065E		
105	5.00	-60 to 260/280	125-10B5			



Structure of HP-1

HP-1

- 100% Dimethylpolysiloxane
- Non-polar
- Excellent general purpose column – "Industry Standard"
- Wide range of applications
- Superior performance for low molecular weight alcohols (<C5)
- High temperature limit
- Bonded and cross-linked
- Solvent rinsable
- Wide range of column dimensions available
- Equivalent to USP Phase G2

HP-1 Chromatograms

Environmental

Organotin Compounds I	Page 595
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Industrial Chemicals

Common Industrial Solvents	Page 661
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Inorganic Hydride Gases	Page 669
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Petroleum

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Glycols/Diols	Page 657
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Oxygenates in Gasoline ASTM D5599 (GC-OFID)	Page 701
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Sulfur Compounds in Natural Gas – Synthetic Mixture	Page 698
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HP-1

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.18	20	0.18	-60 to 325/350	19091Z-577	19091Z-577E	19091Z-577LTM
0.20	12	0.33	-60 to 325/350	19091-60312		
	17	0.11	-60 to 325/350	19091Z-008		19091Z-008LTM
	25	0.11	-60 to 325/350	19091Z-002		19091Z-002LTM
		0.33	-60 to 325/350	19091Z-102	19091Z-102E	19091Z-102LTM
50	0.50	-60 to 325/350	19091Z-202		19091Z-202LTM	
	0.11	-60 to 325/350	19091Z-005			
	0.33	-60 to 325/350	19091Z-105			
		0.50	-60 to 325/350	19091Z-205		

(Continued)

HP-1

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	
0.25	15	0.10	-60 to 325/350	19091Z-331		19091Z-331LTM	
		0.25	-60 to 325/350	19091Z-431		19091Z-431LTM	
		1.00	-60 to 325/350	19091Z-231		19091Z-231LTM	
	30	0.10	-60 to 325/350	19091Z-333		19091Z-333LTM	
		0.25	-60 to 325/350	19091Z-433	19091Z-433E	19091Z-433LTM	
		1.00	-60 to 325/350	19091Z-233	19091Z-233E	19091Z-233LTM	
	60	0.25	-60 to 325/350	19091Z-436			
		1.00	-60 to 325/350	19091Z-236	19091Z-236E		
	100	0.50	-60 to 325/350	19091Z-530	19091Z-530E		
0.32	15	0.25	-60 to 325/350	19091Z-411	19091Z-411E	19091Z-411LTM	
		1.00	-60 to 325/350	19091Z-211		19091Z-211LTM	
	25	0.17	-60 to 325/350	19091Z-012	19091Z-012E	19091Z-012LTM	
		0.52	-60 to 325/350	19091Z-112	19091Z-112E	19091Z-112LTM	
		1.05	-60 to 325/350	19091Z-212		19091Z-212LTM	
	30	0.10	-60 to 325/350	19091Z-313	19091Z-313E	19091Z-313LTM	
		0.25	-60 to 325/350	19091Z-413	19091Z-413E	19091Z-413LTM	
		1.00	-60 to 325/350	19091Z-213	19091Z-213E	19091Z-213LTM	
		3.00	-60 to 260/280	19091Z-513	19091Z-513E	19091Z-513LTM	
		4.00	-60 to 260/280	19091Z-613		19091Z-613LTM	
		5.00	-60 to 260/280	19091Z-713	19091Z-713E	19091Z-713LTM	
	50	0.17	-60 to 325/350	19091Z-015			
		0.52	-60 to 325/350	19091Z-115	19091Z-115E		
		1.05	-60 to 325/350	19091Z-215			
	60	0.25	-60 to 325/350	19091Z-416			
		1.00	-60 to 325/350	19091Z-216	19091Z-216E		
		5.00	-60 to 260/280	19091Z-716			
	0.53	5	0.15	-60 to 320/400	19095Z-220		
			0.88	-60 to 320/400	19095Z-020		19095Z-020LTM
				-60 to 325/350	125-100a		
			2.65	-60 to 260/280	19095S-100	19095S-100E	19095S-100LTM
7.5		5.00	-60 to 260/280	19095Z-627	19095Z-627E	19095Z-627LTM	
10		0.88	-60 to 300/320	19095Z-021	19095Z-021E	19095Z-021LTM	
		2.65	-60 to 260/280	19095Z-121	19095Z-121E	19095Z-121LTM	
15		0.15	-60 to 320/400	19095Z-221	19095Z-221E		
		1.50	-60 to 300/320	19095Z-321		19095Z-321LTM	
		3.00	-60 to 260/280	19095Z-421	19095Z-421LTM	19095Z-421LTM	
		5.00	-60 to 260/280	19095Z-621		19095Z-621LTM	
30		0.88	-60 to 300/320	19095Z-023	19095Z-023E	19095Z-023LTM	
		1.50	-60 to 300/320	19095Z-323	19095Z-323E	19095Z-323LTM	
		2.65	-60 to 260/280	19095Z-123	19095Z-123E	19095Z-123LTM	
		3.00	-60 to 260/280	19095Z-423	19095Z-423E	19095Z-423LTM	
	5.00	-60 to 260/280	19095Z-623	19095Z-623E	19095Z-623LTM		
60	5.00	-60 to 260/280	19095Z-626				

CP-Sil 5 CB

- Extended column lifetime reduces replacement costs
- Wide application range improves productivity
- Available in Fused Silica or UltiMetal to maximize choice

The CP-Sil 5 CB high efficiency column contains a 100% dimethylpolysiloxane phase. Separation is almost entirely based on boiling points, making this column suitable for a wide range of applications with a broad temperature range. Due to intensive cross-linking, CP-Sil 5 CB is highly inert and withstands large solvent injections, guaranteeing reproducibility and ensuring maximum column lifetime. For the highest operating temperatures, use our UltiMetal columns.

CP-Sil 5 CB Chromatograms

Industrial Chemicals

Analysis of amino alcohols in water

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CP-Sil 5 CB

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.10	5	0.12	-60 to 330/350	CP7300	
	10	0.10	-60 to 330/350	CP7311	
		0.12	-60 to 330/350	CP7310	CP7310I5
		0.40	-60 to 325/350	CP7312	
	20	0.10	-60 to 330/350	CP7313	
0.15	10	0.12	-60 to 330/350	CP7684	CP7684I5
		2.00	-60 to 325/350	CP7682	CP7682I5
	25	0.12	-60 to 330/350	CP7694	
		1.20	-60 to 325/350	CP7693	
		2.00	-60 to 325/350	CP7692	CP7692I5
0.20	12	0.33	-60 to 325/350	CP7602	
	15	0.20	-60 to 330/350	CP7604	
	25	0.33	-60 to 325/350	CP7622	
	30	0.80	-60 to 325/350	CP7633	
	50	0.11	-60 to 330/350	CP7642	
		0.33	-60 to 325/350	CP7643	CP7643I5
	0.50	-60 to 325/350	CP7644	CP7644I5	

(Continued)

CP-Sil 5 CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.25	10	0.12	-60 to 330/350	CP7700	
		15	-60 to 330/350	CP8510	
	25	0.12	-60 to 330/350	CP7710	CP7710I5
		0.25	-60 to 330/350	CP7441	
		0.40	-60 to 325/350	CP7709	
		1.20	-60 to 325/350	CP7670	CP7670I5
	30	0.10	-60 to 330/350	CP8710	
		0.25	-60 to 330/350	CP8741	CP8741I5
		1.00	-60 to 325/350	CP8770	
	50	0.12	-60 to 330/350	CP7720	
		0.25	-60 to 330/350	CP7443	CP7443I5
		0.40	-60 to 325/350	CP7719	CP7719I5
60	0.25	-60 to 330/350	CP8743	CP8743I5	
	1.00	-60 to 325/350	CP8780	CP8780I5	
0.32	10	0.12	-60 to 330/350	CP7730	
		1.20	-60 to 325/350	CP7758	CP7758I5
	15	0.10	-60 to 330/350	CP8529	
		0.25	-60 to 325/350	CP8530	
		3.00	-60 to 325/350	CP8550	CP8550I5
		1.00	-60 to 325/350	CP8540	
		5.00	-60 to 300/325	CP8560	CP8560I5
	25	0.12	-60 to 330/350	CP7740	
		0.25	-60 to 325/350	CP7442	
		0.40	-60 to 325/350	CP7739	
		0.52	-60 to 325/350	CP8430	CP8430I5
		1.20	-60 to 325/350	CP7760	CP7760I5
		5.00	-60 to 300/325	CP7680	CP7680I5
	30	0.25	-60 to 325/350	CP8742	CP8742I5
		1.00	-60 to 325/350	CP8760	CP8760I5
		3.00	-60 to 310/335	CP8687	CP8687I5
		5.00	-60 to 300/325	CP8688	CP8688I5
	50	0.12	-60 to 330/335	CP7750	CP7750I5
		0.25	-60 to 325/350	CP7444	CP7444I5
		0.40	-60 to 325/350	CP7749	CP7749I5
		1.20	-60 to 325/350	CP7770	CP7770I5
		5.00	-60 to 300/325	CP7690	CP7690I5
	60	0.25	-60 to 325/350	CP8744	CP8744I5
		1.00	-60 to 325/350	CP8870	
		3.00	-60 to 310/335	CP8689	
		5.00	-60 to 300/325	CP8690	CP8690I5

(Continued)

CP-Sil 5 CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.53	10	1.00	-60 to 315/340	CP7625	
		2.00	-60 to 305/330	CP7620	CP7620I5
		5.00	-60 to 290/325	CP7645	
15	15	0.15	-60 to 330/350	CP8673	CP8673I5
		1.50	-60 to 305/330	CP8674	CP8674I5
		3.00	-60 to 300/325	CP8675	
		5.00	-60 to 290/325	CP8676	
20	5.00	-60 to 290/325	CP8774		
25	25	1.00	-60 to 315/340	CP7635	CP7635I5
		2.00	-60 to 305/330	CP7630	
		5.00	-60 to 290/325	CP7675	CP7675I5
30	30	1.50	-60 to 305/330	CP8735	CP8735I5
		2.00	-60 to 305/330	CP8730	CP8730I5
		3.00	-60 to 300/325	CP8677	CP8677I5
		5.00	-60 to 290/325	CP8775	CP8775I5
50	50	1.00	-60 to 315/340	CP7695	
		2.00	-60 to 305/330	CP7640	
		5.00	-60 to 290/325	CP7685	CP7685I5
60	60	1.50	-60 to 305/330	CP8799	
		5.00	-60 to 290/325	CP8685	
100	100	0.50	-60 to 325/350	CP7608	
		2.00	-60 to 305/330	CP7650	
		5.00	-60 to 290/325	CP7688	

CP-Sil 5 CB UltiMetal

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.53	10	1.00	-60 to 325/350	CP7120	
		2.00	-60 to 325/350	CP7150	
		5.00	-60 to 325/350	CP6666	CP6666I5
25	25	0.50	-60 to 325/350	CP7135	CP7135I5
		2.00	-60 to 325/350	CP7160	
		5.00	-60 to 325/350	CP6670	
50	50	0.50	-60 to 325/350	CP7195	
		1.00	-60 to 325/350	CP7140	
		2.00	-60 to 325/350	CP7170	
		5.00	-60 to 325/350	CP6671	

Ultra 1

- 100% Dimethylpolysiloxane
- Non-polar
- Equivalent to HP-1 with tighter specifications for retention index and capacity factors
- Bonded and cross-linked
- Solvent rinsable

Ultra 1 Chromatograms

Industrial Chemicals

Ethylene Glycol Mixture	Page 657
Pyrolysates of Polystyrene	Page 652

Ultra 1

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.20	12	0.33	-60 to 325/350	19091A-002		19091A-008LTM
		0.11	-60 to 325/350	19091A-112LTM		19091A-002LTM
	25	0.33	-60 to 325/350	19091a-108		19091A-008
		0.11	-60 to 325/350	19091A-108		19091A-115
		0.33	-60 to 325/350	19091A-005	19091A-012	19091A-101LTM
	50	0.11	-60 to 325/350	19091A-101		
0.33		-60 to 325/350	19091A-015			
0.32	25	0.17	-60 to 325/350	19091A-102		19091A-102LTM
		0.52	-60 to 325/350	19091A-105		19091A-012LTM
	50	0.17	-60 to 325/350	19091A-102E		
		0.52	-60 to 325/350	19091A-112		

Ultra 2

- (5%-Phenyl)-methylpolysiloxane
- Non-polar
- Equivalent to HP-5 with tighter specifications for retention index and capacity factors
- Bonded and cross-linked
- Solvent rinsable

Ultra 2 Chromatograms

Food, Flavors and Fragrances

Flavor Mixture	Page 623
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Life Sciences

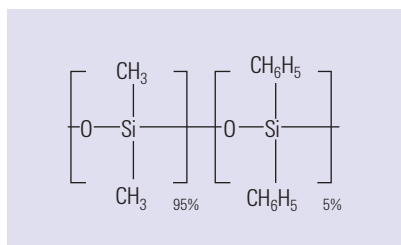
Antiepileptic Drugs	Page 676
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Tricyclic Antipsychotics	Page 676
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Urine Drug Screen	Page 673
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Ultra 2

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.20	12	0.33	-60 to 325/350	19091B-101		19091B-101LTM
		0.11	-60 to 325/350	19091B-002		19091B-002LTM
	25	0.33	-60 to 325/350	19091B-102	19091B-102E	19091B-102LTM
		0.11	-60 to 325/350	19091B-005		
		0.33	-60 to 325/350	19091B-105	19091A-108LTM	
0.32	25	0.17	-60 to 325/350	19091B-012	19091B-012E	19091B-012LTM
		0.52	-60 to 325/350	19091B-112		19091B-112LTM
	50	0.17	-60 to 325/350	19091B-015		
		0.52	-60 to 325/350	19091B-115	19091B-115E	



Structure of DB-5

DB-5

- (5%-Phenyl)-methylpolysiloxane
- Non-polar
- Excellent general purpose column
- Wide range of applications
- Low bleed
- High temperature limit
- Bonded and cross-linked
- Solvent rinsable
- Wide range of column dimensions available
- Equivalent to USP Phase G27

DB-5 Chromatograms

Environmental

Organochlorine Pesticides, DB5/1701P	Page 581
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Food, Flavors and Fragrances

Bacterial Fatty Acid Methyl Esters	Page 632
Cold-Pressed Orange Oil	Page 625
Lemon Oil	Page 624

Life Sciences

Amphetamines and Precursors – TMS Derivatives	Page 674
Antihistamines	Page 676
Common Drug Screen	Page 672
Marijuana (Δ^9 -THC) and Major Metabolites – TMS Derivatives	Page 681
Narcotics and Adulterants	Page 680
Over-the-Counter Pain Killers – TMS Derivatives	Page 680

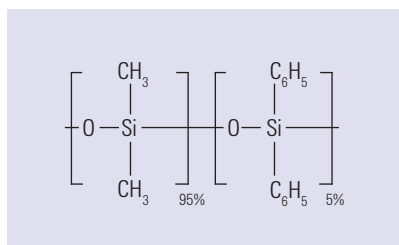
DB-5

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.10	10	0.10	-60 to 325/350	127-500A	127-5012E	127-5012LTM
		0.17	-60 to 325/350	127-501E	127-501EE	127-501ELTM
		0.33	-60 to 325/350	127-501N		127-501NLTM
		0.40	-60 to 325/350	127-5013		127-5013LTM
	20	0.10	-60 to 325/350	127-5022	127-5022E	127-5022LTM
		0.40	-60 to 325/350	127-5023		127-5023LTM
0.15	10	1.20	-60 to 300/320	12a-5015		12a-5015LTM
0.18	10	0.18	-60 to 325/350	121-5012	121-5012E	12A-5015LTM
		0.40	-60 to 325/350	121-5013		121-5013LTM
	20	0.18	-60 to 325/350	121-5022	121-5022E	121-5022LTM
		0.40	-60 to 325/350	121-5023	121-5023E	121-5023LTM
		40	0.18	-60 to 325/350	121-5042	
0.20	12	0.33	-60 to 325/350	128-5012		128-5012LTM
	15	0.20	-60 to 325/350	128-50H7		128-50H7LTM
	25	0.33	-60 to 325/350	128-5022		128-5022LTM
	50	0.33	-60 to 325/350	128-5052		
0.25	15	0.10	-60 to 325/350	122-5011		122-5011LTM
		0.25	-60 to 325/350	122-5012		122-5012LTM
		0.50	-60 to 325/350	122-501E		122-501ELTM
		1.00	-60 to 325/350	122-5013		122-5013LTM
	25	0.25	-60 to 325/350	122-5022		122-5022LTM
	30	0.10	-60 to 325/350	122-5031		122-5031LTM
		0.25	-60 to 325/350	122-5032	122-5032E	122-5032LTM
		0.50	-60 to 325/350	122-503E		122-503ELTM
		1.00	-60 to 325/350	122-5033	122-5033E	122-5033LTM
	50	0.25	-60 to 325/350	122-5052		
	60	0.10	-60 to 325/350	122-5061		
		0.25	-60 to 325/350	122-5062		
		0.50	-60 to 325/350	122-506E		
		1.00	-60 to 325/350	122-5063		

(Continued)


DB-5

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	
0.32	10	0.5	-60 to 325/350	123-500E		123-500ELTM	
		15	0.10	-60 to 325/350	123-5011		123-5011LTM
	15	0.25	-60 to 325/350	123-5012	123-5012E	123-5012LTM	
		1.00	-60 to 325/350	123-5013	123-5013E	123-5013LTM	
		25	0.17	-60 to 325/350	123-502D		123-502DLTM
		0.25	-60 to 325/350	123-5022		123-5022LTM	
	25	0.52	-60 to 325/350	123-5026		123-5026LTM	
		1.05	-60 to 325/350	123-502F		123-502FLTM	
		30	0.10	-60 to 325/350	123-5031		123-5031LTM
		0.25	-60 to 325/350	123-5032	123-5032E	123-5032LTM	
30	0.50	-60 to 325/350	123-503E		123-503ELTM		
	1.00	-60 to 325/350	123-5033	123-5033E	123-5033LTM		
	1.50	-60 to 325/350	123-503B		123-503BLTM		
	50	0.25	-60 to 325/350	123-5052			
50	0.52	-60 to 325/350	123-5056				
	1.00	-60 to 325/350	123-5053				
	60	0.25	-60 to 325/350	123-5062			
60	1.00	-60 to 325/350	123-5063	123-5063E			
	0.45	15	1.27	-60 to 300/320	124-5012	124-5012LTM	
		30	0.42	-60 to 300/320	124-5037	124-5037LTM	
0.45	30	1.27	-60 to 300/320	124-5032	124-5032LTM		
		10	2.65	-60 to 260/280	125-50HB	125-50HBLTM	
	15	0.25	-60 to 300/320	125-501K	125-501KLTM		
0.50		-60 to 300/320	125-5017	125-5017LTM			
1.00		-60 to 300/320	125-501J	125-501JLTM			
1.50		-60 to 300/320	125-5012	125-5012E	125-5012LTM		
25	5.00	-60 to 260/280	125-5025	125-5025LTM			
30	0.25	-60 to 300/320	125-503K	125-503KLTM			
		0.50	-60 to 300/320	125-5037	125-5037LTM		
	0.88	-60 to 300/320	125-503D	125-503DLTM			
	1.00	-60 to 300/320	125-503J	125-503JLTM			
	1.50	-60 to 300/320	125-5032	125-5032E	125-5032LTM		
	2.65	-60 to 260/280	125-503B	125-503BLTM			
	3.00	-60 to 260/280	125-5034	125-5034E	125-5034LTM		
	5.00	-60 to 260/280	125-5035	125-5035E	125-5035LTM		
	60	1.50	-60 to 300/320	125-5062	125-5062E		
		5.00	-60 to 260/280	125-5065	125-5065E		



Structure of HP-5

HP-5

- (5%-Phenyl)-methylpolysiloxane
- Non-polar
- Excellent general purpose column
- Wide range of applications
- High temperature limit
- Bonded and cross-linked
- Solvent rinsable
- Wide range of column dimensions available
- Equivalent to USP Phase G27

HP-5 Chromatograms

Environmental

Organotin Compounds II

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HP-5

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.18	20	0.18	-60 to 325/350	19091J-577	19091J-577E	19091J-577LTM
0.20	12	0.33	-60 to 325/350	19091J-101		19091J-101LTM
	17	0.33	-60 to 325/350	19091J-108		
	25	0.11	-60 to 325/350	19091J-002		19091J-002LTM
		0.33	-60 to 325/350	19091J-102	19091J-102E	19091J-102LTM
		0.50	-60 to 325/350	19091J-202		19091J-202LTM
	50	0.11	-60 to 325/350	19091J-005		
0.33		-60 to 325/350	19091J-105	19091J-105E		
0.50		-60 to 325/350	19091J-205			
0.25	5	0.10	-60 to 325/350	19091J-330		19091J-330LTM
	15	0.25	-60 to 325/350	19091J-431	19091J-431E	19091J-431LTM
		1.00	-60 to 325/350	19091J-231		19091J-231LTM
	30	0.10	-60 to 325/350	19091J-333		19091J-333LTM
		0.25	-60 to 325/350	19091J-433	19091J-433E	19091J-433LTM
		1.00	-60 to 325/350	19091J-233		19091J-233LTM
	60	0.25	-60 to 325/350	19091J-436	19091J-436E	
		1.00	-60 to 325/350	19091J-236	19091J-236E	

(Continued)

HP-5

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.32	15	0.25	-60 to 325/350	19091J-411		19091J-411LTM
	25	0.17	-60 to 325/350	19091J-012	19091J-012E	19091J-012LTM
		0.52	-60 to 325/350	19091J-112	19091J-112E	19091J-112LTM
		1.05	-60 to 325/350	19091J-212		19091J-212LTM
30	0.10	-60 to 325/350	19091J-313		19091J-313LTM	
	0.25	-60 to 325/350	19091J-413	19091J-413E	19091J-413LTM	
	0.50	-60 to 325/350	19091J-113	19091J-113E	19091J-113LTM	
	1.00	-60 to 325/350	19091J-213	19091J-213E	19091J-213LTM	
50	0.17	-60 to 325/350	19091J-015	19091J-015E		
	0.52	-60 to 325/350	12A-5015	19091J-115E		
	1.05	-60 to 325/350	19091J-215	19091J-215E		
60	0.25	-60 to 325/350	19091J-416			
	1.00	-60 to 325/350	19091J-216	19091J-216E		
0.53	10	2.65	-60 to 260/280	19095J-121	19095J-121E	19095J-121LTM
	15	1.50	-60 to 300/320	19095J-321		19095J-321LTM
		5.00	-60 to 260/280	19095J-621		19095J-621LTM
	30	0.88	-60 to 300/320	19095J-023	19095J-023E	19095J-023LTM
		1.50	-60 to 300/320	19095J-323	19095J-323E	19095J-323LTM
		2.65	-60 to 260/280	19095J-123	19095J-123E	19095J-123LTM
	5.00	-60 to 260/280	19095J-623	19095J-623E	19095J-623LTM	

CP-Sil 8 CB

- High efficiency increases data accuracy
- Wide choice of dimensions for maximum utility
- Ultimate reproducibility, selectivity and retention times enhance productivity

By incorporating 5% phenyl groups in the dimethylpolysiloxane polymer, the CP-Sil 8 CB column has a slightly higher polarity than CP-Sil 5 CB columns. This results in better selectivity for aromatic compounds and is generally the best choice when developing a method.

CP-Sil 8 CB shows excellent column-to-column reproducibility and very high column efficiencies. We recommend the UltiMetal column for the highest operating temperatures, and when working in rugged environments with process or portable instruments.

CP-Sil 8 CB Chromatograms

Environmental

Phenols according to EPA Method 8040

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CP-Sil 8 CB

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	
0.10	20	0.10	-60 to 330/350	CP7319	CP7319I5	
0.15	10	0.12	-60 to 330/350	CP7884		
		1.20	-60 to 325/350	CP7885		
		25	0.12	-60 to 330/350	CP7894	
0.20	12	0.33	-60 to 325/350	CP7900		
		25	0.33	-60 to 325/350	CP7921	
		50	0.33	-60 to 325/350	CP7941	
		60	0.20	-60 to 330/350	CP7950	
0.25	15	0.25	-60 to 330/350	CP8511		
		1.00	-60 to 325/350	CP8521		
	25	0.12	-60 to 330/350	CP7711		
			-60 to 330/350	CP7451	CP7451I5	
			-60 to 325/350	CP7759		
			-60 to 325/350	CP7671		
	30	0.25	-60 to 330/350	CP8751	CP8751I5	
			-60 to 325/350	CP8771	CP8771I5	
	50	0.12	-60 to 330/350	CP7721		
			-60 to 330/350	CP7453	CP7453I5	
-60 to 325/350			CP7769			
60	0.10	-60 to 325/350	CP8750			
		-60 to 330/350	CP8753			
		-60 to 325/350	CP8781			

(Continued)

CP-Sil 8 CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.32	10	0.12	-60 to 330/350	CP7731	
		5.00	-60 to 300/325	CP8014	CP801415
	15	0.25	-60 to 325/350	CP8531	
		1.00	-60 to 325/350	CP8541	
	25	0.12	-60 to 330/350	CP7741	CP774115
		0.25	-60 to 325/350	CP7452	
		0.40	-60 to 325/350	CP7779	
		0.52	-60 to 325/350	CP8431	
		1.20	-60 to 325/350	CP7761	
		5.00	-60 to 300/325	CP7681	CP768115
	30	0.10	-60 to 330/350	CP8791	
		0.25	-60 to 325/350	CP8752	CP875215
		1.00	-60 to 325/350	CP8761	CP876115
	50	0.12	-60 to 330/350	CP7751	CP775115
		0.25	-60 to 325/350	CP7454	
		0.40	-60 to 325/350	CP7789	
		1.20	-60 to 325/350	CP7771	
		5.00	-60 to 300/325	CP7691	CP769115
		1.00	-60 to 325/350	CP8871	CP887115
	0.53	10	2.00	-60 to 305/330	CP7621
5.00			-60 to 290/325	CP7646	
15		1.50	-60 to 305/330	CP8678	
25		0.15	-60 to 325/350	CP7634	
		2.00	-60 to 305/330	CP7631	
		1.00	-60 to 315/340	CP7636	
		5.00	-60 to 290/325	CP7656	
30		0.50	-60 to 325/350	CP8716	
		1.50	-60 to 305/330	CP8736	CP873615
		5.00	-60 to 290/325	CP8756	CP875615
50		1.00	-60 to 315/340	CP7696	
		2.00	-60 to 305/330	CP7641	
		5.00	-60 to 290/325	CP7666	
60		1.50	-60 to 305/330	CP8796	
100	5.00	-60 to 290/325	CP7676		

CP-Sil 8 CB UltiMetal

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.53	25	5.00	-60 to 325/350	CP6680
	50	5.00	-60 to 325/350	CP7196

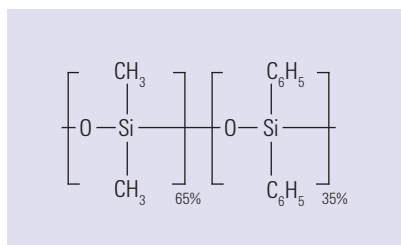
CP-Sil 13 CB

- Bonded and cross-linked for solvent rinsing that extends column lifetime
- Ideal confirmation column for complete confidence
- Non-cyano phase for the best sensitivity with ECD

The CP-Sil 13 CB was specially developed for the analysis of medium polarity compounds where halocarbon-sensitive detectors are used (e.g. ECD). It is a non-cyano containing, medium polarity column with a 14% phenyl, 86% dimethylpolysiloxane phase, preventing raised baselines due to the column bleed on an ECD.

CP-Sil 13 CB

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.15	25	0.40	-25 to 300/330	CP7813	
0.25	25	0.20	-25 to 300/330	CP7906	
		0.40	-25 to 300/330	CP7916	
		1.20	-25 to 300/330	CP7977	CP7977I5
	50	0.20	-25 to 300/330	CP7907	
		0.40	-25 to 300/330	CP7917	
0.32	25	0.20	-25 to 300/330	CP7926	CP7926I5
		0.40	-25 to 300/330	CP7936	
		1.20	-25 to 300/330	CP7946	
	50	0.20	-25 to 300/330	CP7927	
		0.40	-25 to 300/330	CP7937	
		1.20	-25 to 300/330	CP7947	
0.53	10	1.00	-25 to 300/330	CP7609	
	25	1.00	-25 to 300/330	CP7619	
		2.00	-25 to 300/330	CP7649	
	50	1.00	-25 to 300/330	CP7629	
		2.00	-25 to 300/330	CP7659	
100	2.00	-25 to 300/330	CP7669		



Structure of DB-35

DB-35

- (35%-Phenyl)-methylpolysiloxane
- Mid-polarity – slightly more polar than HP-35
- Low bleed
- Inert to active solutes
- Ideal for confirmational analyses
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G42

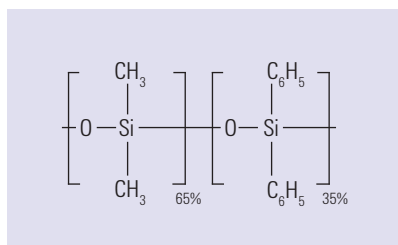
DB-35 Chromatograms

Environmental

Organochlorine Pesticides IV	Page 580
Nitrogen/Phosphorus Containing Pesticides, EPA Method 507	Page 586

DB-35

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.25	30	0.25	40 to 300/320	122-1932		122-1932LTM
	60	0.25	40 to 300/320	122-1962		
0.32	30	0.25	40 to 300/320	123-1932		123-1932LTM
		0.50	40 to 300/320	123-1933	123-1933E	123-1933LTM
0.53	15	1.00	40 to 280/300	125-1912		125-1912LTM
	30	0.50	40 to 280/300	125-1937		125-1937LTM
		1.00	40 to 280/300	125-1932		125-1932LTM



Structure of HP-35

HP-35

- (35%-Phenyl)-methylpolysiloxane
- Mid-polarity – slightly less polar than DB-35
- Inert to active solutes
- Ideal for confirmational analyses
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G42

HP-35 Chromatograms

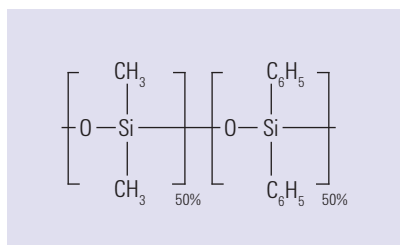
Industrial Chemicals

Polymer Additives

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HP-35

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)			7890/6890
				7 in. Cage	5 in. Cage	LTM Module
0.25	15	0.25	40 to 300/320	19091G-131	19091G-131E	19091G-131LTM
	30	0.25	40 to 300/320	19091G-133		19091G-133LTM
0.32	30	0.25	40 to 300/320	19091G-113		19091G-113LTM
		0.50	40 to 300/320	19091G-213		19091G-213LTM



Structure of DB-17

DB-17

- (50%-Phenyl)-methylpolysiloxane
- Mid-polarity – slightly more polar than HP-50+
- Excellent for conformational analyses
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G3

DB-17 Chromatograms

Life Sciences

Common Drug Screen	Page 672
Free Steroids	Page 681

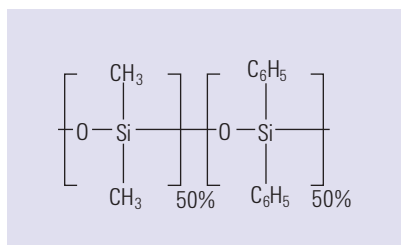
DB-17

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.05	10	0.10	40 to 280/300	126-1713		126-1713LTM
0.10	10	0.10	40 to 280/300	127-1712		127-1712LTM
		0.20	40 to 280/300	127-1713		127-1713LTM
		20	0.10	40 to 280/300	127-1722	
0.18	20	0.18	40 to 280/300	121-1722		121-1722LTM
		0.30	40 to 280/300	121-1723		121-1723LTM
0.25	15	0.15	40 to 280/300	122-1711		122-1711LTM
		0.25	40 to 280/300	122-1712		122-1712LTM
		0.50	40 to 280/300	122-1713	122-1713E	122-1713LTM
30		0.15	40 to 280/300	122-1731	122-1731E	122-1731LTM
		0.25	40 to 280/300	122-1732	122-1732E	122-1732LTM
		0.50	40 to 280/300	122-1733		122-1733LTM
60		0.25	40 to 280/300	122-1762		

(Continued)

DB-17

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.32	15	0.15	40 to 280/300	123-1711		123-1711LTM
		0.25	40 to 280/300	123-1712		123-1712LTM
		0.50	40 to 280/300	123-1713		123-1713LTM
	30	0.15	40 to 280/300	123-1731		123-1731LTM
		0.25	40 to 280/300	123-1732	123-1732E	123-1732LTM
		0.50	40 to 280/300	123-1733	123-1733E	123-1733LTM
60	0.25	40 to 280/300	123-1762			
0.53	5	2.00	40 to 280/300	125-1704		125-1704LTM
	15	0.25	40 to 260/280	125-1711		125-1711LTM
		0.50	40 to 260/280	125-1717		125-1717LTM
		1.00	40 to 260/280	125-1712		125-1712LTM
		1.50	40 to 260/280	125-1713		125-1713LTM
		0.25	40 to 260/280	125-1731		125-1731LTM
	30	0.5	40 to 260/280	125-1737		125-1737LTM
		1.00	40 to 260/280	125-1732	125-1732E	125-1732LTM
		1.50	40 to 260/280	125-1733		125-1733LTM
		60	1.00	40 to 260/280	125-1762	



Structure of HP-50+

HP-50+

- (50%-Phenyl)-methylpolysiloxane
- Mid-polarity – slightly less polar than DB-17
- Excellent for conformational analyses
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G3

HP-50+

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.18	20	0.18	40 to 280/300	19091L-577		19091L-577LTM
0.20	12	0.31	40 to 280/300	19091L-101		19091L-101LTM
0.25	5	0.15	40 to 280/300	19091L-330		19091L-330LTM
	15	0.25	40 to 280/300	19091L-431		19091L-431LTM
	30	0.15	40 to 280/300	19091L-333		19091L-333LTM
		0.25	40 to 280/300	19091L-433		19091L-433LTM
		0.50	40 to 280/300	19091L-133		19091L-133LTM
0.32	15	0.50	40 to 280/300	19091L-111		19091L-111LTM
	30	0.25	40 to 280/300	19091L-413	19091L-413E	19091L-413LTM
		0.50	40 to 280/300	19091L-113	19091L-113E	19091L-113LTM
		60	0.25	40 to 280/300	19091L-416	
0.53	15	1.00	40 to 260/280	19095L-021		19095L-021LTM
	30	0.50	40 to 260/280	19095L-523	19095L-523E	19095L-523LTM
		1.00	40 to 260/280	19095L-023	19095L-023E	19095L-023LTM

CP-Sil 24 CB

- Bonded and cross linked for extended longevity
- Lowest detection limits using ECD
- Good inertness for highly accurate results

CP-Sil 24 CB is a medium polarity, 50% phenyl/50% dimethylpolysiloxane phase with no cyano groups, making it ideal for use with ECD. The CP-Sil 24 CB column produces perfect peak shapes for amines as shown by the Grob test mixture. It is especially suitable for the analysis of drugs and pesticides and is an excellent confirmation column in combination with CP-Sil 5 CB or CP-Sil 8 CB.

CP-Sil 24 CB Chromatograms

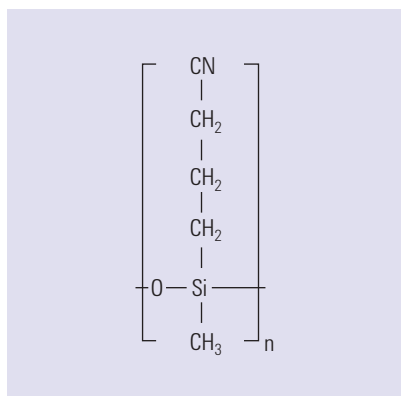
Environmental

Phenols according to EPA Method 8040

Page 602

CP-Sil 24 CB

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	15	0.25	40 to 280/300	CP7820	
	30	0.25	40 to 280/300	CP7821	
		0.50	40 to 280/300	CP7824	
	60	0.25	40 to 280/300	CP7822	CP7822I5
		0.50	40 to 280/300		CP7825I5
0.32	15	0.25	40 to 280/300	CP7830	CP7830I5
	30	0.25	40 to 280/300	CP7831	CP7831I5
	60	0.25	40 to 280/300	CP7832	
0.53	15	1.00	40 to 265/290	CP7870	
	30	0.50	40 to 280/300	CP7834	CP7834I5
		1.00	40 to 265/290	CP7871	CP7871I5
	60	1.00	40 to 265/290	CP7872	



Structure of DB-23

DB-23

- (50%-Cyanopropyl)-methylpolysiloxane
- High polarity
- Designed for separation of fatty acid methyl esters (FAMES)
- Excellent resolution for cis- and trans-isomers
- Bonded and cross-linked
- Solvent rinsable
- Replaces HP-23
- Close equivalent to USP Phase G5

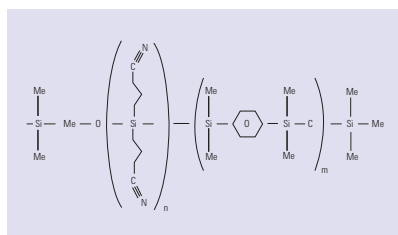
DB-23 Chromatograms

Food, Flavors and Fragrances

Canola Oil Margarine Partially Hydrogenated FAMES AOCS Method 1c-89	Page 637
FAMES I	Page 633

DB-23

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.18	20	0.20	40 to 250/260	121-2323		121-2323LTM
0.25	15	0.25	40 to 250/260	122-2312		122-2312LTM
		30	0.15	40 to 250/260	122-2331	122-2331LTM
	60	0.25	40 to 250/260	122-2332	122-2332E	122-2332LTM
		0.15	40 to 250/260	122-2361	122-2361E	
0.32	30	0.25	40 to 250/260	123-2332	123-2332E	123-2332LTM
	60	0.25	40 to 250/260	123-2362		
0.53	15	0.50	40 to 230/240	125-2312		125-2312LTM
	30	0.50	40 to 230/240	125-2332		125-2332LTM



Structure of HP-88

HP-88

- (88%-Cyanopropyl)aryl-polysiloxane
- 250/320°C upper temperature limits
- High polarity
- Designed for separation of cis-trans fatty acid methyl esters (FAMES)
- Even better separation than DB-23 of cis-trans isomers

HP-88 Chromatograms

Food, Flavors and Fragrances

69 Component FAME Mix

Page 634

HP-88

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.25	100	0.25	0 to 250/260	112-88A7	112-88A7E	
	60	0.2	0 to 250/260	112-8867	112-8867E	
	30	0.2	0 to 250/260	112-8837	112-8837E	112-8837LTM

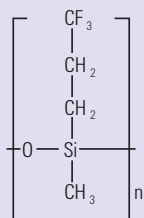
CP-Sil 88

- High selectivity towards positional and geometric isomers for ease-of-use
- Highly substituted cyanopropyl phase
- Highest polarity, non-chemically bonded and stabilized

The CP-Sil 88 column contains a highly substituted cyanopropyl phase that has been stabilized. It has the highest polarity and is non-chemically bonded. The extremely high polarity of this column offers maximum resolution in separations where the boiling point and polarity of the analytes are nearly equal (for example, in the separation of positional and geometric isomers).

CP-Sil 88

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	25	0.20	50 to 225/240	CP6172	CP6172I5
	50	0.20	50 to 225/240	CP6173	CP6173I5
0.32	25	0.20	50 to 225/240	CP6174	CP6174I5
	50	0.20	50 to 225/240	CP6175	



Structure of DB-200

DB-200

- (35% Trifluoropropyl)-methylpolysiloxane
- 300/320°C temperature limit
- Mid-polarity – more polar than DB-1701 or DB-17
- Ideal for difficult-to-separate positional isomers
- Unique interactions with compounds containing nitro, halogen and carbonyl groups
- Low ECD bleed
- Unique selectivity
- Close equivalent to USP Phase G6

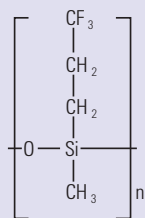
DB-200 Chromatograms

Industrial Chemicals

Acrylate Impurities I	Page 663
Aromatic Solvents	Page 661
Solvents I	Page 659

DB-200

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	7890/6890
					LTM Module
0.25	30	0.25	30 to 300/320	122-2032	122-2032LTM
		0.50	30 to 300/320	122-2033	122-2033LTM
0.32	30	0.25	30 to 300/320	123-2032	123-2032LTM
		0.50	30 to 300/320	123-2033	123-2033LTM
0.53	30	1.00	30 to 280/300	125-2032	125-2032LTM



Structure of DB-210

DB-210

- (50%-Trifluoropropyl)-methylpolysiloxane
- High polarity
- Excellent for U.S. EPA Methods 8140 and 609
- Bonded and cross-linked
- Solvent rinsable
- Exact replacement of HP-210
- Close equivalent to USP Phase G6

DB-210 Chromatograms

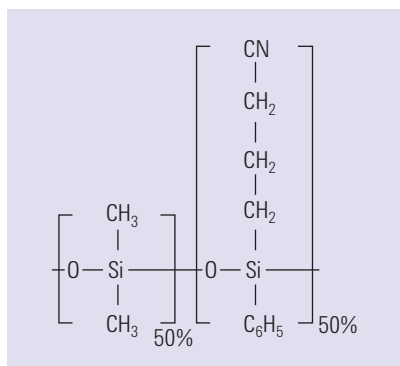
Environmental

Herbicides II

Page 586

DB-210

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.25	15	0.25	45 to 240/260	122-0212		122-0212LTM
		0.25	45 to 240/260	122-0232	122-0232E	122-0232LTM
		0.50	45 to 240/260	122-0233		122-0233LTM
0.32	15	0.50	45 to 240/260	123-0213		123-0213LTM
		0.25	45 to 240/260	123-0232		123-0232LTM
		0.50	45 to 240/260	123-0233		123-0233LTM
0.53	15	1	45 to 220/240	125-0212		125-0212LTM
		1.00	45 to 220/240	125-0232		125-0232LTM



Structure of DB-225

DB-225

- (50%-Cyanopropylphenyl)-dimethylpolysiloxane
- Mid/high polarity
- Excellent for separations of cis- and trans-fatty acid methyl esters (FAMES)
- Bonded and cross-linked
- Solvent rinsable
- Exact replacement of HP-225
- Close equivalent to USP Phase G7

DB-225 Chromatograms

Environmental

Tetrachlorodibenzo-p-furans Page 591

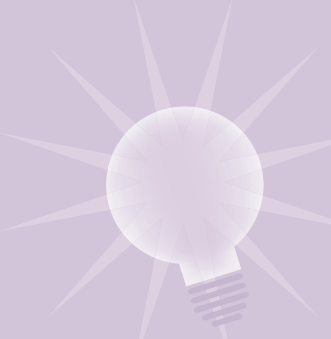
Food, Flavors and Fragrances

Alditol Acetates Page 629

FAME Standard II Page 636

Tips & Tools

Need assistance selecting a column for your method? Contact our chromatography technical specialists at www.agilent.com/chem/TechRep



DB-225

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	
0.10	20	0.10	40 to 220/240	127-2222		127-2222LTM	
0.18	20	0.20	40 to 220/240	121-2223		121-2223LTM	
0.25	15	0.25	40 to 220/240	122-2212		122-2212LTM	
		0.15	40 to 220/240	122-2231		122-2231LTM	
		0.25	40 to 220/240	122-2232		122-2232LTM	
0.32	30	0.25	40 to 220/240	123-2232	123-2232E	123-2232LTM	
0.53	15	1.00	40 to 200/220	125-2212		125-2212LTM	
		30	0.50	40 to 200/220	125-2237		125-2237LTM
			1.00	40 to 200/220	125-2232		125-2232LTM

CP-Sil 43 CB

- Moderate polarity for specific selectivity
- Separates aromatic from aliphatic compounds
- Bonded and cross-linked for extended longevity

CP-Sil 43 CB is a chemically bonded, moderately polar column with a 25% cyanopropyl/25% phenyl/50% dimethylpolysiloxane phase for specific selectivity. It separates aromatic from aliphatic hydrocarbons and is equivalent to a OV-255 column.

CP-Sil 43 CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.25	25	0.20	45 to 200/225	CP7715	CP7715I5
	50	0.20	45 to 200/225	CP7725	CP7725I5
0.32	10	0.20	45 to 200/225	CP7735	
	25	0.20	45 to 200/225	CP7745	

DB-1301

- (6%-Cyanopropyl-phenyl) methylpolysiloxane
- Equivalent to USP Phase G43
- Low/mid-polarity
- Bonded and cross-linked
- Exact replacement of HP-1301 and HP-1701
- Solvent rinsable

DB-1301

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.18	10	0.40	-20 to 280/300	121-1313		121-1313LTM
0.25	30	0.25	-20 to 280/300	122-1332	122-1332E	122-1332LTM
		1.00	-20 to 280/300	122-1333		122-1333LTM
	60	0.25	-20 to 280/300	122-1362		
		1.00	-20 to 280/300	122-1363	122-1363E	
0.32	30	0.25	-20 to 280/300	123-1332		123-1332LTM
		1.00	-20 to 280/300	123-1333		123-1332LTM
	60	1.00	-20 to 280/300	123-1363	123-1363E	
0.53	15	1.00	-20 to 260/280	125-1312		125-1312LTM
	30	1.00	-20 to 260/280	125-1332		125-1332LTM
		1.50	-20 to 260/280	125-1333		125-1333LTM

CP-1301

- Thin film, medium polarity GC column for fast analysis
- Good reproducibility improves workflow
- Good inertness for better quality of data

The CP-1301 is a non-bonded, 6% cyanopropyl-phenyl phase that delivers lower bleed and improved column-to-column reproducibility. This medium polarity column is ideal for the analysis of herbicides, pesticides and many pharmaceutical products.

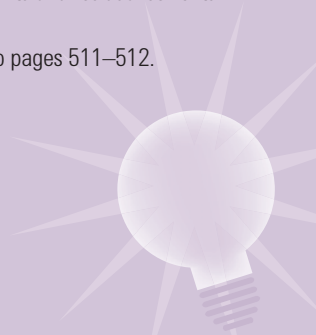
CP-1301

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.25	30	1.00	-25 to 265/280	CP8604
	60	0.25	-25 to 280/280	CP8602
		1.00	-25 to 265/280	CP8605
0.32	30	0.25	-25 to 280/280	CP8607
		1.00	-25 to 265/280	CP8610
	60	0.25	-25 to 280/280	CP8608
		1.00	-25 to 265/280	CP8611
0.53	30	1.00	-25 to 265/280	CP8613

Tips & Tools

Agilent also offers DB-624 columns for the analysis of volatile priority pollutants and residual solvents.

Turn to pages 511–512.



DB-1701

- (14%-Cyanopropyl-phenyl)-methylpolysiloxane
- Low/mid-polarity
- Bonded and cross-linked
- Exact replacement of HP-1301 and HP-1701
- Solvent rinsable

DB-1701 Chromatograms

Environmental

Organochlorine Pesticides III	Page 580
Phenoxy Acid Herbicides	Page 585

Industrial Chemicals

Acrylate Impurities II	Page 664
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Life Sciences

Fentanyl	Page 678
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DB-1701

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.10	20	0.10	-20 to 280/300	127-0722		127-0722LTM
		0.40	-20 to 280/300	127-0723		127-0723LTM
0.18	10	0.40	-20 to 280/300	121-0713		121-0713LTM
	20	0.18	-20 to 280/300	121-0722		121-0722LTM
0.25	15	0.25	-20 to 280/300	122-0712		122-0712LTM
		1.00	-20 to 280/300	122-0713		122-0713LTM
	30	0.15	-20 to 280/300	122-0731		122-0731LTM
		0.25	-20 to 280/300	122-0732	122-0732E	122-0732LTM*
		1.00	-20 to 280/300	122-0733	122-0733E	122-0733LTM
	60	0.15	-20 to 280/300	122-0761		
0.25		-20 to 280/300	122-0762			
0.50		-20 to 280/300	122-0766			
		1.00	-20 to 280/300	122-0763	122-0763E	

*Also available as LTM column toroid assembly for Agilent 5975T, 0.25 mm x 30 m, 0.25 µm, P/N 222-0732LTM

(Continued)

DB-1701

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.32	15	0.25	-20 to 280/300	123-0712		123-0712LTM
		1.00	-20 to 280/300	123-0713		123-0713LTM
	30	0.15	-20 to 280/300	123-0731		123-0731LTM
		0.25	-20 to 280/300	123-0732	123-0732E	123-0732LTM
		1.00	-20 to 280/300	123-0733	123-0733E	123-0733LTM
	50	1.00	-20 to 280/300	123-0753		
	60	0.25	-20 to 280/300	123-0762		
		1.00	-20 to 280/300	123-0763	123-0763E	
0.53	15	1.00	-20 to 260/280	125-0712	125-0712E	125-0712LTM
	30	0.25	-20 to 260/280	125-0731		125-0731LTM
		0.50	-20 to 260/280	125-0737		125-0737LTM
		1.00	-20 to 260/280	125-0732	125-0732E	125-0732LTM
		1.50	-20 to 260/280	125-0733		125-0733LTM
	60	1.00	-20 to 260/280	125-0762	125-0762E	

CP-Sil 19 CB

- Confirmation column for highly reliable results
- Bonded and cross-linked phase for longevity
- Broad range of dimensions for ultimate utility

The medium polarity, 14% cyanopropyl-phenyl/86% dimethylpolysiloxane stationary phase of the CP-Sil 19 CB column shows a different selectivity than phenyl/dimethylsiloxane based phases because of the cyano functional groups. Its long history yields many practical applications for environmental, food and beverage and pharmaceutical laboratories.

CP-Sil 19 CB

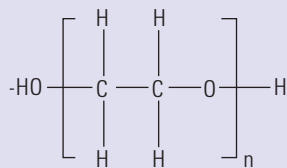
ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.10	10	0.20	-25 to 275/300	CP7331	
0.15	25	0.50	-25 to 275/300	CP7340	
0.20	25	0.20	-25 to 275/300	CP7360	
0.25	10	0.20	-25 to 275/300	CP7702	
	15	0.15	-25 to 275/300	CP8502	
		0.25	-25 to 275/300	CP8512	CP8512I5
		0.20	-25 to 275/300	CP7712	
	25	0.40	-25 to 275/300	CP7809	
		1.20	-25 to 275/300	CP7672	
30		0.25	-25 to 275/300	CP8712	CP8712I5
	1.00	-25 to 275/300	CP8562	CP8562I5	
50	0.20	-25 to 275/300	CP7722		
	0.40	-25 to 275/300	CP7819	CP7819I5	
60	0.15	-25 to 275/300	CP8592	CP8592I5	
	0.25	-25 to 275/300	CP8722		

(Continued)

CP-Sil 19 CB

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	
0.32	10	0.20	-25 to 275/300	CP7732		
	15	0.25	-25 to 275/300	CP8542	CP8542I5	
	25	0.20	0.20	-25 to 275/300	CP7742	
			0.40	-25 to 275/300	CP7829	
			1.20	-25 to 275/300	CP7762	
	30	0.25	0.25	-25 to 275/300	CP8842	
			1.00	-25 to 275/300	CP8762	
	50	0.20	0.20	-25 to 275/300	CP7752	
			0.40	-25 to 275/300	CP7839	
			1.20	-25 to 275/300	CP7772	
	60	0.15	0.15	-25 to 275/300	CP8662	
			0.25	-25 to 275/300	CP8852	
			1.00	-25 to 275/300	CP8772	CP8772I5
	0.53	10	2.00	-25 to 275/300	CP7647	
		15	0.50	-25 to 275/300	CP8663	
25		1.00	1.00	-25 to 275/300	CP7637	
			2.00	-25 to 275/300	CP7657	
30		1.00	-25 to 275/300	CP8737		
50		2.00	2.00	-25 to 275/300	CP7667	
			1.00	-25 to 275/300	CP7697	

Polyethylene Glycol (PEG) Columns



Structure of Polyethylene Glycol (PEG)

Agilent offers a full range of PEG columns. Even though each phase is based on the polyethylene glycol polymer, strict control of the cross-linking and deactivation processes result in a variety of unique phase characteristics to meet your varying analysis needs.

DB-WAX and DB-WaxFF

- Polyethylene glycol (PEG)
- Equivalent to USP Phase G16
- High polarity
- Lower temperature limit of 20°C is the lowest of any bonded PEG phase; improves resolution of low boiling point analytes
- Column-to-column reproducibility
- Bonded and cross-linked
- Exact replacement of HP-WAX
- Solvent rinsable
- DB-WaxFF is a highly reproducible, specially tested microbore DB-Wax for fragrance analysis



Tips & Tools

Ghost peaks can be caused by cored septa material accumulating in the inlet. To prevent coring, use Agilent Premium Non-Stick Septa with CenterGuide.

Turn to page 255.



DB-WAX and DB-WaxFF Chromatograms

Food, Flavors and Fragrances

FAME Standard I	Page 635
Fragrance Reference Standard II	Page 621
Lavender Oil Spiked with Camphor	Page 622
Peppermint Oil	Page 625
Spearmint Oil (Western)	Page 626
Ylang Ylang Oil II	Page 627

Industrial Chemicals

Aldehydes and Ketones	Page 648
Aromatics II	Page 651
Ethylene Oxide	Page 667
Formaldehyde Underivatized	Page 649
Glycols I	Page 655
Impurities in Styrene	Page 652
Phenols III	Page 667

DB-WAX and DB-WaxFF

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
DB-WAX							
0.05	10	0.05	20 to 250/260	126-7012		126-7012LTM	
		0.10	20 to 240/250	126-7013		126-7013LTM	222-7013LTM
0.10	10	0.10	20 to 250/260	127-7012	127-7012E	127-7012LTM	
		0.20	20 to 240/250	127-7013		127-7013LTM	
	20	0.10	20 to 250/260	127-7022		127-7022LTM	
		0.20	20 to 240/250	127-7023	127-7023E	127-7023LTM	
0.18	10	0.18	20 to 250/260	121-7012		121-7012LTM	
	20	0.18	20 to 250/260	121-7022	121-7022E	121-7022LTM	
		0.30	20 to 240/250	121-7023	121-7023E	121-7023LTM	
	40	0.18	20 to 250/260	121-7042	121-7042E		
		0.30	20 to 240/250	121-7043			
0.20	25	0.20	20 to 250/260	128-7022		128-7022LTM	
	30	0.20	20 to 250/260	128-7032		128-7032LTM	
	50	0.20	20 to 250/260	128-7052			
0.25	15	0.25	20 to 250/260	122-7012	122-7012E	122-7012LTM	
		0.50	20 to 240/250	122-7013		122-7013LTM	
	30	0.15	20 to 250/260	122-7031		122-7031LTM	
		0.25	20 to 250/260	122-7032	122-7032E	122-7032LTM	
		0.50	20 to 240/250	122-7033	122-7033E	122-7033LTM	222-7033LTM
	60	0.15	20 to 250/260	122-7061			
		0.25	20 to 250/260	122-7062	122-7062E		
		0.50	20 to 240/250	122-7063	122-7063E		
0.32	15	0.25	20 to 250/260	123-7012		123-7012LTM	
		0.50	20 to 240/250	123-7013		123-7013LTM	
	30	0.15	20 to 250/260	123-7031		123-7031LTM	
		0.25	20 to 250/260	123-7032	123-7032E	123-7032LTM	
		0.50	20 to 240/250	123-7033	123-7033E	123-7033LTM	
	60	0.25	20 to 250/260	123-7062			
		0.50	20 to 240/250	123-7063	123-7063E		
	0.45	30	0.85	20 to 230/240	124-7032		124-7032LTM
0.53	15	0.50	20 to 230/240	125-7017		125-7017LTM	
		1.00	20 to 230/240	125-7012	125-7012E	125-7012LTM	
	30	0.25	20 to 230/240	125-7031		125-7031LTM	
		0.50	20 to 230/240	125-7037		125-7037LTM	
		1.00	20 to 230/240	125-7032	125-7032E	125-7032LTM	
	60	1.00	20 to 230/240	125-7062	125-7062E		
	DB-WaxFF						
0.10	20	0.20	20 to 240/250	127-7023FF			

DB-WAXetr

- Polyethylene glycol (PEG)
- Extended Temperature Range (etr)
- High polarity
- Excellent column-to-column repeatability
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G16

DB-WAXetr Chromatograms

Industrial Chemicals

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Impurities in Mixed Xylenes	Page 668
Impurities in Styrene	Page 652
Organic Acids	Page 644
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DB-WAXetr

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.20	25	0.40	30 to 250/260	128-7323		128-7323LTM
0.25	30	0.25	30 to 260/280	122-7332	122-7332E	122-7332LTM
		0.50	30 to 250/260	122-7333		122-7333LTM
	60	0.25	30 to 260/280	122-7362		
		0.50	30 to 250/260	122-7363		
0.32	15	0.25	30 to 260/280	123-7312		123-7312LTM
		1.00	30 to 250/260	123-7314		123-7314LTM
	30	0.25	30 to 260/280	123-7332		123-7332LTM
		0.50	30 to 250/260	123-7333		123-7333LTM
	50	1.00	30 to 250/260	123-7334		123-7334LTM
		1.00	30 to 250/260	123-7354	123-7354E	
	60	0.25	30 to 260/280	123-7362		
		0.50	30 to 250/260	123-7363		
1.00		30 to 250/260	123-7364			
0.53	15	1.00	30 to 240/260	125-7312		125-7312LTM
		2.00	50 to 230/250	125-7314		125-7314LTM
	30	1.00	30 to 240/260	125-7332	125-7332E	125-7332LTM
		1.50	30 to 230/240	125-7333		125-7333LTM
	60	2.00	50 to 230/250	125-7334	125-7334E	125-7334LTM
		1.00	30 to 240/260	125-7362		

HP-INNOWax

- Polyethylene glycol (PEG)
- High polarity
- Highest upper temperature limits of the bonded PEG phases
- Column-to-column repeatability
- Bonded and cross-linked
- Solvent rinsable
- Close equivalent to USP Phase G16

HP-INNOWax Chromatograms

Food, Flavors and Fragrances

Bourbon	Page 629
Free Fatty Acids	Page 630
Perfume	Page 623
Strawberry Syrup	Page 629

Industrial Chemicals

Alcohols III	Page 642
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Free Organic Acids/C4-C5 Isomers	Page 644
Chlorinated Isooctane	Page 659
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Impurities in Ethylbenzene	Page 652

Petroleum

Aromatics Analysis – Ethylbenzene Impurities	Page 699
Aromatics Analysis – ASTM D16 Analytes	Page 699
Fast Analysis of Aromatic Solvent	Page 708
Impurities in p-Xylene – ASTM D3798	Page 700

HP-INNOWax

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.18	20	0.18	40 to 260/270	19091N-577	19091N-577E	19091N-577LTM	29091N-577LTM
0.20	25	0.20	40 to 260/270	19091N-102		19091N-102LTM	
		0.40	40 to 260/270	19091N-202		19091N-202LTM	
	50	0.20	40 to 260/270	19091N-105	19091N-105E		
		0.40	40 to 260/270	19091N-205	19091N-205E		
0.25	4	0.25	40 to 260/270	19091N-130		19091N-130LTM	
	5	0.1	40 to 260/270	19091N-330			
		0.15	40 to 260/270	19091N-030		19091N-030LTM	
	15	0.1	40 to 260/270	19091N-331			
		0.25	40 to 260/270	19091N-131	19091N-131E	19091N-131LTM	
		0.50	40 to 260/270	19091N-231		19091N-231LTM	
	30	0.15	40 to 260/270	19091N-033		19091N-033LTM	
		0.25	40 to 260/270	19091N-133	19091N-133E	19091N-133LTM	29091N-133LTM
		0.50	40 to 260/270	19091N-233	19091N-233E	19091N-233LTM	
	60	0.15	40 to 260/270	19091N-036			
0.25		40 to 260/270	19091N-136	19091N-136E			
0.50		40 to 260/270	19091N-236				
0.32	15	0.25	40 to 260/270	19091N-111		19091N-111LTM	
	30	0.15	40 to 260/270	19091N-013		19091N-013LTM	
		0.25	40 to 260/270	19091N-113	19091N-113E	19091N-113LTM	
		0.50	40 to 260/270	19091N-213	19091N-213E	19091N-213LTM	
	60	0.25	40 to 260/270	19091N-116			
0.50		40 to 260/270	19091N-216	19091N-216E			
0.53	15	1.00	40 to 240/250	19095N-121	19095N-121E	19095N-121LTM	
	30	1.00	40 to 240/250	19095N-123	19095N-123E	19095N-123LTM	
	60	1.00	40 to 240/250	19095N-126			

CP-Wax 52 CB

- For enhanced column lifetime and better detection limits
- High polarity provides wide application area
- Broad temperature range for enhanced productivity

The CP-Wax 52 CB column has a lower minimum temperature and a higher maximum temperature than non-bonded polyethylene glycols due to extensive cross-linking, delivering higher resolution of low boiling point analytes. With guaranteed reproducibility and excellent temperature stability, CP-Wax 52 CB is ideal for EPA and ASTM methods.

We recommend the UltiMetal column when working in rugged environments with process or portable instruments.

CP-Wax 52 CB

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	
0.10	10	0.10	20 to 250/265	CP7334	CP7334I5	
		0.20	20 to 250/265	CP7335		
0.15	15	0.15	20 to 250/265	CP7791	CP7791I5	
	25	0.25	20 to 250/265	CP7792	CP7792I5	
0.20	25	0.20	20 to 250/265	CP7765		
		0.20	20 to 250/265	CP7775		
		0.20	20 to 250/265	CP7785		
0.25	10	0.20	20 to 250/265	CP7703		
	15	0.25	20 to 250/265	CP8513		
		0.20	20 to 250/265	CP7713	CP7713I5	
	30	1.20	0.20	20 to 250/265	CP7673	CP7673I5
			0.15	20 to 250/265	CP8745	
			0.25	20 to 250/265	CP8713	CP8713I5
	50	0.50	0.20	20 to 250/265	CP8746	CP8746I5
			0.20	20 to 250/265	CP7723	CP7723I5
			0.25	20 to 250/265	CP8723	CP8723I5
	60	0.50	20 to 250/265	CP8748		

(Continued)

CP-Wax 52 CB

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.32	10	0.20	20 to 250/265	CP7733	CP773315
		1.00	20 to 250/265	CP7628	
	15	0.15	20 to 250/265	CP8533	
		0.25	20 to 250/265	CP8543	
		0.50	20 to 250/265	CP8553	
	25	0.20	20 to 250/265	CP7743	
		0.40	20 to 250/265	CP7879	
		1.20	20 to 250/265	CP7763	CP776315
	30	0.25	20 to 250/265	CP8843	CP884315
		0.50	20 to 250/265	CP8763	CP876315
	50	0.20	20 to 250/265	CP7753	CP775315
		0.40	20 to 250/265	CP7889	
1.20		20 to 250/265	CP7773	CP777315	
60	0.25	20 to 250/265	CP8853		
	0.50	20 to 250/265	CP8773		
	1.20	20 to 250/265	CP8073	CP807315	
0.53	10	2.00	20 to 250/265	CP7648	
	15	1.00	20 to 250/265	CP8718	
	25	1.00	20 to 250/265	CP7638	
		2.00	20 to 250/265	CP7658	CP765815
	30	1.00	20 to 250/265	CP8738	CP873815
	50	1.00	20 to 250/265	CP7698	CP769815
		2.00	20 to 250/265	CP7668	
	60	1.00	20 to 250/265	CP8798	
	100	2.00	20 to 250/265	CP7678	

CP-Wax 52 CB UltiMetal

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.53	10	0.50	20 to 250/275	CP7128
		1.00	20 to 250/275	CP7148
		2.00	20 to 250/275	CP7177
	25	0.50	20 to 250/275	CP7138
		1.00	20 to 250/275	CP7158
		2.00	20 to 250/275	CP7178
	50	0.50	20 to 250/275	CP7198
		1.00	20 to 250/275	CP7168
		2.00	20 to 250/275	CP7179

DB-FFAP

- Nitroterephthalic acid modified polyethylene glycol
- High polarity
- Temperature range from 40°C to 250°C
- Designed for the analysis of volatile fatty acids and phenols
- Replaces OV-351
- Bonded and cross-linked
- Solvent rinsable
- Close equivalent to USP Phase G35

We do not recommend the use of water or methanol to rinse DB-FFAP GC columns.

DB-FFAP Chromatograms

Food, Flavors and Fragrances

Organic Acids Page 631

Life Sciences

Aspirin and Ibuprofen in Methanol Page 680

DB-FFAP

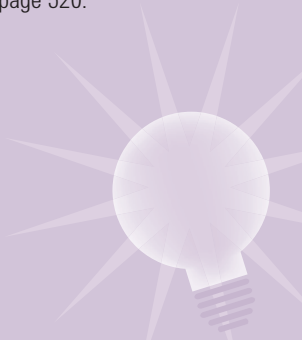
ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.10	10	0.10	40 to 250	127-3212		127-3212LTM	
	15	0.10	40 to 250	127-32H2		127-32H2LTM	
0.25	15	0.25	40 to 250	122-3212		122-3212LTM	222-3212LTM
	30	0.25	40 to 250	122-3232	122-3232E	122-3232LTM	222-3232LTM
		0.50	40 to 250	122-3233		122-3233LTM	
	60	0.25	40 to 250	122-3262	122-3262E		
		0.50	40 to 250	122-3263			

DB-FFAP

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.32	15	0.25	40 to 250	123-3212		123-3212LTM	
	25	0.50	40 to 250	123-3223		123-3223LTM	
	30	0.25	40 to 250	123-3232	123-3232E	123-3232LTM	
		0.50	40 to 250	123-3233		123-3233LTM	
		1.00	40 to 250	123-3234		123-3234LTM	
	50	0.50	40 to 250	123-3253			
	60	0.25	40 to 250	123-3262			
		0.50	40 to 250	123-3263			
		1.00	40 to 250	123-3264			
0.45	30	0.85	40 to 250	124-3232		124-3232LTM	
0.53	10	1.00	40 to 250	125-32H2		125-32H2LTM	
	15	0.50	40 to 250	125-3217		125-3217LTM	
		1.00	40 to 250	125-3212		125-3212LTM	
	30	0.25	40 to 250	125-3231		125-3231LTM	
		0.50	40 to 250	125-3237		125-3237LTM	
		1.00	40 to 250	125-3232	125-3232E	125-3232LTM	
		1.50	40 to 250	125-3233		125-3233LTM	
	60	1.00	40 to 250	125-3262			

Tips & Tools

Agilent also offers CAM columns for amine analysis. Turn to page 520.

**HP-FFAP**

- Nitroterephthalic acid modified polyethylene glycol
- High polarity
- Temperature range from 60°C to 240/250°C (230/240°C for 0.53 mm)
- Designed for the analysis of volatile fatty acids and phenols
- Replaces OV-351
- Bonded and cross-linked
- Solvent rinsable
- Close equivalent to USP Phase G35

We do not recommend the use of water or methanol to rinse HP-FFAP GC columns.

HP-FFAP Chromatograms**Food, Flavors and Fragrances**

Alcohol Beverage Standard Page 628

Industrial Chemicals

Acrylates Page 664

Ethoxyethanol Page 644

HP-FFAP

ID (mm)	Length Film		Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
	(m)	(μ m)				
0.20	25	0.30	60 to 240/250	19091F-102	19091F-102E	19091F-102LTM
	50	0.30	60 to 240/250	19091F-105	19091F-105E	
0.25	30	0.25	60 to 240/250	19091F-433	19091F-433E	19091F-433LTM
0.32	25	0.50	60 to 240/250	19091F-112	19091F-112E	19091F-112LTM
	30	0.25	60 to 240/250	19091F-413		19091F-413LTM
	50	0.50	60 to 240/250	19091F-115	19091F-115E	
0.53	10	1.00	60 to 240	19095F-121		19095F-121LTM
	15	1.00	60 to 240	19095F-120	19095F-120E	19095F-120LTM
	30	1.00	60 to 240	19095F-123	19095F-123E	19095F-123LTM

CP-Wax 58 FFAP CB

- Highest polarity bonded wax column for more productivity when analyzing polar compounds
- Chemically-bonded for enhanced longevity
- High inertness provides excellent peak shapes for highest accuracy

The phase of the CP-Wax 58 FFAP CB column is a nitroterephthalic acid-modified, chemically bonded polyethylene glycol. It is designed for the analysis of acidic compounds, such as phenols, underivatized and derivatized free fatty acids.

CP-Wax 58 FFAP CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.20	25	0.30	20 to 250/275	CP7787	CP7787I5
	50	0.30	20 to 250/275	CP7797	
0.25	25	0.20	20 to 250/275	CP7717	CP7717I5
	50	0.20	20 to 250/275	CP7727	
0.32	25	0.20	20 to 250/275	CP7747	CP7747I5
		1.20	20 to 250/275	CP7767	
	50	0.20	20 to 250/275	CP7757	
		0.50	20 to 250/275	CP7778	
0.53	15	0.50	20 to 250/275	CP7665	
		1.00	20 to 250/275	CP7614	CP7614I5
	25	2.00	20 to 250/275	CP7654	
		1.00	20 to 250/275	CP7624	
		2.00	20 to 250/275	CP7664	

CP-Wax 57 CB

- Unique high polarity wax column enhances productivity
- 100% chemically-bonded polyethylene glycol for excellent longevity
- Excellent peak shape for alcohols and glycols for accurate results

The CP-Wax 57 CB column has a unique selectivity, especially for the analysis of alcohols in the brewing and wines/spirits industry. The high inertness of this column offers excellent peak shapes for these very polar compounds, ensuring high precision. The 0.15 mm ID version offers a significant gain in analysis speed.

CP-Wax 57 CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.15	15	0.12	20 to 200/225	CP97711	CP9771115
	30	0.12	20 to 200/225	CP97721	
0.25	25	0.20	20 to 200/225	CP97713	
	50	0.20	20 to 200/225	CP97723	CP9772315
	60	0.40	20 to 200/225	CP8120	
0.32	25	0.20	20 to 200/225	CP97743	
		1.20	20 to 200/225	CP97763	CP9776315
	50	0.20	20 to 200/225	CP97753	CP9775315
		1.20	20 to 200/225	CP97773	CP9777315
0.53	25	1.00	20 to 200/225	CP97638	CP9763815
	25	2.00	20 to 200/225	CP97658	CP9765815



PLOT Columns

PLOT columns are ideal for separating compounds that are gases at room temperatures. Agilent Technologies offers a comprehensive line of PLOT columns for analysis of fixed gases, low molecular weight hydrocarbon isomers, volatile polar compounds and reactive analytes such as sulfur gases, amines and hydrides. Our PLOT phases are offered in dimensions from 0.25 to 0.53 mm ID, allowing for easy column selection for various detector and system requirements. For GC/MS systems, we offer several small diameter columns with truly bonded and immobilized stationary phases, eliminating potential detector fouling due to particle generation.

CP-PoraBOND Q

- Bonded PLOT column for more reliable results
- Extended analysis of hydrocarbons for broader application range
- Increased maximum temperature for greater productivity

CP-PoraBOND Q is the long-term solution for analyzing volatile solvents and hydrocarbons. It is the most stable column of its kind and withstands repeated later injections. Due to our manufacturing techniques, the porous polymer is very pure and has virtually no catalytic activity, allowing temperatures up to 320°C without decomposition.

The use of bonding technology in the CP-PoraBOND Q also reduces the presence of loose particles that cause detector spiking, so there is no need for particle traps.

CP-PoraBOND Q Chromatograms

Industrial Chemicals

Analysis of solvents

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CP-PoraBOND Q

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	10	3.00	-100 to 300/300	CP7347	CP734715
	25	3.00	-100 to 300/320	CP7348	CP734815
0.32	10	5.00	-100 to 300/320	CP7350	CP735015
	25	5.00	-100 to 300/320	CP7351	CP735115
	50	5.00	-100 to 300/320	CP7352	CP735215
0.53	10	10.00	-100 to 300/320	CP7353	CP735315
	25	10.00	-100 to 300/320	CP7354	CP735415
	50	10.00	-100 to 300/320	CP7355	

CP-PoraBOND U

- Increased maximum temperature widens application range
- Reduced bleed delivers lower detection limits and more accurate results
- Bonded PLOT phase for longevity

CP-PoraBOND U is a highly stable polar-bonded porous polymer with the maximum temperature extended from 190°C to 300°C. The reduction of bleed provides lower detection limits and faster stabilization times. Because the porous polymer is bonded to the column, the CP-PoraBOND U is ideal for use with pressure programs, GC/MS applications and valve switching.

CP-PoraBOND U

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.25	10	3.00	-100 to 300/300	CP7347

CP-PoraPLOT Q and CP-PoraPLOT Q-HT

- Analysis of polar and non-polar volatile compounds delivers broad applicability
- Water elutes as a sharp peak and can therefore be quantified, improving productivity
- Repeatable retention times for long-term stability that enhances efficiency

CP-PoraPLOT Q

CP-PoraPLOT Q is recommended for column switching systems that analyze polar and apolar volatile compounds. Water elutes as a sharp and quantifiable peak. In addition, retention times are repeatable, as retention is not influenced by water in the sample.

CP-PoraPLOT Q Chromatograms

Petroleum

Analysis of gases C1 to C4

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CP-PoraPLOT Q

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.25	10	8.00	-100 to 250/250	CP7548	
	25	8.00	-100 to 250/250	CP7549	CP754915
0.32	10	10.00	-100 to 250/250	CP7550	CP755015
	25	10.00	-100 to 250/250	CP7551	CP755115
	50	10.00	-100 to 250/250	CP7552	
0.53	10	20.00	-100 to 250/250	CP7553	CP755315
	25	20.00	-100 to 250/250	CP7554	CP755415
	50	20.00	-100 to 250/250	CP7555	

CP-PoraPLOT Q UltiMetal

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.53	10	20.00	-100 to 250/250	CP6953	CP695315
	25	20.00	-100 to 250/250	CP6954	CP695415
	50	20.00	-100 to 250/250	CP6955	

CP-PoraPLOT Q-HT

CP-PoraPLOT Q-HT is the high temperature version of CP-PoraPLOT Q, offering the same benefits but operating up to 290 $^{\circ}\text{C}$.

CP-PoraPLOT Q-HT

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.32	10	10.00	-100 to 290/290	CP7556	
	25	10.00	-100 to 290/290	CP7557	CP755715
0.53	10	20.00	-100 to 290/290	CP7558	CP755815
	25	20.00	-100 to 290/290	CP7559	CP755915

HP-PLOT Q

- Bonded polystyrene-divinylbenzene based column
- Polarity between Porapak-Q and Porapak-N
- Excellent column for C₁ to C₃ isomers and alkanes to C₁₂, CO₂, methane, air/CO, oxygenated compounds, sulfur compounds and solvents
- Replaces packed gas-solid columns
- Separates ethane, ethylene and ethyne (acetylene)
- Improved resolution in less time than conventional packed columns
- Minimal conditioning time required – 1 hour
- Preferred "Q" column due to its robust nature

HP-PLOT Q Chromatograms

Environmental

N ₂ O I	Page 615
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Petroleum

Baseline Resolution of Air/CO, CO ₂ , and Methane in a Natural Gas Sample	Page 687
Ethylene Oxide Synthetic Standard	Page 700
Oxygenates	Page 700

HP-PLOT Q

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7890/6890		
				7 in. Cage	5 in. Cage	LTM Module
0.32	15	20.00	-60 to 270/290	19091P-Q03		19091P-Q03LTM
	30	20.00	-60 to 270/290	19091P-Q04	19091P-Q04E	19091P-Q04LTM
0.53	15	40.00	-60 to 270/290	19095P-Q03	19095P-Q03E	19095P-Q03LTM
	30	40.00	-60 to 270/290	19095P-Q04	19095P-Q04E	19095P-Q04LTM

GS-Q

- Porous divinylbenzene homopolymer
- Polarity between Porapak-Q and Porapak-N
- Separates ethane, ethylene and ethyne (acetylene)
- Not recommended for quantification of polar compounds
- Minimal conditioning time required – 1 hour

GS-Q Chromatograms

Petroleum

Sulfur Gas Analysis in Light Hydrocarbon Streams II

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GS-Q

ID (mm)	Length (m)	Temp Limits (°C)	Temp Limits		7890/6890 LTM Module
			7 in. Cage	5 in. Cage	
0.32	10	-60 to 250	113-3432	113-3432E	113-3432LTM
0.53	10	-60 to 250	115-34H2		115-34H2LTM
	15	-60 to 250	115-3412		115-3412LTM
	25	-60 to 250	115-3422		115-3422LTM
	30	-60 to 250	115-3432	115-3432E	115-3432LTM

CP-PoraPLOT U and CP-PoraPLOT S

- Symmetrical peaks from polar and non-polar volatiles for ultimate accuracy
- Minimal particle loss reduces detector spiking for reliable results
- Repeatable retention times for better long-term stability

CP-PoraPLOT U

CP-PoraPLOT U provides symmetrical peaks with polar volatiles. Water has no effect on retention times and elutes as a sharp and quantifiable peak. CP-PoraPLOT U is the most polar porous polymer PLOT column and is designed for halogenated compounds, hydrocarbons C1-C6, ketones and solvents.

CP-PoraPLOT U Chromatograms

Industrial Chemicals

Sulfur gases

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CP-PoraPLOT U

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.25	25	8.00	-100 to 190/190	CP7579	
0.32	10	10.00	-100 to 190/190	CP7580	
	25	10.00	-100 to 190/190	CP7581	
0.53	10	20.00	-100 to 190/190	CP7583	CP758315
	25	20.00	-100 to 190/190	CP7584	CP758415

CP-PoraPLOT S

CP-PoraPLOT S is a divinylbenzene/vinylpyridine polymer for hydrocarbons and ketones. This phase is ideal for the analysis of medium polarity volatiles, including hydrocarbons and ketones, at higher temperatures than CP-PoraPLOT U.

CP-PoraPLOT S

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.53	25	20.00	-100 to 250/250	CP7574	CP757415

HP-PLOT U

- Bonded divinylbenzene/ethylene glycol dimethacrylate
- More polar than HP-PLOT Q
- Excellent column for C_1 to C_7 hydrocarbons, CO_2 , methane, air/ CO , water, oxygenates, amines, solvents, alcohols, ketones, and aldehydes
- Improved resolution in less time than conventional packed columns

HP-PLOT U

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.32	30	10	-60 to 190	19091P-U04	19091P-U04E	19091P-U04LTM
0.53	15	20	-60 to 190	19095P-U03		19095P-U03LTM
	30	20	-60 to 190	19095P-U04	19095P-U04E	19095P-U04LTM

HP-PLOT Al₂O₃ KCl

- Least "polar" Alumina phase
- Aluminum oxide deactivated with KCl
- Standard column choice for light hydrocarbon analysis – C₁ to C₈ hydrocarbon isomers
- Low retention of olefins relative to comparable paraffin
- Excellent for quantitation of dienes, especially propadiene and butadiene from ethylene and propylene streams
- Recommended phase for many ASTM methods
- Preferred KCl deactivated Alumina

HP-PLOT Al₂O₃ KCl

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890
						LTM Module
0.25	30	5.00	-60 to 200	19091P-K33	19091P-K33E	19091P-K33LTM
0.32	50	8.00	-60 to 200	19091P-K15	19091P-K15E	
0.53	30	15	-60 to 200	19095P-K23		19095P-K23LTM
	50	15	-60 to 200	19095P-K25	19095P-K25E	

GS-Alumina KCl

- Least "polar" Alumina phase
- Aluminum oxide deactivated with KCl
- Good choice for light hydrocarbon analysis
- Good resolution of propadiene and butadiene from ethylene and propylene streams

GS-Alumina KCl Chromatograms

Petroleum

Impurities in Ethylene	Page 688
Impurities in Propylene	Page 689

GS-Alumina KCl

ID (mm)	Length (m)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890
					LTM Module
0.53	30	-60 to 200	115-3332		115-3332LTM
	50	-60 to 200	115-3352	115-3352E	



CP-Al₂O₃/KCl and CP-Al₂O₃/Na₂SO₄

- High analytical capacity improves efficiency
- No need for sub-ambient cooling simplifies operation
- Choice of two polarities for a broad range of applications

Aluminum oxide PLOT columns offer high selectivity for separating ppm levels of C₁ to C₅ hydrocarbons in a main stream of C₁ to C₅ hydrocarbons. These columns analyze more compounds in a single run than packed columns, while still delivering higher resolution and faster analysis times. When compared to liquid stationary phases, the CP-Al₂O₃ PLOT column offers increased selectivity and allows all C₁ to C₅ hydrocarbon isomers to be separated. CP-Al₂O₃ operates without the need for sub-ambient cooling and is available in two unique selectivities.

Selectivity Through KCl or Na₂SO₄ Deactivation

Aluminum oxide PLOT columns are deactivated using very small salt crystals, providing a reproducible and stable deactivation up to 200°C. Depending on the type of deactivation salt, the CP-Al₂O₃ PLOT column will show a particular selectivity. The KCl salt results in a relatively apolar Al₂O₃ surface, while Na₂SO₄ deactivation provides a polar surface. Unsaturated compounds such as ethylene and acetylene (ethyne) are retained longer.

CP-Al₂O₃/Na₂SO₄

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	25	4.00	-100 to 200/200	CP7586	
	50	4.00	-100 to 200/200	CP7587	
0.32	10	5.00	-100 to 200/200	CP7561	
	50	5.00	-100 to 200/200	CP7565	CP7565I5
0.53	25	10.00	-100 to 200/200	CP7567	
	50	10.00	-100 to 200/200	CP7568	

CP-Al₂O₃/Na₂SO₄ UltiMetal

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage
0.53	50	10.00	-100 to 200/200	CP6968

CP-Al₂O₃/KCl

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	25	4.00	-100 to 200/200	CP7576	
	50	4.00	-100 to 200/200	CP7577	CP7577I5
0.32	10	5.00	-100 to 200/200	CP7511	CP7511I5
	25	5.00	-100 to 200/200	CP7515	CP7515I5
	50	5.00	-100 to 200/200	CP7519	CP7519I5
0.53	10	10.00	-100 to 200/200	CP7516	
	25	10.00	-100 to 200/200	CP7517	
	50	10.00	-100 to 200/200	CP7518	

CP-Al₂O₃/KCl UltiMetal

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage
0.53	50	10.00	-100 to 200/200	CP6918

HP-PLOT Al₂O₃ S

- Middle range of "polarity" for Alumina phases
- Aluminum oxide deactivated with sodium sulfate
- Excellent general use column for light hydrocarbon analysis – C₁ to C₈ hydrocarbon isomers
- Best for resolving acetylene from butane and propylene from isobutane

HP-PLOT Al₂O₃ S Chromatograms

Petroleum

Ethylene	Page 688
Natural Gas	Page 687

HP-PLOT Al₂O₃ S

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.25	30	5.00	-60 to 200	19091P-S33		19091P-S33LTM
0.32	25	8.00	-60 to 200	19091P-S12		19091P-S12LTM
	50	8.00	-60 to 200	19091P-S15	19091P-S15E	
0.53	15	15.00	-60 to 200	19095P-S21		19095P-S21LTM
	30	15.00	-60 to 200	19095P-S23		19095P-S23LTM
	50	15.00	-60 to 200	19095P-S25	19095P-S25E	





GS-Alumina

- Most "polar" Alumina phase
- Aluminum oxide with proprietary deactivation
- Excellent general use column for light hydrocarbon analysis – C₁ to C₈ hydrocarbon isomers
- Separates C₁ to C₄ saturated and unsaturated hydrocarbons
- Best for resolving cyclopropane from propylene
- Faster, more efficient and provides more sensitivity than packed equivalents
- Minimal conditioning time required
- Preferred substitution for sodium sulfate deactivated Alumina because of its regenerative nature

Note: Alumina columns have a tendency to adsorb water and CO₂ which, over time, results in changes in retention time. We use an advanced, proprietary deactivation process which allows for rapid regeneration. Fully water saturated GS-Alumina columns regenerate in 7 hours or less at 200°C.

GS-Alumina Chromatograms

Petroleum

1,3-Butadiene Purity	Page 691
Extended Hydrocarbon Analysis I	Page 692
Propylene	Page 689

GS-Alumina

ID (mm)	Length (m)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890
					LTM Module
0.53	30	-60 to 200	115-3532	115-3532E	115-3532LTM
	50	-60 to 200	115-3552		

HP-PLOT Al₂O₃ M

- Most "polar" Alumina phase (similar to GS-Alumina)
- Aluminum oxide deactivated with proprietary deactivation
- Good general use column for light hydrocarbon analysis – C₁ to C₈ hydrocarbon isomers
- Good for resolving acetylene from butane and propylene from isobutane

HP-PLOT Al₂O₃ M

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.32	50	8.00	-60 to 200	19091P-M15	19091P-M15E	
0.53	30	15.00	-60 to 200	19095P-M23		19095P-M23LTM
	50	15.00	-60 to 200	19095P-M25		

GS-GasPro

- Unique bonded silica PLOT column technology
- Excellent choice for light hydrocarbons and sulfur gases
- Retention stability not affected by water
- Separates CO and CO₂ on a single column
- Ideal PLOT column for GC/MS – no particles

GS-GasPro Chromatograms

Environmental

C1 and C2 Halocarbons (Freons)	Page 614
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Industrial Chemicals

Halocarbons	Page 667
Halothane	Page 668
Inorganic Gases	Page 669

Petroleum

Extended Hydrocarbon Analysis II	Page 693
Mercaptans	Page 697
Sulfur Compounds in Propylene (1 ppm)	Page 697
Sulfur Gas Analysis in Light Hydrocarbon Streams I	Page 695

GS-GasPro

ID (mm)	Length (m)	Temp Limits (°C)	7 in. Cage
0.32	5	-80 to 260/300	113-4302
	15	-80 to 260/300	113-4312
	30	-80 to 260/300	113-4332
	60	-80 to 260/300	113-4362

CP-SilicaPLOT

- No influence of water on retention times for robust methodology
- Elution of CO₂ and sulfur gases at ppm levels for improved productivity
- Separates cyclopropane from propylene for accurate results

CP-SilicaPLOT brings the benefits of capillary PLOT columns (higher efficiency and faster analysis time) to many applications that previously could only be done by packed columns. It is ideal for COS in ethylene, freons/CFCs, hydrocarbons, propylene and sulfur gases. The column offers high selectivity of C₁ to C₄ isomers in the presence of water, with water having no influence on retention times. CP-SilicaPLOT elutes CO₂ and sulfur gases at ppm levels and separates cyclopropane from propylene. Decomposition of pentadienes or CFCs is absent.

CP-SilicaPLOT Chromatograms

Environmental

Halogenated hydrocarbons C1 to C2

Page 610

CP-SilicaPLOT

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	30	3.00	-80 to 225/225	CP8564	
	60	3.00	-80 to 225/225	CP8565	
0.32	10	4.00	-80 to 225/225	CP8574	
	15	4.00	-80 to 225/225	CP8566	CP856615
	30	4.00	-80 to 225/225	CP8567	CP856715
	60	4.00	-80 to 225/225	CP8568	CP856815
0.53	30	6.00	-80 to 225/225	CP8570	CP857015
	60	6.00	-80 to 225/225	CP8571	

CP-CarboBOND and CP-CarboPLOT P7

- Single column solution for ASTM D 2505 for higher productivity
- Stable and robust for high repeatability of results
- Available in bonded and PLOT versions for improved versatility and enhanced productivity

These carbon-based PLOT columns offer a simplified solution for ASTM D 2505, which describes the measurement of ppm CO and CO₂ in ethylene and propylene streams. Compared to a multi-packed column system, the analysis is performed on a single column, providing higher sample throughputs and reduced system maintenance.

CP-CarboBOND

For hydrocarbons in ethylene and trace gases in ethylene and propylene, He, Xe, CO, Ne, CH₄, CO₂, O₂/Ar, N₂, Kr, and hydrocarbons C₂ and C₃ (ASTM D 2505). The bonded CP-CarboBOND offers significant improvement in column stability with a maximum temperature of 300°C, reducing cycle times by speeding up the elution of high boiling contaminants. Retention times are repeatable because water has no influence on retention. High stability makes this bonded PLOT column equally suited for both laboratory and online applications.

CP-CarboBOND

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.53	25	5.00	-100 to 200/300	CP7371
		10.00	-100 to 200/300	CP7374
	50	5.00	-100 to 200/300	CP7372
		10.00	-100 to 200/300	CP7375

CP-CarboPLOT P7

For the separation of N₂, O₂, CO, CO₂, He, Xe, Ne, CH₄, O₂/Ar, Kr and C₁ to C₂ hydrocarbons, such as C₂H₆, C₂H₄, C₂H₂. CP-CarboPLOT is recommended in cases where air or oxygen are present. The high separation efficiency of the column is revealed in the separation of CO from nitrogen peak, allowing CO to be determined at ppm levels. Because the CP-CarboPLOT P7 column exhibits a specific retention for CO and CO₂, it is possible to analyze both compounds in one run in the presence of air.

CP-CarboPLOT P7

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.53	10	25.00	-200 to 115/115	CP7513
	25	25.00	-200 to 115/115	CP7514

GS-CarbonPLOT

- High stability, bonded carbon layer stationary phase
- Unique selectivity for inorganic and organic gases
- Extended temperature limit of 360°C
- Ideal for GC/MS – no particle generation
- Retention stability not affected by water

GS-CarbonPLOT Chromatograms

Environmental

N2O III

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GS-CarbonPLOT

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	7890/6890
					LTM Module
0.32	15	1.50	0 to 360	113-3112	113-3112LTM
	30	1.50	0 to 360	113-3132	113-3132LTM
		3.00	0 to 360	113-3133	113-3133LTM
	60	1.50	0 to 360	113-3162	
0.53	15	3.00	0 to 360	115-3113	115-3113LTM
	30	3.00	0 to 360	115-3133	115-3133LTM

HP-PLOT Molesieve

- A PLOT column for the analysis of permanent gases
- O₂, N₂, CO and CH₄ resolve in less than 5 minutes
- Durable molecular sieve 5Å coating minimizes baseline spiking and damage to multiport valves
- Select a thick film for Ar/O₂ separation without cryogenic cooling
- Select thin film HP-PLOT Molesieve columns for routine air monitoring applications
- Replaces GS-Molesieve

Note: Molecular sieve columns will absorb water which, over time, results in changes in retention time. We use an advanced, proprietary deactivation process which allows for rapid regeneration. Fully saturated HP-PLOT Molesieve columns regenerate in 7 hours or less at 200°C.

HP-PLOT Molesieve Chromatograms

Environmental

N2O II Page 615

Petroleum

Noble Gases Page 686

Permanent Gases Page 687

HP-PLOT Molesieve

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage		7890/6890
				5 in. Cage	LTM Module	
0.32	15	25.00	-60 to 300	19091P-MS7		19091P-MS7LTM
		30	12.00	-60 to 300	19091P-MS4	19091P-MS4E
	25.00		-60 to 300	19091P-MS8		19091P-MS8LTM
0.53	15	25.00	-60 to 300	19095P-MS5		19095P-MS5LTM
		50.00	-60 to 300	19095P-MS9		19095P-MS9LTM
	30	25.00	-60 to 300	19095P-MS6	19095P-MS6E	19095P-MS6LTM
		50.00	-60 to 300	19095P-MS0	19095P-MS0E	19095P-MS0LTM

CP-Molsieve 5Å

- Separate argon and oxygen at ambient temperature to reduce costs
- High efficiency for increased productivity
- Symmetrical peaks for accurate results

This molecular-sieve coated capillary column is especially valuable when separating permanent gases. Analysis times are reduced by up to 75% compared to packed columns. On the CP-Molsieve 5Å, baseline separation of Ar/O₂ is achieved at ambient temperatures. The column's thin layer dimensions produce fast elution of CO with symmetrical peaks. High resolution analysis of permanent gases is assured.

CP-Molsieve 5Å Chromatograms

Environmental

Permanent gases on a thick film Molsieve column

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CP-Molsieve 5Å

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	25	30.00	-200 to 350/350	CP7533	
0.32	10	30.00	-200 to 350/350	CP7535	CP7535I5
	25	30.00	-200 to 350/350	CP7536	CP7536I5
	30	10.00	-200 to 350/350	CP7534	CP7534I5
	50	30.00	-200 to 350/350	CP7540	CP7540I5
0.53	10	50.00	-200 to 350/350	CP7537	
	15	15.00	-200 to 350/350	CP7543	
	25	50.00	-200 to 350/350	CP7538	CP7538I5
	30	15.00	-200 to 350/350	CP7544	CP7544I5
	50	50.00	-200 to 350/350	CP7539	

CP-Molsieve 5Å UltiMetal

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.53	10	50.00	-200 to 350/350	CP6937	CP6937I5
	25	50.00	-200 to 350/350	CP6938	CP6938I5

CP-PoraPLOT Amines

- Guaranteed performance for volatile amines providing ease-of-use
- Very high efficiency at temperatures above ambient for lower cost per analysis
- High sensitivity for amines and ammonia for accurate results

CP-PoraPLOT Amines is a unique column specially designed for the high retention analysis of very volatile amines.

CP-PoraPLOT Amines

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.32	25	10.00	-100 to 220/220	CP7591	CP759115
0.53	25	20.00	-100 to 220/220	CP7594	

Particle Traps for Use with PLOT Columns

Though highly stabilized, it is impossible to guarantee that no particles will dislodge from the column wall. When used in valve-switching applications, the use of a particle trap can prevent scarring of the rotors.

Particle Traps for Use with PLOT Columns

ID (mm)	Length (m)	Part No.
0.32	2.5	5181-3351
0.53	2.5	5181-3352

Particle Traps for PoraPLOT Columns

ID (mm)	Length (m)	Material	Part No.
0.32	2.5	Fused Silica	CP4016
0.53	2.5	Fused Silica	CP4017
0.53	2.5	UltiMetal	CP4018*

*Includes CP-UltiMetal connector

Particle Trap Connectors for PoraPLOT Columns

ID (mm)	Material	Unit	Part No.
0.25/0.32	Fused Silica	10/pk	CP4788
0.53	Fused Silica	10/pk	CP4789
0.25	UltiMetal	5/pk	CP4795
0.53	UltiMetal	5/pk	CP4796

Special Application Columns

Agilent chemists have developed many columns with unique characteristics designed to solve the most difficult separation problems of a given method. As a result, we offer a comprehensive line of specialty columns for a variety of applications to enhance the standard phase portfolio. From columns for volatiles to pesticides to petrochemical and more – Agilent exceeds standard QA/QC procedures for the manufacturing and testing of all of our specialty columns to ensure they meet the stringent demands for their application. These columns offer reliable, accurate results with the shortest run times possible on complex sample lists and matrices.



Biodiesel Capillary GC Columns

Biofuels are becoming more attractive as a viable supplement or alternative to petroleum-based fuels. Agilent J&W Biodiesel Capillary GC columns are purposely designed and application-optimized for the analysis of biodiesel to meet ASTM and CEN testing standards.

Biodiesel EN14105 Free/Total Glycerin and Biodiesel ASTM D6584 Free/Total Glycerin

- Designed for the analysis of free and total glycerin in B100 according to EN14105 or ASTM D6584
- Specially processed for extended temperature limit of 400°C
- High temperature, polyimide-coated fused silica tubing
- Excellent peak shape and extended column life
- Bonded and cross-linked
- Solvent rinsable
- Retention gaps please order P/N 160-BD65-5 (5 m x 0.53 mm)

Biodiesel EN14103 FAME Analysis

- Specially designed for the analysis of esters and linoleic acid methyl esters in B100 using EN14103
- Bonded and cross-linked
- Solvent rinsable

Biodiesel EN14110 Residual Methanol

- Specially designed for the determination of trace methanol in B100 using EN14110
- Bonded and cross-linked
- Solvent rinsable

Biodiesel Capillary GC Columns

Description	ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
Biodiesel ASTM D6584 Free/Total Glycerin	0.32	15	0.10	-60 to 400	123-BD11
Biodiesel EN14105 Free/Total Glycerin	0.32	10	0.10	-60 to 400	123-BD01
Biodiesel EN14103 FAME Analysis	0.32	30	0.25	40 to 260/270	1909BD-113
Biodiesel EN14110 Residual Methanol	0.32	30	1.80	20 to 260/280	123-BD34

Biodiesel Test Samples

Description	Part No.
Biodiesel MSTFA kit, 10 x 1 mL ampoules, N-Methyl-N-(trimethylsilyl)trifluoro-acetamide for ASTM method D6584	5190-1407
Biodiesel D6584 kit 2 internal standard solutions, 1 mL, 5/µk and 2 internal standard solutions, 5 mL	5190-1408
Biodiesel E14105 kit, 4 x 1 mL ampoules 4 standard solutions	5190-1409
Biodiesel Monoglyceride kit, 3 x 1 mL ampoules	5190-1410

Select Biodiesel

- Complete set of biodiesel columns for full compliance and ease-of-use
- UltiMetal technology provides high accuracy and longevity
- Designed and pre-tested for complete confidence in results

Select Biodiesel columns address the key challenge of good column lifetime when operating at very high temperatures up to 400°C. Although traditional fused silica can be used, high temperatures often mean shortened column lifetimes. By using an UltiMetal column with an ultra-stable stationary phase, results are more consistent and column breakage is a thing of the past.

Select Biodiesel columns are offered with a pre-coupled retention gap that is leak tested prior to shipment, making life much easier for the operator. This short piece of tubing not only enhances the analytical separation but also dramatically simplifies automation when using the column with a column inlet as specified in the standard methods.

Technical Specifications

Method	Analytes	Column	Injector Type	Analysis Time (min)
ASTM D 6584	Free and total glycerine	Select Biodiesel for Glycerides	On-column	32
EN14103	Ester and linoleic acid methyl esters	Select Biodiesel for FAME	Split/splitless	30
EN14105	Free and total glycerine; mono, di- and tri-glycerides	Select Biodiesel for Glycerides	On-column	35
EN14106	Free glycerol	Select Biodiesel for Glycerides	Split/splitless	10
EN14110	Methanol	Select Biodiesel for Methanol	Headspace with split/splitless	10

Select Biodiesel

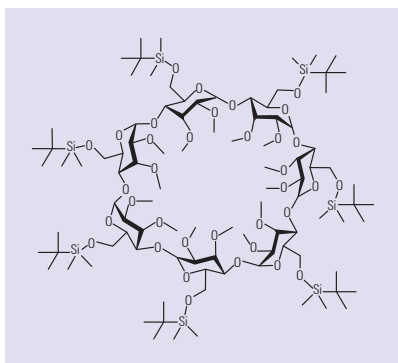
Description	ID (mm)	Length (m)	Film (µm)	7 in. Cage
For glycerides, UltiMetal, with retention gap	0.32	15	0.10	CP9078
For glycerides, UltiMetal	0.32	15	0.10	CP9079
For glycerides, UltiMetal, with retention gap	0.32	10	0.10	CP9076
For glycerides, UltiMetal	0.32	10	0.10	CP9077
For FAME, fused silica	0.32	30	0.25	CP9080
For Methanol, fused silica	0.32	30	3.00	CP9083
UltiMetal retention gap, methyl deactivated	0.53	2		CP6530

Chiral Columns

Our proven Cyclodex-B, CycloSil-B and HP-Chiral β offer the chiral analyst a broad range of chiral separations. Although no single column resolves every enantiomeric pair, our no-hassle return policy allows you to try the column for your application and if it doesn't work, simply return it.

Recommendations for choosing a chiral column

- Contact Technical Support through your local Agilent office for a more specific recommendation
- Refer to existing applications and literature
- Choose CycloSil-B as a general purpose column
- Use HP-Chiral β when using a nitrogen-specific detector



Structure of CycloSil-B

CycloSil-B

- 30% heptakis (2,3-di-O-methyl-6-O-t-butyl dimethylsilyl)- β -cyclodextrin in DB-1701
- Chiral separations without chiral-specific derivatization
- New stationary phase for improved resolution of many chiral separations
- Ideal for many chiral γ -lactones and terpenes

Because CycloSil-B GC columns are not bonded or cross-linked, we do not recommend solvent rinsing.

CycloSil-B Chromatograms

Food, Flavors and Fragrances

Citrus Flavored Carbonated Beverage (Soda)	Page 628
Rosemary Oil	Page 627

CycloSil-B

ID (mm)	Length (m)	Film (μ m)	Temp Limits ($^{\circ}$ C)	7 in. Cage	7890/6890
					LTM Module
0.25	30	0.25	35 to 260/280	112-6632	112-6632LTM
0.32	30	0.25	35 to 260/280	113-6632	113-6632LTM

Cyclodex-B

- 10.5% β -cyclodextrin in DB-1701
- Chiral separations without chiral-specific derivatization
- Broad range of resolving potential
- Excellent peak shape

Because Cyclodex-B GC columns are not bonded or cross-linked, we do not recommend solvent rinsing.

Cyclodex-B Chromatograms

Food, Flavors and Fragrances

Menthol

Page 624

Cyclodex-B

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.25	30	0.25	50 to 230/250	112-2532	112-2532E	112-2532LTM
	60	0.25	50 to 230/250	112-2562		
0.32	30	0.25	50 to 230/250	113-2532	113-2532E	113-2532LTM

HP-Chiral β

- β -cyclodextrin in (35%-Phenyl)-methylpolysiloxane
- Chiral separations without chiral-specific derivatization
- Phenyl-based polymer provides low bleed and does not interfere with nitrogen-specific detectors
- Available in two concentrations of β -cyclodextrin: 10% and 20%
- 20% β -cyclodextrin best choice for initial screening

HP-Chiral β Chromatograms

Food, Flavors and Fragrances

Chiral Compounds in Essential Oils and Fragrances

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HP-Chiral β

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
HP-Chiral 10β					
0.25	30	0.25	30 to 240/250	19091G-B133	
0.32	30	0.25	30 to 240/250	19091G-B113	
HP-Chiral 20β					
0.25	30	0.25	30 to 240/250	19091G-B233	19091G-B233E
0.32	30	0.25	30 to 240/250	19091G-B213	19091G-B213E

Tips & Tools

View up-to-date educational resources such as posters, Application Notes, training tools, seminars, product information and more at www.agilent.com/chem/mygccolumns



CP-Chirasil-Dex CB

- High resolution across a broad application range
- Chemically-bonded phase for excellent longevity
- No need for derivatization improves productivity

The CP-Chirasil-Dex CB phase consists of cyclodextrin directly bonded to dimethylpolysiloxane. This bond prevents the cyclodextrin from migrating to different locations in the surface film, delivering homogeneous enantioselectivity throughout the phase. This provides the highest resolution factor between isomers.

It also guarantees stability of enantioselectivity. As a result, the lifetime of β -cyclodextrin capillary columns is significantly improved. CP-Chirasil-Dex CB permits low elution temperatures of polar compounds and is suitable for all injection techniques.

CP-Chirasil-Dex CB Chromatograms

Industrial Chemicals

High resolution separation of xylene isomers

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CP-Chirasil-Dex CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.25	25	0.25	200/200	CP7502	CP750215
0.32	25	0.25	200/200	CP7503	CP750315

CP-Chirasil Val

- Both antipode phases available (D and L) for maximum versatility
- Stabilized phase, over 50% cross-linked for great longevity
- Specially designed and tested for amino acid enantiomers for the ultimate in reliable data

The CP-Chirasil Val columns are designed for the separation of optically active compounds, especially amino acids. They have lower bleed levels than other phases with a T_{max} of 200°C, isothermally and programmed. Both antipodes of the phase are available. On Chirasil-L-Val, D-amino acids elute before the L-amino acids, while on Chirasil-D-Val this elution order is reversed. This is especially valuable when determining the optical purity of compounds. Selecting the column from which the minor component elutes before the major enantiomer results in the lowest detection levels.

CP-Chirasil Val

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	25	0.08	200/200	CP7494	CP7494I5
0.25	25	0.12	200/200	CP7495	CP7495I5

CP-Cyclodextrin-β-2,3,6-M-19

- Unique selectivity for isomer separation with ease-of-use
- High inertness delivers accurate results
- High efficiency for a broad application area

The CP-Cyclodextrin-β-2,3,6-M-19 column separates many optical isomers that could not be analyzed previously. Due to its selectivity, o-, m- and p-xylenes can now be separated. The column is also useful for non-chiral compounds. CP-Cyclodextrin-β-2,3,6-M-19 has a very high inertness, enabling separation of underivatized polar compounds.

CP-Cyclodextrin-β-2,3,6-M-19

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	25	0.25	225/250	CP7500	CP7500I5
0.32	50	0.25	225/250	CP7501	



Food, Flavors and Fragrances Columns

Food and flavor analyses place stringent demands on capillary columns. Samples have many components that are difficult to resolve and column-to-column reproducibility becomes critical. Agilent J&W GC columns are ideal for meeting these needs. Our rigorous quality control specifications and extensive QC testing ensure that the column you buy today will perform just like the column you buy tomorrow.

Recommended Columns for Food, Flavors and Fragrances

- HP-88 for cis- and trans-FAME isomers
- DB-XLB and DB-17ht for triglycerides
- DB-FFAP for organic free fatty acids
- DB-1, DB-WAX for fragrance compounds
- High Efficiency (0.18 mm ID), DB-1, DB-5 or DB-Wax for fast analysis of fragrances and FAMES
- Highly reproducible and specially tested Microbore (0.1 mm ID) DB-WaxFF for fragrance analysis
- DB-XLB and DB-17ms or DB-XLB and DB-35ms for dual column confirmation of CLP pesticide analysis
- HP-INNOWax or DB-WAXetr for higher temperature polar compound analysis

Select FAME

- Long lifetime due to high polarity 100% bonded phase
- Low bleed provides more sensitivity for better detection limits
- Better separation due to high efficiency and loadability for more accurate results

The Select FAME column is tuned for optimal cis-trans separations of FAMEs, especially C18 isomers. The bonded column has an isothermal maximum operation temperature of 275°C and a programmed temperature of 290°C – a dramatic improvement of 50°C compared to non-bonded columns. Select FAME has better detection limits because the column has a very low bleed level. Even though this is a very polar column, the column efficiency is extremely high. Columns up to 200 m are available for detailed analysis of the C18:1 isomer cluster. The Select FAME column also offers three times greater loadability, further improving the shape and separation for FAME isomers – especially if one component is present at a higher concentration.

Select FAME Chromatograms

Food, Flavors and Fragrances

Separation of cis-trans FAME isomers

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Select FAME

ID (mm)	Length (m)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	50	275/290	CP7419	CP741915
	100	275/290	CP7420	CP742015
	200	275/290	CP7421	

CP-Sil 88 for FAME

- Guaranteed analysis of FAME cis-trans isomers for complete confidence
- High polarity stationary phase providing more efficiency and higher productivity
- Use for FAME in the C₆ to C₂₆ range

CP-Sil 88 for FAME

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.25	50	0.20	225/240	CP7488
	60	0.20	225/240	CP7487
	100	0.20	225/240	CP7489

CP-Carbowax 400 for Volatiles in Alcohol

- Highest resolution for amyl alcohols for accurate quality inspection
- High plate number, even at 0°C, for reliable analysis of the most volatile compounds
- Specially designed and tested for this application, ensuring ease-of-use

This column is guaranteed for the analysis of volatiles in alcoholic beverages and offers the highest resolution for amyl alcohols, to verify possible falsification.

CP-Carbowax 400 for Volatiles in Alcohol

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.32	50	0.20	60/80	CP7527	CP752715

CP-TAP CB for Triglycerides

- Guaranteed detailed analysis of triglycerides for complete confidence
- Complete triglyceride pattern in about 15 min improves productivity
- Stabilized phase and special fused silica for enhanced longevity at higher temperatures

The resolution of this column depends not only on carbon number – a more refined separation is produced according to the degree of unsaturation. The chemically-bonded phase exhibits low bleed and provides longer column lifetimes. CP-TAP CB is available in special Fused Silica for maximum column strength at temperatures up to 370°C, or UltiMetal capillary for the ultimate robustness.

CP-TAP CB for Triglycerides

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.25	25	0.10	350/360	CP7483

CP-TAP CB UltiMetal

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.25	25	0.10	355/370	CP7463

CP-FFAP CB

- Separates C₂ to C₂₄ acids in one run without derivatization, saving time
- Water and solvent resistant for long lifetimes
- Chemically-bonded for excellent longevity

CP-FFAP CB is ideal for flavors, aromas and free fatty acids C₁ to C₂₆.

CP-FFAP CB

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.15	25	0.25	250/275	CP7686	CP768615
0.32	25	0.30	250/275	CP7485	CP748515
0.53	25	1.00	250/275	CP7486	CP748615

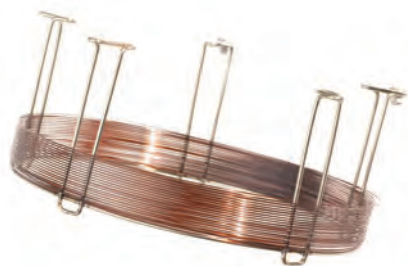
CP-Wax 57 CB for Glycols and Alcohols

- Guaranteed analysis for complete confidence
- Symmetrical peaks providing the most accurate results
- Extensive cross-linking delivers robustness and enhanced column lifetime

CP-Wax 57 CB for Glycols and Alcohols is guaranteed for the analysis of glycols, diols and alcohols. It has a unique, high polarity wax phase that produces symmetrical peaks.

CP-Wax 57 CB for Glycols and Alcohols

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	50	0.25	200/200	CP7615	CP761515
0.53	25	0.50	225/250	CP7617	CP761715



High Temperature Columns

DB-1ht

- 100% Dimethylpolysiloxane
- Non-polar
- Specially processed for extended temperature limit of 400°C
- High temperature, polyimide-coated, fused silica tubing
- Excellent peak shape and faster elution times for high boilers
- Bonded and cross-linked
- Solvent rinsable

DB-1ht

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.25	15	0.10	-60 to 400	122-1111	122-1111E	122-1111LTM	222-1111LTM
	30	0.10	-60 to 400	122-1131		122-1131LTM	222-1131LTM
0.32	15	0.10	-60 to 400	123-1111		123-1111LTM	
	30	0.10	-60 to 400	123-1131	123-1131E	123-1131LTM	
0.53	30	0.17	-60 to 400	125-1131			

DB-5ht

- (5%-Phenyl)-methylpolysiloxane
- Non-polar
- Specially processed for extended temperature limit of 400°C
- High temperature, polyimide-coated, fused silica tubing
- Excellent peak shape and faster elution times for high boilers
- Bonded and cross-linked
- Solvent rinsable

DB-5ht Chromatograms

Food, Flavors and Fragrances

Butter Triglycerides I

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DB-5ht

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.25	15	0.10	-60 to 400	122-5711	122-5711E	122-5711LTM	222-5711LTM
	30	0.10	-60 to 400	122-5731		122-5731LTM	222-5731LTM
0.32	10	0.10	-60 to 400	123-5701		123-5701LTM	
	15	0.10	-60 to 400	123-5711	123-5711E	123-5711LTM	
	30	0.10	-60 to 400	123-5731	123-5731E	123-5731LTM	



VF-5ht and VF-5ht UltiMetal

- High molecular weight selectivity extends the range of applications
- Enhanced stability improves column longevity and reduces downtime
- Superior detector performance gives you better detection limits and greater accuracy

The VF-5ht improves the analysis of high boiling compounds by exhibiting low bleed, even at high temperatures. Based on ultra-low bleed FactorFour technology, VF-5ht provides unmatched selectivity, sensitivity, and accuracy for the analysis of high-molecular weight compounds.

VF-5ht is a stabilized equivalent of 5% phenyl methyl dimethylpolysiloxane, offering the same polarity as a VF-5ms. The difference is that it can be operated above 350°C yet still offers a low bleed level (bleed specification of a 30 m x 0.25 mm column is <5 pA at 400°C). This enables better separation of high-boiling mixtures. VF-5ht is well suited to the separation of non-polar to mid-polar compounds.

UltiMetal technology renders the stainless steel inert and enhances the bonding of the stationary phase. The result is long column lifetime with excellent peak shape and low column bleed for the best detection limits at high temperatures, and the lowest cost per analysis.

VF-5ht Chromatograms

Petroleum

Diesel analysis

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VF-5ht

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.25	15	0.10	-60 to 400/400	CP9045
	30	0.10	-60 to 400/400	CP9046
0.32	10	0.10	-60 to 400/400	CP9044
	15	0.10	-60 to 400/400	CP9047
	30	0.10	-60 to 400/400	CP9048

VF-5ht UltiMetal

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	15	0.10	-60 to 430/450	CP9090	
		0.10	-60 to 430/450	CP9091*	
	30	0.10	-60 to 430/450	CP9092	CP909215
		0.10	-60 to 430/450	CP9093*	
0.32	15	0.10	-60 to 430/450	CP9094	CP909415
		0.10	-60 to 430/450	CP9095*	
	30	0.10	-60 to 430/450	CP9096	
		0.10	-60 to 430/450	CP9097*	

*Retention gap 2 x 0.53 mm ID

DB-17ht

- (50%-Phenyl)-methylpolysiloxane
- Mid-polarity
- Extended upper temperature limit of 365°C
- High temperature, polyimide-coated, fused silica tubing
- Excellent peak shape and faster elution times for high boilers
- Improved resolution for triglycerides
- Ideal for confirmational analyses
- Bonded and cross-linked
- Solvent rinsable

DB-17ht Chromatograms**Food, Flavors and Fragrances**

Butter Triglycerides II

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DB-17ht

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.25	5	0.15	40 to 340/365	122-1801		122-1801LTM
	15	0.15	40 to 340/365	122-1811		122-1811LTM
	30	0.15	40 to 340/365	122-1831		122-1831LTM
0.32	15	0.15	40 to 340/365	123-1811		123-1811LTM
	30	0.15	40 to 340/365	123-1831	123-1831E	123-1831LTM
	60	0.15	40 to 340/365	123-1861		



Life Sciences Columns

The life sciences offer some difficult challenges to capillary GC chromatographers. These include complex sample matrices, the necessity for low level detection and the chemically active characteristics of many of the samples. In response to this, Agilent offers a line of columns which are designed specifically for drugs of abuse testing.

Recommended Columns for Life Sciences

- DB-ALC1 and DB-ALC2 for U.S. Blood Alcohol analysis
- DB-ALC2 and HP-Blood Alcohol column for European Blood Alcohol analysis
- Low-bleed columns for controlled substances
- DB-35ms for barbiturates
- DB-17ms for hallucinogens
- DB-EVDX for analysis of drugs of abuse
- DB-624, DB-1301, DB-1, DB-WAX, DB-WAXetr or HP-INNOWax for Residual Solvent analysis

DB-ALC1 and DB-ALC2

- Reliable blood alcohol analysis
- Optimized primary and confirmation column pair for U.S. blood alcohol analysis
- Faster GC run times
- Improved resolution of key ethanol/acetone peaks
- Available in 0.32 and 0.53 mm ID
- Bonded and cross-linked

DB-ALC1 and DB-ALC2 Chromatograms

Life Sciences

Blood Alcohols I (Static Headspace/Split)	Page 682
Blood Alcohols II (Static Headspace/Split)	Page 682
Blood Pollutants I	Page 683
Blood Pollutants II	Page 683

DB-ALC1 and DB-ALC2

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
DB-ALC1						
0.32	30	1.80	20 to 260/280	123-9134		123-9134LTM
0.53	30	3.00	20 to 260/280	125-9134	125-9134E	125-9134LTM
DB-ALC2						
0.32	30	1.20	20 to 260/280	123-9234	123-9234E	123-9234LTM
0.53	30	2.00	20 to 260/280	125-9234		125-9234LTM

HP-Blood Alcohol

- Reliable blood alcohol analysis
- Excellent confirmation column with DB-ALC2 for method using t-butanol as internal standard

HP-Blood Alcohol

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.32	7.5	2.00	-60 to 270/290	19091S-510	19091S-510E	19091S-510LTM

DB-5ms EVDX

- Specially configured and tested for drugs of abuse confirmation
- Drug test mix included: caffeine, glutethimide, lidocaine, phenobarbital, EDDP, methaqualone, methadone, cocaine, desipramine, carbamazepine
- DB-5ms EVDX is equivalent to (5%-Phenyl)-methylpolysiloxane
- Consistent retention and peak shape
- Low bleed for GC/MS analysis
- Bonded and cross-linked
- Solvent rinsable

DB-5ms EVDX Chromatograms

Life Sciences

Anesthetics	Page 675
Sedative Hypnotics	Page 679

DB-5ms EVDX

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.20	25	0.33	-60 to 325/350	128-8522

HP-Fast Residual Solvent

- Equivalent to USP Phase G43
- Thinner film reduces run time by 2.5 times and increases Minimum Detection Limit (MDL) by 2 times compared to standard film thickness used for this method
- Bonded and cross-linked

HP-Fast Residual Solvent

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.53	30	1.00	-20 to 260	19095V-420	19095V-420E	19095V-420LTM

VF-DA

- Cross-linked and bonded to extend column lifetime
- Minimal bleed to improve detection limits and productivity
- High recovery of trace components to deliver accurate results

VF-DA is a unique, guaranteed low bleed FactorFour GC column for drugs of abuse confirmation testing. The VF-DA column has high recovery for trace components and excellent resistance to direct methanol injections. Drugs of abuse are measured in a variety of matrices. In urine, most general screenings are performed using full-scan GC/MS (EI). Since column bleeding can negatively influence detection limits in full scan mode, the exceptionally low bleed of VF-DA columns is critically important. As column bleed is minimized, all the benefits of low bleed are provided; reduced detection limits, improved accuracy and a cleaner detector.

VF-DA Chromatograms

Life Sciences

Analysis of drugs of abuse in urine via GC/MS

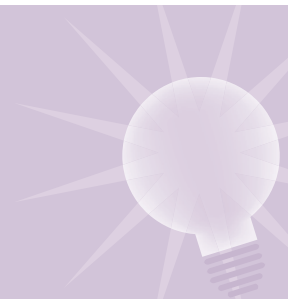
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VF-DA

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.20	12	Optimized	-60 to 325/350	CP8964

Tech Support

Need assistance selecting a column for your method?
 Contact our chromatography technical specialists at
www.agilent.com/chem/TechRep





Pesticides Columns

Agilent J&W low bleed columns are ideal for the analysis of pesticides. Not only do they possess less bleed than a standard polymer, which improves the signal-to-noise ratio and minimum detectable quantities, but they also have higher upper temperature limits which allow for faster run times. Agilent also offers several common phases with additional pesticide-specific testing to ensure performance for your application.

Recommended Columns for Pesticides

- DB-35ms (P/N 123-3832) and DB-XLB (P/N 122-1236) for CLP pesticides, chlorinated herbicides, and EPA Method 508.1 pesticides
- High efficiency 0.18 mm ID DB-17ms (P/N 121-4722) and DB-XLB (P/N 121-1222) for faster analysis
- Also ideal for other dual ECD applications such as 8082 PCBs (Aroclors) and haloacetic acids
- DB-5ms (P/N 122-5532) and DB-35ms (P/N 122-3832) for organophosphorous pesticides (EPA Method 8141A)
- HP-5ms for over 550 pesticides using retention time locking software and database

HP-PAS5

- Non-polar
- Specifically designed and processed for the analysis of organochlorine pesticides
- ECD tested to ensure minimal pesticide breakdown and low ECD bleed
- Bonded and cross-linked
- Solvent rinsable

HP-PAS5

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	7890/6890	
					LTM Module	
0.32	25	0.52	-60 to 325/350	19091S-010	19091S-010LTM	

DB-1701P

- Low/mid-polarity
- Exact replacement of HP-PAS1701
- Specifically designed and processed for the analysis of organochlorine pesticides
- ECD tested to ensure minimal pesticide breakdown and low ECD bleed
- Bonded and cross-linked
- Solvent rinsable

DB-1701P

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890	
						LTM Module	
0.25	30	0.25	-20 to 280/300	122-7732	122-7732LTM		
0.32	25	0.25	-20 to 280/300	123-7722	123-7722LTM		
	30	0.25	-20 to 280/300	123-7732	123-7732E	123-7732LTM	
0.53	30	1.00	-20 to 260/280	125-7732	125-7732LTM		

DB-608

- Specifically designed for the analysis of chlorinated pesticides and PCBs
- U.S. EPA Methods: 608, 508, 8080
- Excellent inertness and recoveries without pesticide breakdown
- Bonded and cross-linked
- Solvent rinsable
- Exact replacement of HP-608

DB-608 Chromatograms

Environmental

Organochlorine Pesticides II

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DB-608

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.18	20	0.18	40 to 280/300	121-6822	121-6822LTM	221-6822LTM
0.25	30	0.25	40 to 280/300	122-6832	122-6832LTM	
0.32	30	0.50	40 to 280/300	123-1730	123-1730LTM	
0.45	30	0.70	40 to 260/280	124-1730	124-1730LTM	
0.53	15	0.83	40 to 260/280	125-1710	125-1710LTM	
	30	0.50	40 to 260/280	125-6837	125-6837LTM	
		0.83	40 to 260/280	125-1730	125-1730LTM	



VF-5 Pesticides and VF-1701 Pesticides

- Tested with key pesticides for improved efficiency
- Highly inert for enhanced detection
- Proven performance with ECD and MS detection for maximum productivity

These columns are specially designed for the determination of trace levels of pesticide residue. Every column is individually tested before shipment with key pesticides, including endrin and aldrin, ensuring optimal performance and consistency of results. The columns are highly inert for trace pesticide determination, and therefore provide better detection limits. Analyses at extremely low concentrations are easy, regardless of whether your method specifies ECD or MS detection. VF-Pesticides columns benefit from ultra low bleed FactorFour technology to improve sensitivity. VF-1701 Pesticides deliver up to 8 times lower bleed than other columns used for pesticide analysis.

VF-1701 Pesticides Chromatograms

Environmental

EPA 625 halogenated pesticides

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VF-5 Pesticides

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.25	30	0.25	-60 to 325/350	CP9074
	50	0.25	-60 to 325/350	CP9073
0.32	30	0.25	-60 to 325/350	CP9075

VF-1701 Pesticides

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.25	30	0.25	-20 to 280/300	CP9070
	50	0.25	-20 to 280/300	CP9072
0.32	30	0.25	-20 to 280/300	CP9071

Rapid-MS

- Fast analysis improves productivity
- High loadability for better detection limits
- Easy installation enhances efficiency

Rapid-MS columns reduce analysis duration by 3 to 5 times for temperature programmed, and up to 10 times for isothermal runs. The film thickness from 0.1 μm to 1 μm ensures high loadability and the higher sensitivity typically increases the signal-to-noise ratio by a factor of three or greater.

Rapid-MS columns utilize the high optimal carrier gas velocity obtained when a separation is performed under reduced pressure to reduce analysis times. The low bleed VF-5ms stationary phase is equivalent to a 5% phenyl, 95% dimethylpolysiloxane phase. Rapid-MS requires no changes to your injector procedures or MS methods. Installation is easy, standard fittings and ferrules can be used, and no special skills are required.

Rapid-MS Chromatograms

Food, Flavors and Fragrances

Fast analysis of lemon oil using Rapid-MS

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Rapid-MS

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.53	10	0.12	-60 to 325/325	CP8131
		0.25	-60 to 325/325	CP8132
		0.50	-60 to 325/325	CP8133
		1.0	-60 to 325/325	CP8134

Restriction for Rapid-MS

Description	Part No.
Restriction for Rapid-MS, fused silica, 0.1 mm ID, 0.6 m, 5/pk	CP8121

CP-Sil 8 CB for Pesticides

- Linear column response down to femtogram levels improves productivity
- Maximum inertness – tested with DDTs to provide very reliable data
- Can be used with on-column injection techniques for best detection limits

CP-Sil 8 CB delivers a linear column response down to femtogram levels. The column is supplied with a retention gap to avoid problems with solvent condensation, thus allowing repeated splitless injections without phase deterioration. In addition, because of the integrated retention gap, there is no leakage from coupling devices, thereby considerably extending column life.

CP-Sil 8 CB for Pesticides

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.25	50	0.12	300/325	CP7481
0.53	50	0.25	300/325	CP7504

CP-Sil 19 CB for Pesticides

- Ideal as a confirmation column for reliable results
- Specified for EPA and CLP analytes for ultimate compliance
- Supplied with a coupled retention gap for on-column injection for best detection limits

CP-Sil 19 CB for Pesticides

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.25	30	0.25	275/300	CP7406	
	50	0.20	275/300	CP7407	CP740715
0.32	30	0.25	275/300	CP7408	
0.53	30	1.00	260/275	CP7409	

Polycyclic Aromatic Hydrocarbons (PAH) Columns

DB-EUPAH

Polycyclic aromatic hydrocarbons (PAHs) are chemical compounds consisting of fused aromatic rings formed during the incomplete combustion of organic materials. The European Commission (EU) recommends the monitoring of 16 PAHs possessing both genotoxic and carcinogenic properties. Agilent J&W DB-EUPAH capillary GC columns are purposely designed, application optimized and tested to provide the most optimal performance for all EU regulated PAHs.

- Specially designed for analysis of EU regulated PAHs
- Individually tested with application-specific QC test probe mixture
- Great resolution of critical isomers, e.g. benzo(b,j,k)fluoranthenes
- Superb thermal stability for accurate analysis of high boiling PAHs, e.g. dibenzopyrenes
- Excellent signal-to-noise ratio
- Optimized column dimensions for proven performance

DB-EUPAH Chromatograms

Environmental

15+1 EU Priority PAHs

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DB-EUPAH

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage
0.18	20	0.14	40 to 320/340	121-9627
0.25	60	0.25	40 to 320/340	122-96L2
0.32	15	0.25	40 to 320/340	123-9612

Select PAH

- No time wasted on false positives
- Fast results with no need for further analysis
- Low bleed reduces maintenance time and enhances sensitivity

Select PAH is the first capillary column that provides a single solution for PAH analysis by separating all the isomers, thereby avoiding false positives and inaccurate results. It provides easy, fast, and accurate quantification of PAHs in environmental and food samples by resolving PAH isomers. Select PAH provides full separations of EPA PAHs in less than 7 minutes and EU PAHs in less than 30 minutes, including separation of chrysene, triphenylene, and benzo[fluoranthene (type b, j and k), with no need for additional analysis.

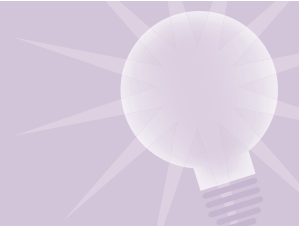
Its one-shot technology saves money on capital investment and cost per analysis, and increases productivity. In addition, the low column bleed of Select PAH reduces the requirement for MS maintenance and enhances sensitivity.

Select PAH

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.15	15	0.10	40 to 325/350	CP7461
0.25	30	0.15	40 to 325/350	CP7462

Tips & Tools

Find all the tools you need for column installation in Agilent's Column Installation Kit, P/N 430-2000.



CP-Sil PAH CB UltiMetal

- High temperature, low bleed phase for extended lifetime
- Virtually unbreakable, inert UltiMetal capillary column, reducing replacement costs
- Maximum temperature of 400/425°C for enhanced productivity

The UltiMetal CP-Sil PAH CB column combines the advantages of a highly thermo-stable stationary phase with UltiMetal as the column material. This unique column can separate all 16 PAHs according to EPA Method 610. It may also be used for fingerprint analysis and pattern recognition of complex hydrocarbon mixtures.

CP-Sil PAH CB UltiMetal

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.25	25	0.12	400/425	CP7440

VF-17ms for PAH

VF-17ms for PAH

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.15	15	0.05	-40 to 290/320	CP9009



Petroleum Columns

Petroleum applications vary greatly in character. From noble gases to simulated distillation, Agilent offers a broad range of columns designed to meet the needs of the petroleum/ petrochemical chromatographer. Refer to the PLOT column section for columns for the analysis of light gases.

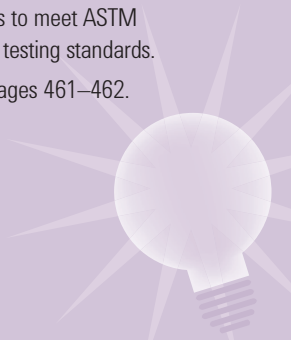
Recommended Columns for Petroleum

- DB-HT SimDis for Simulated Distillation
- HP-PONA, DB-5 or HP-1 for PONA and PIANO analysis

Tips & Tools

Agilent offers a complete line of columns designed and application optimized for the analysis of biodiesels to meet ASTM and CEN testing standards.

Turn to pages 461–462.



DB-2887

- 100% Dimethylpolysiloxane
- Specifically designed for simulated distillation using ASTM Method D 2887
- Rapid conditioning, fast run time and low bleed when compared to packed columns
- Bonded and cross-linked
- Solvent rinsable

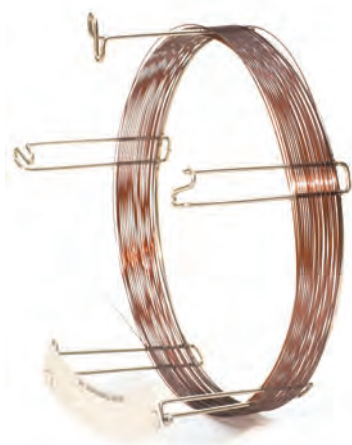
DB-2887 Chromatograms

Petroleum

Reference Gas Oil	Page 703
Simulated Distillation	Page 703

DB-2887

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.53	10	3.00	-60 to 350	125-2814	125-2814E	125-2814LTM



DB-HT SimDis

- 100% Dimethylpolysiloxane
- "Boiling point" phase for high temperature simulated distillation
- Durable stainless steel tubing
- 430°C upper temperature limit
- Distillation range of C₆ to C₁₁₀₊
- Low bleed, even at 430°C
- Bonded and cross-linked
- Solvent rinsable

DB-HT SimDis Chromatograms

Petroleum

n-Paraffin Standard

Page 705

DB-HT SimDis

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage
0.53	5	0.10	-60 to 400/430	145-1009
		0.15	-60 to 400/430	145-1001

CP-SimDist

- Conforms to ASTM Method D 2887 to provide full compliancy
- High temperature stationary phase for extended column lifetime
- Low bleed makes quantitation easier

CP-SimDist Fused Silica columns are guaranteed for simulated distillation up to C₁₀₀. These columns are low bleed, typically only 4-5 pA at 400°C. The high temperature stationary phase and polyimide coating extend column lifetime.

CP-SimDist

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.32	10	0.10	375/400	CP7521	
0.53	5	0.17	375/400	CP7522	CP7522I5
	10	0.10	375/400	CP7541	

CP-SimDist UltiMetal

- Conforms to ASTM D 2887 and the extended D 2887 method for compliancy
- Lower bleed rate than Fused Silica, best column lifetime and accurate results
- Extended analysis to C120, with maximum temperature of 450°C
- UltiMetal tubing for extreme durability

The internal diameter of UltiMetal tubing is the same as for Fused Silica 0.53 mm ID (wide bore) columns, providing trouble-free automation of on-column injection. Retention time repeatability is better than that of any other high temperature column, due to the special deactivation applied to the UltiMetal surface.

CP-SimDist UltiMetal

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	
0.53	5	0.09	450/450	CP7569	CP7569I5	
		0.17	450/450	CP7532	CP7532I5	
		0.88	450/450	CP7570		
		2.65	400/400	CP7571		
	10	10	0.17	450/450	CP7542	CP7542I5
			0.06	450/450	CP6540	
			0.53	450/450	CP7592	
			0.88	450/450	CP7512	CP7512I5
			1.20	450/450	CP7562	
			2.65	400/400	CP7582	CP7582I5
			5.00	400/400	CP7572	
			20	0.11	450/450	CP7593
	25	0.06	450/450	CP6550		
	50	0.06	450/450	CP6560		

HP-PONA

- 100% Dimethylpolysiloxane
- Configured for the analysis of petroleum process products
- Tested to ensure the resolution of m-xylene from p-xylene and of cyclopentane from 2,3-dimethylbutane
- PONA, PIANO
- High resolution
- Bonded and cross-linked
- Solvent rinsable

Note: 100 psi regulator required to reach optimum carrier gas velocity

HP-PONA Chromatograms

Petroleum

Sulfur Compounds in Naphtha

Page 698

HP-PONA

Description	ID (mm)	Length		Temp Limits (°C)	7 in. Cage	5 in. Cage
		ID (mm)	(m)			
HP-PONA	0.20	50	0.50	-60 to 325/350	19091S-001	19091S-001E
HP-1	0.20	50	0.50	-60 to 325/350	19091Z-205	19091Z-205E
HP-1	0.25	100	0.50	-60 to 325/350	19091Z-530	19091Z-530E

CP-Sil PONA CB

- Guaranteed hydrocarbon analysis for ultimate reliability
- Inert to polar compounds for highly accurate data
- Excellent reproducibility increases productivity

CP-Sil PONA CB delivers accurate analysis of paraffins, olefins, naphthalenes and aromatics in complex hydrocarbon mixtures. The column delivers guaranteed hydrocarbon analysis according to ASTM (DHA method).

CP-Sil PONA CB Chromatograms

Petroleum

Gasoline unleaded ASTM D 5769

Page 705

CP-Sil PONA CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.21	50	0.50	250/275	CP7531	CP753115
0.25	100	0.50	250/275	CP7530	CP753015

CP-Sil PONA for ASTM D 5134

- Guaranteed PONA analysis to ASTM D 5134 for ultimate reliability
- Exact dimensions as specified in the ASTM method for complete compliance
- Inert to polar additives for excellent data quality

CP-Sil PONA for ASTM D 5134 Chromatograms

Petroleum

Petroleum naphthas through n-nonane

Page 709

CP-Sil PONA for ASTM D 5134

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.21	50	0.50	250/275	CP7531

DB-Petro

- 100% Dimethylpolysiloxane
- Configured for the analysis of petroleum process products
- PONA, PIANO
- High resolution
- Bonded and cross-linked
- Solvent rinsable

Note: 100 psi regulator required to reach optimum carrier gas velocity

DB-Petro Chromatograms

Petroleum

Regular Unleaded Gasoline (California Phase 1) – "Normal" GC Run I	Page 704
Unleaded Gasoline	Page 701
PONA Mix	Page 702

DB-Petro

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.20	50	0.50	-60 to 325/350	122-10A6E	
0.25	100	0.50	-60 to 325/350	122-10A6	122-10A6



HP-1 Aluminum Clad

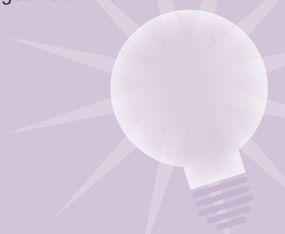


- 100% Dimethylpolysiloxane
- Aluminum clad fused silica tubing
- For high temperature simulated distillation
- Bonded and cross-linked
- Solvent rinsable

Tips & Tools

For optimum performance, ferrules should be replaced every time the column is replaced and during column maintenance.

Turn to pages 268–270.



HP-1 Aluminum Clad

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.53	5	0.09	0 to 350/450	19095S-205
	10	0.09	0 to 350/450	19095S-200

Select Al₂O₃ MAPD

- Two-fold improvement of sensitivity for MAPD decreases detection limits
- Faster run times improve operating efficiency
- Improved responses from polar hydrocarbons for better data accuracy

The Select Al₂O₃ MAPD is an aluminum oxide PLOT column for the analysis of reactive hydrocarbons and is especially targeted towards the response for methyl acetylene and propadiene (MAPD). The column is stable up to 200°C for hydrocarbons up to C₁₀. With Select Al₂O₃ MAPD, the adsorption and non-stable response for reactive (polar) hydrocarbons is greatly improved. Select Al₂O₃ MAPD delivers up to a two-fold higher response for MAPD, especially important when running an impurity analysis.

Select Al₂O₃ MAPD Chromatograms

Industrial Chemicals

Analysis of acetylenes mixture

Page 670

Select Al₂O₃ MAPD

ID (mm)	Length (m)	Temp Limits (°C)	7 in. Cage
0.32	50	-100 to 200/200	CP7431
0.53	25	-100 to 200/200	CP7433
	50	-100 to 200/200	CP7432

CP-TCEP for Alcohols in Gasoline

- Guaranteed analysis of alcohols in gasoline
- Perfect peak shape for accurate separations of alcohols
- High temperature stability to 135°C for high productivity and enhanced longevity

To avoid confusing aliphatic and aromatic fractions, the CP-TCEP column is able to separate benzene after n-dodecane. In addition, the excellent separation power provides the necessary resolution for complex mixtures such as gasoline.

CP-TCEP

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	50	0.40	135/140	CP7525	CP752515

CP-Sil 5 CB for Sulfur

- Trace analysis of volatile sulfur compounds to C₇ mercaptan for higher productivity
- Non-polar phase providing accurate results based on volatility
- High inertness, elutes SO₂ for high quality data and low detection limits

CP-Sil 5 CB for Sulfur

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.32	30	4.00	-60 to 300/325	CP7529	CP752915

Select Silanes

- High capacity and retention provide optimized productivity for silane analysis
- Low bleed analysis to ppm levels for best detection limits and most accurate results
- Reduced surface activity provides better peak shape for more reliable data

The Select Silanes column is a stabilized trifluoropropyl-methyl polysiloxane phase optimized for silanes determination. The Select Silanes column has a very thick film, resulting in high capacity and retention for highly volatile silanes. In addition, the low bleed allows the column to perform compositional as well as impurity analyses down to ppm levels, while reducing surface activity so that you get better peak shapes. Typical applications include alkylated chlorosilanes at % levels or impurity analysis. Valve, direct, and split/splitless injections are possible.

Select Silanes

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.32	30	1.80	0 to 270/300	CP7434
	60	1.80	0 to 270/300	CP7435
0.53	60	3.00	0 to 270/300	CP7437

Select Permanent Gases

- Isothermal separation at temperatures >40°C reduces operating costs
- Temperature stability up to 300°C allows short regeneration times and improves efficiency
- One injector, one detector simplifies operation

Select Permanent Gases/CO₂ is a set of two parallel columns that combine CP-Molsieve 5Å for permanent gas analysis and CP-PoraBOND Q for CO₂ analysis. The selection of column dimensions accords with your need for fast separation, lowest level analysis, and quantification of argon/oxygen. The Select Permanent Gases column separates permanent gases and CO₂ in a single run, and columns are coupled, tested, and securely mounted on the EZ-GRIP column mounting system.

The CP7429 Select Permanent Gases/CO₂ column is designed for fast analysis of permanent gases and CO₂. For resolution of the difficult-to-separate argon/oxygen and helium/neon pairs, use CP7430 Select Permanent Gases/HR (High Resolution) column.

Select Permanent Gases Chromatograms

Environmental

Fast analysis of permanent gases and CO₂

Page 616

Select Permanent Gases

ID (mm)	Temp Limits (°C)	7 in. Cage
Select Permanent Gases/CO ₂	300/325	CP7429
Select Permanent Gases/HR	300/325	CP7430

CP-Volamine

- Excellent stability for samples containing water expands the application range
- Maximum temperature of 265°C for enhanced productivity
- Highly inert providing sharp amine peaks for accurate results

CP-Volamine is optimized for the separation of volatile amines. The column is coated with a non-polar stationary phase and produces symmetrical peaks due to MPD (Multi-Purpose Deactivation) technology. CP-Volamine is the most stable column for analyzing volatile amines even when the sample contains high percentages of water.

The CP-Volamine column is the best choice for analyzing volatile amines like MMA, DMA and TMA (monomethyl, dimethyl and trimethyl amine). On this column other components of interest such as alcohols, water, and ammonia also elute as sharp peaks. CP-Volamine is highly inert, elutes a wide range of compounds, and delivers excellent performance and unique stability for water. Both 15 m and 30 m columns are available to ensure the shortest run times for amine samples that do not require the resolution of the 60 m column.

CP-Volamine Chromatograms

Industrial Chemicals

Amines and alcohols

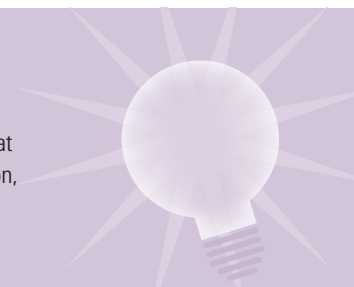
Page 643

CP-Volamine

ID (mm)	Length (m)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.32	15	265/300	CP7446	
	30	265/300	CP7447	CP744715
	60	265/275	CP7448	CP744815

Tips & Tools

For fast and easy GC pressure and flow calculations at your fingertips with Agilent's GC Calculator Application, visit www.agilent.com/chem/GCapp



CP-Sil 8 CB for Amines

- Good inertness towards basic compounds for best accuracy
- Guaranteed for the analysis of a broad range of amines for reliable results
- Available in non-polar and polar phases for broad application range

CP-Sil 8 CB for Amines is a base-deactivated 5% phenyl polydimethylsiloxane column that can be used for a wide range of amines. Due to a thermal stability up to 350°C, it analyzes a broad range of amines up to C₂₀, as well as alkanolamines.

CP-Sil 8 CB for Amines Chromatograms

Industrial Chemicals

Analysis of ethanolamines

Page 643

CP-Sil 8 CB for Amines

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.15	25	2.00	325/350	CP7599	
0.25	30	0.25	325/350	CP7598	CP7598I5
	30	0.50	325/350	CP7595	CP7595I5
0.32	30	1.00	325/350	CP7596	CP7596I5
0.53	30	1.00	325/350	CP7597	CP7597I5

CP-Wax for Volatile Amines and Diamines

CP-Wax for Volatile Amines and Diamines

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.32	25	1.20	220/220	CP7422	CP7422I5
0.53	25	2.00	220/220	CP7424	

CP-Wax 51 for Amines

CP-Wax 51 for Amines

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	25	0.20	60 to 260/275	CP7405	CP7405I5

CP-Lowox

- Unique selectivity for a wide range of oxygenates maximizes flexibility
- No particle loss preserves detector performance
- Suitable for process applications

CP-Lowox offers a unique solution to the chemical and petrochemical industries. It is now possible to analyze trace level oxygenate impurities in gas and liquid hydrocarbon streams. This high polarity makes the column ideal for the measurement of oxygenated compounds. CP-Lowox can be used for the prevention of catalyst contamination by oxygenates, process/on-line applications or portable GC applications (ASTM D 7059).

CP-Lowox Chromatograms

Petroleum

Analysis of oxygenates in a C1 to C5 hydrocarbon mix

Page 707

CP-Lowox

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.53	10	10.00	0 to 350/350	CP8587	CP8587I5

GS-OxyPLOT

- Accurate analysis of ppm/ppb level oxygenates in C₁ to C₁₀ hydrocarbons
- Strong selectivity for a wide range of oxygenates (ethers, alcohols, aldehydes, and ketones) in complex matrices such as gaseous hydrocarbons, motor fuels, and crude oil
- Suitable for ASTM methods for oxygenates
- Very high column stability (upper temperature limit of 350°C) with no column bleed
- Stable phase coating virtually eliminates particle generation and detector spiking
- Excellent for low concentration, quantitative GC analysis
- Ideal for selective heart-cutting applications

GS-OxyPLOT Chromatograms

Petroleum

Selected Oxygenates

Page 686

Trace Oxygenates in Light Hydrocarbon Matrices

Page 686

GS-OxyPLOT

ID (mm)	Length (m)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.53	10	350	115-4912	115-4912E

CP-Sil 5 CB for Formaldehyde

CP-Sil 5 CB for Formaldehyde

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.32	60	8.00	-60 to 300/325	CP7475	CP7475I5

CP-Squalane

CP-Squalane

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.25	100	0.20	-15 to 90/95	CP7520	CP7520I5

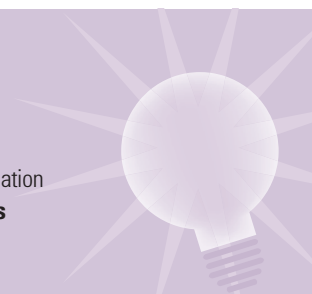
CP-Propox

CP-Propox

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.32	60	8.00	-60 to 300/325	CP7475

Tips & Tools

View up-to-date educational resources such as posters, Application Notes, training tools, seminars, product information and more at www.agilent.com/chem/mygccolumns



Semivolatiles Columns

Recommended Columns for Semivolatiles

- HP-5ms, DB-5.625, DB-5ms Ultra Inert, HP-5ms Ultra Inert for EPA methods 8270 and 525
- DB-XLB for PCB congeners
- HP-5ms, DB-5ms Ultra Inert, HP-5ms Ultra Inert or DB-35ms for PAHs
- DB-5ms, DB-5ms Ultra Inert or DB-XLB for phenols

Semivolatiles are usually extracted from soil samples or other environmental matrices. GC columns with precise retention time reproducibility and good mass spectrometer performance are key enablers for these often demanding analyses.

DB-Dioxin

- Specifically engineered for the analysis of polychlorinated dibenzodioxins (PCDDs) and dibenzofurans (PCDFs)
- Resolves 2,3,7,8-TCDD and 2,3,7,8-TCDF from all other isomers in one run
- Low bleed
- Bonded and cross-linked
- Solvent rinsable

Note: 100 psi regulator required to reach optimum carrier gas velocity

DB-Dioxin

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	60	0.15	40 to 250/270	122-2461	122-2461E
		0.25	40 to 250/270	122-2462	
0.32	60	0.15	40 to 250/270	123-2461	
		0.25	40 to 250/270	123-2462	

CP-Sil 88 for Dioxins

- Integrated retention gap eliminates leaks and extends column lifetime
- 2,3,7,8-TCDD can be determined at low concentrations for ease-of-use
- Guaranteed analysis of dioxin isomers for complete confidence in results

The CP-Sil 88 column has a very high polarity and a specific selectivity for dioxins and dibenzofuran separations. The column is supplied with an integrated retention gap to avoid problems with solvent condensation, thus allowing repeated splitless injections without phase deterioration, extending column life. In addition, because of the integrated retention gap, data quality is considerably improved. For the shortest analysis times, a series of thin-film coated columns is available that allow applications up to 270°C in temperature programmed mode.

CP-Sil 88 for Dioxins Chromatograms

Environmental

Dioxins and dibenzofurans

Page 571

CP-Sil 88 for Dioxins

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.25	30	0.10	50 to 250/270	CP7497
	50	0.20	50 to 225/240	CP7588
	60	0.10	50 to 250/270	CP7498
0.32	60	0.13	50 to 250/270	CP7499

DB-5.625

- Close equivalent to a (5%-Phenyl)-methylpolysiloxane
- Non-polar
- Specially processed to exhibit excellent inertness for EPA Semivolatiles Methods 625, 1625, 8270 and CLP protocols*
- Surpasses EPA performance criteria for semivolatiles
- Inert for base, neutral and acidic compounds
- High temperature limit with excellent thermal stability and low bleed
- Bonded and cross-linked
- Solvent rinsable

*Pentachlorophenol, 2,4-dinitrophenol, carbazole, and N-nitrosodiphenylamine used to test response factors.

DB-5.625 Chromatograms

Environmental

Analysis of Semivolatiles	Page 591
European Red List Volatiles	Page 609

DB-5.625

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	7890/6890 LTM Module
0.18	20	0.18	-60 to 325/350	121-5621	121-5621LTM
		0.36	-60 to 325/350	121-5622	121-5622LTM
0.25	30	0.25	-60 to 325/350	122-5631	122-5631LTM
		0.50	-60 to 325/350	122-5632	122-5632LTM
		1.00	-60 to 325/350	122-5633	122-5633LTM
	60	0.25	-60 to 325/350	122-5661	
0.32	30	0.25	-60 to 325/350	123-5631	123-5631LTM
		0.50	-60 to 325/350	123-5632	123-5632LTM



HP-5ms Semivolatile

- (5%-Phenyl)-methylpolysiloxane, identical selectivity to HP-5
- Non-polar
- Very low bleed characteristics, ideal for GC/MS
- Specifically tested for inertness for active compounds including acidic and basic compounds
- Improved signal-to-noise ratio for better sensitivity and mass spectral integrity
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G27

HP-5ms Semivolatile

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	7890/6890
					LTM Module
0.25	30	0.50	-60 to 325/350	19091S-139	19091S-139LTM

CP-Sil 5/C18 CB for PCB

- Guaranteed for very high resolution PCB analysis for ultimate confidence
- 100 m column separates critical isomer pairs for accurate results
- Use with high sensitivity ECD detection for enhanced productivity

CP-Sil 5/C18 CB for PCB has a lower polarity than 100% polydimethylsiloxane due to its C18 substitutions. Due to the absence of cyano groups it provides high signal-to-noise ratios for ECD detectors. The 100 m column separates critical isomer pairs: 28/31, 56/60, 149/118, 105/153/132 and 170/190.

CP-Sil 5/C18 CB for PCB

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage
0.25	50	0.10	275/300	CP7477
	100	0.10	275/300	CP7476
0.32	100	0.10	275/300	CP7478

CP-Sil 8 CB for PCB

- Guaranteed for the analysis of PCBs according to DIN Method 51527 for confidence in results
- Suitable for high sensitivity ECD detection for low detection limits
- High temperature stability provides extended lifetime and enhanced productivity

CP-Sil 8 CB has high temperature stability and is resistant to continuous splitless injections. Due to the absence of cyano groups the column provides high signal-to-noise ratios on ECD.

CP-Sil 8 CB for PCB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.25	50	0.25	300/325	CP7482

Select 28/31

Select 28/31

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.25	50	0.25	300/325	CP7482

Volatiles Columns

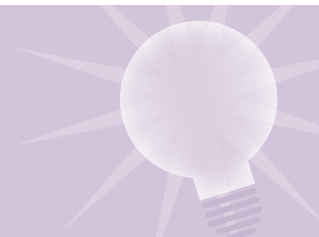
Recommended Columns for Volatiles

- DB-VRX and DB-624 for EPA Methods 502.2 and 8021
- DB-VRX (60 m, 0.25 mm ID) for GC/MS volatiles methods
- DB-VRX (20 m, 0.18 mm ID) for fast GC/MS volatiles analysis using a 5973 MSD (Not recommended for Ion Trap MS or older MSDs)
- DB-MTBE for extended EPA Method 8020
- DB-TPH for the analysis of BTEX and gasoline total petroleum hydrocarbons
- DB-624 (20 m, 0.18 mm ID) for fast GC/MS volatiles analysis

Agilent offers a selection of advanced polymer chemistries for increasingly demanding volatiles applications. Whether for a primary analytical column or as a complementary confirmation column, Agilent J&W capillaries are chromatographers' first choice.

Tips & Tools

Find all the tools you need for column installation in Agilent's Column Installation Kit, P/N 430-2000.



DB-VRX

- Unique selectivity engineered for optimum resolution of volatiles analysis:
U.S. EPA Methods 502.2, 524.2 and 8260
- 0.45 mm ID columns provide more plates per meter compared to 0.53 mm ID columns for the fewest coelutions for GC method (an industry first)*
- No subambient cooling required to resolve the six "gases"
- Fast run time:
<30 minutes for optimum sample throughput
<8 minutes with 0.18 mm ID
- Low polarity
- Excellent peak shape
- Bonded and cross-linked
- Solvent rinsable

*Two coelutions: 1) m- and p-xylene, for which U.S. EPA does not require separation, and 2) 1,1,2,2-tetrachloroethane and o-xylene which are separated by detectors PID and ELCD, respectively. Note to GC/MS analysts: These coeluting compounds have different primary characteristic ions of 83 and 106, respectively.

DB-VRX Chromatograms

Environmental

EPA Volatiles by GC/MS (Split Injector)	Page 604
High Speed VOC, EPA Method 8260	Page 606
Unleaded Gasoline	Page 569
Extended Analyte List for EPA Method 8021	Page 607

DB-VRX

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.18	20	1.00	-10 to 260	121-1524		121-1524LTM	221-1524LTM
	40	1.00	-10 to 260	121-1544	121-1544E	121-1544LTM	
0.25	30	1.40	-10 to 260	122-1534		122-1534LTM	222-1534LTM
	60	1.40	-10 to 260	122-1564	122-1564E		
0.32	30	1.80	-10 to 260	123-1534		123-1534LTM	
	60	1.80	-10 to 260	123-1564	123-1564E		
0.45	30	2.55	-10 to 260	124-1534		124-1534LTM	
	75	2.55	-10 to 260	124-1574			

DB-624

- Specifically designed for the analysis of volatile priority pollutants and residual solvents
- No cryogenics needed for U.S. EPA Method 502.2
- Excellent for U.S. EPA Methods: 501.3, 502.2, 503.1, 524.2, 601, 602, 8010, 8015, 8020, 8240, 8260, and USP 467
- Excellent inertness for active compounds
- Bonded and cross-linked
- Solvent rinsable
- Exact replacement of HP-624
- Equivalent to USP Phase G43

DB-624 Chromatograms

Environmental

EPA Volatiles by GC/MS II (Split Injector)	Page 605
European Red List Volatiles	Page 609
Extended Analyte List for EPA Method 8021	Page 607
Fast VOC Analysis	Page 608

Food, Flavors and Fragrances

Fusel Oil Standard & Brandy Sample	Page 619
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Industrial Chemicals

Alcohols I	Page 641
Esters II	Page 653
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Glycols II	Page 655
Halogenated Hydrocarbons I	Page 658
Nitrogen Based Solvents II	Page 663

Life Sciences

Residual Solvents, DMI Diluent	Page 684
Residual Solvents, USP 467	Page 684

Petroleum

1,3-Butadiene	Page 690
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DB-624

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.18	20	1.00	-20 to 280	121-1324	121-1324E	121-1324LTM	221-1324LTM
0.20	25	1.12	-20 to 260	128-1324	128-1324E	128-1324LTM	
0.25	30	1.40	-20 to 260	122-1334	122-1334E	122-1334LTM	222-1334LTM
	60	1.40	-20 to 260	122-1364	122-1364E		
0.32	30	1.80	-20 to 260	123-1334	123-1334E	123-1334LTM	
	60	1.80	-20 to 260	123-1364	123-1364E		
0.45	30	2.55	-20 to 260	124-1334		124-1334LTM	
	75	2.55	-20 to 260	124-1374			
0.53	15	3.00	-20 to 260	125-1314			
	30	3.00	-20 to 260	125-1334	125-1334E	125-1334LTM	
	60	3.00	-20 to 260	125-1364	125-1364E		
	75	3.00	-20 to 260	125-1374	125-1374E		

CP-Select 624 CB

- Guaranteed for EPA volatiles with methods 524.2, 624 and 8015 for maximum confidence
- Excellent peak shape for polar and basic compounds for accurate results
- Specified by Pharmacopoeia Method V.3.3.9 for residual solvent analysis, providing compliancy

The CP-Select 624 CB is a highly reproducible version of the popular 624 phase and has 2-3 times lower bleed (bleed specification for a 30 m, 0.53 mm, df = 3.00 µm is <9 pA) than conventional columns. The Select 624 CB, a 6% cyanopropylphenyl, 94% dimethylsiloxane phase is synthesized and fully characterized to ensure maximum column-to-column reproducibility. For an even lower bleed performance we recommend the VF-624ms.

CP-Select 624 CB

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.15	25	0.84	265/280	CP7411	CP741115
0.25	30	1.40	265/280	CP7412	
	60	1.40	265/280	CP7413	CP741315
0.32	30	1.80	265/280	CP7414	CP741415
	60	1.80	265/280	CP7415	CP741515
0.53	30	3.00	265/280	CP7416	CP741615
	75	3.00	265/280	CP7417	
	105	3.00	265/280	CP7418	

HP-VOC

- Selectivity engineered for U.S. EPA Methods 502.2, 524.2 and 8260
- Low polarity – slightly more polar than DB-VRX
- Excellent peak shape
- Bonded and cross-linked
- Solvent rinsable

HP-VOC

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.20	30	1.10	-60 to 280/290	19091R-303	19091R-303LTM	29091R-303LTM
	60	1.10	-60 to 280/290	19091R-306		
0.32	60	1.80	-60 to 280/290	19091R-316		
	90	1.80	-60 to 280/290	19091R-319		
0.53	90	3.00	-60 to 280/290	19095R-429		
	105	3.00	-60 to 280/290	19095R-420		

DB-502.2

- Available in 105 m for volatiles analyses
- Excellent peak shape
- Bonded and cross-linked
- Solvent rinsable

DB-502.2

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.25	60	1.40	0 to 260/280	122-1464
0.32	60	1.80	0 to 260/280	123-1464
0.45	75	2.55	0 to 260/280	124-1474
	105	2.55	0 to 260/280	124-14a4
0.53	105	3.00	0 to 260/280	124-14A4

DB-MTBE

- Low polarity stationary phase
- Resolves MTBE from 2-methylpentane and 3-methylpentane for better quantitation
- Engineered for purge and trap injection without the need for cryofocusing
- Bonded and cross-linked
- Solvent rinsable

DB-MTBE Chromatograms

Environmental

Methyl Tert-Butyl Ether (MTBE) FID, Extended 8020 Analysis

Page 569

DB-MTBE

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.45	30	2.55	35 to 260/280	125-14A4		124-0034LTM
0.53	30	3.00	35 to 260/280	125-0034	125-0034E	125-0034LTM

CP-Select CB for MTBE

- Guaranteed analysis of MTBE in reformulated gasolines for reproducible results
- Unique selectivity for ease-of-use with MTBE
- Broad dynamic range for quantification of MTBE for the highest productivity

CP-Select CB for MTBE

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.25	50	0.25	200/200	CP7528

DB-TPH

- Specifically designed for the analysis of total petroleum hydrocarbons (TPHs), soil analysis, and LUFT
- Three analyses in one injection – gas range organics, diesel range organics and motor oil
- Fast run time
- Bonded and cross-linked
- Solvent rinsable

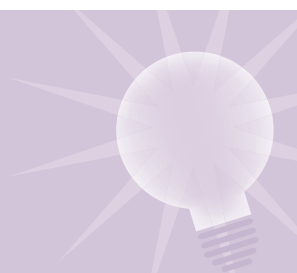
DB-TPH

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	7890/6890
					LTM Module
0.32	30	0.25	-10 to 320	123-1632	123-1632LTM
0.45	30	1.00	-10 to 290	124-1632	



Tips & Tools

For a precision cut on your capillary column, use Agilent's GC column cutting tool (P/N 5183-4620).



Select Mineral Oil

- Optimized selectivity for more reliable results
- Low bleed for better accuracy
- Available in UltiMetal for ultimate longevity

Total petroleum hydrocarbon (TPH) analysis is a routine technique used in environmental laboratories screening many samples. A simple and reliable method that provides the shortest analysis time is required. Select Mineral Oil is designed to meet this need, with a stabilized, non-polar bonded phase specifically for fast mineral oil analysis. The column is temperature stable up to 375/400°C and provides speedy analyses according to DIN H53 and DIN-EN-ISO 9377-2 methods. Thanks to the temperature stability of Select Mineral Oil, your C₄ to C₄₀ hydrocarbons can be analyzed in less than ten minutes. The high temperature stability of the column permits faster bakeout. For optimal injection performance be sure to use the special 4 m retention gap. Select Mineral Oils are available in economical three- and six-packs.

Select Mineral Oil

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Unit	7 in. Cage	5 in. Cage
0.32	15	0.10	-60 to 390/400	1/pk	CP7491	CP749115
	15	0.10	-60 to 390/400	3/pk	CP749103	
	15	0.10	-60 to 390/400	6/pk	CP749106	
Retention gap						
0.53	4		-60 to 325/350	3/pk	CP8015	

Select Mineral Oil UltiMetal

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.32	15	0.10	-60 to 390/400	CP7493

Metal Columns

Recommended Metal Columns

- CP-Sil 13 CB UltiMetal
- CP-Sil 5 CB UltiMetal
- CP-SIL 8 CB UltiMetal
- CP-WAX 52 CB UltiMetal
- FactorFour VF-5HT UltiMetal
- CP-AL₂O₃/KCL UltiMetal
- CP-AL₂O₃/NA₂SO₄ UltiMetal
- CP-PoraPLOT Q UltiMetal
- PLOT Molesieve 5Å UltiMetal



DB-ProSteel

- Excellent inertness
- Virtually unbreakable
- Available in a wide variety of stationary phases
- Bonded and cross-linked
- Ideal for high temperature analysis and process applications

Our easy-to-handle DB-ProSteel metal columns are deactivated with a new formula (this is not glass lined steel) to provide inertness that truly rivals fused silica. DB-ProSteel metal columns can be custom wound upon request for small GC ovens. Several of our most popular bonded phases are available in metal.

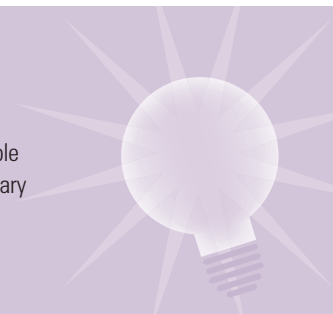
DB-ProSteel GC columns have the same outer diameter as standard Megabore (0.53 mm ID), so no special ferrules are required.

DB-ProSteel

Phase	ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
DB-PS1	0.53	15	0.15	-60 to 340/360	145-1011
			0.50	-60 to 300/320	145-1017
			1.50	-60 to 300/320	145-1012
		30	0.15	-60 to 340/360	145-1031
			0.50	-60 to 300/320	145-1037
			3.00	-60 to 260/280	145-1034
			5.00	-60 to 260/280	145-1035
DB-PS624	0.53	30	3.00	-20 to 260	145-1334
DB-PSWAX	0.53	30	1.00	20 to 230/240	145-7032
DB-PS2887	0.53	10	3.00	-60 to 350	145-2814

Tips & Tools

For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library



Non-Bonded Stationary Phases

Whenever possible Agilent recommends the use of bonded and cross-linked polymers. Bonded polymers are more rugged, will have longer lifetimes and can be solvent rinsed. However, Agilent recognizes that some methods have been developed on non-bonded phases and therefore maintains these columns to support established methods.

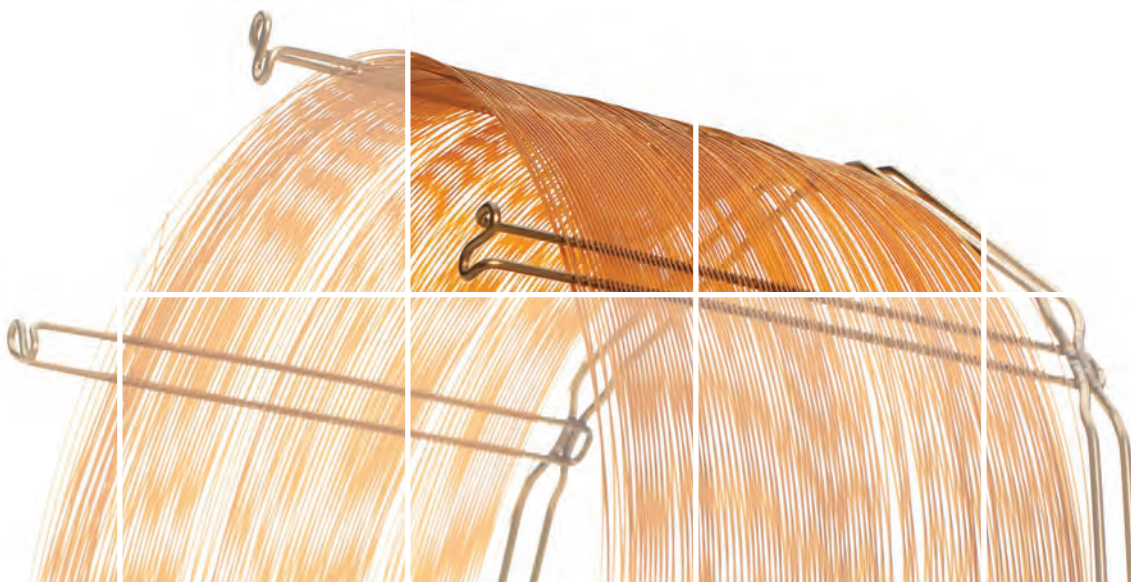
HP-101

- 100% Dimethylpolysiloxane

Because HP-101 columns are not bonded or cross-linked, we do not recommend solvent rinsing.

HP-101

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.20	10	0.20	-60 to 280	19091Y-101		
	25	0.20	-60 to 280	19091Y-102		19091Y-102LTM
	50	0.20	-60 to 280	19091Y-105		
	12	0.25	-60 to 280	19091-60010	19091-60010E	
0.32	25	0.30	-60 to 280	19091Y-012	19091Y-012E	19091Y-012LTM
	50	0.30	-60 to 280	19091Y-015		



HP-17

- 50% Phenyl and 50% Methyl siloxane

Because the HP-17 is not bonded or cross-linked, we do not recommend solvent rinsing.

HP-17

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	7890/6890
					LTM Module
0.53	10	2.00	25 to 260/280	19095L-121	19095L-121LTM

CAM

- Base deactivated polyethylene glycol
- Specifically designed for amine analysis
- Excellent peak shape for primary amines
- Replaces HP-Basicwax

Because the CAM is not bonded or cross-linked, we do not recommend solvent rinsing.

CAM Chromatograms

Industrial Chemicals

Amines in Water	Page 647
Primary Amines	Page 645

CAM

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890
						LTM Module
0.25	15	0.25	60 to 220/240	112-2112		112-2112LTM
	30	0.25	60 to 220/240	112-2132		112-2132LTM
		0.50	60 to 220/240	112-2133		112-2133LTM
	60	0.25	60 to 220/240	112-2162		
0.32	30	0.25	60 to 220/240	113-2132	113-2132E	113-2132LTM
		0.50	60 to 220/240	113-2133	113-2133E	113-2133LTM
0.53	30	1.00	60 to 200/220	115-2132		115-2132LTM

Carbowax 20M and HP-20M

- Polyethylene glycol, MW 20,000
- Equivalent to USP Phase G16

Because the Carbowax 20M and the HP-20M are not bonded or cross-linked, we do not recommend solvent rinsing. DB-WAX is the recommended bonded alternate for the HP-20M.

Carbowax 20M

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	7890/6890
					LTM Module
0.25	30	0.25	60 to 220/240	112-2032	112-2032LTM
0.32	30	0.25	60 to 220/240	113-2032	113-2032LTM
	60	0.25	60 to 220/240	113-2062	

HP-20M

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890
						LTM Module
0.20	25	0.10	60 to 220	19091W-102		19091W-102LTM
	50	0.10	60 to 220	19091W-105		
0.32	25	0.30	60 to 220	19091W-012	19091W-012E	19091W-012LTM
	50	0.30	60 to 220	19091W-015	19091W-015E	
0.53	10	1.33	60 to 220	19095W-121		19095W-121LTM
	30	1.33	60 to 220	19095W-123		19095W-123LTM

DX-1 and DX-4

- DX-1: 90% Dimethylpolysiloxane 10% Polyethylene Glycol
- DX-4: 15% Dimethylpolysiloxane 85% Polyethylene Glycol

Because DX series GC columns are not bonded and cross-linked, we do not recommend solvent rinsing.

DX-1

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	7890/6890 LTM Module
0.25	30	1.00	50 to 250/270	122-6133	
0.32	30	1.00	50 to 250/270	123-6133	123-6133LTM

DX-4

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	7890/6890 LTM Module
0.25	30	0.25	50 to 250/270	122-6432	122-6432LTM
	60	0.25	50 to 250/270	122-6462	
0.32	15	0.25	50 to 250/270	123-6412	123-6412LTM
	30	0.25	50 to 250/270	123-6432	123-6432LTM
	60	0.25	50 to 250/270	123-6462	

SE-30 and SE-54

- SE-30: 100% Dimethylpolysiloxane
- SE-54: (5%-Phenyl)(1%-Vinyl)-methylpolysiloxane

Because SE series GC columns are not bonded or cross-linked, we do not recommend solvent rinsing.

SE-30

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	7890/6890
					LTM Module
0.32	30	0.25	0 to 325/350	113-3032	113-3032LTM

SE-54

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	7890/6890
					LTM Module
0.25	30	0.25	0 to 325/350	112-5432	112-5432LTM
	60	0.25	0 to 325/350	112-5462	
0.32	30	0.25	0 to 325/350	113-5432	113-5432LTM

Packed GC Columns

Stationary phases are available for the production of packed columns and coated packings.

Stationary Phases for Packed GC Columns

A	C
Antarox CO 630	CP-Sil 34
Antarox CO 880	CP-Sil 5
Antarox CO 990	CP-Sil 58
Apiezon H	CP-Sil 76
Apiezon J	CP-Sil 8
Apiezon K	CP-Sil 84
Apiezon L	CP-Sil 88
Apiezon M	CP-Wax 4000 M
Apiezon N	CP-Wax 600 M
Armeen SD	Cyano B
B	Cyanoethyl sucrose
Bentone 34	Cyanoethyl sucrose, CES
Benzylcyanide-silver nitrate	Cyclo N
Bis(2-butoxyethylphthalate)	Cyclohexane dimethanol succinate, CDS
Benzylpyridine	D
Bis(2-ethoxyethyladipate)	Decaglycerol
Bis(2-cyanoethyl)formamide N,N-	Decane n-
Bis(2-ethoxyethylsebacate)	Dexsil 300 GC polymethylcarborane
Bis(2-methoxyethyl)adipate	Dexsil 400 GC polymethylcarborane
Butanediol succinate	Dexsil 410 GC polymethylcarborane
Bis(p-butoxybenziline)- α,α -bi-p-toluidine N,N-	Di isodecyl-phthalate, DIDP
Bis(p-methoxybenzylidene)- α,α -bi-p-toluidine N,N-	Di isooctyl-adipate
C	Di isooctyl-phthalate
Carbowax 1000	Di isooctyl-sebacate, DEHS
Carbowax 10000	Di-n-decyl phthalate, DDP
Carbowax 1500	Di-n-octyl adipate
Carbowax 1540	Di-n-propyl phthalate
Carbowax 200	Di-n-propyl tetrachlorophthalate
Carbowax 20M	Dioctoil
Carbowax 20M TPA	Dioctyl phthalate
Carbowax 300	Dioctyl sebacate (Octoil s)
Carbowax 400	Dibenzyl ether
Carbowax 4000	Dibutyl maleate
Carbowax 4000 TPA	Dibutyl phthalate, DBP
Carbowax 550	Dibutyl tetrachlorophthalate, DBTP
Carbowax 600	Diethylene glycol
Carbowax 6000	Diethylene glycol adipate, DEGA, cross linked
Carbowax 750	Diethylene glycol adipate, DEGA
Castorwax	Diethylene glycol sebacate, DEGSe
Celanese ester	Diethylene glycol succinate, DEGS

Stationary Phases for Packed GC Columns

D	H
Diglycerol	Hexadecene
Dimer acid	Hexadecanol
Dimethylformamide, DMF	Hexakis(2-cyanoethoxy)cyclohexane 1,2,3,4,5,6-
Dimethyl sulfolane, DMS 2,4-	Hexamethyl phosphoramidate, HMPA
Dimethanol cyclohexane succinate, CDS	HI-EFF 1 AP
Dimethyl sulfoxide, DMSO	HI-EFF 1 BP
Dinonyl phthalate	HI-EFF 3 AP
Dinonyl sebacate	HI-EFF 3 B
DOW coming 705	HI-EFF 8 BP
Dow fax 9 N 40	Hyprose SP-80, (octakis-(2-hydroxypropyl)sucrose)
Dowfax 9N9	I
E	Isoquinoline
EGSS-X	K
Emulphor ON-870	Kel F grease
Epon 1001, epoxy resin	Kel F oil no. 10
Ethofat 60/25	Kel F oil no. 3
Ethylbenzene	Kel F wax
Ethylene glycol adipate, EGA	KOH (potassium hydroxide)
Ethylene glycol isophthalate	L
Ethylene glycol isophthalate EGIP	LAC 1 R 296
Ethylene glycol phthalate	LAC 10 R 744
Ethylene glycol sebacate	LAC 12 R 796
Ethylene glycol succinate	LAC 17-R-770
Ethylene glycol tetrachlorophthalate	LAC 22 R 863
F	Lexan (polycarbonate resin)
FFAP	M
Fluorad FC 431	Mannitol
Fluorene	Montan wax
Fluorolube GR-362	N
Fyrquel 220	Neopentyl glycol adipate
G	Neopentyl glycol sebacate
Glycerol	Neopentyl glycol succinate
H	Nitrobenzene
H ₃ PO ₄ (Phosphoric acid)	Nujol (paraffin oil)
Hallcomid M-18, dimethylstearamide	O
Hallcomid M-18-OL, dimethyloleamide	Octadecane n-
Halocarbon K-352	Octadecene n-
Halocarbon oil 10.25	Octoil
Halocarbon wax	Olive oil
Hexadecane	Oronite NIW

Stationary Phases for Packed GC Columns

O	S
Oronite polybutene 128	Silicone DC 200
Oronite polybutene 32	Silicone DC 410
OS-124 (PMPE 5 ring)	Silicone DC 550
OS-138 (PMPE 6 ring)	Silicone DC 560
P	Silicone DC 702
Palladium	Silicone DC-704
Paraffin oil	Silicone DC 710
Paraffin wax	Silicone fluid MS 550
Pentanediolsuccinate; 1,5-	Silicone OV-1
Phenyl diethanolamine	Silicone OV-101
Phenyl diethanolamine succinate	Silicone OV-105
Pluronic P84	Silicone OV-11
Poly-A 101A (polyamide)	Silicone OV-17
Poly-A 103 (polyamide)	Silicone OV-1701
Poly-A 135 (polyamide)	Silicone OV-202
Poly-L 110 (polyamide)	Silicone OV-210
Poly-m-phenyl ether 5 ring	Silicone OV-215
Poly-m-phenoxyene, PPE-21	Silicone OV-22
Poly-m-phenyl ether 6 ring	Silicone OV-225
Poly-S 179	Silicone OV-25
Polyethylene glycol 2000	Silicone OV-275
Polyethylene glycol 600, Jefferson	Silicone OV-3
Polyethylene imine	Silicone OV-330
Polypropylene glycol 2000	Silicone OV-351
Polypropylene glycol 3500	Silicone OV-61
Polypropylene glycol 4000	Silicone OV-7
Polypropylene imine	Silicone OV-73
Polyvinylpyrrolidone	Silicone QF-1
Q	Silicone SE-30
Quadrol	Silicone SE-30 GC Grade
R	Silicone SE-52
Reoplex 4000	Silicone SE-54
S	Silicone SF-96
Sebaconitrile	Silicone UC W-98
Silar 10 C	Silicone UC W-982
Silar 5 CP highly polar	Silver nitrate
Silar 7 C	Sorbitol
Silar 9 C	SP-1000
Silicone AN-600 (50% cyanoethyl)	SP-1200
Silicone DC 111 grease	SP-2100

Stationary Phases for Packed GC Columns

S	U
SP-2250	UC-L-45
SP-2300	UCON 50 HB 2000
SP-2310	UCON 50 HB 280X
SP-2330	UCON 50 HB 5100
SP-2340	UCON 75 H 90000
SP-2401	UCON LB 1200X
SP-300	UCON LB 1715
Span-80	UCON LB 1800X
Squalane	UCON LB 550X
Squalene	UCW-98
Sucrose acetate isobutyrate	UC W-982
Sucrose-octa acetate	V
Supelco SP-216 PS	Versamid 900 (polyamide resin)
Surfonic N-300	
T	
Terephthalic acid	
Tergitol NP-35	
Tergitol NPX	
Tetra ethylene glycol	
Tetracyanoethyl pentaerythritol	
Tetraethylene glycol dimethyl ether	
Tetraethylene pentamine	
Tetrahydroxyethylenediamine	
Thiodipropionitrile β,β -	
Tri(tetra hydrofuryl)phosphate	
Triacetin	
Tributylphosphate	
Triethanolamine	
Trimer acid	
Trimethylol pelargonate	
Triton X-100	
Tris(2-cyanoethoxy)propane 1,2,3-	
Tritolyl phosphate	
Triton X-305	
Tween-80	

Supports for Packed GC Columns

Supports are available for the production of packed columns and coated packings.

Supports for Packed GC Columns

Description	Mesh Size	Description	Mesh Size
Activated charcoal	40-60	Chromosorb G AW DMCS	80-100
Activated charcoal	60-80	Chromosorb G AW DMCS	100-120
Activated charcoal	80-100	Chromosorb G HP	45-60
Alumina GC	40-60	Chromosorb G HP	60-80
Alumina GC	60-80	Chromosorb G HP	80-100
Alumina GC	80-100	Chromosorb G HP	100-120
Carbopack B	60-80	Chromosorb G NAW	45-60
Carbopack B	80-100	Chromosorb G NAW	60-80
Carbopack C	60-80	Chromosorb G NAW	80-100
Carbopack C	80-100	Chromosorb G NAW	100-120
Carbosieve G	60-80	Chromosorb P	20-40
Carbosieve G	80-100	Chromosorb P	40-60
Carbosieve S II	60-80	Chromosorb P	60-80
Carbosieve S II	80-100	Chromosorb P	80-100
Carbosieve S III	60-80	Chromosorb P	100-120
Carbosieve S III	80-100	Chromosorb P AW	45-60
Carbosphere	60-80	Chromosorb P AW	60-80
Carbosphere	80-100	Chromosorb P AW	80-100
Chromosorb 101	60-80	Chromosorb P AW	100-120
Chromosorb 101	80-100	Chromosorb P AW DMCS	45-60
Chromosorb 101	100-120	Chromosorb P AW DMCS	60-80
Chromosorb 102	20-40	Chromosorb P AW DMCS	80-100
Chromosorb 102	60-80	Chromosorb P AW DMCS	100-120
Chromosorb 102	80-100	Chromosorb P NAW	45-60
Chromosorb 102	100-120	Chromosorb P NAW	60-80
Chromosorb 103	80-100	Chromosorb P NAW	80-100
Chromosorb 103	100-120	Chromosorb P NAW	100-120
Chromosorb 105	80-100	Chromosorb T	30-60
Chromosorb 105	100-120	Chromosorb T	40-60
Chromosorb 106	60-80	Chromosorb W AW	40-60
Chromosorb 106	80-100	Chromosorb W AW	60-80
Chromosorb 106	100-120	Chromosorb W AW	80-100
Chromosorb 107	80-100	Chromosorb W AW	100-120
Chromosorb 107	100-120	Chromosorb W AW DMCS	45-60
Chromosorb 108	80-100	Chromosorb W AW DMCS	60-80
Chromosorb 108	100-120	Chromosorb W AW DMCS	80-100
Chromosorb 750	80-100	Chromosorb W AW DMCS	100-120
Chromosorb G AW	60-80	Chromosorb W HMDS	45-60
Chromosorb G AW	80-100	Chromosorb W HMDS	60-80
Chromosorb G AW	100-120	Chromosorb W HMDS	80-100
Chromosorb G AW DMCS	60-80	Chromosorb W HMDS	100-120

Supports for Packed GC Columns

Description	Mesh Size	Description	Mesh Size
Chromosorb W HP	60-80	Porapak N	50-80
Chromosorb W HP	80-100	Porapak N	80-100
Chromosorb W HP	100-120	Porapak N	100-120
Chromosorb W NAW	60-80	Porapak P	50-80
Chromosorb W NAW	80-100	Porapak P	80-100
Chromosorb W NAW	100-120	Porapak P	100-120
Glass beads regular	45-60	Porapak PS	50-80
Glass beads regular	60-80	Porapak PS	80-100
Glass beads regular	80-100	Porapak Q	50-80
Glass beads regular	100-120	Porapak Q	80-100
Hayesep A	60-80	Porapak Q	100-120
Hayesep A	80-100	Porapak QS	50-80
Hayesep A	100-120	Porapak QS	80-100
Hayesep B	60-80	Porapak QS	100-120
Hayesep B	80-100	Porapak R	50-80
Hayesep B	100-120	Porapak R	80-100
Hayesep C	60-80	Porapak R	100-120
Hayesep C	80-100	Porapak S	50-80
Hayesep C	100-120	Porapak S	80-100
Hayesep N	60-80	Porapak S	100-120
Hayesep N	80-100	Porapak T	50-80
Hayesep N	100-120	Porapak T	80-100
Hayesep P	60-80	Porapak T	100-120
Hayesep P	80-100	Porasil B	80-100
Hayesep P	100-120	Porasil C	80-100
Hayesep Q	60-80	Silica gel GC grade	30-40
Hayesep Q	80-100	Silica gel GC grade	45-60
Hayesep Q	100-120	Silica gel GC grade	60-80
Hayesep R	60-80	Silocel	45-60
Hayesep R	80-100	Silocel	60-80
Hayesep R	100-120	Silocel	80-100
Hayesep S	60-80	Silocel	100-120
Hayesep S	80-100	Spherosil XOB 75	100-120
Hayesep S	100-120	Tenax GR	35-60
Hayesep T	50-80	Tenax GR	60-80
Hayesep T	80-100	Tenax GR	80-100
Hayesep T	100-120	Tenax TA	20-35
Molecular sieve 5Å	45-60	Tenax TA	35-60
Molecular sieve 5Å	60-80	Tenax TA	60-80
Molecular sieve 5Å	80-100	Tenax TA	80-100
Molecular sieve 5Å	100-120	W KOH washed	45-60
Molecular sieve 13X	60-80	W KOH washed	60-80
Molecular sieve 13X	80-100	W KOH washed	80-100
Molecular sieve 13X	100-120	W KOH washed	100-120



Custom GC Column Ordering

Even though we offer over a thousand readily available columns, Agilent recognizes that sometimes you need something a little out of the ordinary. That's why we developed our Custom Column Shop. If you can't find what you're looking for in our standard order guides, we will design, build, and test capillary GC columns to meet your needs.

- We can create columns with non-standard lengths or unusual film thickness.
- We can connect columns together in series or as dual columns.
- We recognize that sometimes customers have specific column performance requirements for their applications that might not be met with standard test mixes. As a result we can also custom-test your columns with your desired test mixture and test conditions to meet your specific performance requirements.
- We can create DuraGuard columns with an integrated guard column. Most phases can be manufactured with a built-in guard column which means you get the advantages of a guard column without the union. Only available in DB-phases.

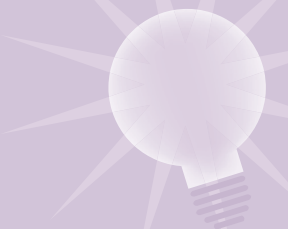
Custom columns are ordered using P/N 100-2000. Be sure to provide the details of your desired custom service or column including phase, length, ID, and film thickness.

Contact your local Agilent office or Authorized Agilent Distributor to receive a quote for your custom column needs. You can find order forms in the back of the catalog.

Customers in the United States, Canada, and Puerto Rico can request a custom column quote online at www.agilent.com/chem/CustomColumn

Tech Support

Need assistance selecting a column for your method? Contact our chromatography technical specialists at www.agilent.com/chem/TechRep



Agilent J&W GC Column Test Standards

Compare your column's performance to the test chromatogram shipped with your J&W column from Agilent. The column test standard contains components that test the column for resolution characteristics, efficiency, and inertness. The test mixes are supplied at a concentration of 250 ng/ μ L in 2 mL vials. Match the phase and column diameter in the chart below to find the test mix for your column.

Agilent J&W GC Column Test Standards

Column Description	Microbore (0.05 & 0.10 mm ID) Part No.	Capillary (0.18 & 0.32 mm ID) Part No.	Megabore (0.45 & 0.53 mm ID) Part No.
OV-351		200-0032	
DB-1ht		200-0010	
DB-1	200-0010	200-0310	200-0110
DB-5	200-0010	200-0310	200-0110
DB-5ht		200-0010	
DB-5ms		200-0185	200-0185
DB-624		200-0113	200-0113
DB-2887			200-0110
DB-WAX	200-0070	200-0370	200-0070
DB-WAXetr		200-0370	200-0070
SE-30		200-0010	
SE-52		200-0010	
SE-54		200-0010	200-0010
HP-1		5080-8858	8500-6812
HP-5		5080-8858	8500-6812
HP-FFAP	8500-6813	8500-6813	8500-6813
GS-OxyPLOT			5188-5379

Fused Silica Tubing

Deactivated Tubing

Deactivated tubing can be used as retention gaps, guard columns, or transfer lines. Our standard deactivation process is a phenyl methyl deactivation – the preferred choice for most applications due to its inertness and robustness.

Deactivated Fused Silica

ID (mm)	OD (mm)	Length (m)	Part No.
0.05	0.36	1	160-2655-1
		5	160-2655-5
		10	160-2655-10
0.10	0.19	1	160-1010-1
		5	160-1010-5
		10	160-1010-10
	0.36	1	160-2635-1
		5	160-2635-5
		5	19091-60620E
10	160-2635-10		
0.15	0.36	1	160-2625-1
		5	160-2625-5
		10	160-2625-10
0.18	0.34	1	160-2615-1
		5	160-2615-5
		10	160-2615-10
0.20	0.36	1	160-2205-1
		5	160-2205-5
		10	160-2205-10
0.25	0.36	1	160-2255-1
		5	160-2255-5
		10	160-2255-10
		30	160-2255-30
0.32	0.43	1	160-2325-1
		5	160-2325-5
		10	160-2325-10
		30	160-2325-30
0.45	0.67	1	160-2455-1
		5	160-2455-5
		10	160-2455-10
0.53	0.67	1	160-2535-1
		5	160-2535-5
		10	160-2535-10
		30	160-2535-30

Deactivated Fused Silica High Temperature (400°C)

ID (mm)	OD (mm)	Length (m)	Part No.
0.05	0.36	5	160-2815-5
0.10	0.36	5	160-2825-5
0.25	0.35	5	160-2845-5
		10	160-2845-10
0.32	0.43	5	160-2855-5
		10	160-2855-10
0.53	0.67	5	160-2865-5
		10	160-2865-10

ProSteel Deactivated Fused Silica

ID (mm)	OD (mm)	Length (m)	Part No.
0.53	0.67	5	160-4535-5

Undeactivated Fused Silica

Undeactivated tubing or bare fused silica is commonly used for capillary electrophoresis. It can also be used for transfer lines and other applications where inertness is not critical.

Undeactivated Fused Silica

ID (mm)	OD (mm)	Length (m)	Part No.
0.02	0.36	5	160-2660-5
0.05	0.36	5	160-2650-5
		10	160-2650-10
0.075	0.36	5	160-2644-5
		10	160-2644-10
0.10	0.36	5	160-2634-5
		10	160-2634-10
0.18	0.34	5	160-2610-5
		10	160-2610-10
0.20	0.36	5	160-2200-5
		10	160-2200-10
		50	19091-20050
0.25	0.36	5	160-2250-5
		10	160-2250-10
0.32	0.43	5	160-2320-5
		10	160-2320-10
		50	19091-21050
0.45	0.67	5	160-2450-5
		10	160-2450-10
0.53	0.67	5	160-2530-5
		10	160-2530-10

GC Column Application and Method Guides

Application	Specific Application	Agilent Phase
Biodiesel	EN14105 Free/Total Glycerin	Biodiesel, Select Biodiesel
	ASTM D6584 Free/Total Glycerin	Biodiesel, Select Biodiesel
	EN14103 FAME Analysis	Biodiesel, Select Biodiesel
	EN14110 Residual Methanol	Biodiesel, Select Biodiesel
	EN14106 Free Glycerol	Select Biodiesel
Chiral	Chiral γ -lactones and terpenes	CycloSil-B
	Optical isomers of acids, alcohols, amino acids, aromatic hydrocarbons, diols, flavors, aromas, ketones, organic acids and phenols	Cyclodex-B
	Chiral compounds using a nitrogen selective detector	HP-Chiral β
	Optical isomers of acids, alcohols, amino acids, aromatic, diols, flavor, aromas, ketones, organic acids and phenols	CP-Chirasil-Dex CB, CP-Cyclodextrin- β -2,3,6-M-19
	Amino acids, optical isomers	CP-Chirasil-Dex CB, CP-Cyclodextrin- β -2,3,6-M-19
Foods, Flavors and Fragrances	FAME up to C26, cis, trans, fast resolution FAME	Select FAME
	Best separation for cis, trans FAME up to 260°C	CP-Sil 88 for FAME
	Volatiles	CP-Carbowax 400 for Volatiles in Alcohol
	Unsaturated triglycerides	CP-TAP CB for Triglycerides
	Flavors, aromas, free fatty acids C1-C26	CP-FFAP CB
	Glycols, diols, alcohols	CP-Wax 57 CB for Glycols and Alcohols
Life Sciences	Blood alcohol analysis	DB-ALC1 and DB-ALC2
	Blood alcohol analysis	HP-Blood Alcohol
	Drugs of abuse confirmation	DB-5ms EVDX
	USP solvents, common solvents	HP-Fast Residual Solvent
	Drugs of abuse confirmation	VF-DA
Pesticides	Organochlorine pesticides	HP-PAS5
	Organochlorine pesticides	DB-1701P
	Chlorinated pesticides and PCBs	DB-608
	Trace levels of pesticides in food and environmental samples	VF-5 Pesticides and VF-1701 Pesticides
	Chlorinated, nitrogen, phosphorus pesticides and PCBs	Rapid-MS
	Chlorinated, nitrogen, phosphorus pesticides	CP-Sil 8 CB for Pesticides
	Chlorinated, nitrogen, phosphorus pesticides, trace level DDT and Endrin	CP-Sil 19 CB for Pesticides

Application	Specific Application	Agilent Phase
Polycyclic Aromatic Hydrocarbons	EU regulated PAHs	DB-EUPAH
	PAHs in environmental and food samples	Select PAH
	C5-C80, PAH and polar compounds	CP-Sil PAH CB UltiMetal
	EU and EPA regulated PAHs	VF-17ms for PAH
Petroleum	Simulated distillation using ASTM Method D2887	DB-2887
	C6-C110+	DB-HT SimDis
	C5-C100 simulated distillation	CP-SimDist
	C5-C120 simulated distillation	CP-SimDist UltiMetal
	PONA and PIANO analysis	HP-PONA
	Paraffins, aromatics, naphthenes and olefins C4-C20	CP-Sil PONA CB
	ASTM D 5134	CP-Sil PONA for ASTM D 5134
	PONA and PIANO analysis	DB-Petro
	High temperature simulated distillation	HP-1 Aluminum Clad
	C1-C10 hydrocarbons	Select Al2O3 MAPD
	C1-C6 alcohols, aromatic C6-C10	CP-TCEP for Alcohols in Gasoline
	Hydrogen, sulfide, carbonyl sulfide, methanethiol, ethanethiol and thiophenes in LPG	CP-Sil 5 CB for Sulfur
	Polar and non-polar volatile compounds, especially chlorosilanes with different substituents such as alkyl groups, or groups with ether, hydroxy and nitrile bonds	Select Silanes
	C1-C6 amines, alcohols, NH3, water, solvents, ethanol amines	CP-Volamine
	C3-C20 amines, alkanol amines	CP-Sil 8 CB for Amines
	C3-C8 amines and diamines	CP-Wax for Volatile Amines and Diamines
	C4-C10 amines, diamines and aromatic amines	CP-Wax 51 for Amines
	Oxygenates in C1-C10 hydrocarbons	CP-Lowox
	C1-C10 hydrocarbons	GS-OxyPLOT
	Methanol, formaldehyde and formic acid in water	CP-Sil 5 CB for Formaldehyde
	C1-C12 hydrocarbons	CP-Squalane
	Volatile oxygenates and halogenated hydrocarbons	CP-Propox
	Semivolatiles	Polychlorinated dibenzodioxins (PCDDs) and dibenzofurans (PCDFs)
Dioxins and dibenzo furan		CP-Sil 88 for Dioxins
EPA Semivolatiles Methods 625, 1625, 8270 and CLP protocols		DB-5.625
EPA Semivolatiles Methods 625, 1625, 8270 and CLP protocols		HP-5ms Semivolatile
PCB, detailed analysis		CP-Sil 5/C18 CB for PCB
PCB		CP-Sil 8 CB for PCB

Application	Specific Application	Agilent Phase
Volatiles	EPA Methods 502.2, 524.2 and 8260	DB-VRX
	Volatile priority pollutants and residual solvents	DB-624
	Halogenated hydrocarbons and solvents	CP-Select 624 CB
	EPA Methods 502.2, 524.2 and 8260	HP-VOC
	EPA Method 502.2	DB-502.2
	MTBE in soil and water	DB-MTBE
	Oxygenates and solvents	CP-Select CB for MTBE
	Total petroleum hydrocarbons (TPHs), soil analysis, and LUFT	DB-TPH
	C5-C40 hydrocarbons	Select Mineral Oil
Metal	High temperature analysis and process applications	DB-ProSteel
Non-Bonded	Amino acid derivatives, essential oils	HP-101
	Drugs, glycols, pesticides, steroids	HP-17
	Amines, basic compounds	CAM
	Alcohols, free acids, essential oils, ethers, glycols, solvents	Carbowax 20M and HP-20M
	Generic	SE-30 and SE-54

Agilent Phase	Composition	Application
Ultra Inert Columns		
DB-1ms Ultra Inert	100% Dimethylpolysiloxane	Semivolatiles, halogenated compounds, pesticides, herbicides, drugs of abuse, amines, unknown sample screening
HP-1ms Ultra Inert	100% Dimethylpolysiloxane	
DB-5ms Ultra Inert	5% Phenyl 95% dimethyl arylene siloxane	
HP-5ms Ultra Inert	5% Phenyl 95% dimethylpolysiloxane	
DB-35ms Ultra Inert	5% Phenyl 65% dimethylpolysiloxane	
General Application Columns		
DB-1ms	100% Dimethylpolysiloxane	Amines, hydrocarbons, pesticides, PCBs, phenols, sulfur compounds, flavors and fragrances
HP-1ms		
VF-1ms		
DB-5ms	5% Phenyl 95% dimethyl arylene siloxane	Semivolatiles, alkaloids, drugs, FAMES, halogenated compounds, pesticides, herbicides
HP-5ms	5% Phenyl 95% dimethylpolysiloxane	
VF-5ms		
DB-XLB		Pesticides, herbicides, PCBs and PAHs
VF-Xms	High arylene modified	Pesticides, herbicides, PCBs and PAHs
DB-35ms	5% Phenyl 65% dimethylpolysiloxane	Aromatic compounds, pesticides and herbicides, sterols and other substituted aromatic compounds
VF-35ms		

(Continued)

Agilent Phase	Composition	Application
General Application Columns		
DB-17ms VF-17ms	50% Phenyl 50% dimethylpolysiloxane	Antidepressants, herbicides and pesticides
VF-23ms	High cyanopropyl modified	FAME, solvents, sugars
VF-200ms	Trifluoropropyl methyl	Ketones, aldehydes, nitro- or chloro-containing compounds, PAHs, unsaturated compounds, silanes and CFCs
DB-225ms	50% Cyanopropylphenyl 50% dimethylpolysiloxane	FAMEs, alditol acetates, neutral sterols
VF-624ms	6% Cyanopropyl-phenyl 94% dimethylpolysiloxane	Purgeable organic volatiles and semi-volatiles, aromatics, halocarbons, solvents
VF-1301ms	6% Cyanopropyl-phenyl 94% dimethylpolysiloxane	Thin-film version of the VF-624ms suitable for volatile solvents, pesticides, PCBs and other organic compounds requiring thin films
VF-WAXms	Polyethylene glycol	Trace analysis of polar substances
VF-1701ms	14% Cyanopropyl-phenyl 86% dimethylpolysiloxane	Organic compounds in drinking water, base/neutrals and acids, PCBs and chlorinated pesticides, organophosphorus pesticides and herbicides
DB-1 HP-1 CP-Sil 5 CB	100% Dimethylpolysiloxane	Amines, hydrocarbons, pesticides, PCBs, phenols, sulfur compounds, flavors and fragrances
Ultra 1	100% Dimethylpolysiloxane	
Ultra 2	100% Dimethylpolysiloxane	
DB-5 HP-5 CP-Sil 8 CB	5% Phenyl 95% dimethylpolysiloxane	Semivolatiles, alkaloids, drugs, FAMEs, halogenated compounds, pesticides, herbicides
CP-Sil 13 CB	14% Phenyl 86% dimethylpolysiloxane	Analysis of medium-polarity compounds where halocarbon-sensitive detectors are used (e.g. ECD) Amines, aromatic hydrocarbons, EPA methods, fungicides, halogenated compounds, herbicides, pesticides, PCBs, phenols, phthalate esters, steroids, sugars and tranquilizers
DB-35 HP-35	35% Phenyl 65% dimethylpolysiloxane	CLP-pesticides, aroclors, pharmaceuticals, drugs of abuse
DB-17 HP-50+ CP-Sil 24 CB	50% Phenyl 50% dimethylpolysiloxane	Drugs, glycols, pesticides, steroids Antidepressants, herbicides and pesticides
DB-23	50% Cyanopropyl 50% methylpolysiloxane	FAMEs
HP-88	88% Cyanopropyl 12% aryl-polysiloxane	FAMEs
CP-Sil 88	Highly substituted, stabilized cyanopropyl	Dioxins, FAME, PCBs, PCDFs, pyridines and sugars

(Continued)

Agilent Phase	Composition	Application
General Application Columns		
DB-200	35% Trifluoropropyl 65% dimethylpolysiloxane	Residual solvents, pesticides, herbicides
DB-210	50% Trifluoropropyl 50% dimethylpolysiloxane	EPA Methods 8140 and 609
DB-225	50% Cyanopropylphenyl 50% dimethylpolysiloxane	FAMEs, alditol acetates, neutral sterols
CP-Sil 43 CB	25% Cyanopropyl 25% phenyl 50% dimethylpolysiloxane	FAME, halogenated compounds, phenols and pyridines
DB-1301	6% Cyanopropylphenyl 94% dimethylpolysiloxane	Aroclors, alcohols, pesticides, VOCs
CP-1301		Herbicides, pesticides and many pharmaceutical products
DB-1701	14% Cyanopropylphenyl 86% dimethylpolysiloxane	Pesticides, herbicides, TMS sugars, aroclors
CP-Sil 19 CB		Trace levels of pesticide residues in food and environmental samples
Polyethylene Glycol (PEG) Columns		
DB-WAX	Polyethylene glycol	Solvents, glycols, alcohols
HP-INNOWax		Alcohols, free organic acids, solvents, essential oils, flavors and fragrances
CP-Wax 52 CB		Alcohols, aldehydes, anesthetics, antidepressants, aromatic hydrocarbons, EPA methods, esters, FAME, flavors and aromas, glycols, halogenated components, ketones, nitro compounds, PAHs, phenols, solvents and sulfur compounds
DB-FFAP	Polyethylene glycol-acid modified	Organic acids, alcohols, aldehydes, ketones, acrylates
HP-FFAP		
CP-Wax 58 FFAP CB		FAME, flavors and aromas, free fatty acids, organic acids and phenols
CP-Wax 57 CB	Polyethylene glycol	Alcohols, aromatic hydrocarbons, esters, FAME, flavors and aromas, free fatty acids, glycols, halogenated compounds, ketones, organic acids and solvents
PLOT Columns		
CP-PoraBOND Q	Styrene-divinylbenzene copolymer	Alcohols, free fatty acids, gases, glycols, halogenated compounds, hydrocarbons, C1-C9, ketones, solvents, sulfur compounds
CP-PoraBOND U	Styrene-glycol methacrylate copolymer	Alcohols, free fatty acids, gases, glycols, halogenated compounds, hydrocarbons, C1-C9, ketones, solvents, sulfur compounds
CP-PoraPLOT Q	Styrene-divinylbenzene copolymer	Alcohols, free fatty acids, gases, glycols, halogenated compounds, hydrocarbons, C1-C9, ketones, solvents, sulfur compounds
CP-PoraPLOT Q-HT	Styrene-divinylbenzene copolymer	Halogenated compounds, hydrocarbons C1-C9, ketones, oxygenated hydrocarbons, permanent gases, solvents

(Continued)

Agilent Phase	Composition	Application
PLOT Columns		
HP-PLOT Q	Polystyrene-divinylbenzene	Hydrocarbons including isomers, CO ₂ , methane, air/CO, water, polar solvents, sulfur compounds
GS-Q	Porous divinylbenzene homopolymer	Hydrocarbons, halogenated hydrocarbons, sulfides except for SO ₂
CP-PoraPLOT U	Ethylene glycol dimethacrylate-divinylbenzene copolymer	Halogenated compounds, hydrocarbons C1-C6, ketones, oxygenated hydrocarbons, permanent gases and solvents
CP-PoraPLOT S	Vinylpyridine-divinylbenzene copolymer	Hydrocarbons, ketones
HP-PLOT U	Divinylbenzene/ethylene glycol dimethacrylate	C1-C7 hydrocarbons, CO ₂ , methane, air/CO, water, oxygenates, amines, solvents, alcohols, ketones, aldehydes
HP-PLOT Al ₂ O ₃ KCl	Aluminum oxide KCl deactivated	C1-C6 hydrocarbons in natural gas, refinery gas, fuel gas, synthetic gas, dienes
GS-Alumina KCl	Aluminum oxide KCl deactivated	C1-C6 hydrocarbons in natural gas, refinery gas, fuel gas, synthetic gas, dienes
CP-Al ₂ O ₃ /KCl	Aluminium oxide	Hydrocarbons C1-C10 and impurities in hydrocarbon mainstreams, benzene and toluene
CP-Al ₂ O ₃ /Na ₂ SO ₄	Aluminium oxide	Hydrocarbons C1-C10 and impurities in hydrocarbon mainstreams, benzene and toluene
HP-PLOT Al ₂ O ₃ S	Aluminum oxide "Sodium Sulfate" deactivated	C1-C6 hydrocarbons in natural gas, refinery gas, fuel gas, synthetic gas, dienes
GS-Alumina	Aluminum oxide with proprietary deactivation	C1-C6 hydrocarbons in natural gas, refinery gas, fuel gas, synthetic gas, dienes
HP-PLOT Al ₂ O ₃ M	Aluminium oxide	C1-C6 hydrocarbons in natural gas, refinery gas, fuel gas, synthetic gas, dienes
GS-GasPro	Proprietary, bonded silica-based	C1-C12 hydrocarbons, CO ₂ , trace-level sulfurs, hydride gases, inorganic gases, halocarbons, SF ₆ , oxygen/nitrogen separation at -80°C
CP-SilicaPLOT	Proprietary, bonded silica-based	COS in ethylene, freons/CFCs, hydrocarbons, propylene and sulfur gases
CP-CarboBOND	Active carbon	Hydrocarbons in ethylene and traces CO and CO ₂ in ethylene and propylene
CP-CarboPLOT P7	Active carbon	He, Xe, CO, Ne, CH ₄ , CO ₂ , O ₂ /Ar, C ₂ H ₆ , N ₂ , C ₂ H ₄ , Kr, and C ₂ H ₂
GS-CarbonPLOT	Bonded monolithic carbon layer	C1-C5 hydrocarbons, CO ₂ , air/CO, trace acetylene in ethylene, methane
HP-PLOT Molesieve	5Å molecular sieve zeolite	Permanent and noble gases. Argon and oxygen separation at 35°C
CP-Molsieve 5Å	Molecular sieve	He, H ₂ , O ₂ , CO, Ne, HD, N ₂ , NO, Ar, D ₂ , CH ₄ , KrHT, Xe, DT, CD ₄ , Rn, T ₂
CP-PoraPLOT Amines	Styrene-divinylbenzene copolymer base deactivated	Amines C1-C6

EPA Method

Drinking Water			
EPA Method	Application	Recommended Column	Part No.
501, 501.3	Measurement of trihalomethanes in drinking water GC/MS and selected ion monitoring	VF-624ms, 30 m x 0.53 mm, 3.00 µm	CP9106
		VF-624ms, 30 m x 0.25 mm, 1.40 µm	CP9102
		DB-VRX, 30 m x 0.45 mm, 2.55 µm	124-1534
		DB-624, 30 m x 0.45 mm, 2.55 µm	124-1334
502.2	Volatile organic compounds in water by purge and trap capillary column GC with photoionization and electrolytic conductivity detectors in series	VF-624ms, 75 m x 0.53 mm, 3.00 µm	CP9108
		VF-624ms, 30 m x 0.53 mm, 3.00 µm	CP9106
		VF-624ms, 30 m x 0.25 mm, 1.40 µm	CP9102
		DB-VRX, 75 m x 0.45 mm, 2.55 µm	124-1574
503.1	Volatile aromatic and unsaturated organic compounds in water by purge and trap gas chromatography	DB-VRX, 30 m x 0.45 mm, 2.55 µm	124-1534
		DB-624, 30 m x 0.45 mm, 2.55 µm	124-1334
504.1	1,2-Dibromoethane (EDB) and 1,2-dibromo-3-chloropropane (DB CP), GC, microextraction	VF-1ms, 30 m x 0.32 mm, 1.00 µm	CP8926
		VF-1701ms, 30 m x 0.32 mm, 1.00 µm	CP9163
		DB-VRX, 30 m x 0.45 mm, 2.55 µm	124-1534
		DB-624, 30 m x 0.45 mm, 2.55 µm	124-1334
505	Analysis of organohalide pesticides and commercial polychlorinated biphenyl (PCB) products in water by microextraction and GC	VF-1ms, 30 m x 0.32 mm, 1.00 µm	CP8926
		VF-17ms, 30 m x 0.32 mm, 0.50 µm	CP8991
506	Determination of phthalate and adipate esters in drinking water by liquid-liquid extraction or liquid-solid extraction and GC with photoionization detection	VF-5ms, 30 m x 0.32 mm, 0.25 µm	CP8955
		VF-1ms, 30 m x 0.32 mm, 0.25 µm	CP8924
		DB-5ms, 30 m x 0.25 mm, 0.25 µm	122-5532
		DB-5ms, 30 m x 0.53 mm, 1.50 µm	125-5532
507	Determination of nitrogen and phosphorus-containing pesticides in water by GC with a nitrogen-phosphorus detector	DB-608, 30 m x 0.53 mm, 0.50 µm	125-6837
		VF-5 Pesticides, 30 m x 0.25 mm, 0.25 µm	CP9074
		VF-1701 Pesticides, 30 m x 0.25 mm, 0.25 µm	CP9070
		DB-35ms, 30 m x 0.25 mm, 0.25 µm	122-3832
508	Determination of chlorinated pesticides in water GC with an electron capture detector	DB-5ms, 30 m x 0.25 mm, 0.25 µm	122-5532
		VF-5 Pesticides, 30 m x 0.25 mm, 0.25 µm	CP9074
508.1	Determination of chlorinated pesticides, herbicides, and organohalides by liquid-solid extraction and electron capture GC	VF-1701 Pesticides, 30 m x 0.25 mm, 0.25 µm	CP9070
		VF-5 Pesticides, 30 m x 0.25 mm, 0.25 µm	CP9074
		DB-35ms, 30 m x 0.32 mm, 0.25 µm	123-3832
		DB-XLB, 30 m x 0.32 mm, 0.50 µm	123-1236

(Continued)

Drinking Water

EPA Method	Application	Recommended Column	Part No.
515	Determination of chlorinated herbicides in drinking water	DB-35ms, 30 m x 0.32 mm, 0.25 μ m	123-3832
515.3	Determination of chlorinated acids in drinking water by liquid-liquid extraction, derivatization and GC with electron capture detection	VF-1701ms, 30 m x 0.25 mm, 0.25 μ m	CP9151
		VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
515.4	Determination of chlorinated acids in drinking water by liquid-liquid microextraction, derivatization, and fast GC with electron capture detection	VF-1701ms, 30 m x 0.25 mm, 0.25 μ m	CP9151
		VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
521	Determination of nitrosamines in drinking water by solid phase extraction and capillary column gas chromatography with large volume injection and chemical ionization tandem mass spectrometry (MS/MS)	VF-5ms, 30 m x 0.25 mm, 1.00 μ m	CP8946
524.2	Measurement of purgeable organic compounds in water by capillary GC/MS	VF-624ms, 30 m x 0.53 mm, 3.00 μ m	CP9106
		VF-624ms, 75 m x 0.53 mm, 3.00 μ m	CP9108
		VF-5ms, 30 m x 0.32 mm, 1.00 μ m	CP8957
		DB-VRX, 60 m x 0.25 mm, 1.40 μ m	122-1564
		DB-624, 60 m x 0.25 mm, 1.4 μ m	122-1364
		HP-VOC, 60 m x 0.20 mm, 1.10 μ m	19091R-306
		DB-VRX, 20 m x 0.18 mm, 1.00 μ m	121-1524
525, 525.2	Determination of organic compounds in drinking water by liquid-solid extraction and capillary column GC/MS	VF-5 Pesticides, 30 m x 0.25 mm, 0.25 μ m	CP9074
		HP-5ms, 30 m x 0.25 mm, 0.50 μ m	19091S-133
526	Determination of selected semivolatile organic compounds in drinking water by solid phase extraction and capillary column GC/MS	VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
527	Determination of selected pesticides and flame retardants in drinking water by solid phase extraction and capillary column GC/MS	VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
528	Determination of phenols in drinking water by solid phase extraction and capillary column GC/MS	VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
		DB-5ms, 30 m x 0.25 mm, 0.25 μ m	122-5532
		DB-XLB, 30 m x 0.25 mm, 0.25 μ m	122-1232
		DB-5ms, 30 m x 0.53 mm, 1.50 μ m	125-5532
529	Determination of explosives and related compounds in drinking water by solid phase extraction and capillary column GC/MS	VF-5ms, 15 m x 0.25 mm, 0.25 μ m	CP8939

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Drinking Water			
EPA Method	Application	Recommended Column	Part No.
551	Determination of Chlorination Disinfection Byproducts and Chlorinated Solvents in Drinking Water by Liquid-Liquid Extraction and Gas Chromatography with Electron Capture Detection	VF-1301ms, 30 m x 0.25 mm, 1.00 µm	CP9054
		DB-5ms, 30 m x 0.25 mm, 1.00 µm	122-5533
		DB-1, 30 m x 0.25 mm, 1.00 µm	122-1033
551.1	Determination of chlorination disinfection byproducts, chlorinated solvents, and halogenated pesticides/herbicides in drinking water by liquid-liquid extraction and GC with electron-capture detection	VF-1ms, 30 m x 0.25 mm, 1.00 µm	CP8913
		VF-1301ms, 30 m x 0.25 mm, 1.00 µm	CP9054
		DB-5ms, 30 m x 0.25 mm, 1.00 µm	122-5533
		DB-1, 30 m x 0.25 mm, 1.00 µm	122-1033
552	Determination of Haloacetic Acids in Drinking Water by Liquid-Liquid Extraction, Derivatization, and Gas Chromatography with Electron Capture Detection	VF-5ms, 30 m x 0.25 mm, 0.25 µm	CP8944
		DB-35ms, 30 m x 0.32 mm, 0.25 µm	123-3832
		DB-XLB, 30 m x 0.32 mm, 0.50 µm	123-1236
552.1	Determination of Haloacetic Acids and Dalapon in Drinking Water by Ion Exchange Liquid-Solid Extraction and Gas Chromatography with an Electron Capture Detector	DB-35ms, 30 m x 0.32 mm, 0.25 µm	123-3832
		DB-XLB, 30 m x 0.32 mm, 0.50 µm	123-1236
552.2	Determination of haloacetic acids and dalapon in drinking water by liquid-liquid extraction, derivatization GC with electron capture detection	VF-1701ms, 30 m x 0.25 mm, 0.25 µm	CP9151
		VF-5ms, 30 m x 0.25 mm, 0.25 µm	CP8944
		DB-35ms, 30 m x 0.32 mm, 0.25 µm	123-3832
		DB-XLB, 30 m x 0.32 mm, 0.50 µm	123-1236
552.3	Determination of haloacetic acids and dalapon in drinking water by liquid-liquid microextraction, derivatization, and GC with electron capture detection	VF-1701ms, 30 m x 0.25 mm, 0.25 µm	CP9151
		VF-5ms, 30 m x 0.25 mm, 0.25 µm	CP8944
556	Determination of carbonyl compounds in drinking water by pentafluorobenzylhydroxylamine derivatization and capillary GC with electron capture detection	VF-1701ms, 30 m x 0.25 mm, 0.25 µm	CP9151
		VF-5ms, 30 m x 0.25 mm, 0.25 µm	CP8944

Waste Water

EPA Method	Application	Column	Part No.
601	Purgeable Halocarbons	VF-624ms, 75 m x 0.53 mm, 3.00 μ m	CP9108
		VF-624ms, 60 m x 0.32 mm, 1.80 μ m	CP9105
		VF-624ms, 30 m x 0.25 mm, 1.40 μ m	CP9102
		DB-VRX, 75 m x 0.45 mm, 2.55 μ m	124-1574
		DB-624, 75 m x 0.45 mm, 2.55 μ m	124-1374
602	Purgeable aromatics	VF-624ms, 75 m x 0.53 mm, 3.00 μ m	CP9108
		VF-624ms, 30 m x 0.25 mm, 1.40 μ m	CP9102
		VF-624ms, 30 m x 0.25 mm, 1.40 μ m	CP9102
		DB-VRX, 30 m x 0.45 mm, 2.55 μ m	124-1534
		DB-624, 30 m x 0.45 mm, 2.55 μ m	124-1334
603	Acrolein and Acrylonitrile	VF-WAXms, 30 m x 0.25 mm, 1.00 μ m	CP9206
		VF-624ms, 30 m x 0.25 mm, 1.40 μ m	CP9102
		DB-VRX, 30 m x 0.45 mm, 2.55 μ m	124-1534
		DB-624, 30 m x 0.45 mm, 2.55 μ m	124-1334
604	Phenols	VF-624ms, 60 m x 0.32 mm, 1.80 μ m	CP9105
		VF-624ms, 60 m x 0.25 mm, 1.40 μ m	CP9103
		DB-5ms, 30 m x 0.25 mm, 0.25 μ m	122-5532
		DB-XLB, 30 m x 0.25 mm, 0.25 μ m	122-1232
		DB-5ms, 30 m x 0.53 mm, 1.50 μ m	125-5532
605	Benzidines	DB-5ms, 30 m x 0.25 mm, 0.25 μ m	122-5532
		DB-5ms, 30 m x 0.53 mm, 1.50 μ m	125-5532
		DB-608, 30 m x 0.53 mm, 0.50 μ m	125-6837
606	Phthalate esters	VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
		DB-5ms, 30 m x 0.25 mm, 0.25 μ m	122-5532
		DB-5ms, 30 m x 0.53 mm, 1.50 μ m	125-5532
		DB-608, 30 m x 0.53 mm, 0.50 μ m	125-6837
607	Nitrosamines	CP-Sil 8 CB for Amines, 30 m x 0.32 mm, 1.00 μ m	CP7596
		DB-5ms, 30 m x 0.25 mm, 0.25 μ m	122-5532
		DB-5ms, 30 m x 0.53 mm, 1.50 μ m	125-5532
608	Organochlorine pesticides and PCBs	VF-5 Pesticides, 30 m x 0.25 mm, 0.25 μ m	CP9074
		VF-1701 Pesticides, 30 m x 0.25 mm, 0.25 μ m	CP9070
		VF-17ms, 30 m x 0.25 mm, 0.25 μ m	CP8982
		DB-35ms, 30 m x 0.32 mm, 0.25 μ m	123-3832
		DB-XLB, 30 m x 0.32 mm, 0.50 μ m	123-1236

(Continued)

Waste Water			
EPA Method	Application	Column	Part No.
609	Nitroaromatics and Isophorone	VF-5ms, 30 m x 0.53 mm, 1.50 µm	CP8976
		VF-5ms, 30 m x 0.25 mm, 0.50 µm	CP8945
		HP-5ms, 30 m x 0.25 mm, 0.50 µm	19091S-133
		DB-5ms, 30 m x 0.53 mm, 1.50 µm	125-5532
		DB-608, 30 m x 0.53 mm, 0.50 µm	125-6837
610	Polynuclear Aromatic Hydrocarbons	VF-17ms, 30 m x 0.25 mm, 0.25 µm	CP8982
		VF-5ms, 30 m x 0.25 mm, 0.25 µm	CP8944
		DB-5ms, 30 m x 0.25 mm, 0.25 µm	122-5532
		DB-5ms, 30 m x 0.32 mm, 0.25 µm	123-5532
		DB-1ms, 30 m x 0.25 mm, 0.25 µm	122-0132
611	Haloethers	VF-5ms, 30 m x 0.53 mm, 1.50 µm	CP8976
		VF-5ms, 30 m x 0.25 mm, 0.50 µm	CP8945
612	Chlorinated Hydrocarbons	VF-5ms, 30 m x 0.25 mm, 0.10 µm	CP8943
		VF-35ms, 30 m x 0.25 mm, 0.25 µm	CP8877
		VF-200ms, 30 m x 0.25 mm, 1.00 µm	CP8860
		DB-5ms, 30 m x 0.32 mm, 0.50 µm	123-5536
		HP-5ms, 30 m x 0.32 mm, 0.50 µm	19091S-113
		DB-1, 30 m x 0.32 mm, 0.50 µm	123-103E
613	2,3,7,8-Tetrachlorodibenzo-p-dioxin	CP-Sil 88 for Dioxins, 50 m x 0.25 mm, 0.20 µm	CP7588
		VF-5ms, 60 m x 0.25 mm, 0.10 µm	CP8948
614	The Determination of Organophosphorus Pesticides in Municipal and Industrial Wastewater	DB-35ms, 30 m x 0.25 mm, 0.25 µm	122-3832
		DB-5ms, 30 m x 0.25 mm, 0.25 µm	122-5532
615	Chlorinated herbicides	VF-1701 Pesticides, 30 m x 0.25 mm, 0.25 µm	CP9070
		VF-5 Pesticides, 30 m x 0.25 mm, 0.25 µm	CP9074
		DB-35ms, 30 m x 0.32 mm, 0.25 µm	123-3832
619	Triazine pesticides	VF-17ms, 30 m x 0.25 mm, 0.50 µm	CP8983
		VF-5ms, 30 m x 0.25 mm, 0.25 µm	CP8944
		DB-35ms, 30 m x 0.25 mm, 0.25 µm	122-3832
		DB-5ms, 30 m x 0.25 mm, 0.25 µm	122-5532
622	The Determination of Organophosphorus Pesticides in Municipal and Industrial Wastewater	DB-35ms, 30 m x 0.25 mm, 0.25 µm	122-3832
		DB-5ms, 30 m x 0.25 mm, 0.25 µm	122-5532

(Continued)

Waste Water

EPA Method	Application	Column	Part No.
624	Purgeables	VF-624ms, 75 m x 0.53 mm, 3.00 μ m	CP9108
		VF-624ms, 60 m x 0.32 mm, 1.80 μ m	CP9105
		VF-624ms, 30 m x 0.25 mm, 1.40 μ m	CP9102
		DB-VRX, 60 m x 0.25 mm, 1.40 μ m	122-1564
		DB-624, 60 m x 0.25 mm, 1.4 μ m	122-1364
		HP-VOC, 60 m x 0.20 mm, 1.10 μ m	19091R-306
		DB-VRX, 20 m x 0.18 mm, 1.00 μ m	121-1524
		DB-624, 20 m x 0.18 mm, 1.00 μ m	121-1324
625	Base/neutrals and acids	VF-5 Pesticides, 30 m x 0.25 mm, 0.25 μ m	CP9074
		VF-1701 Pesticides, 30 m x 0.25 mm, 0.25 μ m	CP9070
		VF-200ms, 30 m x 0.25 mm, 0.25 μ m	CP8858
		HP-5ms, 30 m x 0.25 mm, 0.50 μ m	19091S-133
1613	Tetra- through octa-chlorinated dioxins and furans by isotope dilution HRGC/HRMS	VF-5ms, 60 m x 0.25 mm, 0.25 μ m	CP8960
		CP-Sil 88 for Dioxins, 50 m x 0.25 mm, 0.20 μ m	CP7588
1624	Volatile organic compounds by isotope dilution GC/MS	VF-624ms, 60 m x 0.25 mm, 1.40 μ m	CP9103
1625	Semivolatile organic compounds by isotope dilution GC/MS	VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
8010	Volatile Halogenated Organic Compounds List by EPA Method 8021	DB-VRX, 75 m x 0.45 mm, 2.55 μ m	124-1574
		DB-624, 75 m x 0.45 mm, 2.55 μ m	124-1374
8021	Volatile Halogenated & Aromatic Organic Compounds	DB-VRX, 75 m x 0.45 mm, 2.55 μ m	124-1574
		DB-624, 75 m x 0.45 mm, 2.55 μ m	124-1374

Solid Waste			
EPA Method	Application	Column	Part No.
8010	Volatile Halogenated Organic Compounds List by EPA Method 8021	DB-VRX, 75 m x 0.45 mm, 2.55 µm	124-1574
		DB-624, 75 m x 0.45 mm, 2.55 µm	124-1374
8011	1,2-Dibromoethane and 1,2-dibromo-3-chloropropane by microextraction and GC	VF-1ms, 30 m x 0.32 mm, 0.25 µm	CP8924
		DB-VRX, 30 m x 0.45 mm, 2.55 µm	124-1534
		DB-624, 30 m x 0.45 mm, 2.55 µm	124-1334
8015	Nonhalogenated organics by GC	DB-VRX, 30 m x 0.45 mm, 2.55 µm	124-1534
		DB-624, 30 m x 0.45 mm, 2.55 µm	124-1334
8015c	Nonhalogenated organics by GC	VF-WAXms, 30 m x 0.53 mm, 1.00 µm	CP9215
		CP-Sil 8 CB, 30 m x 0.53 mm, 1.50 µm	CP8736
8020	Volatile Aromatic Organic Compounds List by EPA Method 8021	DB-VRX, 30 m x 0.45 mm, 2.55 µm	124-1534
		DB-624, 30 m x 0.45 mm, 2.55 µm	124-1334
8021, CLP Volamines	Volatile Halogenated & Aromatic Organic Compounds	DB-VRX, 75 m x 0.45 mm, 2.55 µm	124-1574
		DB-624, 75 m x 0.45 mm, 2.55 µm	124-1374
8021b	Aromatic and halogenated volatiles by GC	VF-624ms, 60 m x 0.53 mm, 3.00 µm	CP9107
		VF-624ms, 60 m x 0.25 mm, 1.40 µm	CP9103
8031	Acrylonitrile by GC	CP-PoraBOND Q, 25 m x 0.53 mm, 10.00 µm	CP7354
		DB-VRX, 30 m x 0.45 mm, 2.55 µm	124-1534
		DB-624, 30 m x 0.45 mm, 2.55 µm	124-1334
8032	Acrylamide by GC	CP-Wax 58 FFAP CB, 25 m x 0.53 mm, 2.00 µm	CP7654
8033	Acetonitrile by GC with nitrogen-phosphorus detection	VF-WAXms, 15 m x 0.53 mm, 1.00 µm	CP9226
8040, 8041	Phenols by Gas Chromatography	DB-5ms, 30 m x 0.25 mm, 0.25 µm	122-5532
		DB-XLB, 30 m x 0.25 mm, 0.25 µm	122-1232
		DB-5ms, 30 m x 0.53 mm, 1.50 µm	125-5532
8041a	Phenols by GC	VF-5ms, 30 m x 0.53 mm, 1.50 µm	CP8976
		VF-1701ms, 30 m x 0.53 mm, 1.00 µm	CP9171
		VF-17ms, 30 m x 0.53 mm, 1.00 µm	CP9001
8060	Phthalate esters	DB-5ms, 30 m x 0.25 mm, 0.25 µm	122-5532
		DB-5ms, 30 m x 0.53 mm, 1.50 µm	125-5532
		DB-608, 30 m x 0.53 mm, 0.50 µm	125-6837

(Continued)

Solid Waste			
EPA Method	Application	Column	Part No.
8061	Phthalate esters by GC with electron capture detection (GC/ECD)	VF-5ms, 30 m x 0.53 mm, 1.50 µm	CP8976
		VF-1701ms, 30 m x 0.53 mm, 1.00 µm	CP9171
		DB-5ms, 30 m x 0.25 mm, 0.25 µm	122-5532
		DB-5ms, 30 m x 0.53 mm, 1.50 µm	125-5532
		DB-608, 30 m x 0.53 mm, 0.50 µm	125-6837
8070	Nitrosamines by Gas Chromatography	DB-5ms, 30 m x 0.25 mm, 0.25 µm	122-5532
		DB-5ms, 30 m x 0.53 mm, 1.50 µm	125-5532
8070a	Nitrosamines by GC	CP-Sil 8 CB for Amines, 30 m x 0.53 mm, 1.00 µm	CP7597
		VF-17ms, 30 m x 0.53 mm, 1.50 µm	CP9002
8081	Organochlorine pesticides by GC	VF-5ms, 30 m x 0.25 mm, 1.00 µm	CP8946
		VF-35ms, 30 m x 0.25 mm, 1.00 µm	CP8879
		VF-35ms, 30 m x 0.53 mm, 0.50 µm	CP8887
		VF-1701ms, 30 m x 0.53 mm, 1.00 µm	CP9171
		VF-5ms, 30 m x 0.53 mm, 1.50 µm	CP8976
8081a	Organochlorine Pesticides by Gas Chromatography	DB-35ms, 30 m x 0.32 mm, 0.25 µm	123-3832
		DB-XLB, 30 m x 0.32 mm, 0.50 µm	123-1236
8082, CLP Pesticides	Polychlorinated Biphenyls (PCBs) by Gas Chromatography	DB-35ms, 30 m x 0.32 mm, 0.25 µm	123-3832
		DB-XLB, 30 m x 0.32 mm, 0.50 µm	123-1236
8082a	Polychlorinated biphenyls (PCBs) by GC	VF-5ms, 30 m x 0.25 mm, 1.00 µm	CP8946
		VF-35ms, 30 m x 0.25 mm, 1.00 µm	CP8879
		VF-35ms, 30 m x 0.53 mm, 0.50 µm	CP8887
		VF-1701ms, 30 m x 0.53 mm, 1.00 µm	CP9171
		VF-5ms, 30 m x 0.53 mm, 1.50 µm	CP8976
8090	Nitroaromatics and Isophorone	HP-5ms, 30 m x 0.25 mm, 0.50 µm	19091S-133
		DB-5ms, 30 m x 0.53 mm, 1.50 µm	125-5532
		DB-608, 30 m x 0.53 mm, 0.50 µm	125-6837
8091	Nitroaromatics and cyclic ketones by GC	VF-5ms, 30 m x 0.53 mm, 1.50 µm	CP8976
		VF-1701ms, 30 m x 0.53 mm, 1.00 µm	CP9171
8095	Explosives by GC	VF-5ms, 15 m x 0.53 mm, 1.50 µm	CP8973
		VF-1ms, 15 m x 0.53 mm, 1.50 µm	CP8967
		VF-200ms, 15 m x 0.53 mm, 1.00 µm	CP8866
8100	Polynuclear aromatic hydrocarbons	VF-5ms, 30 m x 0.25 mm, 0.25 µm	CP8944
		DB-5ms, 30 m x 0.25 mm, 0.25 µm	122-5532
		DB-5ms, 30 m x 0.32 mm, 0.25 µm	123-5532
		DB-1ms, 30 m x 0.25 mm, 0.25 µm	122-0132

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Solid Waste			
EPA Method	Application	Column	Part No.
8111	Haloethers by GC	VF-5ms, 15 m x 0.53 mm, 1.50 µm	CP8973
		VF-1701ms, 30 m x 0.53 mm, 1.00 µm	CP9171
8120	Chlorinated hydrocarbons by Gas Chromatography	DB-5ms, 30 m x 0.32 mm, 0.50 µm	123-5536
		HP-5ms, 30 m x 0.32 mm, 0.50 µm	19091S-113
		DB-1, 30 m x 0.32 mm, 0.50 µm	123-103E
8121	Chlorinated hydrocarbons by GC: capillary column technique	VF-200ms, 30 m x 0.53 mm, 1.00 µm	CP8868
		VF-WAXms, 30 m x 0.53 mm, 1.00 µm	CP9215
		VF-5ms, 30 m x 0.53 mm, 1.50 µm	CP8976
		VF-1701ms, 30 m x 0.53 mm, 1.00 µm	CP9171
		DB-5ms, 30 m x 0.32 mm, 0.50 µm	123-5536
		HP-5ms, 30 m x 0.32 mm, 0.50 µm	19091S-113
		DB-1, 30 m x 0.32 mm, 0.50 µm	123-103E
8131	Aniline and selected derivatives by GC	VF-5ms, 30 m x 0.25 mm, 0.25 µm	CP8944
		CP-Sil 8 CB for Amines, 30 m x 0.25 mm, 0.25 µm	CP7598
8140	Organophosphorus Pesticides by GC-NPD	DB-35ms, 30 m x 0.25 mm, 0.25 µm	122-3832
		DB-5ms, 30 m x 0.25 mm, 0.25 µm	122-5532
8141a	Organophosphorus compounds by gas chromatography: capillary column technique	DB-35ms, 30 m x 0.25 mm, 0.25 µm	122-3832
8141b	Organophosphorus compounds by GC	DB-5ms, 30 m x 0.25 mm, 0.25 µm	122-5532
		VF-200ms, 30 m x 0.53 mm, 1.00 µm	CP8868
		VF-35ms, 30 m x 0.53 mm, 1.00 µm	CP8888
		VF-5ms, 30 m x 0.53 mm, 1.00 µm	CP8975
8150	Chlorinated herbicides	VF-1ms, 30 m x 0.53 mm, 1.00 µm	CP8969
		DB-35ms, 30 m x 0.32 mm, 0.25 µm	123-3832
8151	Chlorinated herbicides by GC using methylation or pentafluorobenzoylation derivatization: capillary column technique	DB-35ms, 30 m x 0.32 mm, 0.25 µm	123-3832
8151b	Chlorinated herbicides by GC using methylation or pentafluorobenzoylation derivatization	VF-5 Pesticides, 30 m x 0.25 mm, 0.25 µm	CP9074
		VF-5ms, 30 m x 0.32 mm, 1.00 µm	CP8957
		VF-35ms, 30 m x 0.25 mm, 0.25 µm	CP8877
		VF-1701 Pesticides, 30 m x 0.25 mm, 0.25 µm	CP9070
		VF-35ms, 30 m x 0.53 mm, 1.00 µm	CP8888
		VF-1701ms, 30 m x 0.53 mm, 1.00 µm	CP9171
8240	Volatile Chlorinated and Aromatic Hydrocarbons	DB-VRX, 20 m x 0.18 mm, 1.00 µm	121-1524
		DB-624, 20 m x 0.18 mm, 1.00 µm	121-1324
		DB-VRX, 60 m x 0.25 mm, 1.40 µm	122-1564
		DB-624, 60 m x 0.25 mm, 1.4 µm	122-1364
		HP-VOC, 60 m x 0.20 mm, 1.10 µm	19091R-306

(Continued)

Solid Waste			
EPA Method	Application	Column	Part No.
8260/CLP-VOCs	Volatile Organic Compounds by Gas Chromatography/Mass Spectroscopy (GC/MS): Capillary Column Technique Method	DB-VRX, 60 m x 0.25 mm, 1.40 μ m	122-1564
		DB-624, 60 m x 0.25 mm, 1.4 μ m	122-1364
		HP-VOC, 60 m x 0.20 mm, 1.10 μ m	19091R-306
		DB-VRX, 20 m x 0.18 mm, 1.00 μ m	121-1524
		DB-624, 20 m x 0.18 mm, 1.00 μ m	121-1324
8260b	Volatile organic compounds by GC/MS	VF-624ms, 75 m x 0.53 mm, 3.00 μ m	CP9108
		VF-5ms, 30 m x 0.25 mm, 1.00 μ m	CP8946
		VF-624ms, 60 m x 0.32 mm, 1.80 μ m	CP9105
8261	Volatile organic compounds by vacuum distillation in combination with GC/MS spectrometry (VD/GC/MS)	VF-624ms, 60 m x 0.53 mm, 3.00 μ m	CP9107
		VF-624ms, 60 m x 0.25 mm, 1.40 μ m	CP9103
8270	Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	HP-5ms, 30 m x 0.25 mm, 0.50 μ m	19091S-133
8270d	Semivolatile organic compounds by GC/MS	VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
		VF-5ms, 30 m x 0.25 mm, 0.50 μ m	CP8945
		VF-5ms, 30 m x 0.25 mm, 1.00 μ m	CP8946
8275a	Semivolatile organic compounds (PAHs and PCBs) in soils/sludges and solid wastes using thermal extraction/gas chromatography/mass spectrometry (TE/GC/MS)	VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
		VF-5ms, 30 m x 0.25 mm, 0.50 μ m	CP8945
		VF-5ms, 30 m x 0.25 mm, 1.00 μ m	CP8946
8280b	Polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) by high resolution gas chromatography/low resolution mass spectrometry (HRGC/LRMS)	CP-Sil 8 CB, 30 m x 0.25 mm, 0.25 μ m	CP8751
8290b	Polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) by high resolution gas chromatography/high resolution mass spectrometry (HRGC/HRMS)	CP-Sil 8 CB, 30 m x 0.25 mm, 0.25 μ m	CP8751
		CP-Sil 88 for Dioxins, 50 m x 0.25 mm, 0.20 μ m	CP7588
8410	Gas chromatography/Fourier transform infrared (GC/FT-IR) spectrometry for semivolatile organics: capillary column	VF-5ms, 30 m x 0.32 mm, 0.25 μ m	CP8955
8430	Analysis of bis(2-chloroethyl) ether and hydrolysis products by direct aqueous injection (GC/FT-IR)	VF-WAXms, 30 m x 0.53 mm, 1.00 μ m	CP9215

United States Pharmacopoeia (USP) GC Phases

USP Phase Composition	Agilent Phase Recommendation
G1 Dimethylpolysiloxane oil	HP-1*, DB-1*, HP-1ms*, DB-1ms*, VF-1ms, CP-Sil 5 CB, CP-Sil 5 CB Low Bleed/MS
G2 Dimethylpolysiloxane gum	HP-1*, DB-1*, HP-1ms*, DB-1ms*, VF-1ms, CP-Sil 5 CB, CP-Sil 5 CB Low Bleed/MS, CP-SimDist
G3 50% Phenyl 50% methylpolysiloxane	DB-17*, HP-50+*, VF-17ms, CP-Sil 24 CB, CP-Sil 24 CB Low Bleed/MS
G5 3-cyanopropyl polysiloxane	DB-23, VF-23ms, Select for FAME, CP-Sil 88
G6 Trifluoropropylmethylpolysilicone	DB-200, DB-210, VF-200ms
G7 50% 3-cyanopropyl 50% phenylmethylsilicone	DB-225, DB-225ms, CP-Sil 43 CB
G8 80% Bis(3-cyanopropyl) 20% 3-cyanopropylphenylpolysiloxane or 90% 3-cyanopropyl 10% phenylmethylsiloxane	HP-88, VF-23ms
G14 Polyethylene glycol (average molecular weight of 950-1,050)	DB-WAX, VF-WAXms, CP-Wax 52 CB
G15 Polyethylene glycol (average molecular weight of 3,000-3,700)	DB-WAX, VF-WAXms, CP-Wax 52 CB
G16 Polyethylene glycol (average molecular weight of 15,000)	DB-WAX*, VF-WAXms, CP-Wax 52 CB
G17 75% Phenyl 25% methylpolysiloxane	DB-17, HP-50+, VF-17ms, CP-Sil 24 CB, CP-Sil 24 CB Low Bleed/MS
G19 25% Phenyl 25% cyanopropylmethylsilicone	DB-225*, DB-225ms, CP-Sil 43 CB
G20 Polyethylene glycol (average molecular weight of 380-420)	DB-WAX, VF-WAXms, CP-Wax 52 CB
G25 Polyethylene glycol TPA (Carbowax 20M terephthalic acid)	DB-FFAP*, HP-FFAP*, CP-Wax 58 (FFAP) CB, CP-FFAP CB
G27 5% Phenyl 95% methylpolysiloxane	DB-5*, HP-5*, HP-5ms*, DB-5ms, VF-5ms, VF-5ht, CP-Sil 8 CB, CP-Sil 8 CB Low Bleed/MS
G28 25% Phenyl 75% methylpolysiloxane	DB-35, HP-35, DB-35ms, VF-35ms
G32 20% Phenylmethyl 80% dimethylpolysiloxane	DB-35, HP-35, DB-35ms, VF-35ms
G35 Polyethylene glycol & diepoxide esterified with nitroterephthalic acid	DB-FFAP*, HP-FFAP*, CP-Wax 58 (FFAP) CB, CP-FFAP CB
G36 1% Vinyl 5% phenylmethylpolysiloxane	DB-5, HP-5, HP-5ms, DB-5ms, VF-5ms, VF-5ht, CP-Sil 8 CB, CP-Sil 8 CB Low Bleed/MS
G38 Phase G1 plus a tailing inhibitor	DB-1, HP-1, HP-1ms, DB-1ms, VF-1ms, CP-Sil 5 CB, CP-Sil 5 CB Low Bleed/MS
G39 Polyethylene glycol (average molecular weight of 1,500)	DB-WAX, VF-WAXms, CP-Wax 52 CB
G41 Phenylmethyldimethylsilicone (10% phenyl substituted)	DB-5, HP-5, HP-5ms, DB-5ms, VF-5ms, VF-5ht, CP-Sil 8 CB, CP-Sil 8 CB Low Bleed/MS
G42 35% Phenyl 65% dimethylvinylsiloxane	DB-35*, HP-35*, DB-35ms, VF-35ms
G43 6% Cyanopropylphenyl 94% dimethylpolysiloxane	DB-624*, DB-1301, VF-624ms, VF-1301ms, CP-1301, CP-Select 624 CB
G45 Divinylbenzene-ethylene glycol-dimethacrylate	HP-PLOT U*, CP-PoraBOND U, CP-PoraPLOT U
G46 14% Cyanopropylphenyl 86% methylpolysiloxane	DB-1701*, VF-1701ms, CP-Sil 19 CB, CP-Sil 19 CB Low Bleed/MS

*Indicates an exact equivalent

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ASTM Methods

Method	Title	Recommended Agilent Column	Part No.
D 1945	Standard Test Method for the Analysis of Natural Gas by GC	HP PLOT, 15 m x 0.53 mm, 50 µm	19095P-MS9
		HP PLOT Q, 15 m x 0.53 mm, 40 µm	19095P-Q03
		CP-Molsieve 5Å, 10 m x 0.53 mm, 50.00 µm	CP7537
		CP-PoraPLOT Q-HT, 10 m x 0.53 mm, 20.00 µm	CP7558
D 1946	Standard Test Method for the Analysis of Reformed Gas by GC	HP PLOT, 15 m x 0.53 mm, 50 µm	19095P-MS9
		HP PLOT Q, 15 m x 0.53 mm, 40 µm	19095P-Q03
		CP-Molsieve 5Å, 10 m x 0.53 mm, 50.00 µm	CP7537
		CP-Molsieve 5Å, 25 m x 0.25 mm, 30.00 µm	CP7533
D 1983	Standard Test Method for Fatty Acid Composition by Gas-Liquid Chromatography of Methyl Esters	DB-WAX, 30 m x 0.25 mm, 0.25 µm	122-7032
D 2163	Standard Test Method for the Analysis of Liquified Petroleum (LP) Gases and Propene Concentrates by GC	HP PLOT Al2O3 "KCl", 30 m x 0.53 mm, 15 µm	19095P-K23
		HP PLOT Al2O3 "S", 30 m x 0.53 mm, 15 µm	19095P-S23
D 2195	Standard Test Methods for Pentaerythritol	CP-Sil 5 CB, 30 m x 0.53 mm, 1.50 µm	CP8735
D 2268	Standard Test Method for Analysis of High-Purity n-Heptane and Isooctane by Capillary GC	DB-1, 60 m x 0.25 mm, 0.50 µm	122-106E
D 2306	Standard Test Method for C8 Aromatic Hydrocarbons by GC	HP-INNOWax, 60 m x 0.25 mm, 0.25 µm	19091N-136
D 2360	Standard Test Method for Trace Impurities in Monocyclic Aromatic Hydrocarbons by GC	HP-INNOWax, 60 m x 0.32 mm, 0.25 µm	19091N-116
D 2426	Standard Test Method for Butadiene Dimer and Styrene in Butadiene Concentrates by GC	DB-1, 30 m x 0.53 mm, 5.00 µm	125-1035
		CP-Sil 5 CB, 30 m x 0.53 mm, 1.50 µm	CP8735
D 2427	Standard Test Method for Determination of C2 through C5 Hydrocarbons in Gasoline by GC	DB-1, 30 m x 0.53 mm, 5.00 µm	125-1035
		GS-Alumina, 30 m x 0.53 mm,	115-3532
		CP-Al2O3/KCl, 50 m x 0.53 mm, 10.00 µm	CP7518
D 2245	Standard Test Method for Identification of Oils and Oil Acids in Solvent-Reducible Paints	CP-Sil 88 for FAME, 50 m x 0.25 mm, 0.20 µm	CP7488
D 2504	Standard Test Method for Noncondensable Gases in C2 and Lighter Hydrocarbon Products by GC	HP PLOT, 30 m x 0.53 mm, 50 µm	19095P-MS0
		CP-CarboBOND, 25 m x 0.53 mm, 10.00 µm	CP7374
D 2505	Standard Test Method for Ethylene, Other Hydrocarbons, and Carbon Dioxide in High-Purity Ethylene by GC	GS-GasPro, 60 m x 0.32 mm,	113-4362
D 2580	Standard Test Method for Phenols in Water by Gas-Liquid Chromatography	CP-Sil 8 CB, 25 m x 0.32 mm, 0.40 µm	CP5850
		CP-FFAP CB, 25 m x 0.53 mm, 1.00 µm	CP7486

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ASTM Methods

Method	Title	Recommended Agilent Column	Part No.
D 2593	Standard Test Method for Butadiene Purity and Hydrocarbon Impurities by GC	GS-Alumina, 30 m x 0.53 mm	115-3532
		CP-AI203/KCl, 25 m x 0.32 mm, 5.00 µm	CP7515
		CP-AI203/KCl, 50 m x 0.53 mm, 10.00 µm	CP7518
D 2712	Standard Test Method for Hydrocarbon Traces in Propylene Concentrates by GC	GS-Alumina, 50 m x 0.53 mm	115-3552
D 2743	Standard Practices for Uniformity of Traffic Paint Vehicle Solids by Spectroscopy and Gas Chromatography	CP-Sil 88 for FAME, 50 m x 0.25 mm, 0.20 µm	CP7488
D 2804	Standard Test Method for Purity of Methyl Ethyl Ketone by GC	DB-WAX, 30 m x 0.53 mm, 1.00 µm	125-7032
		DB-210, 15 m x 0.53 mm, 1 µm	125-0212
		CP-WAX 52 CB, 30 m x 0.32 mm, 0.50 µm	CP8763
		CP-WAX 52 CB, 30 m x 0.53 mm, 1.00 µm	CP8738
D 2887	Standard Test Method for Boiling Range Distribution of Petroleum Fractions by GC	DB-2887, 10 m x 0.53 mm, 3.00 µm	125-2814
		CP-SimDist UltiMetal, 5 m x 0.53 mm, 0.88 µm	CP7570
		CP-SimDist UltiMetal, 10 m x 0.53 mm, 2.65 µm	CP7582
		CP-SimDist UltiMetal, 5 m x 0.53 mm, 0.17 µm	CP7532
Extended D 2887	Standard Test Method for Boiling Range Distribution of Petroleum Fractions by GC, to C60	HP-1, 10 m x 0.53 mm, 0.88 µm	19095Z-021
		HP-1, 5 m x 0.53 mm, 0.88 µm	19095Z-020
D 2908	Standard Practice for Measuring Volatile Organic Matter in Water by Aqueous-Injection GC	CP-Select 624 CB, 30 m x 0.32 mm, 1.80 µm	CP7414
		CP-Select 624 CB, 75 m x 0.53 mm, 3.00 µm	CP7417
		CP-WAX 52 CB, 30 m x 0.32 mm, 0.50 µm	CP8763
		CP-WAX 52 CB, 30 m x 0.53 mm, 1.00 µm	CP8738
D 3054	Standard Test Method for Analysis of Cyclohexane by GC	DB-1, 60 m x 0.32 mm, 0.50 µm	123-106E
D 3168	Standard Practice for Qualitative Identification of Polymers in Emulsion Paints	CP-Sil 5 CB, 30 m x 0.32 mm, 1.00 µm	CP8760
		CP-Sil 5 CB, 30 m x 0.53 mm, 1.50 µm	CP8735
D 3257	Standard Test Method for Aromatics in Mineral Spirits by GC	DB-624, 30 m x 0.53 mm, 3.00 µm	125-1334
D 3271	Standard Practice for Direct Injection of Solvent-Reducible Paints into a Gas Chromatograph for Solvent Analysis	CP-PoraPLOT Q, 25 m x 0.53 mm, 20.00 µm	CP7554
		CP-WAX 52 CB, 30 m x 0.53 mm, 1.00 µm	CP8738
D 3328	Standard Test Methods for Comparison of Waterborne Petroleum Oils by Gas Chromatography	CP-Sil 5 CB, 30 m x 0.32 mm, 3.00 µm	CP8687
		CP-Sil 5 CB, 30 m x 0.53 mm, 3.00 µm	CP8677
D 3329	Standard Test Method for Purity of Methyl Isobutyl Ketone by GC	DB-WAX, 30 m x 0.53 mm, 1.00 µm	125-7032
		DB-624, 30 m x 0.45 mm, 2.55 µm	124-1334
		CP-WAX 52 CB, 60 m x 0.53 mm, 1.00 µm	CP8798
D 3432	Standard Test Method for Unreacted Toluene Diisocyanates in Urethane Prepolymers and Coating Solutions by GC	HP-1ms, 30 m x 0.32 mm, 1.00 µm	19091S-713

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ASTM Methods

Method	Title	Recommended Agilent Column	Part No.
D 3447	Standard Test Method for Purity of Halogenated Organic Solvents	DB-624, 30 m x 0.53 mm, 3.00 µm	125-1334
D 3452	Standard Practice for Rubber – Identification by Pyrolysis-Gas Chromatography	CP-Sil 5 CB, 30 m x 0.53 mm, 1.50 µm	CP8735
D 3465	Standard Test Method for Purity of Monomeric Plasticizers by Gas Chromatography	CP-Sil 5 CB, 25 m x 0.32 mm, 0.52 µm	CP8430
		CP-Sil 5 CB, 30 m x 0.53 mm, 1.50 µm	CP8735
D 3524	Standard Test Method for Diesel Fuel Diluent in Used Diesel Engine Oils by Gas Chromatography	CP-SimDist UltiMetal, 10 m x 0.53 mm, 0.53 µm	CP7592
D 3545	Standard Test Method for Alcohol Content and Purity of Acetate Esters by GC	DB-624, 30 m x 0.53 mm, 3.00 µm	125-1334
D 3606	Standard Test Method for Determination of Benzene and Toluene in Finished Motor and Aviation Gasoline by Gas Chromatography	VF-1ms, 15 m x 0.25 mm, 0.10 µm	CP8906
		CP-TCEP for Alcohols in Gasoline, 50 m x 0.25 mm, 0.40 µm	CP7525
D 3687	Standard Test Method for Analysis of Organic Vapors Collected by the Activated Charcoal Tube Adsorption Method	DB-WAX, 30 m x 0.53 mm, 1.00 µm	125-7032
		DB-WAX, 30 m x 0.45 mm, 0.85 µm	124-7032
		CP-WAX 52 CB, 30 m x 0.32 mm, 0.50 µm	CP8763
		CP-WAX 52 CB, 30 m x 0.53 mm, 1.00 µm	CP8738
D 3695	Standard Test Method for Volatile Alcohols in Water by Direct Aqueous-Injection GC	DB-WAX, 30 m x 0.53 mm, 1.00 µm	125-7032
		CP-SimDist UltiMetal, 10 m x 0.53 mm, 0.53 µm	CP7592
D 3710	Standard Test Method for Boiling Range Distribution of Gasoline and Gasoline Fractions by GC	DB-2887, 10 m x 0.53 mm, 3.00 µm	125-2814
D 3749	Standard Test Method for Residual Vinyl Chloride Monomer in Poly(Vinyl Chloride) Resins by Gas Chromatographic Headspace Technique	CP-PoraBOND Q, 10 m x 0.32 mm, 5.00 µm	CP7350
		CP-PoraBOND Q, 10 m x 0.53 mm, 10.00 µm	CP7353
D 3760	Standard Test Method for Analysis of Isopropylbenzene (Cumene) by GC	DB-WAX, 60 m x 0.32 mm, 0.25 µm	123-7062
		HP-1, 50 m x 0.32 mm, 0.52 µm	19091Z-115
		CP-Xylenes, 50 m x 0.53 mm,	CP7428
D 3792	Standard Test Method for Water Content of Coatings by Direct Injection Into a Gas Chromatograph	CP-PoraBOND Q, 25 m x 0.32 mm, 5.00 µm	CP7351
		CP-PoraBOND Q, 25 m x 0.53 mm, 10.00 µm	CP7354
D 3797	Standard Test Method for Analysis of o-Xylene by GC	HP-INNOWax, 60 m x 0.32 mm, 0.50 µm	19091N-216
		CP-Xylenes, 50 m x 0.53 mm	CP7428
D 3798	Standard Test Method for Analysis of p-Xylene by GC	HP-INNOWax, 60 m x 0.32 mm, 0.50 µm	19091N-216
		CP-Xylenes, 50 m x 0.53 mm	CP7428
D 3871	Standard Test Method for Purgeable Organic Compounds in Water Using Headspace Sampling	DB-VRX, 75 m x 0.45 mm, 2.55 µm	124-1574
D 3876	Standard Test Method for Methoxyl and Hydroxypropyl Substitution in Cellulose Ether Products by Gas Chromatography	CP-Sil 5 CB, 30 m x 0.32 mm, 1.00 µm	CP8760
		CP-Sil 5 CB, 30 m x 0.53 mm, 1.50 µm	CP8735

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ASTM Methods

Method	Title	Recommended Agilent Column	Part No.
D 3893	Standard Test Method for Purity of Methyl Amyl Ketone and Methyl Isoamyl Ketone by GC	DB-VRX, 30 m x 0.45 mm, 2.55 µm	124-1534
D 3973	Standard Test Method for Low-Molecular Weight Halogenated Hydrocarbons in Water	DB-VRX, 30 m x 0.45 mm, 2.55 µm	124-1534
D 4059	Standard Test Method for Analysis of Polychlorinated Biphenyls in Insulating Liquids by Gas Chromatography	CP-Sil 8 CB for PCB, 50 m x 0.25 mm, 0.25 µm	CP7482
D 4275	Standard Test Method for Determination of Butylated Hydroxy Toluene (BHT) in Polymers of Ethylene and Ethylene – Vinyl Acetate (EVA) Copolymers By Gas Chromatography	CP-Sil 5 CB, 30 m x 0.32 mm, 3.00 µm	CP8687
		CP-Sil 5 CB, 30 m x 0.53 mm, 3.00 µm	CP8677
D 4322	Standard Test Method for Residual Acrylonitrile Monomer Styrene-Acrylonitrile Copolymers and Nitrile Rubber by Headspace Gas Chromatography	CP-PoraBOND Q, 25 m x 0.53 mm, 10.00 µm	CP7354
D 4367	Standard Test Method for Benzene in Hydrocarbon Solvents by Gas Chromatography	VF-1ms, 15 m x 0.25 mm, 0.10 µm	CP8906
		CP-TCEP for Alcohols in Gasoline, 50 m x 0.25 mm, 0.40 µm	CP7525
D 4415	Standard Test Method for Determination of Dimer in Acrylic Acid	DB-FFAP, 30 m x 0.32 mm, 0.25 µm	123-3232
D 4424	Standard Test Method for Butylene Analysis by GC	HP PLOT Al ₂ O ₃ S, 50 m x 0.53 mm, 15 µm	19095P-S25
		CP-Al203/Na2SO4, 25 m x 0.53 mm, 10.00 µm	CP7567
D 4443	Standard Test Method for Residual Vinyl Chloride Monomer Content in PPB Range in Vinyl Chloride Homo- and Co-Polymers by Headspace GC	DB-VRX, 30 m x 0.45 mm, 2.55 µm	124-1534
D 4492	Standard Test Method for Analysis of Benzene by Gas Chromatography	CP-TCEP for Alcohols in Gasoline, 50 m x 0.25 mm, 0.40 µm	CP7525
D 4509	Standard Test Methods for Determining the 24-Hour Gas (AIR) Space Acetaldehyde Content of Freshly Blown PET Bottles	CP-PoraBOND Q, 25 m x 0.32 mm, 5.00 µm	CP7351
		CP-PoraBOND Q, 25 m x 0.53 mm, 10.00 µm	CP7354
D 4534	Test Method for Benzene Content of Cyclic Products by Gas Chromatography	CP-TCEP for Alcohols in Gasoline, 50 m x 0.25 mm, 0.40 µm	CP7525
D 4735	Standard Test Method for Determination of Trace Thiophene in Refined Benzene by GC	DB-FFAP, 30 m x 0.45 mm, 0.85 µm	124-3232
		CP-Wax 58 FFAP CB, 25 m x 0.53 mm, 1.00 µm	CP7614
D 4768	Standard Test Method for Analysis of 2,6-Ditertiary-Butyl Para-Cresol and 2,6-Ditertiary- Butyl Phenol in Insulating Liquids by Gas Chromatography	CP-Wax 58 FFAP CB, 25 m x 0.53 mm, 1.00 µm	CP7614
D 4864	Standard Test Method for Determination of Traces of Methanol in Propylene Concentrates by GC	DB-WAX, 30 m x 0.45 mm, 0.85 µm	124-7032

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ASTM Methods

Method	Title	Recommended Agilent Column	Part No.
D 4947	Standard Test Method for Chlordane and Heptachlor Residues in Indoor Air	DB-5, 30 m x 0.53 mm, 1.50 μ m	125-5032
		DB-608, 30 m x 0.53 mm, 0.83 μ m	125-1730
D 4961	Standard Test Method for GC Analysis of Major Organic Impurities in Phenol Produced by the Cumene Process	DB-FFAP, 30 m x 0.45 mm, 0.85 μ m	124-3232
		HP PLOT Q, 15 m x 0.53 mm, 40 μ m	19095P-Q03
D 4983	Standard Test Method for Cyclohexylamine Morpholine and Diethylaminoethanol in Water and Condensed Steam by Direct Aqueous Injection GC	HP-5ms, 30 m x 0.32 mm, 1.00 μ m	19091S-213
		CAM, 30 m x 0.53 mm, 1 μ m	115-2132
D 5008	Standard Test Method for Ethyl Methyl Pentonal Content and Purity Value of 2-Ethylhexanol by GC	HP-1, 15 m x 0.53 mm, 5.00 μ m	19095Z-621
		HP-INNOWax, 30 m x 0.32 mm, 0.25 μ m	19091N-113
D 5060	Standard Test Method for Determining Impurities in High-Purity Ethylbenzene by GC	HP-INNOWax, 60 m x 0.32 mm, 0.50 μ m	19091N-216
		CP-WAX 52 CB, 60 m x 0.32 mm, 0.50 μ m	CP8773
D 5075	Standard Test Method for Nicotine in Indoor Air	DB-5, 30 m x 0.53 mm, 1.50 μ m	125-5032
		DB-5, 30 m x 0.32 mm, 1.00 μ m	123-5033
D 5134	Standard Test Method for Detailed Analysis of Petroleum Naphthas Through n-Nonane by Capillary GC	HP-PONA, 50 m x 0.20 mm, 0.50 μ m	19091S-001
		CP-Sil PONA for ASTM D 5134, 50 m x 0.21 mm, 0.50 μ m	CP7531
D 5135	Standard Test Method for Analysis of Styrene by Capillary GC	HP-INNOWax, 60 m x 0.32 mm, 0.50 μ m	19091N-216
		CP-WAX 52 CB, 60 m x 0.32 mm, 0.50 μ m	CP8773
D 5175	Standard Test Method for Organohalide Pesticides and Polychlorinated Biphenyls in Water by Microextraction and GC	DB-1, 30 m x 0.32 mm, 1.00 μ m	123-1033
		DB-608, 30 m x 0.32 mm, 0.5 μ m	123-1730
		DB-XLB, 30 m x 0.25 mm, 0.25 μ m	122-1232
D 5303	Standard Test Method for Trace Carbonyl Sulfide in Propylene by GC	GS-GasPro, 30 m x 0.32 mm	113-4332
		HP PLOT Q, 30 m x 0.53 mm, 40 μ m	19095P-Q04
D 5307	Standard Test Method for Determination of Boiling Range Distribution of Crude Petroleum by GC	HP-1, 7.5 m x 0.53 mm, 5.00 μ m	19095Z-627
D 5310	Standard Test Method for Tar Acid Composition by Capillary GC	HP-5ms, 30 m x 0.25 mm, 0.25 μ m	19091S-433
		DB-225ms, 30 m x 0.25 mm, 0.25 μ m	122-2932
D 5316	Standard Test Method for 1, 2-Dibromoethane and 1, 2-Dibromo-3-Chloropropane in Water by Microextraction and GC	HP-1ms, 30 m x 0.32 mm, 1.00 μ m	19091S-713
		DB-624, 30 m x 0.45 mm, 2.55 μ m	124-1334
D 5317	Standard Test Method for Determination of Chlorinated Organic Acid Compounds in Water by GC with Electron Capture Detector	HP-5ms, 30 m x 0.25 mm, 0.25 μ m	19091S-433
		DB-1701P, 30 m x 0.25 mm, 0.25 μ m	122-7732
		DB-XLB, 30 m x 0.25 mm, 0.25 μ m	122-1232
		DB-35ms, 30 m x 0.25 mm, 0.25 μ m	122-3832

(Continued)

ASTM Methods

Method	Title	Recommended Agilent Column	Part No.
D 5320	Standard Test Method for Determination of 1, 1-Trichloroethane and Methylene Chloride in Stabilized Trichloroethylene and Tetrachloroethylene	DB-1, 30 m x 0.53 mm, 3.00 µm	125-1034
		DB-VRX, 30 m x 0.32 mm, 1.80 µm	123-1534
D 5399	Standard Test Method for Boiling Point Distribution of Hydrocarbon Solvents by GC	DB-2887, 10 m x 0.53 mm, 3.00 µm	125-2814
D 5441	Standard Test Method for Analysis of Methyl Tert-Butyl Ether (MTBD) by GC	HP-PONA, 50 m x 0.20 mm, 0.50 µm	19091S-001
		DB-Petro, 100 m x 0.25 mm, 0.50 µm	122-10A6
D 5442	Standard Test Method for Analysis of Petroleum Waxes by GC	DB-1, 25 m x 0.32 mm, 0.25 µm	123-1022
		DB-5, 15 m x 0.25 mm, 0.25 µm	122-5012
D 5475	Standard Test Method for Nitrogen- and Phosphorus-Containing Pesticides in Water by GC with a Nitrogen Phosphorus Detector	HP-5ms, 30 m x 0.25 mm, 0.25 µm	19091S-433
		DB-1701P, 30 m x 0.25 mm, 0.25 µm	122-7732
		DB-XLB, 30 m x 0.25 mm, 0.25 µm	122-1232
		DB-35ms, 30 m x 0.25 mm, 0.25 µm	122-3832
D 5480	Standard Test Method for Engine Oil Volatility by GC	DB-PS1, 15 m x 0.53 mm, 0.15 µm	145-1011
D 5501	Standard Test Method for Determination of Ethanol Content of Denatured Fuel Ethanol by GC	HP-1, 100 m x 0.25 mm, 0.50 µm	19091Z-530
D 5504	Standard Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Chemiluminescence	CP-Sil 5 CB for Sulfur, 30 m x 0.32 mm, 4.00 µm	CP7529
D 5507	Standard Test Method for Determination of Trace Organic Impurities in Monomer Grade Vinyl Chloride by Capillary Column/Multi-dimensional GC	HP PLOT Q, 15 m x 0.53 mm, 40 µm	19095P-Q03
		HP PLOT U, 30 m x 0.53 mm, 20 µm	19095P-U04
D 5508	Standard Test Method for Determination of Residual Acrylonitrile Monomer in Styrene-Acrylonitrile Co-polymer Resins and Nitrile-Butadiene Rubber by Headspace Capillary GC	HP PLOT Q, 30 m x 0.53 mm, 40 µm	19095P-Q04
D 5580	Standard Test Method for Determination of Benzene, Toluene, Ethylbenzene, p/m-Xylene, C9 and Heavier Aromatics, and Total Aromatics in Finished Gasoline by GC	DB-1, 30 m x 0.53 mm, 5.00 µm	125-1035
		CP-TCEP for Alcohols in Gasoline, 50 m x 0.25 mm, 0.40 µm	CP7525
		CP-Sil 5 CB, 30 m x 0.53 mm, 5.00 µm	CP8775
		VF-1ms, 15 m x 0.25 mm, 0.10 µm	CP8906
D 5599	Standard Test Method for Determination of Oxygenates in Gasoline by GC and Oxygen Selective Flame Ionization Detection	DB-5, 30 m x 0.25 mm, 0.25 µm	122-5032

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ASTM Methods

Method	Title	Recommended Agilent Column	Part No.
D 5623	Standard Test Method for Sulfur Compounds in Light Petroleum Liquids by GC and Sulfur Selective Detection	HP-1, 30 m x 0.32 mm, 4.00 μ m	19091Z-613
D 5713	Standard Test Method for Analysis of High Purity Benzene for Cyclohexane Feedstock by Capillary GC	DB-Petro, 50 m x 0.20 mm, 0.5 μ m	122-10A6E
D 5739	Standard Practice for Oil Spill Source Identification by GC and Positive Ion Electron Impact Low Resolution Mass Spectrometry	DB-5, 30 m x 0.25 mm, 0.25 μ m	122-5032
		DB-TPH, 30 m x 0.32 mm, 0.25 μ m	123-1632
D 5769	Standard Test Method for Determination of Benzene, Toluene, and Total Aromatics in Finished Gasoline by GC/MS	HP-1, 60 m x 0.25 mm, 1.00 μ m	19091Z-236
D 5790	Standard Test Method for Measurement of Purgeable Organic Compounds in Water by Capillary Column GC/MS	DB-VRX, 60 m x 0.25 mm, 1.40 μ m	122-1564
		DB-VRX, 20 m x 0.18 mm, 1.00 μ m	121-1524
		DB-624, 60 m x 0.25 mm, 1.4 μ m	122-1364
		DB-624, 20 m x 0.18 mm, 1.00 μ m	121-1324
D 5812	Standard Test Method for Determination of Organochlorine Pesticides in Water by Capillary Column GC	HP-5MS, 30 m x 0.25 mm, 0.25 μ m	19091S-433
		DB-1701P, 30 m x 0.25 mm, 0.25 μ m	122-7732
		DB-XLB, 30 m x 0.25 mm, 0.25 μ m	122-1232
		DB-35ms, 30 m x 0.25 mm, 0.25 μ m	122-3832
D 5917	Standard Test Method for Trace Impurities in Monocyclic Aromatic Hydrocarbons by GC and External Calibration	HP-INNOWax, 60 m x 0.32 mm, 0.25 μ m	19091N-116
D 5974	Standard Test Method for Fatty and Rosin Acids in Tall Oil Fraction Products by Capillary GC	DB-23, 60 m x 0.25 mm, 0.25 μ m	122-2362
D 5986	Standard Test Method for Determination of Oxygenates, Benzene, Toluene, C8-C12 Aromatics and Total Aromatics in Finished Gasoline by GC/FTIR	HP-1, 60 m x 0.53 mm, 5.00 μ m	19095Z-626
D 6144	Standard Test Method for Trace Impurities in Alpha-Methylstyrene by Capillary GC	HP-1, 60 m x 0.25 mm, 1.00 μ m	19091Z-236
D 6159	Standard Test Method for Determination of Hydrocarbon Impurities in Ethylene by GC	HP PLOT Al2O3 "KCl", 50 m x 0.53 mm, 15 μ m	19095P-K25
		GS-Alumina, 50 m x 0.53 mm	115-3552
		DB-1, 30 m x 0.53 mm, 5.00 μ m	125-1035
D 6160	Standard Test Method for Determination of PCBs in Waste Materials by GC	HP-5MS, 30 m x 0.32 mm, 0.25 μ m	19091S-413
		DB-XLB, 30 m x 0.25 mm, 0.25 μ m	122-1232
D 6352	Standard Test Method for Boiling Range Distribution of Petroleum Distillates in Boiling Range from 174 to 700 by GC	DB-HT SimDis, 5 m x 0.53 mm, 0.15 μ m	145-1001

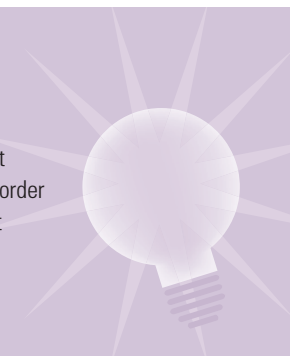
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ASTM Methods

Method	Title	Recommended Agilent Column	Part No.
D 6387	Standard Test Methods for Composition of Turpentine and Related Terpene Products by Capillary Gas Chromatography	CP-WAX 52 CB, 30 m x 0.32 mm, 0.50 μ m	CP8763
		CP-WAX 52 CB, 30 m x 0.53 mm, 1.00 μ m	CP8738
D 6417	Standard Test Method for Estimation of Engine Oil Volatility by Capillary GC	DB-HT SimDis, 5 m x 0.53 mm, 0.15 μ m	145-1001
D 6584	Standard Test Method for Determination of Total Monoglyceride, Total Diglyceride, Total Triglyceride, and Free and Total Glycerin in B-100 Biodiesel Methyl Esters by Gas Chromatography	Select Biodiesel, 15 m x 0.32 mm, 0.10 μ m	CP9078
D 6806	Standard Practice for Analysis of Halogenated Organic Solvents and Their Admixtures by Gas Chromatography	CP-Sil 5 CB, 50 m x 0.53 mm, 5.00 μ m	CP7685
E 1616	Standard Test Method for Analysis of Acetic Anhydride Using GC	HP-1, 50 m x 0.32 mm, 0.52 μ m	19091Z-115
E 1863	Standard Test Method for Analysis of Acrylonitrile by GC	DB-WAXetr, 60 m x 0.32 mm, 1.00 μ m	123-7364
E 0202	Standard Test Method for Analysis of Ethylene Glycols and Propylene Glycols	DB-624, 30 m x 0.53 mm, 3.00 μ m	125-1334
		CP-Wax 57 CB for Glycols and Alcohols, 50 m x 0.25 mm, 0.25 μ m	CP7615
E 0475	Standard Test Method for Assay of Di-tert-Butyl Peroxide Using GC	HP-5, 30 m x 0.53 mm, 5.00 μ m	19095J-623

Tips & Tools

GC Method Translation Software allows you to port a current GC method to another while ensuring that relative retention order is maintained so peaks elute in the same order. Download at www.agilent.com/chem/gcmethodtranslation





GC Column Troubleshooting and Maintenance

These at-a-glance troubleshooting tables will help you pinpoint and fix the most common GC column problems.

Please consult *Agilent's J&W GC Column Installation Guide* (publication number 830-0120) and the *Agilent J&W GC Column Selection Guide* (publication number 5989-6159EN) for more in-depth information, including:

- Comprehensive column selection principles
- Maintenance procedures, including column installation, conditioning, testing, and storage
- Strategies for increasing your productivity
- The most current method development procedures



To request your copy of the *Agilent J&W GC Column Selection Guide*, visit www.agilent.com/chem/guides

The Agilent J&W GC Column Installation Guide comes standard with every Agilent J&W GC column. You can also request a copy by contacting your local Agilent Representative or Agilent Authorized Distributor.

Excessive Baseline Noise		
Possible Cause	Solution	Comments
Injector contamination	Clean the injector; replace liner, gold seal	Try a condensation test; gas lines may also need cleaning
Column contamination	Bake-out the column	Limit the bake-out to 1-2 hours
	Solvent rinse the column	Only for bonded and cross-linked phases Check for inlet contamination
Detector contamination	Clean the detector	Usually the noise increases over time and not suddenly
Contaminated or low quality gases	Use better grade gases; also check for expired gas traps or leaks	Usually occurs after changing a gas cylinder
Column inserted too far into the detector	Reinstall the column	Consult GC manual for proper insertion distance
Incorrect detector gas flow rates	Adjust the flow rates to the recommended values	Consult GC manual for proper flow rates
Leak when using an MS, ECD, or TCD	Find and eliminate the leak	Usually at the column fittings or injector
Old detector filament, lamp or electron multiplier	Replace appropriate part	
Septum degradation	Replace septum	For high temperature applications use an appropriate septum

Baseline Instability or Disturbances

Possible Cause	Solution	Comments
Injector contamination	Clean the injector	Try a condensation test; gas lines may also need cleaning
Unequilibrated detector	Allow the detector to stabilize	Some detectors may require up to 24 hours to fully stabilize
Incompletely conditioned column	Fully condition the column	More critical for trace level analyses
Change in carrier gas flow rate during the temperature program	Normal in many cases	MS, TCD and ECD respond to changes in carrier gas flow rate
Column contamination	Trim the column	Remove 0.5-1 m from the front of the column
	Solvent rinse the column	Only for bonded and cross-linked phases Check for inlet contamination
Column activity	Irreversible. Replace the column	Only affects active compounds
Solvent-phase polarity mismatch	Change sample solvent to a single solvent	More tailing for the early eluting peaks or those closest to the solvent front
	Use a retention gap	3-5 m retention gap is sufficient
Solvent effect violation for splitless or on-column injections	Decrease the initial column temperature	Peak tailing decreases with retention
Too low of a split ratio	Increase the split ratio	Flow from split vent should be 20 mL/min or higher
Poor column installation	Reinstall the column	More tailing for early eluting peaks
Some active compounds always tail	None	Most common for amines and carboxylic acids

Split Peaks

Possible Cause	Solution	Comments
Injection technique	Change technique	Usually related to erratic plunger depression or having sample in the syringe needle. Use an auto injector.
Mixed sample solvent	Change sample solvent to a single solvent	Worse for solvents with large differences in polarity or boiling points
Poor column installation	Reinstall the column	Usually a large error in the insertion distance
Sample degradation in the injector	Reduce the injector temperature	Peak broadening or tailing may occur if the temperature is too low
	Change to an on-column injection	Requires an on-column injector
Poor sample focusing	Use a retention gap	For splitless and on-column injection

Retention Time Shift

Possible Cause	Solution	Comments
Change in carrier gas velocity	Check the carrier gas velocity	All peaks will shift in the same direction by approximately the same amount
Change in column temperature	Check the column temperature	Not all peaks will shift by the same amount
Change in column dimension	Verify column identity	
Large change in compound concentration	Try a different sample concentration	May also affect adjacent peaks. Sample overloading is corrected with an increase in split ratio or sample dilution.
Leak in the injector	Leak check the injector	A change in peak size usually occurs
Blockage in a gas line	Clean or replace the plugged line	More common for the split line; also check flow controllers and solenoids
Septum leak	Replace septum	Check for needle barb
Sample solvent incompatibility	Change sample solvent to a single solvent Use a retention gap	For splitless injection

Change in Peak Size

Possible Cause	Solution	Comments
Change in detector response	Check gas flows, temperatures and settings	All peaks may not be equally affected
	Check background level or noise	May be caused by system contamination and not the detector
Change in the split ratio	Check split ratio	All peaks may not be equally affected
Change in the purge activation time	Check the purge activation line	For splitless injection
Change in injection volume	Check the injection technique	Injection volumes are not linear
Change in sample concentration	Check and verify sample concentration	Changes may also be caused by degradation, evaporation, or variances in sample temperature or pH
Leak in the syringe	Use a different syringe	Sample leaks past the plunger or around the needle; leaks are not often readily visible
Column contamination	Trim the column	Remove 0.5-1 m from the front of the column
	Solvent rinse the column	Only for bonded and cross-linked phases
Column activity	Irreversible	Only affects active compounds
Coelution	Change column temperature or stationary phase	Decrease column temperature and check for the appearance of a peak shoulder or tail
Change in injector discrimination	Maintain the same injector parameters	Most severe for split injections
Sample flashback	Inject less, use a larger liner, reduce the inlet temperature	Less solvent and higher flow rates are most helpful
Decomposition from inlet contamination	Clean the injector; replace liner, gold seal	Only use deactivated liners and glass wool in the inlet

Loss of Resolution

Possible Cause	Solution	Comments
Decrease in separation		
Different column temperature	Check the column temperature	Differences in other peaks will be visible
Different column dimensions or phase	Verify column identity	Differences in other peaks will be visible
Coelution with another peak	Change column temperature	Decrease column temperature and check for the appearance of a peak shoulder or tail
Increase in peak width		
Change in carrier gas velocity	Check the carrier gas velocity	A change in the retention time also occurs
Column contamination	Trim the column	Remove 0.5-1 m from the front of the column
	Solvent rinse the column	Only for bonded and cross-linked phases
Change in the injector	Check the injector settings	Typical areas: split ratio, liner, temperature, injection volume
Change in sample concentration	Try a different sample concentration	Peak widths increase at higher concentrations
Improper solvent effect, lack of focusing	Lower oven temperature, better solvent, sample phase polarity match, use a retention gap	For splitless injection

Tips & Tools

Watch Agilent's in-depth video series cover common chromatographic problems, causes, and corresponding solutions presented by two of Agilent's seasoned GC experts at www.agilent.com/chem/gctroubleshooting



Solvent Retention Data

	Analyte	DB-624	DB-1	DB-WAX
Column: DB-624 125-1334 30 m x 0.53 mm, 3.00 µm	1,3-dioxolane	7.30	4.09	7.09
	1,3-propanediol	13.13	9.95	18.97
	1,4-butanediol	17.70	15.03	23.14
	1,4-dichlorobenzene	18.79	17.31	17.06
	1,4-diisopropylbenzene	20.73	20.42	16.20
	1,4-dioxane	10.38	9.18	9.65
	1,5-pentanediol	19.52	17.17	24.43
	1,6-hexanediol	21.30	19.17	25.75
	1,7-heptanediol	22.97	21.03	27.26
	1,8-octanediol	24.54	22.73	29.06
Carrier: Helium, constant pressure at 30 cm/sec (40°C)	1,9-nonanediol	26.02	24.33	31.29
	1-butanol	9.73	7.90	11.48
	1-chloro-4-nitrobenzene (diisopropyl ketone)	3.06	21.34	23.97
	1-chlorobutane	8.25	7.56	3.99
	1-chlorohexane	14.21	13.69	9.10
	1-decanol	22.65	21.85	21.12
	1-heptanol	17.22	16.13	16.91
	1-hexanol	15.06	13.81	15.31
	1-methyl-2-pyrrolidone	19.66	17.21	20.71
	1-nonanol	20.97	20.11	19.80
Oven: 40°C for 5 min 40-260°C at 10°/min 260°C for 3 min	1-octanol	19.17	18.21	18.40
	1-pentanol	12.63	11.11	13.54
	1-penten-3-ol	10.20	8.54	11.77
	1-penten-3-one (ethyl vinyl ketone)	10.03	8.40	8.56
	1-propanol	6.34	4.44	9.11
	2,2-dichloropropane	7.16	6.34	3.99
	2,3-butanediol	14.14	11.40	18.70
	2,3-butanedione (diacetal)	6.99	5.09	7.44
	2,3-pentanedione	10.34	8.66	9.49
	2,4-dimethyl-3-pentanone	12.94	11.90	7.94
Injection: Split 1:10, 250°C	2,6-dimethyl-4-heptanone	17.06	16.26	12.03
	2-butanone (MEK)	7.19	5.41	5.35
	2-buten-1-ol (crotyl alcohol)	9.87	7.99	12.95
	2-butoxyethanol (butyl cellosolve)	15.89	14.72	16.31
	2-chlorotoluene	16.71	16.07	14.71
	2-ethoxyethanol (cellosolve)	10.98	9.39	13.11
	2-ethoxyethyl acetate	15.57	14.40	14.31
	2-ethyl-1-hexanol	18.40	17.42	17.41
	2-heptanol	15.63	14.61	14.71
	2-heptanone	15.46	14.26	12.27
Detector: FID, 300°C	2-hexanol	13.31	12.06	12.95
	2-hexanone	13.01	11.60	10.04
	2-methoxyethanol (methyl cellosolve)	8.67	6.74	12.25
	2-methyl-1-butanol (active amyl alcohol)	11.87	10.30	12.73
	2-methyl-2-butanol (tert-amyl alcohol)	8.73	7.14	8.43
	2-methyl-3-buten-2-ol	7.91	6.17	9.11
	2-methyl-3-pentanone	11.85	10.59	7.94
	2-methylbutyl acetate	14.82	14.81	12.05
	2-nitrotoluene	21.60	20.02	22.62
	2-octanone	17.63	16.46	14.20
Carrier: Helium, constant pressure at 34 cm/sec (40°C)	2-pentanol	10.60	9.10	10.94
	2-pentanone	10.11	8.46	7.44
	2-penten-1-ol	12.63	11.11	14.65
	2-phenoxyethanol	22.65	20.92	26.14
	2-propen-1-ol (allyl alcohol)	6.21	4.09	10.78
	2-propyn-1-ol (propargyl alcohol)	7.55	4.57	15.16
	3-buten-1-ol	9.02	6.95	12.02
	3-chloropropene (allyl chloride)	4.57	3.96	3.46
	3-chlorotoluene	16.82	16.07	14.90
	3-heptanol	15.53	14.54	14.29
Oven: 40°C for 5 min 40-230°C at 10°/min 230°C for 7 min	3-heptanone	15.29	14.19	11.66
	3-hexanol	13.16	11.97	12.49
	3-hexanone	12.80	11.52	9.34
	3-methyl-1-butanol (iso-amyl alcohol)	11.78	10.17	12.73
	3-methyl-2-butanone	9.21	7.60	6.15
	3-methyl-2-buten-1-ol	12.85	11.33	14.82
	3-nitrotoluene	22.40	20.72	21.92
	3-octanone	17.45	16.46	13.66
	3-pentanol	10.60	9.10	10.66
	3-pentanone	10.34	8.80	7.44
Injection: Split 1:10, 250°C	3-penten-2-one (methyl vinyl ketone)	6.93	5.09	6.61
	4-chlorostyrene (diisobutyl ketone)	19.35	18.56	18.19
	4-chlorotoluene	16.82	16.07	14.90
	4-heptanone	14.95	13.88	11.06
	4-hexen-3-one	14.24	12.76	12.55
	4-hydroxy-4-methyl-2-pentanone	14.98	12.89	15.70
	4-methyl-2-pentanol	12.28	11.89	11.89
	4-methyl-2-pentanone	11.64	10.22	8.19
	4-methyl-3-penten-3-one	13.20	11.90	11.26
	4-methylstyrene	17.68	16.99	15.61
Detector: FID, 300°C	4-nitrotoluene	22.79	21.05	23.14
	4-phenyl-2-butanone (benzyl acetone)	22.91	21.36	22.76
	4-tert-butyltoluene	19.35	18.97	15.13
	5-methyl-2-hexanone	14.73	13.46	11.40
	1,1,1,2-tetrachloroethane	14.38	13.43	13.80
	1,1,1-trichloroethane	8.05	7.56	4.85
	1,1,2,2-tetrachloroethane	16.38	14.67	17.73
	1,1,2-trichloroethane	12.60	11.00	13.80
	1,1,2-trichlorotrifluoroethane (Freon 113)	4.00	4.09	2.13
	1,10-decanediol	27.43	25.84	34.11
1,1-dichloroethane	6.11	5.02	9.10	
1,1-dichloroethylene (vinylidene chloride)	4.00	3.75	2.65	
1,1-dichloropropane	8.72	8.55	9.71	
1,1-dichloropropene	8.34	7.85	4.56	
1,2,3-trichlorobenzene	22.23	21.28	21.25	
1,2,3-trichloropropane	16.46	14.84	17.06	
1,2,3-trimethylbenzene (hemimellitene)	18.18	17.61	15.29	
1,2,4,5-tetrachlorobenzene	24.02	23.35	22.08	
1,2,4-trichlorobenzene	21.41	20.63	20.03	
1,2,4-trimethylbenzene (pseudocumene)	17.47	16.99	14.27	
1,2-dibromo-3-chloropropane (DBCP)	20.02	18.50	20.57	
1,2-dibromoethane (EDB)	13.43	12.10	13.80	
1,2-dichlorobenzene	18.69	17.81	17.80	
1,2-dichloroethane (ethylene dichloride)	9.62	7.17	7.20	
1,2-dichloropropane	10.17	8.93	4.95	
1,3,5-trichlorobenzene	20.35	19.85	18.19	
1,3,5-trimethylbenzene (mesitylene)	16.82	16.41	13.55	
1,3-butanediol	16.10	13.30	20.96	
1,3-dichlorobenzene	17.96	17.20	16.60	
1,3-dichloropropane	12.86	11.35	12.38	
1,3-diisopropylbenzene	20.35	20.02	15.47	

These solvent tables have many uses, not least of which is to determine impurities in bulk solvents. All of the columns were selected for their capacity, selectivity and reproducibility.

Warning: Other manufacturers' look-a-like columns do not have the same selectivity as Agilent J&W GC Columns. We do not recommend using this data on other manufacturers' columns.

Analyte	DB-624	DB-1	DB-WAX	Analyte	DB-624	DB-1	DB-WAX
5-methyl-3-heptanone	16.52	15.55	12.38	hexadecane	26.63	26.88	18.70
acetal (acetaldehyde diethyl acetal)	10.58	10.21	5.09	hexanal	13.14	11.88	10.07
acetaldehyde	2.46	2.16	2.47	hexane	5.82	6.25	2.05
acetone	4.05	3.05	3.60	iodobenzene	18.10	17.87	18.30
acetic acid	9.10	16.87	16.87	iodomethane	4.27	3.75	3.46
acetonitrile	4.27	2.87	8.12	iso-amyl acetate	14.75	13.97	10.31
acetophenone	19.69	18.13	20.13	iso-butanol	8.60	6.74	10.96
acrolein	3.81	2.98	4.10	iso-butyl acetate	12.19	11.30	8.36
acrylic acid	12.21	19.16	19.61	iso-butylbenzene	17.68	17.31	13.47
acrylonitrile	5.22	3.43	7.81	iso-butylaldehyde	5.66	4.37	3.54
a-ethylphenethyl alcohol	22.65	21.38	23.10	iso-octane	8.81	9.27	2.44
allyl ether	9.65	9.05	6.04	isophorone	21.04	19.31	19.47
allyl ethyl ether	6.41	6.00	3.05	iso-propanol	4.27	3.22	6.28
a-methylphenyl alcohol	19.60	18.03	22.00	iso-propyl acetate	8.87	7.88	5.32
a-methylstyrene	17.22	16.62	15.13	iso-propyl ether	6.23	6.21	3.27
amyl acetate	15.57	14.04	10.96	iso-propylbenzene (cumene)	15.88	15.43	12.13
benzaldehyde	17.45	15.88	17.25	methacrolein	6.01	4.68	4.83
benzene	8.69	8.00	6.46	methacrylonitrile	7.53	5.36	7.54
benzonitrile 1	18.21	16.26	19.55	methanol	2.59	2.15	5.40
benzyl acetate	21.07	19.86	21.01	methyl acetate	4.60	3.79	3.78
benzyl alcohol	19.27	17.42	22.82	methyl benzoate	19.90	18.76	19.70
benzyl ether	29.08	27.72	30.41	methyl formate	2.80	2.44	2.85
b-ethylphenethyl alcohol	23.03	21.71	24.12	methyl propionate	7.88	6.78	5.54
bromobenzene	16.39	15.54	15.47	methyl tert-butyl ether (MTBE)	5.30	5.06	2.30
bromochloromethane	7.59	4.79	9.26	methylene chloride	4.80	3.85	6.18
bromodichloromethane	10.64	9.22	11.76	morpholine	12.98	13.62	13.62
bromoethane	4.27	3.75	2.95	m-tolualdehyde	19.63	18.23	19.77
bromoform	15.61	14.20	17.00	m-xylene	14.62	14.11	11.44
butyl acetate	13.24	12.36	9.85	nitrobenzene	20.35	18.56	21.41
butyl ether	14.41	14.39	6.97	nonanal	19.71	18.84	16.05
butyl ethyl ether	9.34	9.18	3.27	nonane	14.63	14.95	4.97
butyl methyl ether	7.10	6.85	2.80	octanal	17.76	16.80	14.29
butylbenzene	18.69	18.24	14.81	octane	12.11	12.48	3.22
butyraldehyde	6.84	5.29	4.72	o-tolualdehyde	19.63	18.23	19.73
carbon disulfide	4.27	4.09	2.65	o-xylene	15.28	14.69	12.39
carbon tetrachloride	8.34	8.18	4.85	pentachlorobenzene	27.10	26.38	25.09
chlorobenzene	14.25	13.44	13.00	pentadecane	25.26	25.51	17.28
chlorodibromomethane	13.25	11.81	14.52	pentanal (valeraldehyde)	10.25	8.76	7.46
chloroform	7.75	6.34	8.58	pentane	3.37	3.51	1.89
cis-1,2-dichloroethylene	7.16	5.98	7.84	pentyl ether	18.53	18.51	12.66
cis-1,3-dichloropropene	11.38	10.20	11.27	propionaldehyde	3.91	3.11	3.25
cis-2-hexen-1-ol	15.19	13.81	16.31	propionic acid	11.89	18.18	18.18
cis-3-hexen-1-ol	14.88	13.51	15.87	propionitrile	7.25	4.43	8.72
cis-4-hepten-1-ol	17.22	16.02	17.67	propyl acetate	10.51	9.47	7.38
crotonaldehyde	9.18	7.03	9.07	propyl benzoate	22.92	21.91	21.46
cyclohexane	8.10	8.32	2.27	propyl ether	9.05	9.05	3.05
cyclohexanol	15.63	14.26	16.31	propyl formate	7.66	6.48	5.93
cyclohexanone	16.04	14.26	14.61	propyl propionate	13.07	12.25	9.17
cyclopentanol	3.16	11.56	14.57	propylbenzene	16.56	16.07	12.86
cyclopentanone	13.39	11.42	12.46	propylene glycol (1,2-propanediol)	13.16	9.90	18.96
decane	16.82	17.12	7.63	p-tolualdehyde	19.96	18.50	20.13
dibromomethane	10.37	8.93	11.98	p-xylene	14.62	14.11	11.30
diethylene glycol	18.24	15.60	23.91	pyridine	11.70	10.21	12.44
diethylene glycol monobutyl ether	21.46	20.26	21.74	sec-butanol	7.55	5.80	8.77
diethylene glycol monoethyl ether	18.04	16.60	19.48	sec-butyl acetate	11.76	10.91	7.69
diethylene glycol monomethyl ether	16.78	15.09	19.06	sec-butylbenzene	17.68	17.37	13.64
diglyme (diethylene glycol dimethyl ether)	9.92	8.68	6.04	styrene	15.28	14.55	13.80
DMF (dimethylformamide)	13.73	10.80	15.25	styrene oxide	19.46	18.24	19.46
DMSO (methyl sulfoxide)	15.58	11.94	19.21	tert-amyl methyl ether	8.89	8.68	3.27
dodecane	20.58	20.85	12.23	tert-butanol	5.01	3.72	5.54
epichlorohydrin	11.22	9.35	11.69	tert-butyl acetate	10.02	9.32	5.40
ethanol	3.47	2.68	6.46	tert-butyl ethyl ether	6.90	6.85	2.47
ethyl acetate	7.34	6.21	5.03	tert-butylbenzene	17.39	16.99	13.41
ethyl acrylate	10.02	8.93	7.87	tetrachloroethylene	12.86	12.66	8.58
ethyl benzoate	21.22	20.15	20.27	tetradecane	23.80	24.06	15.75
ethyl ether	3.72	3.50	2.13	tetrahydrofuran	10.06	9.35	5.83
ethyl formate	4.27	3.56	3.78	THF (tetrahydrofuran)	7.64	6.75	4.45
ethyl propionate	10.37	9.42	6.93	toluene	11.93	11.33	9.06
ethyl vinyl ether	3.72	3.50	2.39	trans-1,2-dichloroethylene	5.33	6.17	4.38
ethylbenzene	14.42	13.90	11.13	trans-1,3-dichloropropene	12.30	10.80	12.78
ethylene glycol	12.15	8.54	19.47	trans-1,4-dichloro-2-butene	16.46	14.91	17.00
ethylene glycol monobutyl ether	15.84	14.68	16.24	trans-2-hepten-1-ol	17.22	16.13	17.77
ethylene glycol monoethyl ether	10.95	9.35	13.11	trichloroethylene	9.80	9.22	7.84
ethylene glycol monomethyl ether	8.64	6.72	12.24	tridecane	22.24	22.51	14.09
fluorobenzene	9.18	8.36	7.72	triethylamine	8.91	8.93	3.26
fluorotrichloromethane (Freon 11)	3.24	3.23	2.13	triglyme (triethylene glycol dimethyl ether)	21.95	20.75	20.77
furan	3.72	3.36	3.27	undecane	18.78	19.07	10.10
furfural	14.63	12.54	18.32	vinyl acetate	6.37	4.09	5.03
furfuryl alcohol	15.32	13.25	19.90				
glycidol	11.93	9.10	17.25				
glyme (propylene glycol dimethyl ether)	8.65	7.56	6.04				
heptanal	15.60	14.52	12.32				
heptane	9.15	9.58	2.65				
hexachloro-1,3-butadiene	21.69	21.46	17.84				

Pesticide Elution Order Using Low Bleed Phases

Pesticide Retention Data

Column: 30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 35 cm/sec, measured at 50°C

Oven: 50°C for 1 min
50-100°C at 25°/min
100-300°C at 5°/min (DB-1701 ramped to 280°C)
300°C for 5 min (DB-1701 held at 280°C for 10 min)

Many analysts have reported obtaining excellent results with DB-35ms. Some now use it as their primary analytical column in selective detector applications because of its selectivity, inertness and high upper temperature limits.

Alphabetical Order By Analyte

Compound	DB-5ms	DB-XLB	DB-35ms	DB-17ms	DB-1701
Alachlor	24.29	25.84	27.40	27.91	27.59
Aldrin	25.99	27.33	28.28	28.54	26.79
Aspon	25.72	26.69	28.11	27.55	28.22
Atrazine	21.11	22.65	24.82	24.50	25.12
Azinphos-ethyl	37.51	39.94	43.31	43.27	48.74
Azinphos-methyl	36.28	38.83	42.60	42.75	45.86
α-BHC	20.01	21.83	23.50	23.83	23.06
β-BHC	21.12	24.95	26.62	26.70	24.84
γ-BHC	21.46	23.37	25.32	25.73	27.97
δ-BHC	22.70	25.98	27.83	28.08	28.89
Bolstar	32.16	33.89	36.25	35.94	34.96
1-Bromo-2-nitrobenzene (IS)	11.50	12.73	14.87	15.66	14.68
2-Bromobiphenyl (SS)	17.31	18.49	20.24	21.01	18.62
Captafol	33.91	36.35	39.46	40.31	40.40
Captan	27.98	30.15	33.20	34.14	32.25
Carbophenothion	32.56	34.49	36.69	36.26	35.48
γ-Chlordane	28.54	30.72	31.77	31.91	30.91
α-Chlordane	29.06	30.90	32.19	32.43	31.21
Chlorfenvinphos	27.61	29.34	31.47	31.15	31.02
4-Chloro-3-nitrobenzotrifluoride (SS)	7.66	8.55	8.83	8.59	10.00
Chlorobenzilate	31.28	32.82	34.03	34.27	33.78
Chloroneb	15.53	16.87	18.68	19.37	17.92
Chloropropylate	31.28	32.92	34.48	34.85	33.98
Chlorothalonil	22.16	26.44	28.06	28.08	27.73
Chlorpyrifos	25.84	27.52	29.31	28.86	28.36
Chlorpyrifos-methyl	23.86	25.64	27.79	27.55	26.70
Coumaphos	38.74	41.40	44.01	43.52	
Crotoxypfos	28.16	29.48	32.13	32.09	31.89
Dacthal	26.11	27.55	29.13	29.61	28.82
p,p'-DDD	31.62	33.93	35.60	35.92	34.60
p,p'-DDE	29.97	31.82	33.20	33.53	31.50
p,p'-DDT	33.07	35.12	36.71	37.05	35.37
Demeton-O	17.91	18.97	20.58	20.13	20.49
Demeton-S	20.52	21.83	24.03	23.67	24.05
Diallate A	19.88	20.87	21.97	22.31	21.42
Diallate B	20.26	21.35	22.40	22.71	22.10
Diazinon	21.99	23.05	24.59	24.21	24.16
1,2-Dibromo-3-chloropropane	6.63	7.11	8.05	8.47	7.90
α,α-Dibromo-m-xylene	16.72	18.27	20.60	21.40	19.41
Dibutylchloredate (SS)	36.32	37.75	38.67	38.74	39.65
Dichlofenthion	23.64	25.07	26.58	26.02	26.02
Dichlorvos	9.31	9.93	11.53	11.39	12.45

Alphabetical Order By Analyte (Continued)

Compound	DB-5ms	DB-XLB	DB-35ms	DB-17ms	DB-1701
Dicrotophos	19.12	20.58	23.77	23.98	24.66
Dieldrin	30.14	32.03	33.59	33.90	32.16
Dimethoate	20.52	22.32	25.80	26.02	26.70
Dioxathion	21.41	22.78	25.53	25.49	24.80
Disulfoton	22.37	23.68	25.53	25.09	24.95
Endosulfan I	29.06	30.95	32.37	32.61	30.72
Endosulfan II	31.39	34.11	36.04	36.36	34.97
Endosulfan sulfate	32.88	35.74	37.84	38.13	38.91
Endrin	31.00	32.92	34.89	35.35	32.97
Endrin aldehyde	31.96	34.57	37.00	37.52	37.01
Endrin ketone	34.68	37.26	40.23	40.99	41.57
EPN	34.86	37.04	39.61	39.26	41.19
Ethion	31.55	33.09	35.39	35.11	34.85
Ethoprop	18.47	19.60	21.42	21.02	21.29
Ethylparathion	26.17	28.09	29.94	29.36	30.10
Famphur	32.38	34.38	37.69	37.72	39.69
Fenitrothion	25.19	26.96	29.47	29.22	29.36
Fensulfothion	31.25	33.31	36.44	36.36	37.10
Fenthion	26.02	27.62	30.25	30.22	29.07
Fonofos	21.76	23.19	25.29	25.03	24.41
Heptachlor	24.52	25.98	26.92	27.11	25.69
Heptachlor epoxide	27.59	29.32	30.76	31.07	29.68
Hexachlorobenzene	20.12	22.13	22.91	23.01	21.03
Hexachlorocyclopentadiene	11.42	11.94	12.08	12.25	11.60
Hexamethylphosphoramide	10.25	11.10	12.74	12.54	15.46
Isodrin	27.17	28.71	30.10	30.48	28.44
Kelthane	35.37	37.59	39.54	39.91	
Kelthane Decomp. Product	26.57	28.71	30.35	30.68	
Leptophos	36.17	38.15	40.73	40.55	40.94
Malathion	25.62	26.96	29.31	29.13	29.20
Merphos	30.01	31.47	32.94	32.22	31.89
Methoxychlor	35.22	37.05	39.54	40.31	38.91
Methylparathion	24.14	26.14	28.56	28.22	28.57
Mevinphos	13.50	14.48	16.72	16.69	17.56
Mirex	37.09	39.12	40.67	40.99	37.96
Monocrotophos	19.55	21.15	24.70	24.97	26.50
Naled	18.86	20.15	22.72	22.70	22.41
<i>trans</i> -Nonachlor	29.18	31.15	31.91	31.91	31.29
Pentachloronitrobenzene (IS)	21.22	23.47	24.84	25.08	23.64
<i>cis</i> -Permethrine	38.62	40.27	42.12	42.53	42.25
<i>trans</i> -Permethrine	38.89	40.57	42.42	42.80	46.52
Perthane	31.00	32.67	34.29	34.68	32.51
Phorate	19.79	21.02	22.85	22.45	22.33
Phosmet	34.73	37.24	40.83	40.91	42.38
Phosphamidon	23.56	23.40	27.79	27.72	28.85
Propachlor	17.88	19.32	21.17	21.81	21.74
Ronnel	24.58	26.14	27.95	27.55	27.10
Simazine	20.91	22.65	25.05	24.87	25.23
Stirophos	28.66	30.50	32.94	32.69	32.27
Sulfotep	19.37	20.42	22.46	22.27	22.56
TEPP	16.76	17.91	20.69	20.74	21.98
Terbufos	21.64	22.78	24.23	23.67	23.91
Terrazole	14.17	15.12	16.60	17.25	15.86
Tetrachloro- <i>m</i> -xylene (SS)	18.12	19.81	20.24	20.32	18.70
Thionazin	17.72	18.97	21.26	21.12	20.85
Tokuthion	29.55	31.19	32.83	32.22	31.67
Trichloronate	26.51	28.09	29.31	28.59	28.57
Trifluralin	19.30	20.35	19.98	19.47	22.15
Tri- <i>o</i> -cresylphosphate	36.64	38.40	40.93	40.83	42.62

Environmental Applications, Hydrocarbons

15+1 EU Priority PAHs**Resolution of Critical Pairs on an Agilent J&W DB-EUPAH Column**

Column: DB-EUPAH
121-9627
20 m x 0.18 mm, 0.14 µm

Instrument: Agilent 6890N/5975B MSD

Sampler: Agilent 7683B, 5.0 µL syringe,
0.5 µL splitless injection,
injection speed 75 µL/min

Carrier: Helium, ramped flow 1.0 mL/min
(0.2 min), 5 mL/min to 1.7 mL/min

Inlet: 325°C splitless, purge flow 60 mL/min
at 0.8 min

Oven: 45°C (0.8 min) to 200°C (45°C/min),
2.5°C/min to 225°C, 3°C/min to 266°C,
5°C/min to 300°C, 10°C/min to 320°C
(4.5 min)

Detector: MSD source at 300°C, quadrupole
at 180°C, transfer line at 330°C,
Scan range 50-550 AMU

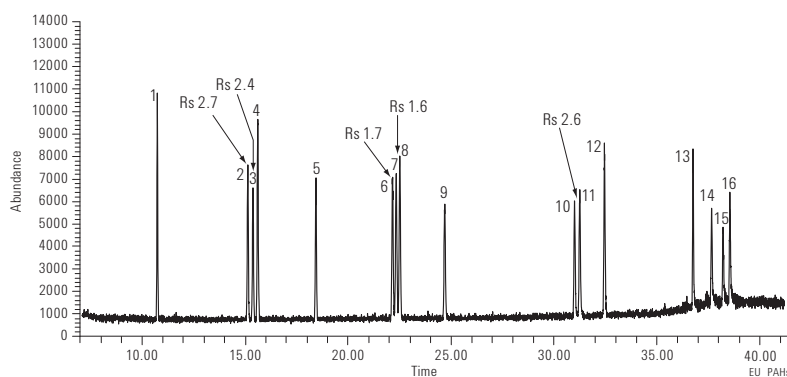
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, dual taper, deactivated,
4 mm ID, G1544-80700

Syringe: 5 µL tapered, FN 23-26s/42/HP,
5181-1273

- | | |
|--------------------------|----------------------------|
| 1. Benzo[c]fluorene | 9. Benz[a]pyrene |
| 2. Benz[a]anthracene | 10. Indeno[1,2,3-cd]pyrene |
| 3. Cyclopenta[c,d]pyrene | 11. Dibenz[a,h]anthracene |
| 4. Chrysene | 12. Benzo[g,h,i]perylene |
| 5. 5-Methylchrysene | 13. Dibenzo[a,l]pyrene |
| 6. Benzo[b]fluoranthene | 14. Dibenzo[a,e]pyrene |
| 7. Benzo[k]fluoranthene | 15. Dibenzo[a,i]pyrene |
| 8. Benzo[j]fluoranthene | 16. Dibenzo[a,h]pyrene |



All 15+1 EU regulated priority PAHs are well resolved with the DB-EUPAH column. Challenging Benzo(b,k,j)fluoranthene isomers are baseline resolved, allowing for accurate quantitation of each isomer. In addition, baseline resolution is achieved for critical pairs benz[a]anthracene and cyclopenta[c,d]pyrene, cyclopenta[c,d]pyrene and chrysene, and indeno[1,2,3-cd]pyrene and dibenz[a,h]anthracene. This application demonstrates that the DB-EUPAH column can provide excellent sensitivity and selectivity for the analysis of EU regulated PAHs.



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Methyl Tert-Butyl Ether (MTBE) FID, Extended 8020 Analysis

Column: DB-MTBE
125-14A4
30 m x 0.45 mm, 2.55 µm

Carrier: Helium at 10 mL/min

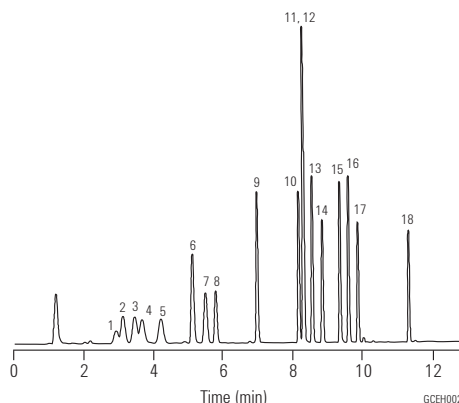
Oven: 35°C for 4 min
35-200°C at 20°/min
200°C for 5 min

Sampler: Purge and Trap (O.I.A. 4560)
Trap: Tenax only
Preheat: 175°C
Desorb: 180°C for 3 min

Injection: LVI (Low Volume Injector), 150°C

Detector: FID (O.I.A. 4410), 200°C

Sample: 40 ppb per component in 5 mL water



1. Methyl-tert-butyl-ether (MTBE)
2. 2-Methylpentane
3. 3-Methylpentane
4. Diisopropyl ether (DIPE)
5. Ethyl-tert-butyl ether (ETBE)
6. Benzene
7. tert-Amyl methyl ether (TAME)
8. α,α,α -Trifluorotoluene
9. Toluene
10. Ethylbenzene
11. m-Xylene
12. p-Xylene
13. o-Xylene
14. Cumene
15. 1,3,5-Trimethylbenzene
16. 1,2,4-Trimethylbenzene
17. 1,2,3-Trimethylbenzene
18. Naphthalene

Unleaded Gasoline

Column: DB-VRX
124-1534
30 m x 0.45 mm, 2.55 µm

Carrier: Helium at 109 cm/sec (10.4 mL/min),
measured at 40°C

Oven: 40°C for 2 min
40-200°C at 12°/min
200°C for 5 min

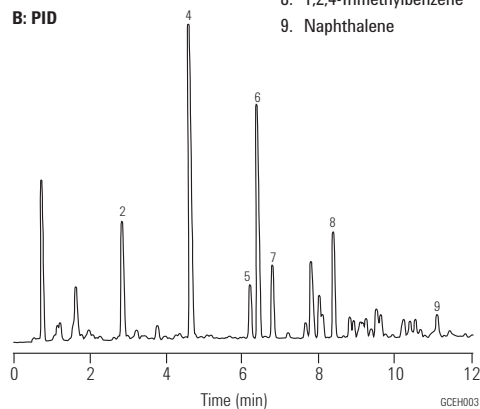
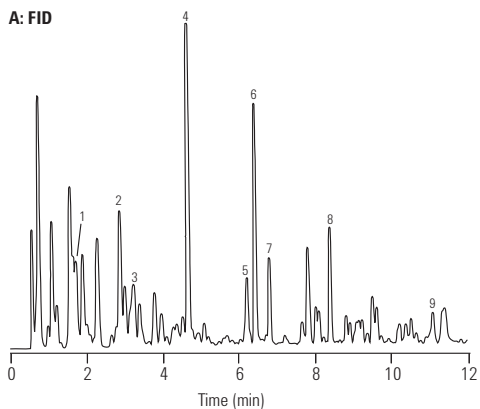
Sampler: Purge and Trap (O.I.A. 4560)
Trap: BTEX (Supelco) at 50°C during purge
Preheat:
Desorb: 270°C for 1 min

Injection: LVI (Low Volume Injector)

Detector: A: FID, 250°C
B: PID (O.I.A. 4430), 200°C

Sample: 115 ppb gasoline in 5 mL water

1. 3-Methylpentane
2. Benzene
3. iso-Octane
4. Toluene
5. Ethylbenzene
6. m, p-Xylene
7. o-Xylene
8. 1,2,4-Trimethylbenzene
9. Naphthalene



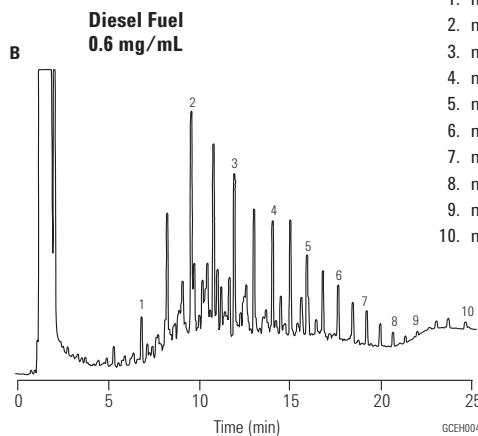
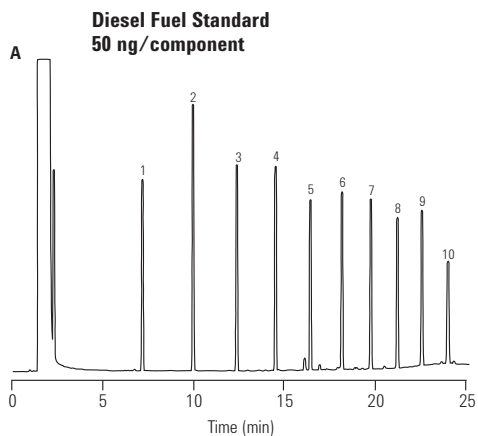
Diesel Fuel

Column: DB-5ms
125-5532
30 m x 0.53 mm, 1.50 µm
Carrier: Helium at 48.5 cm/sec, measured at 60°C
Oven: 60°C for 2 min
60-300°C at 12°/min
300°C for 10 min

Injection: Direct, 280°C
Detector: FID, 250°C
Nitrogen makeup gas at 30 mL/min
Sample: 1 µL injection in hexane
A - Standard, 50 ng/component
B - Sample, 0.6 mg/mL

Suggested Supplies

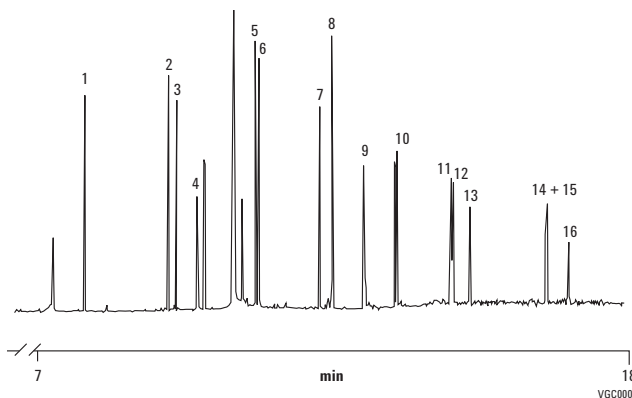
Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730
Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267



1. n-C₁₀, Decane
2. n-C₁₂, Dodecane
3. n-C₁₄, Tetradecane
4. n-C₁₆, Hexadecane
5. n-C₁₈, Octadecane
6. n-C₂₀, Eicosane
7. n-C₂₂, Docosane
8. n-C₂₄, Tetracosane
9. n-C₂₆, Hexacosane
10. n-C₂₈, Octacosane

Analysis of Polycyclic Aromatic Hydrocarbons

Column: VF-Xms
CP8805
30 m x 0.25 mm, 0.10 µm
Sample: 1 µL ca. 3 ng per component on column
Carrier: Helium, 60 kPa
Injection: Split, T=275°C
Detector: Ion Trap MS



1. Naphthalene
2. Acenaphthylene
3. Acenaphthene
4. Fluorene
5. Phenanthrene
6. Anthracene
7. Fluoranthene
8. Pyrene
9. Chrysene
10. Benzo(a)anthracene
11. Benzo(k)fluoranthene
12. Benzo(b)fluoranthene
13. Benzo(a)pyrene
14. Indeno(1,2,3-cd)pyrene
15. Dibenz(a,h)anthracene
16. Benzo(g,h,i)perylene

Dioxins and dibenzofurans

Column: CP-Sil 88
CP6173
50 m x 0.25 mm, 0.20 µm

Sample: 1.0 µL Toluene

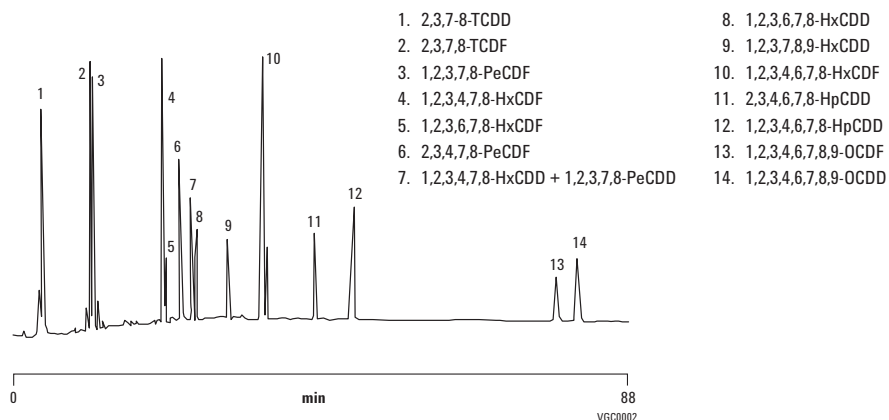
Sample Conc: 100 – 400 pg/µL

Carrier: Helium, 170 kPa (1.7 bar, 24 psi)

Oven: 100°C to 180°C to 230°C,
3°C/min

Injection: Splitless

Detector: MSD



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Environmental Applications, Pesticides and Herbicides

**Direct Comparison for Rapid CLP
(Contract Laboratory Program)
Pesticide Analysis**

Column: DB-17ms
121-4722
20 m x 0.18 mm, 0.18 μ m

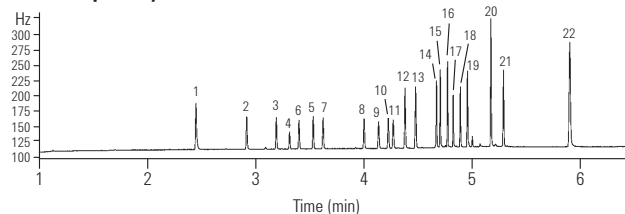
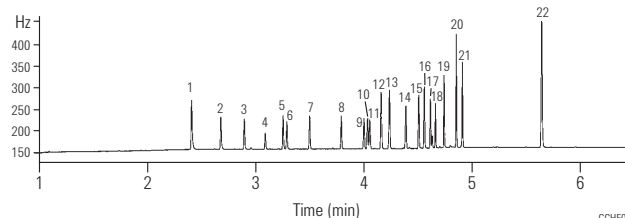
Column: DB-XLB
121-1222
20 m x 0.18 mm, 0.18 μ m

Carrier: Hydrogen (69 cm/sec at 120°C,
ramped at 99 mL/min to 106
cm/sec at 4.4 minutes)

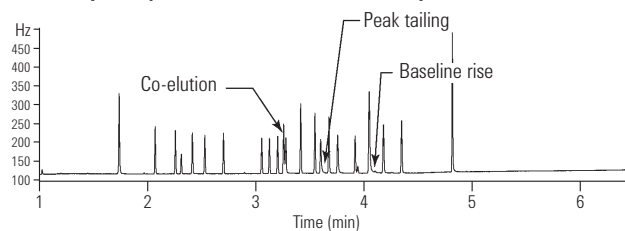
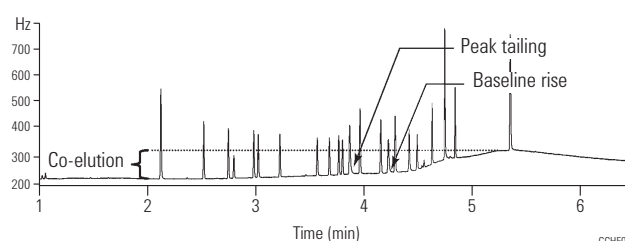
Oven: 120°C (0.32 min); 120°C/min
to 160°C; 30°C/min to 258°C
(0.18 min); 38.81°C/min
to 300°C (1.5 min)

Injection: Split/splitless; 220°C, pulsed
splitless (35 psi for 0.5 min,
purge flow of 40 mL/min on
at 1 minute, gas saver flow
20 mL/min on 3 minutes)

Detector: μ ECD 320°C; nitrogen makeup;
constant column + makeup
flow 60 mL/min

DB-17ms primary column**DB-XLB confirmatory column**

1. Tetrachloro-m-xylene
2. α -BHC
3. γ -BHC
4. β -BHC
5. δ -BHC
6. Heptachlor
7. Aldrin
8. Heptachlor Epoxide
9. γ -Chlordane
10. α -Chlordane
11. Endosulfan I
12. 4,4' DDE
13. Dieldrin
14. Endrin
15. 4,4' DDD
16. Endosulfan II
17. 4,4' DDT
18. Endrin Aldehyde
19. Endosulfan Sulfate
20. Methoxychlor
21. Endrin Ketone
22. Decachlorobiphenyl

Vendor R primary column, 20 m x 0.18 mm, 0.18 μ m**Vendor R confirmatory column, 20 m x 0.18 mm, 0.14 μ m**

Agilent's DB-17ms primary column and DB-XLB confirmatory column sufficiently resolved all the peaks of interest in less than 6 minutes with sharp, symmetrical peaks and minimal baseline drift. In contrast, vendor R's primary analysis column resolved only 20 of 22 peaks with visible peak tailing. Vendor R's confirmatory column resolved all 22 peaks of interest but with peak tailing and an unacceptable level of temperature dependent baseline drift.

CLP Pesticide Analysis on High Efficiency Columns

Column: DB-XLB
121-1222
20 m x 0.18 mm, 0.18 μm

Carrier: H₂, constant flow, 77.3 cm/s at 120 °C

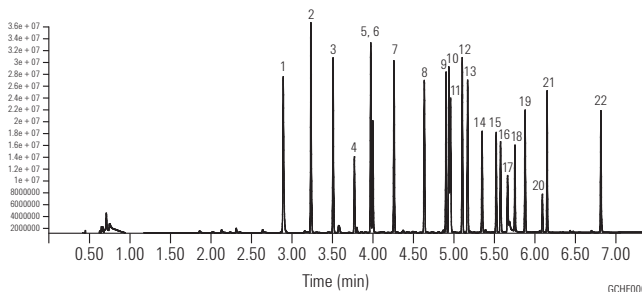
Oven: 120°C for 0.49 min
120°C to 160°C at 59.4°/min
160°C to 260°C at 23.7°/min
260°C to 300°C (1.69min) at 35.6°/min

Injection: Pulsed Splitless, 220°C
Pulse pressure & time: 35psi for 0.5 min Flow ramp at 6.25 min of 99 mL/min 2 to 3 mL/min 2 mm ID liner

Detector: μ-ECD, 320°C
Ar/CH₄ (P5) makeup gas at 60 mL/min

Sample: 0.5 μL 50 ppb

Faster Method (using a High Efficiency GC Column and H₂ carrier)



- | | |
|-------------------------|------------------------|
| 1. Tetrachloro-m-xylene | 12. 4,4' DDE |
| 2. α-BHC | 13. Dieldrin |
| 3. γ-BHC | 14. Endrin |
| 4. β-BHC | 15. 4,4' DDD |
| 5. δ-BHC | 16. Endosulfan II |
| 6. Heptachlor | 17. 4,4' DDT |
| 7. Aldrin | 18. Endrin Aldehyde |
| 8. Heptachlor Epoxide | 19. Endosulfan Sulfate |
| 9. γ-Chlordane | 20. Methoxychlor |
| 10. α-Chlordane | 21. Endrin Ketone |
| 11. Endosulfan I | 22. Decachlorobiphenyl |

Column: DB-XLB
123-1232
30 m x 0.32 mm, 0.25 μm

Carrier: He, constant flow, 38 cm/s at 120°C

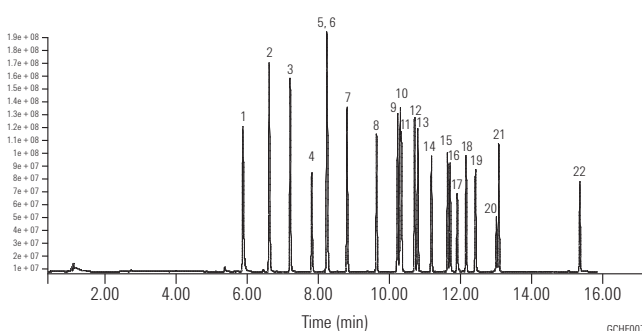
Oven: 120°C for 1.17 min
120°C to 160°C at 25°/min
160°C to 260°C at 10°/min
260°C to 300°C (4 min) at 15°/min

Injection: Pulsed Splitless, 220°C
Pulse pressure & time: 35 psi for 1.15 min

Detector: μ-ECD, 320°C
Ar/CH₄ (P5) makeup gas at 60 mL/min

Sample: 2 μL 50 ppb

CLP Pesticide Analysis on High Efficiency Columns - Original



Contract Laboratory Program (CLP) pesticide analysis on High Efficiency (0.18 mm I.D.) GC columns. In this example, the analysis of 22 CLP pesticides were achieved in 16 minutes using the original method, whereas the improved method was completed in just under 7 minutes. That's a 56% faster sample run time.

CLP Pesticides

Column: DB-35ms
123-3832
30 m x 0.32 mm, 0.25 µm

Column: DB-XLB
123-1236
30 m x 0.32 mm, 0.50 µm

Carrier: Helium at 45 cm/sec
(EPC in constant flow mode)

Oven: 110°C for 0.5 min
110-320°C at 15°C/min
320°C for 2 min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: µECD, 350°C
Nitrogen makeup gas
(column + makeup flow =
30 mL/min constant flow)

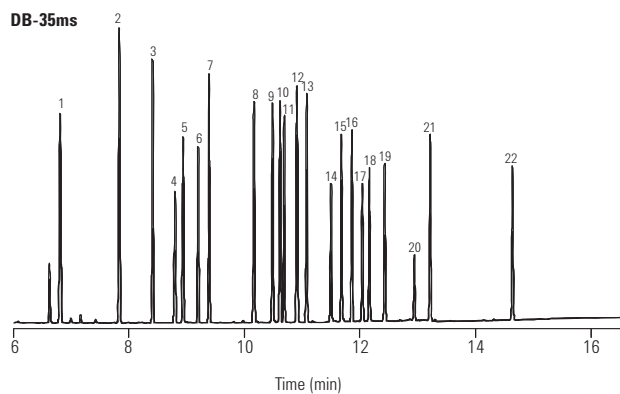
Sample: 50 pg per component

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

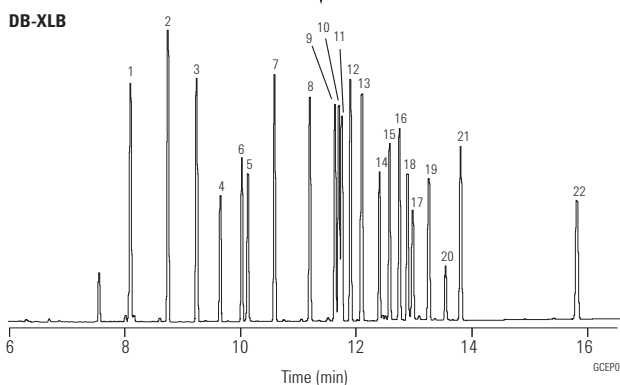
Liner: Splitless, single taper, deactivated,
4 mm ID, 5181-3316

Syringe: 10 µL tapered, FN 23-26s/42/HP,
5181-1267



GCEP001

**Complete resolution and confirmation of
22 CLP Pesticides in under 16 minutes!**



GCEP002

1. Tetrachloro m-xylene (SS)
2. α-BHC
3. γ-BHC
4. β-BHC
5. Heptachlor
6. δ-BHC
7. Aldrin
8. Heptachlor epoxide
9. γ-Chlordane
10. α-Chlordane
11. Endosulfan I
12. 4,4'-DDE
13. Dieldrin
14. Endrin
15. 4,4'-DDD
16. Endosulfan II
17. 4,4'-DDT
18. Endrin aldehyde
19. Endosulfan sulfate
20. Methoxychlor
21. Endrin ketone
22. Decachlorobiphenyl (SS)

SS - Surrogate Standard

**Organochlorine Pesticides I
EPA Method 8081A**

Column: DB-35ms
122-3832
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 35 cm/sec, measured at 50°C

Oven: 50°C for 1 min
50-100°C at 25°/min
100-300°C at 5°/min
300°C for 5 min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: MSD, 300°C transfer line
Full scan at m/z 50-500

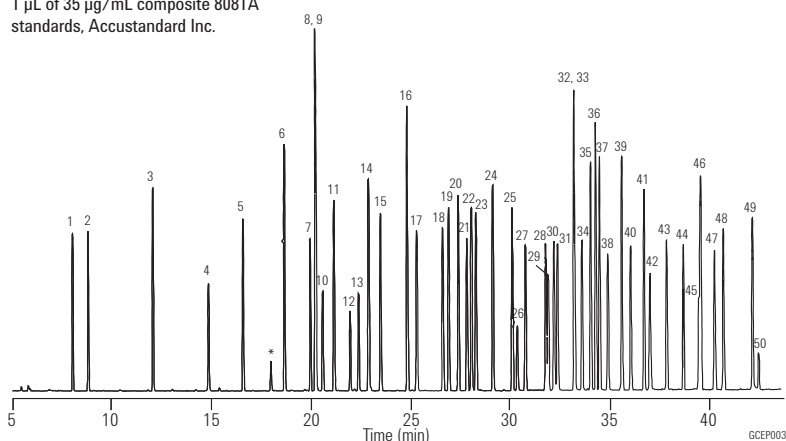
Sample: 1 µL of 35 µg/mL composite 8081A standards, Accustandard Inc.

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316

Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267



1. 1,2-Dibromo-3-chloropropane
 2. 4-Chloro-3-nitrobenzotrifluoride (SS)
 3. Hexachloropentadiene
 4. 1-Bromo-2-nitrobenzene (IS)
 5. Terrazole
 6. Chloroneb
 7. Trifluralin
 8. 2-Bromobiphenyl (SS)
 9. Tetrachloro m-xylene (SS)
 10. α, α-Dibromo-m-xylene
 11. Propachlor
 12. Di-allate A
 13. Di-allate B
 14. Hexachlorobenzene
 15. α-BHC
 16. Pentachloronitrobenzene (IS)
 17. γ-BHC
 18. β-BHC
 19. Heptachlor
 20. Alachlor
 21. δ-BHC
 22. Chlorothalonil
 23. Aldrin
 24. Dacthal
 25. Isodrin
 26. Kelthane
 27. Heptachlor epoxide
 28. γ-Chlordane
 29. trans-Nonachlor
 30. α-Chlordane
 31. Endosulfan I
 32. Captan
 33. p,p'-DDE
 34. Dieldrin
 35. Chlorobenzilate
 36. Perthane
 37. Chloropropylate
 38. Endrin
 39. p,p'-DDD
 40. Endosulfan II
 41. p,p'-DDT
 42. Endrin aldehyde
 43. Endosulfan sulfate
 44. Dibutylchlorodate (SS)
 45. Captafol
 46. Methoxychlor
 47. Endrin ketone
 48. Mirex
 49. cis-Permethrin
 50. trans-Permethrin
- * Breakdown Products
SS - Surrogate Standard
IS - Internal Standard

**Organochlorine Pesticides II
EPA Method 8081A**

Column: DB-5ms
122-5532
30 m x 0.25 mm, 0.25 µm

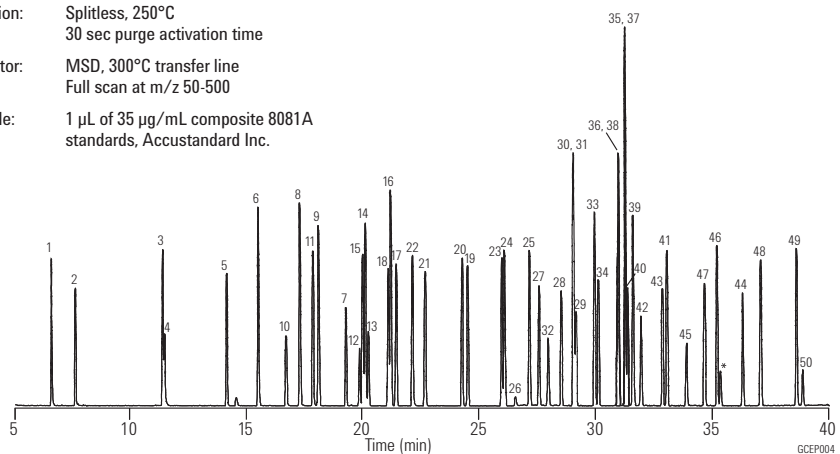
Carrier: Helium at 35 cm/sec, measured at 50°C

Oven: 50°C for 1 min
50-100°C at 25°/min
100-300°C at 5°/min
300°C for 5 min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: MSD, 300°C transfer line
Full scan at m/z 50-500

Sample: 1 µL of 35 µg/mL composite 8081A standards, Accustandard Inc.



Standards used were a composite of individual solutions supplied courtesy of Accustandard Inc., 25 Science Park, New Haven, CT 06511, 800-442-5290.

**Analysis of pesticides
using EPA 8081 with ECD**

Column: VF-1701ms
CP9162
30 m x 0.32 mm, 0.25 µm

Sample: 0.5 µL, 6 ng/mL

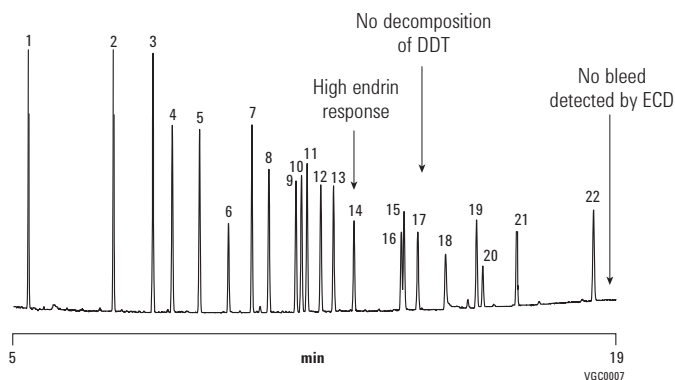
Carrier: Helium, 150 kPa

Oven: 60°C (hold 30 sec) to 150°C @ 50°C/min
to 275°C @ 8 °C/min

Injection: Split/splitless, in splitless mode,
T=250°C

Detector: ECD, T=325°C

- | | |
|---------------------------------|------------------------|
| 1. 2,4,5,6-Tetrachloro-m-Xylene | 12. 4,4'-DDE |
| 2. α-BHC | 13. Dieldrin |
| 3. γ-BHC | 14. Endrin |
| 4. Heptachlor | 15. 4,4'-DDD |
| 5. Aldrin | 16. Endosulfan II |
| 6. β-BHC | 17. 4,4'-DDT |
| 7. δ-BHC | 18. Endrin aldehyde |
| 8. Heptachlor epoxide | 19. Endosulfan sulfate |
| 9. Endosulfan I | 20. Methoxychlor |
| 10. γ-Chlordane | 21. Endrin ketone |
| 11. α-Chlordane | 22. Decachlorobiphenyl |



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Pesticides, EPA 508.1

Column: DB-35ms
123-3832
30 m x 0.32 mm, 0.25 μm

Column: DB-XLB
123-1236
30 m x 0.32 mm, 0.50 μm

Carrier: Helium at 45 cm/sec
(EPC in constant flow mode)

Oven: 75°C for 0.5 min
75-300°C at 10°C/min
300°C for 2 min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: μECD, 350°C
Nitrogen makeup gas
(column + makeup flow = 30 mL/min
constant flow)

Sample: 50 pg per component

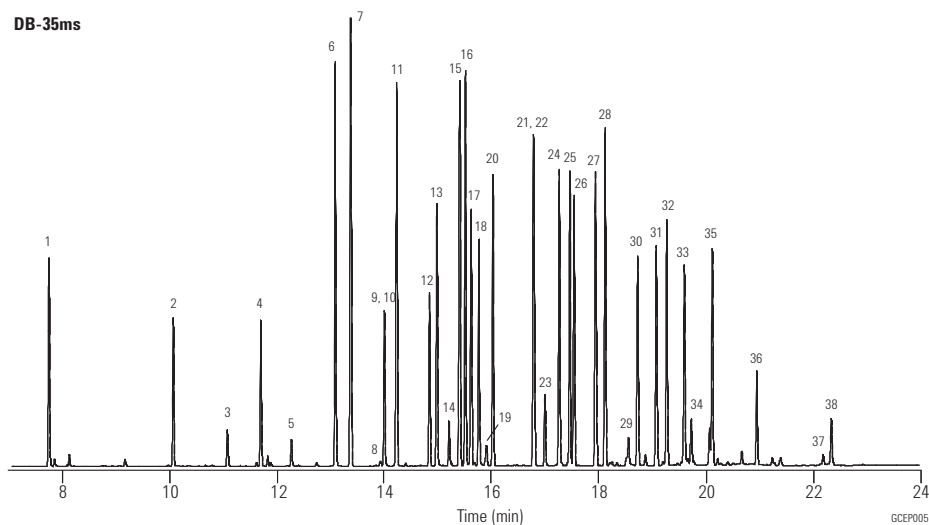
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

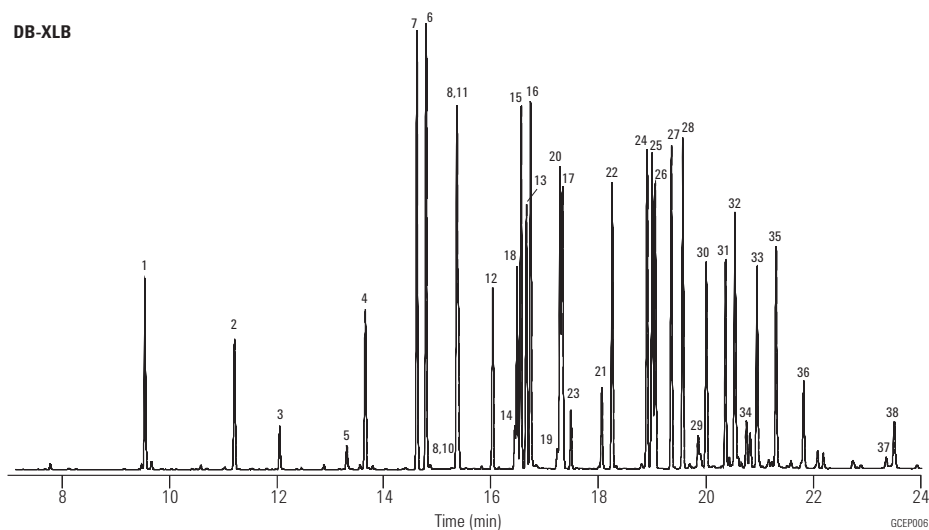
Liner: Direct connect, single taper, deactivated,
4 mm ID, G1544-80730

Syringe: 10 μL tapered, FN 23-26s/42/HP,
5181-1267

DB-35ms



DB-XLB



1. Hexachlorocyclopentadiene
2. Etridiazole
3. Chloroneb
4. Trifluralin
5. Propachlor
6. Hexachlorobezene
7. α-BHC
8. Atrazine
9. Pentachloronitrobenzene
10. Simazine
11. γ-BHC
12. β-BHC
13. Heptachlor
14. Alachlor
15. δ-BHC
16. Chlorothalonil
17. Aldrin
18. Metribuzin
19. Metolachlor
20. DCPA
21. 4,4'-Dibromobiphenyl
22. Heptachlor epoxide
23. Cyanazine
24. γ-Chlordane
25. α-Chlordane
26. Endosulfan I
27. 4,4'-DDE
28. Dieldrin
29. Chlorobenzilate
30. Endrin
31. 4,4'-DDD
32. Endosulfan II
33. 4,4'-DDT
34. Endrin aldehyde
35. Endosulfan sulfate
36. Methoxychlor
37. cis-Permethrin
38. trans-Permethrin

Chlorinated Pesticides, EPA Method 508

Column: HP-5MS
19091S-433
30 m x 0.25 mm, 0.25 µm

Carrier: Helium, 24 psi, 45 cm/sec (80°C)
constant flow

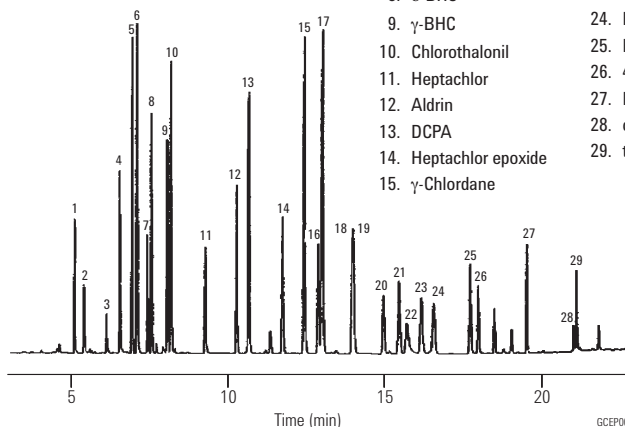
Oven: 80°C for 1 min
80-180°C at 30°C/min
180-205°C at 3°C/min
205°C for 4 min
205-290°C at 20°C/min
290°C for 2 min

Injection: Splitless
1 min purge delay

Detector: ECD, 320°C
Makeup gas Nitrogen, 60 mL/min
Anode purge 3 mL/min

Sample: 1 µL

- | | |
|------------------------|------------------------|
| 1. Etridiazole | 16. Endosulfan I |
| 2. Chloroneb | 17. α-Chlordane |
| 3. Propachlor | 18. Dieldrin |
| 4. Trifluralin | 19. 4,4'-DDE |
| 5. α-BHC | 20. Endrin |
| 6. Hexachlorobezene | 21. Endosulfan II |
| 7. β-BHC | 22. Chlorobenzilate |
| 8. δ-BHC | 23. 4,4'-DDD |
| 9. γ-BHC | 24. Endrin aldehyde |
| 10. Chlorothalonil | 25. Endosulfan sulfate |
| 11. Heptachlor | 26. 4,4'-DDT |
| 12. Aldrin | 27. Methoxychlor |
| 13. DCPA | 28. cis-Permethrin |
| 14. Heptachlor epoxide | 29. trans-Permethrin |
| 15. γ-Chlordane | |



Suggested Supplies

- Septum:** 11 mm Advanced Green septa, 5183-4759
- Liner:** Direct connect, single taper, deactivated, 4 mm ID, G1544-80730
- Syringe:** 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Organohalide Pesticides in Water, EPA Method 505

Column: HP-5MS
19091S-433
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 2.0 mL/min, constant flow,
42 cm/sec (22.4 psi at 80°C)

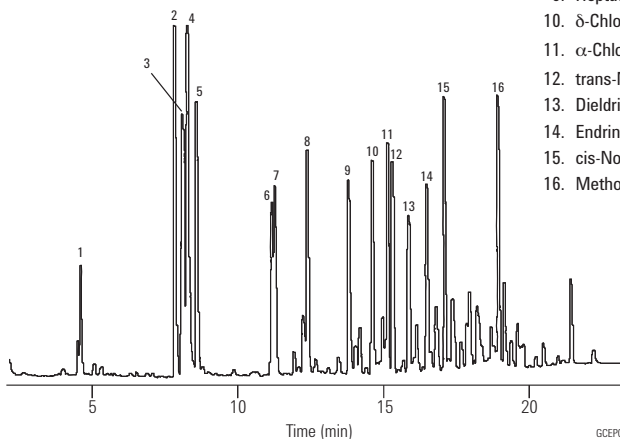
Oven: 80°C for 1 min
80-175°C at 30°C/min
175°C for 4 min
175-215°C at 6°C/min
215°C for 2 min
215-290°C at 15°C/min
290°C for 5 min

Injection: Splitless, 250°C
1 min purge delay

Detector: ECD, 300°C
Makeup gas: N₂, 60 mL/min
Anode purge 6 mL/min

Sample: 1 µL injection volume
16 components EPA-505 targeted pesticides
and 14 ppb Aroclor 1260 in hexane.
Concentration of pesticides: 50 ppb each
except 1.25 ppm for atrazine and simazine.

- | |
|------------------------------|
| 1. Hexachlorocyclopentadiene |
| 2. Hexachlorobenzene |
| 3. Simazine |
| 4. Atrazine |
| 5. Lindane |
| 6. Heptachlor |
| 7. Alachlor |
| 8. Adrin |
| 9. Heptachlor epoxide |
| 10. δ-Chlordane |
| 11. α-Chlordane |
| 12. trans-Nonachlor |
| 13. Dieldrin |
| 14. Endrin |
| 15. cis-Nonachlor |
| 16. Methoxychlor |



Suggested Supplies

- Septum:** 11 mm Advanced Green septa, 5183-4759
- Liner:** Direct connect, single taper, deactivated, 4 mm ID, G1544-80730
- Syringe:** 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Organochlorine Pesticides I

Column: DB-5
125-5037
30 m x 0.53 mm, 0.50 µm

Carrier: Helium at 30 cm/sec (4.0 mL/min)

Oven: 150-275°C at 4°/min
275°C for 30 min

Injection: Splitless, 250°C

Detector: ECD, 300°C
Nitrogen makeup gas at 30 mL/min

Sample: 0.7 µL of 100 pg/µL standard
in isoctane

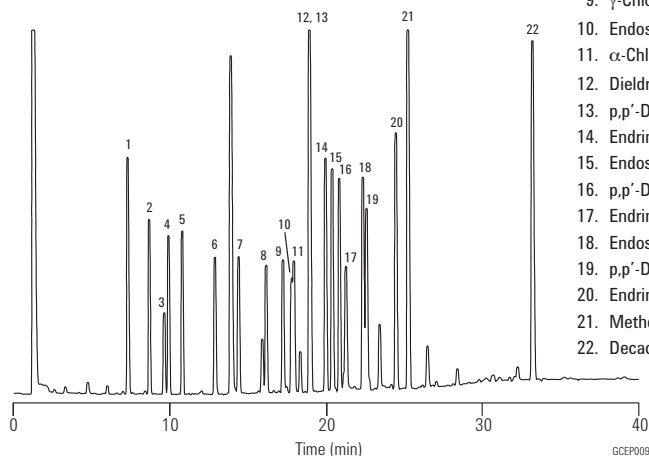
Suggested Supplies

Liner: Splitless, single taper, deactivated,
4 mm ID, 5181-3316

Septum: 11 mm Advanced Green septa, 5183-4759

Syringe: 10 µL tapered, FN 23-26s/42/HP,
5181-1267

1. 2,4,5,6-Tetrachloro-m-xylene (IS)
2. α-BHC
3. β-BHC
4. γ-BHC
5. δ-BHC
6. Heptachlor
7. Aldrin
8. Heptachlor epoxide
9. γ-Chlordane
10. Endosulfan I
11. α-Chlordane
12. Dieldrin
13. p,p'-DDE
14. Endrin
15. Endosulfan II
16. p,p'-DDD
17. Endrin aldehyde
18. Endosulfan sulfate
19. p,p'-DDT
20. Endrin ketone
21. Methoxychlor
22. Decachlorobiphenyl (IS)



Organochlorine Pesticides II

Column: DB-608
125-6837
30 m x 0.53 mm, 0.50 µm

Carrier: Helium at 30 cm/sec (4.0 mL/min)

Oven: 150-275°C at 4°/min
275°C for 30 min

Injection: Splitless, 250°C

Detector: ECD, 300°C
Nitrogen makeup gas
at 30 mL/min

Sample: 0.7 µL of 100 pg/µL
standard in isoctane

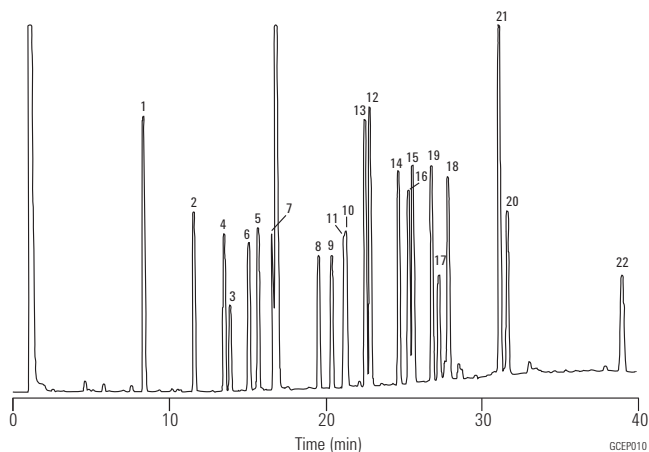
Suggested Supplies

Liner: Splitless, single taper, deactivated,
4 mm ID, 5181-3316

Seal: 11 mm Advanced Green septa, 5183-4759

Syringe: 10 µL tapered, FN 23-26s/42/HP,
5181-1267

1. 2,4,5,6-Tetrachloro-m-xylene (IS)
2. α-BHC
3. β-BHC
4. γ-BHC
5. δ-BHC
6. Heptachlor
7. Aldrin
8. Heptachlor epoxide
9. γ-Chlordane
10. Endosulfan I
11. α-Chlordane
12. Dieldrin
13. p,p'-DDE
14. Endrin
15. Endosulfan II
16. p,p'-DDD
17. Endrin aldehyde
18. Endosulfan sulfate
19. p,p'-DDT
20. Endrin ketone
21. Methoxychlor
22. Decachlorobiphenyl (IS)



Organochlorine Pesticides III

Column: DB-1701
 125-0737
 30 m x 0.53 mm, 0.50 µm

Carrier: Helium at 30 cm/sec (4.0 mL/min)

Oven: 150-275°C at 4°/min
 275°C for 30 min

Injection: Splitless, 250°C

Detector: ECD, 300°C
 Nitrogen makeup gas at 30 mL/min

Sample: 0.7 µL of 100 pg/µL standard in isooctane

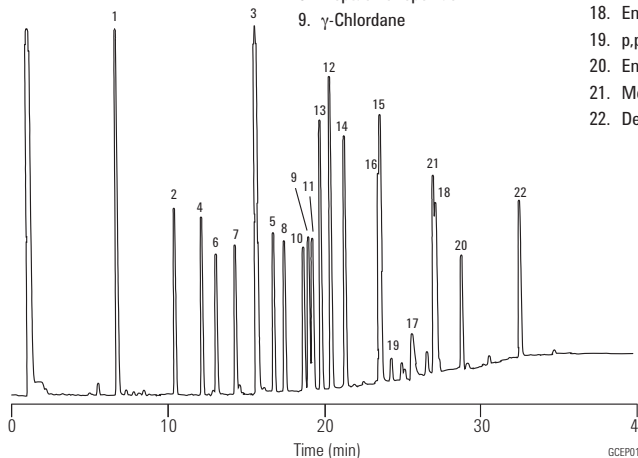
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated,
 4 mm ID, 5181-3316

Syringe: 10 µL tapered, FN 23-26s/42/HP,
 5181-1267

- | | |
|--------------------------------------|-----------------------------|
| 1. 2,4,5,6-Tetrachloro-m-xylene (IS) | 10. Endosulfan I |
| 2. α-BHC | 11. α-Chlordane |
| 3. β-BHC | 12. Dieldrin |
| 4. γ-BHC | 13. p,p'-DDE |
| 5. δ-BHC | 14. Endrin |
| 6. Heptachlor | 15. Endosulfan II |
| 7. Aldrin | 16. p,p'-DDD |
| 8. Heptachlor epoxide | 17. Endrin aldehyde |
| 9. γ-Chlordane | 18. Endosulfan sulfate |
| | 19. p,p'-DDT |
| | 20. Endrin ketone |
| | 21. Methoxychlor |
| | 22. Decachlorobiphenyl (IS) |



Organochlorine Pesticides IV

Column: DB-35
 125-1937
 30 m x 0.53 mm, 0.50 µm

Carrier: Helium at 30 cm/sec (4.0 mL/min)

Oven: 150-275°C at 4°/min
 275°C for 30 min

Injection: Splitless, 250°C

Detector: ECD, 300°C
 Nitrogen makeup gas at 30 mL/min

Sample: 0.7 µL of 100 pg/µL standard in isooctane

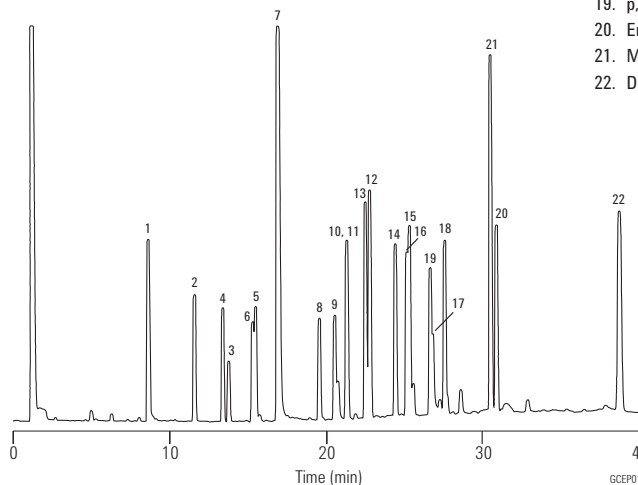
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated,
 4 mm ID, 5181-3316

Syringe: 10 µL tapered, FN 23-26s/42/HP,
 5181-1267

- | | |
|--------------------------------------|-----------------------------|
| 1. 2,4,5,6-Tetrachloro-m-xylene (IS) | 10. Endosulfan I |
| 2. α-BHC | 11. α-Chlordane |
| 3. β-BHC | 12. Dieldrin |
| 4. γ-BHC | 13. p,p'-DDE |
| 5. δ-BHC | 14. Endrin |
| 6. Heptachlor | 15. Endosulfan II |
| 7. Aldrin | 16. p,p'-DDD |
| 8. Heptachlor epoxide | 17. Endrin aldehyde |
| 9. γ-Chlordane | 18. Endosulfan sulfate |
| | 19. p,p'-DDT |
| | 20. Endrin ketone |
| | 21. Methoxychlor |
| | 22. Decachlorobiphenyl (IS) |



Organochlorine Pesticides, DB5/1701P

Column: DB-5
123-5032
30 m x 0.32 mm, 0.25 µm

Column: DB-1701P
123-7732
30 m x 0.32 mm, 0.25 µm

Carrier: Helium at 29.2 cm/sec, measured at 150°C

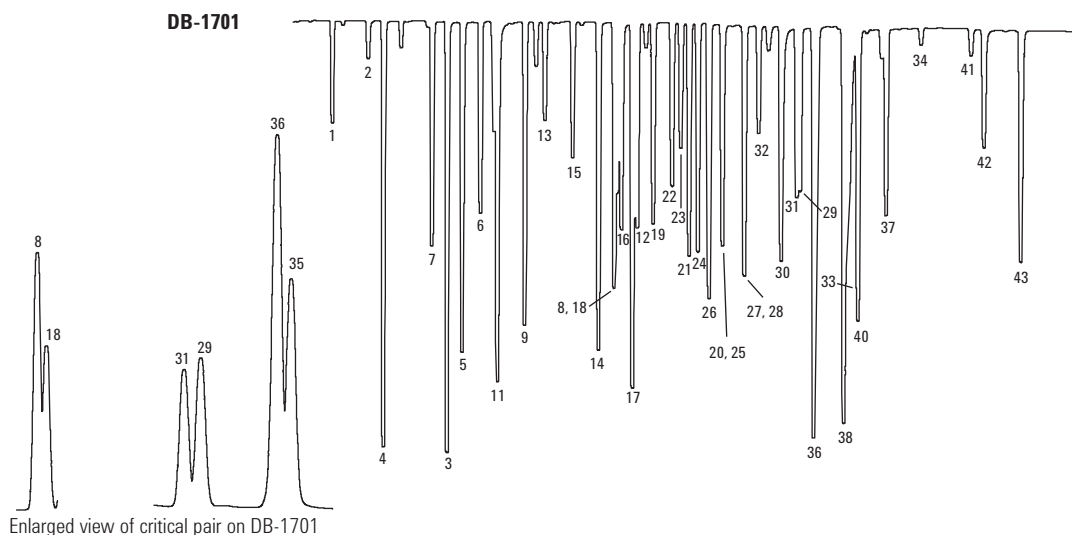
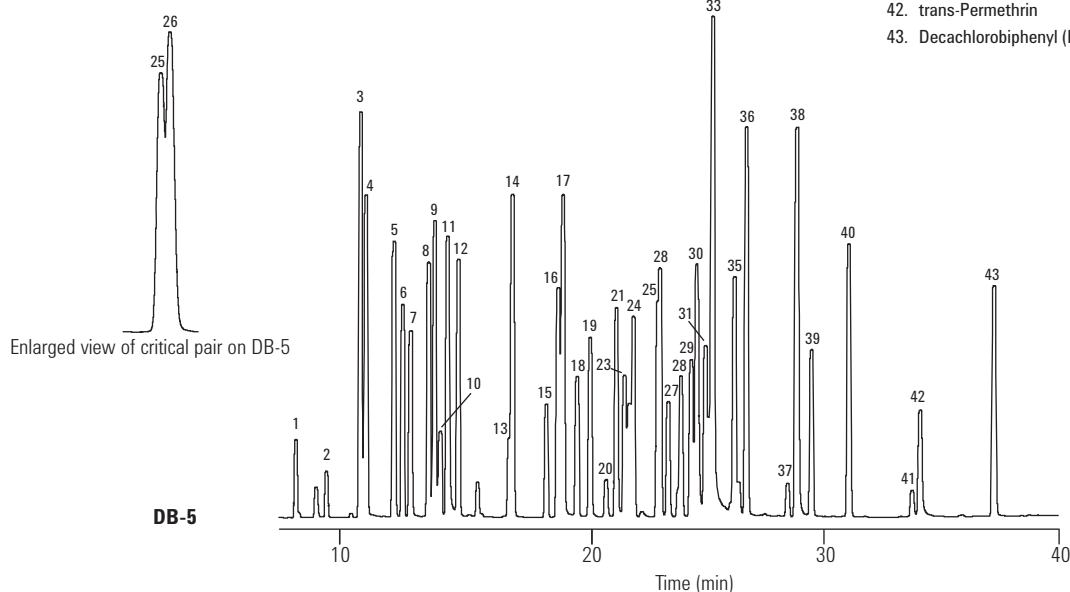
Oven: 60°C for 0.5 min
60-140°C at 20°/min
140-280°C at 11°/min
280°C for 23 min

Injection: Splitless, 200°C

Detector: ECD, 325°C
Nitrogen makeup gas at 30 mL/min

Sample: 2.0 µL, 20-200 µg/µL

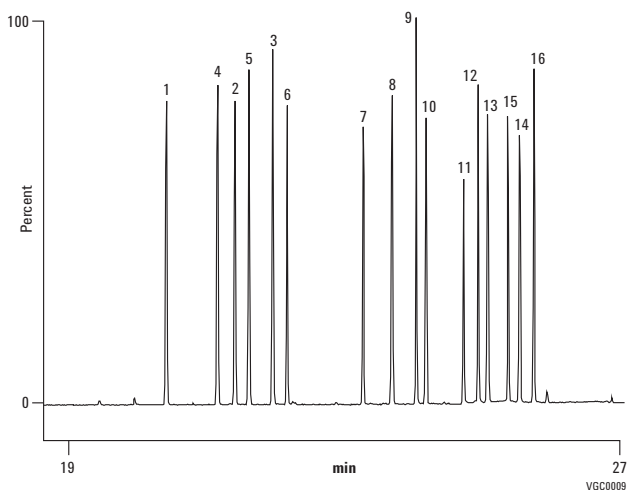
- | | | |
|------------------------------|------------------------|-----------------------------|
| 1. Etridiazole | 14. Alachlor | 27. o,p'-DDD |
| 2. Chloroneb | 15. Aldrin | 28. Endrin |
| 3. Propachlor | 16. Chlorpyrifos | 29. Endosulfan II |
| 4. Tetrachloro-m-xylene (IS) | 17. DCPA | 30. Chlorobenzilate |
| 5. Trifluralin | 18. Isodrin | 31. p,p'-DDD |
| 6. α-BHC | 19. Heptachlor epoxide | 32. o,p'-DDT |
| 7. Hexachlorobenzene | 20. Captan | 33. Endrin aldehyde |
| 8. β-BHC | 21. γ-Chlordane | 34. Endrin ketone |
| 9. γ-BHC | 22. o,p'-DDE | 35. Carbophenothion |
| 10. Pentachloronitrobenzene | 23. Endosulfan I | 36. p,p'-DDT |
| 11. p,p'-Dichlorobiphenyl | 24. α-Chlordane | 37. Endosulfan sulfate |
| 12. δ-BHC | 25. Dieldrin | 38. Hexabromobenzene (HBB) |
| 13. Heptachlor | 26. p,p'-DDE | 39. Methoxychlor |
| | | 40. Mirex |
| | | 41. cis-Permethrin |
| | | 42. trans-Permethrin |
| | | 43. Decachlorobiphenyl (IS) |



Organochlorine pesticides

Column: VF-17ms
CP8982
30 m x 0.25 mm, 0.25 µm

Sample: 1.0 µL
Sample Conc: 200 µg/mL
Carrier: Helium, 70 kPa
Injection: Splitter, 1:100
Detector: MS, Ion Trap, TIC



1. α-BHC
2. β-BHC
3. δ-BHC
4. γ-BHC (lindane)
5. Heptachlor
6. Aldrin
7. Heptachlorepoide
8. Endosulfan I
9. 4,4'-DDE
10. Dieldrin
11. Endrin
12. 4,4'-DDD
13. Endosulfan II
14. Endrin aldehyde
15. 4,4'-DDT
16. Endosulfan sulfate

Nitrogen/Phosphorus Containing Pesticides, EPA Method 507

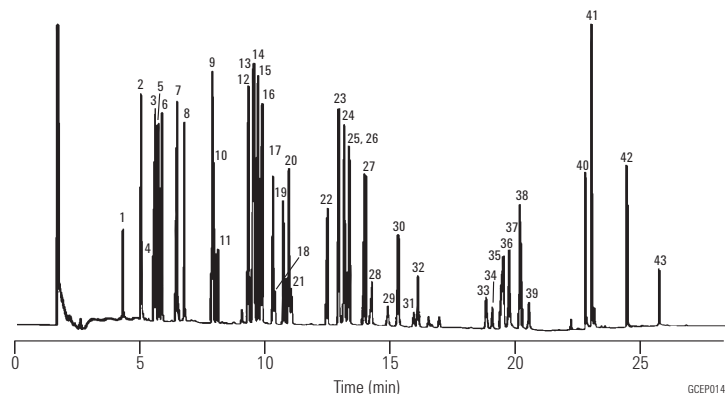
Column: HP-5MS
19091S-433
30 m x 0.25 mm, 0.25 µm

Carrier: Helium, 30 cm/sec (13.6 psi) pressure program
Oven: 80-178°C at 30°C/min
178°C for 4 min
178-205°C at 2°C/min
205-310°C at 30°C/min
310°C for 4 min
Injection: Splitless, 260°C
1 min purge delay
Detector: NPD, 290°C
Helium makeup gas at 30 mL/min

- | | | |
|------------------|-----------------|------------------|
| 1. Dichlorvos | 16. Propazine | 31. MGK-264 |
| 2. EPTC | 17. Terbufos | 32. Diphenamid |
| 3. Butylate | 18. Pronamide | 33. Stirofos |
| 4. Mevinphos | 19. Diazinon | 34. Butachlor |
| 5. Vernolate | 20. Disulfoton | 35. Fenamiphos |
| 6. Pebulate | 21. Terbacil | 36. Napropamide |
| 7. Tebuthiuron | 22. Metribuzin | 37. Tricyclazole |
| 8. Molinate | 23. Simetryn | 38. Merphos |
| 9. Ethoprop | 24. Alachlor | 39. Carboxin |
| 10. Cycloate | 25. Ametryn | 40. Norflurazon |
| 11. Chlorpropham | 26. Prometryn | 41. Hexazinone |
| 12. Atraton | 27. Terbutryn | 42. Fenarimol |
| 13. Simazine | 28. Bromacil | 43. Fluridone |
| 14. Prometon | 29. Metolachlor | |
| 15. Atrazine | 30. Triademefon | |

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730
Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267



GCEP014

**Organophosphorous Pesticides I,
EPA Method 8141A**

Column: DB-5ms
122-5532
30 m x 0.25 mm, 0.25 µm

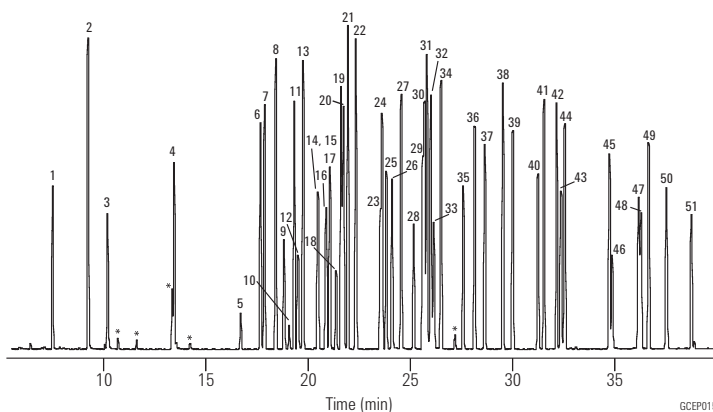
Carrier: Helium at 35 cm/sec,
measured at 50°C

Oven: 50°C for 1 min
50-100°C at 25°/min
100-300°C at 5°/min
300°C for 5 min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: MSD, 300°C transfer line
Full scan m/z 50-500

Sample: 1 µL of 40 µg/mL
8141A standards
Accustandard Inc.



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated,
4 mm ID, 5181-3316

Syringe: 10 µL tapered, FN 23-26s/42/HP,
5181-1267

*Note: All standards used were supplied courtesy of
Accustandard Inc., 25 Science Park, New Haven, CT 06511,
800-442-5290.*

- | | | |
|--------------------------------|-------------------------|----------------------------|
| 1. 4-Chloro-3-nitrotrifluoride | 18. Dioxathion | 35. Chlorfenvinphos |
| 2. Dichlorovos | 19. Terbufos | 36. Crotoxyphos |
| 3. Hexamethylphosphoramide | 20. Fonofos | 37. Stirofos |
| 4. Mevinphos | 21. Diazinon | 38. Tokuthion |
| 5. TEPP | 22. Disulfoton | 39. Merphos |
| 6. Thionazin | 23. Phosphamidon | 40. Fensulfothion |
| 7. Demeton-O | 24. Dichlofenthion | 41. Ethion |
| 8. Ethoprop | 25. Chlorpyrifos-methyl | 42. Bolstar |
| 9. Naled | 26. Methyl parathion | 43. Famphur |
| 10. Dicrotophos | 27. Ronnel | 44. Carbophenothion |
| 11. Sulfotepp | 28. Fenitrothion | 45. Phosmet |
| 12. Monocrotophos | 29. Malathion | 46. EPN |
| 13. Phorate | 30. Aspon | 47. Leptophos |
| 14. Dimethoate | 31. Chlorpyrifos | 48. Azinphos methyl |
| 15. Demeton-S | 32. Fenthion | 49. Tri-o-cresyl phosphate |
| 16. Simazine | 33. Ethyl parathion | 50. Azinphos ethyl |
| 17. Atrazine | 34. Trichloronate | 51. Coumaphos |

* Breakdown products



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

**Organophosphorous Pesticides II,
EPA Method 8141A**

Column: DB-35ms
122-3832
30 m x 0.25 mm, 0.25 µm

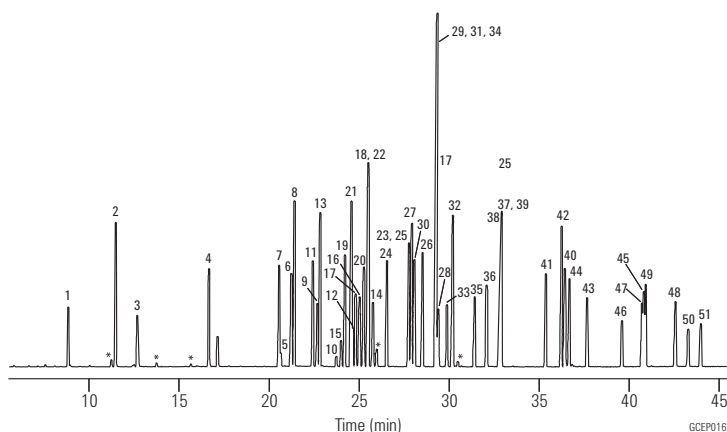
Carrier: Helium at 35 cm/sec, measured at 50°C

Oven: 50°C for 1 min
50-100°C at 25°/min
100-300°C at 5°/min
300°C for 5 min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: MSD, 300°C transfer line
Full scan m/z 50-500

Sample: 1 µL of 40 µg/mL 8141A standards
Accustandard Inc.



- | | | |
|--------------------------------|-------------------------|----------------------------|
| 1. 4-Chloro-3-nitrotrifluoride | 18. Dioxathion | 35. Chlorfenvinphos |
| 2. Dichlorvos | 19. Terbufos | 36. Crotoxyphos |
| 3. Hexamethylphosphoramide | 20. Fonofos | 37. wStirofos |
| 4. Mevinphos | 21. Diazinon | 38. Tokuthion |
| 5. TEPP | 22. Disulfoton | 39. Merphos |
| 6. Thionazin | 23. Phosphamidon | 40. Fensulfothion |
| 7. Demeton-O | 24. Dichlofenthion | 41. Ethion |
| 8. Ethoprop | 25. Chlorpyrifos-methyl | 42. Bolstar |
| 9. Naled | 26. Methyl parathion | 43. Famphur |
| 10. Dicrotophos | 27. Ronnel | 44. Carbofenothion |
| 11. Sulfotepp | 28. Fenitrothion | 45. Phosmet |
| 12. Monocrotophos | 29. Malathion | 46. EPN |
| 13. Phorate | 30. Aspon | 47. Leptophos |
| 14. Dimethoate | 31. Chlorpyrifos | 48. Azinphos methyl |
| 15. Demeton-S | 32. Fenthion | 49. Tri-o-cresyl phosphate |
| 16. Simazine | 33. Ethyl parathion | 50. Azinphos ethyl |
| 17. Atrazine | 34. Trichloronate | 51. Coumaphos |

* Breakdown products

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316

Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Note: All standards used were supplied courtesy of Accustandard Inc., New Haven, CT

**Phenoxy Acid Herbicides –
Methyl Derivatives, EPA 8151A**

Column: DB-35ms
123-3832
30 m x 0.32 mm, 0.25 µm

Carrier: Helium at 45 cm/sec
(EPC in constant flow mode)

Oven: 50°C for 0.5 min
50-100°C at 25°C/min
100-320°C at 12°C/min
320°C for 2 min

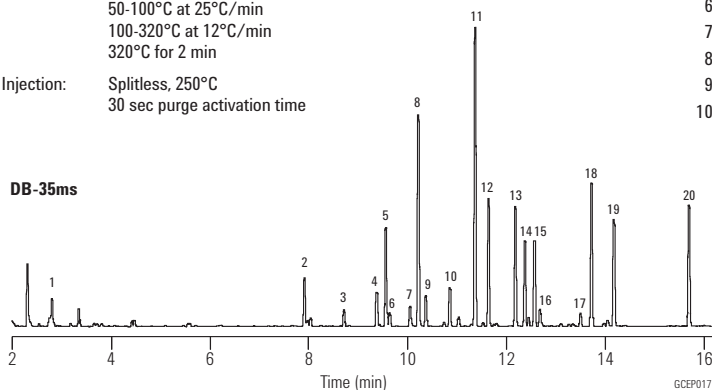
Injection: Splitless, 250°C
30 sec purge activation time

Detector: µECD, 350°C
Nitrogen makeup gas
(column + makeup flow =
30 mL/min constant flow)

Sample: 50 pg per component

- | | |
|--|-----------------------|
| 1. Dalapon | 11. Pentachlorophenol |
| 2. 3,5-Dichlorobenzoic acid | 12. 2,4,5-T,P |
| 3. 4-Nitrophenol | 13. 2,4,5-T |
| 4. Methyl-2,4-dichlorophenylacetate (SS) | 14. Chloramben |
| 5. Dicamba | 15. Dinoseb |
| 6. MCPP | 16. 2,4-DB |
| 7. MCPA | 17. Bentazone |
| 8. 4,4'-Dibromo-octafluorobiphenyl (IS) | 18. DCPA |
| 9. Dichloroprop | 19. Picloram |
| 10. 2,4-D | 20. Acifluorfen |

DB-35ms



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316

Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Phenoxy Acid Herbicides

Column: DB-1701
123-0732
30 m x 0.32 mm, 0.25 µm

Carrier: Helium at 35 cm/sec, measured at 50°C

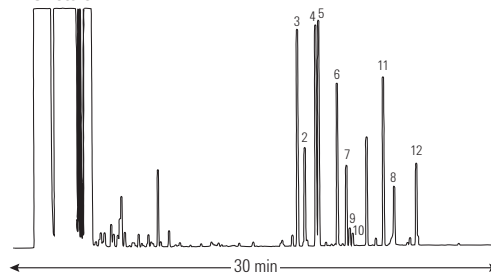
Oven: 50°C for 1 min
50-160°C at 10°/min
160°C for 3 min
160-260°C at 10°/min
260°C for 5 min

Injection: Splitless, 250°C
45 sec purge activation time

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

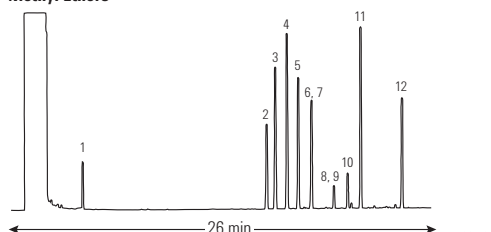
Sample: 1 µL of 0.1 µg/µL standard in methanol

TMS Esters



1. Dalapon
2. Dicamba
3. MCPP
4. MCPA
5. Dichloroprop
6. 2,4-D
7. Pentachlorophenol
8. Dinoseb
9. 2,4,5-TP
10. 2,4,5-T
11. 2,4-DB
12. Picloram

Methyl Ethers



GCEP018

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated,
4 mm ID, 5181-3316

Syringe: 10 µL tapered, FN 23-26s/42/HP,
5181-1267

Herbicides I

Column: DB-XLB
122-1232
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 32 cm/sec, measured at 50°C

Oven: 50°C for 1 min
50-180°C at 10°/min
180-230°C at 5°/min
230-320°C at 10°/min
320°C for 2 min

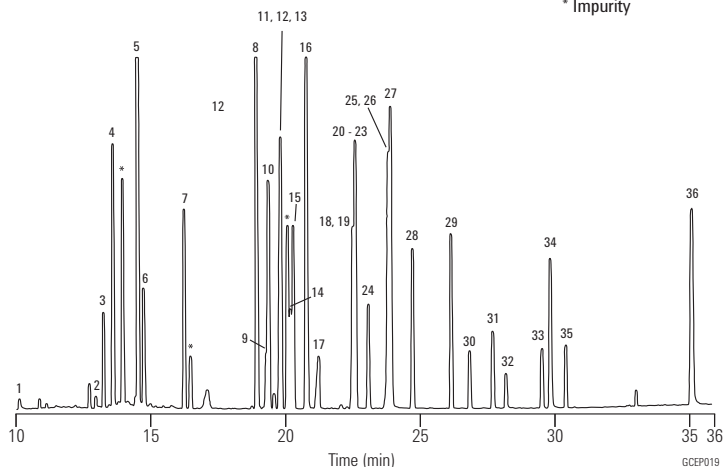
Injection: Splitless, 250°C
30 sec purge activation time

Detector: MSD, 300°C transfer line
Full scan 50-400

Sample: 2 µL x 10-50 ng/µL solution
in acetone

- | | | |
|----------------|-------------------|------------------|
| 1. Monuron | 13. Simazine | 25. Metolachlor |
| 2. Diuron | 14. Terbutylazine | 26. Bromacil |
| 3. EPTC | 15. Pronamide | 27. Dacthal |
| 4. Dichlobenil | 16. Secbumeton | 28. Diphenamid |
| 5. Vernolate | 17. Terbacil | 29. Butachlor |
| 6. Pebulate | 18. Alachlor | 30. Napropamide |
| 7. Molinate | 19. Propanil | 31. Carboxin |
| 8. Sulfallate | 20. Ametryn | 32. Tricyclazole |
| 9. Atraton | 21. Prometryne | 33. Norflurazon |
| 10. Prometon | 22. Simetryn | 34. Hexazinone |
| 11. Atrazine | 23. Metribuzin | 35. Difolotan |
| 12. Propazine | 24. Terbutryn | 36. Fluridone |

* Impurity



GCEP019

Suggested Supplies

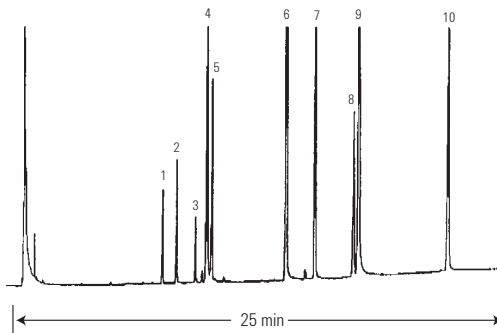
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated,
4 mm ID, 5181-3316

Syringe: 10 µL tapered, FN 23-26s/42/HP,
5181-1267

Herbicides II

Column: DB-210
 122-0232
 30 m x 0.25 mm, 0.25 µm
Carrier: Helium at 35 cm/sec
Oven: 140-215°C at 3°/min
Injection: Split 1:50, 1 µL
Detector: ECD, 300°C
 Nitrogen makeup gas at 30 mL/min

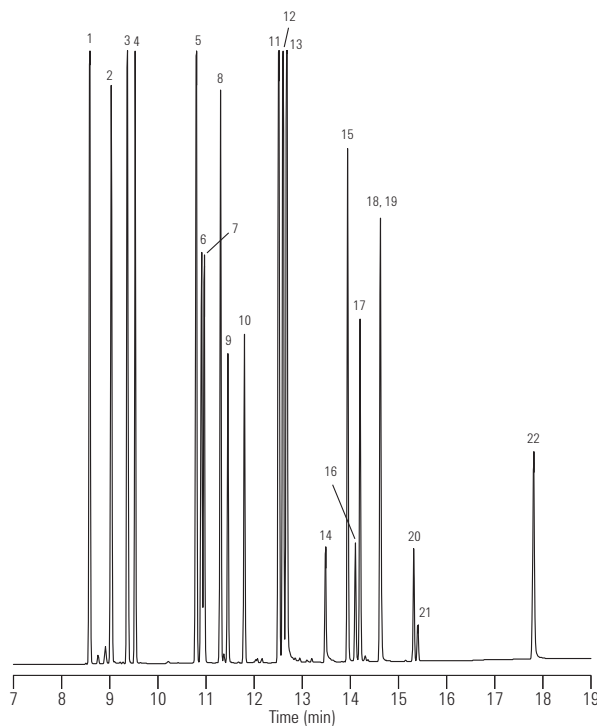


1. Phorate
2. Ethoprop
3. Terbufos
4. Atrazine
5. Fonofos
6. Propachlor
7. Chlorpyrifos
8. Alachlor
9. Metolachlor
10. Cyanazine

GCHERB01

**Nitrogen Containing Herbicides
 (EPA Method 507)**

Column: DB-35
 125-1937
 30 m x 0.53 mm, 0.50 µm
Carrier: Helium at 38 cm/sec (5 mL/min),
 measured at 150°C
Oven: 60°C for 1 min
 60-290°C at 15°/min
 290°C for 5 min
Injection: Megabore Direct, 290°C,
 1 µL of 3 ng/µL standard
Detector: NPD, 290°C



1. Eptam
2. Sutan
3. Vernam
4. Tillam
5. Ordram
6. Treflan
7. Balan
8. Ro-Neet
9. Propachlor
10. Tolban
11. Propazine
12. Atrazine
13. Simazine
14. Terbacil
15. Sencor
16. Dual
17. Paarlan
18. Prowl
19. Bromacil
20. Oxadiazon
21. GOAL
22. Hexazinone

GCNITR01

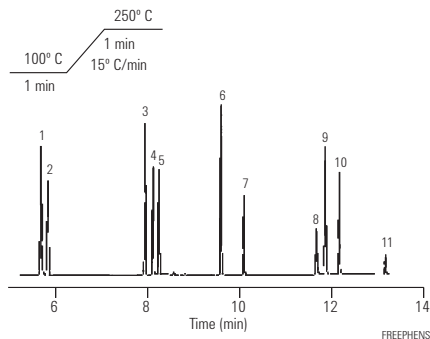
Free Phenols

Column: HP-50+
19091L-433
30 m x 0.25 mm, 0.25 μm

Carrier: Hydrogen, constant flow 45 cm/sec

Injection: Split 100:1

Detector: FID 300°C



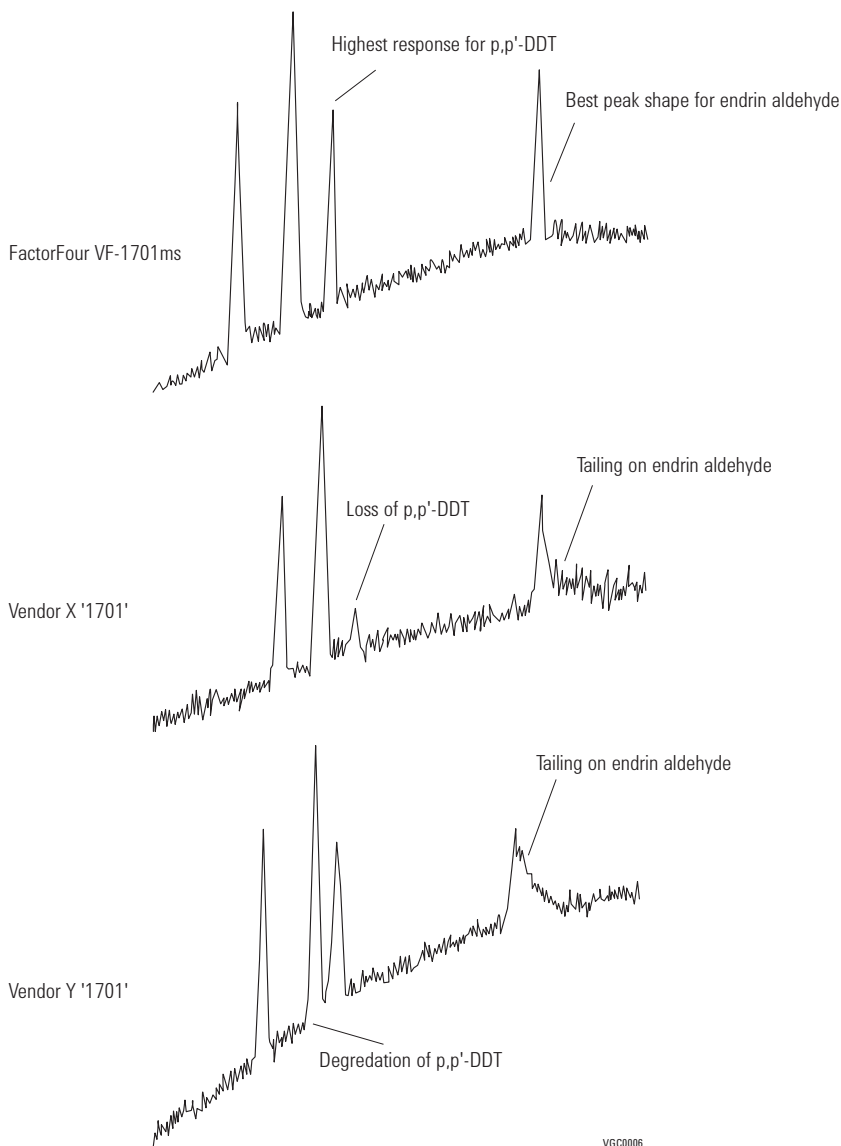
1. Phenol
2. 2-chlorophenol
3. 2,4-dimethylphenol
4. 2-nitrophenol
5. 2,4-dichlorophenol
6. 4-chloro-3-methylphenol
7. 2,4,6-trichlorophenol
8. 2,4-dinitrophenol
9. 4-nitrophenol
10. 2-methyl-4,6-dinitrophenol
11. Pentachlorophenol

EPA 625 halogenated pesticides on "1701" type phases

Column: VF-1701 Pesticides
CP9070
30 m x 0.25 mm, 0.25 μm

Oven: 150°C, 5°C/min to 275°C

Injection: Split, T=275°C
ECD: T=275°C, 2 pg



VG0006

**Organochlorine pesticides to EPA 625
via GC/MS**

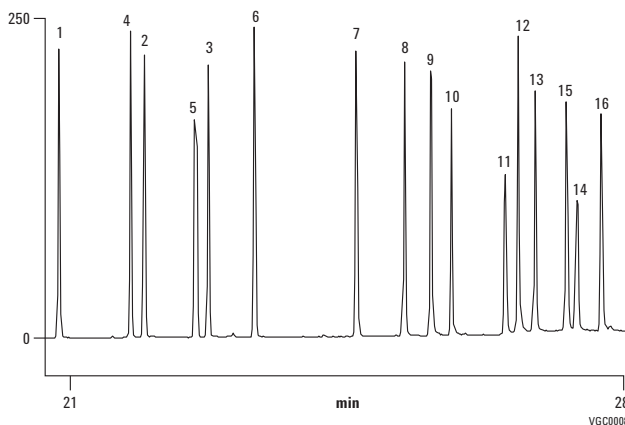
Column: VF-35ms
CP8877
30 m x 0.25 mm, 0.25 µm

Carrier: Helium, approx. 1.0 mL/min, 60 kPa

Oven: 45°C + 10°C/min to 325°C

Injection: Split/splitless, in split mode, 1:100

Detector: Ion Trap MS



1. α-BHC
2. β-BHC
3. δ-BHC
4. γ-BHC (lindane)
5. Heptachlor
6. Aldrin
7. Heptachlorepoxyde
8. Endosulfan I
9. 4,4'-DDE
10. Dieldrin
11. Endrin
12. 4,4'-DDD
13. Endosulfan II
14. Endrin aldehyde
15. 4,4'-DDT
16. Endosulfan sulfate



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Environmental Applications, Semivolatiles

Trace Level Polycyclic Aromatic Hydrocarbon (PAH) Analyses

Column: DB-5MS Ultra Inert
122-5532UI
30 m x 0.25 mm, 0.25 µm

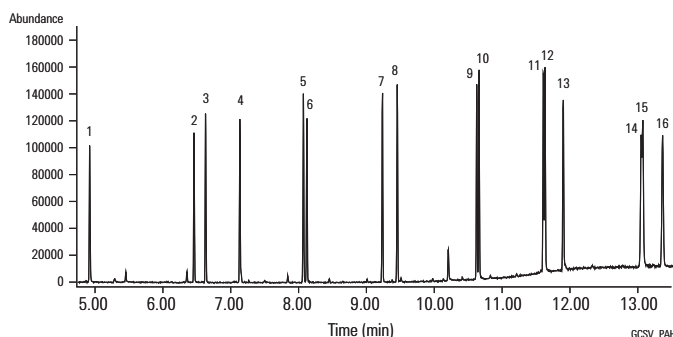
Carrier: Helium constant flow 30 cm/s

Oven: 40°C (1 min) to 100°C (15°C/min)
10°C to 210°C (1 min)
5°C/min. to 310°C (8 min)

Injection: Split/splitless; 260°C, 53.7 mL/min.
total flow, purge flow 50 mL/min. on
at 0.5 min., gas saver flow 80 mL/min. on
at 3.0 min.

Detector: MSD source at 300°C
Quadropole at 180°C
Transfer line at 290°C
Scan range 50-550 AMU

- | | | | |
|-------------------|-----------------|--------------------------|----------------------------|
| 1. Naphthalene | 5. Phenanthrene | 9. Benz[a]anthracene | 13. Benzo[a]pyrene |
| 2. Acenaphthylene | 6. Anthracene | 10. Chrysene | 14. Indeno[1,2,3-cd]pyrene |
| 3. Acenaphthene | 7. Fluoranthene | 11. Benzo[b]fluoranthene | 15. Dibenzo[a,h]anthracene |
| 4. Fluorene | 8. Pyrene | 12. Benzo[k]fluoranthene | 16. Benzo[g,h,i]perylene |

**US EPA Method 8270 Short Mix**

Column: DB-5MS Ultra Inert
122-5532UI
30 m x 0.25 mm, 0.25 µm

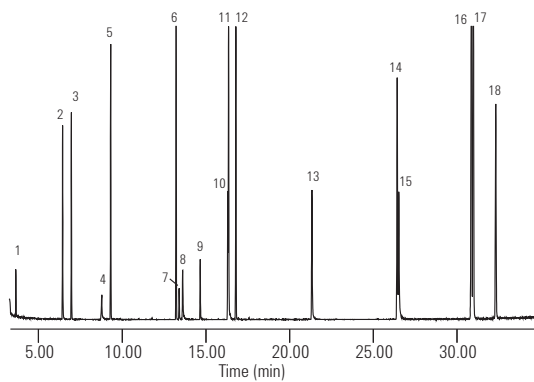
Carrier: Helium constant flow 30 cm/s

Oven: 40°C (1 min) to 100°C (15°C/min),
10°C to 210°C (1 min),
5°C/min. to 310°C (8 min)

Injection: Split/splitless; 260°C, 53.7 mL/min.
total flow, purge flow 50 mL/min. on
at 0.5 min., gas saver flow 80 mL/min.
on at 3.0 min.

Detector: MSD source at 300°C, quadropole
at 180°C, transfer line at 290°C,
full scan m/z 50-550

Sample: 1.0 µL splitless injection, 5 ng each
component on column



1. N-nitrosodimethylamine
2. Aniline
3. 1,4 dichlorobenzene-D4
4. 1,4 dichlorobenzene
5. Naphthalene-D8
6. Acenaphthene-D10
7. 2,4-dinitrophenol
8. 4-nitrophenol
9. 2-methyl-4,6-dinitrophenol
10. Pentachlorophenol
11. 4-aminobiphenyl
12. Phenanthrene- D10
13. Benzidine
14. Chrysene-D12
15. 3,3'-dichlorobenzidine
16. Benzo [b] fluoranthene
17. Benzo [k] fluoranthene
18. Perylene-D12

Suggested Supplies

Liner: Direct connect, dual taper, deactivated,
4 mm ID, G1544-80700

Syringe: Autosampler syringe, 0.5 µL, 23g, cone,
5188-5246

Semivolatile analysis using methods similar to US EPA Method 8270 is becoming increasingly important in environmental laboratories worldwide. Acidic compounds such as benzoic acid or 2,4-dinitrophenol – along with strong bases such as pyridine or benzidine – are examples of active species found in the semivolatile sample set. This DB-5ms Ultra Inert column demonstrates excellent inertness performance for these difficult analytes.

US EPA Method 551.1

Column A: HP-1ms Ultra Inert
19091S-733UI
30 m x 0.25 mm, 1.00 µm

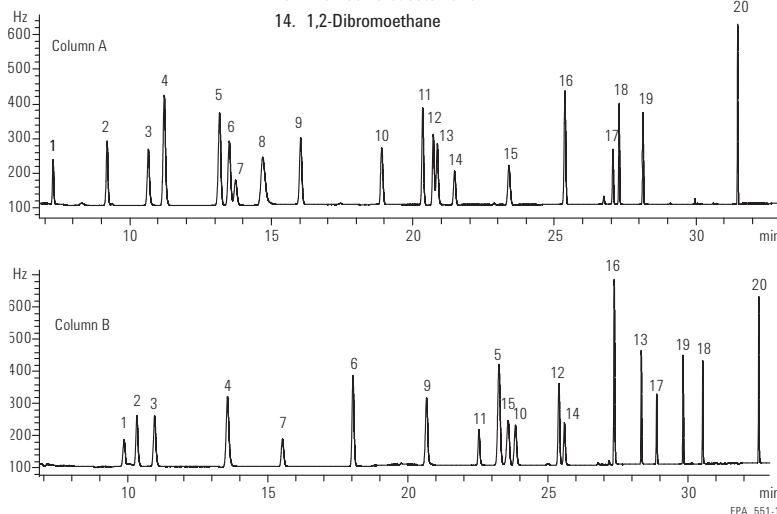
Column B: DB-1301
122-1333
30 m x 0.25 mm, 1.00 µm

Instrument: Agilent 7890A GC
Sampler: Agilent 7683B, 5.0 µL syringe (Agilent p/n 5181-1273) 0.5 µL splitless injection
Carrier: Helium 25 cm/s, constant flow
Inlet: Splitless; 200°C, Purge flow 20 mL/min at 0.25 min
Retention Gap: 1 m, 0.32 mm ID deactivated fused silica high-temperature tubing (Agilent p/n 160-2855-5)
Oven: 33°C (14 min) to 60°C (5°C/min), hold 5 min, 15°C/min to 275°C, hold 20 min
Detector: Dual G2397A µECD; 300°C, const col + makeup (N₂) = 30 mL/min

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct connect, dual taper, deactivated, 4 mm ID, G1544-80700
Syringe: 5 µL tapered, FN 23-26s/42/HP, 5181-1273

- | | | |
|--------------------------|-----------------------------|---------------------------------|
| 1. Chloroform | 7. Trichloroethylene | 15. Tetrachloroethylene |
| 2. 1,1,1-Trichloroethane | 8. Chloral hydrate | 16. 1,1,1-Trichloro-2-propanone |
| 3. Carbon tetrachloride | 9. 1,1-Dichloro-2-propanone | 17. Bromoform |
| 4. Trichloroacetonitrile | 10. 1,1,2-Trichloroethane | 18. Dibromoacetonitrile |
| 5. Dichloroacetonitrile | 11. Chloropicrin | 19. 1,2,3-Trichloropropane |
| 6. Bromodichloromethane | 12. Dibromochloromethane | 20. 1,2-Dibromo-3-chloropropane |
| | 13. Bromochloroacetonitrile | |
| | 14. 1,2-Dibromoethane | |



This application successfully demonstrates the use of the HP-1ms Ultra Inert column for primary analysis of EPA 551.1 chlorinated solvents, trihalomethanes and disinfection by-products. The excellent peak shape of the chloral hydrate and resolution between bromodichloromethane and trichloroethylene emphasize the high column inertness of the HP-1ms Ultra Inert column, making it an excellent choice for EPA Method 551.1 analysis.



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Analysis of Semivolatiles

Column A: DB-5.625
122-5632
30 m x 0.25 mm, 0.50 μ m

Column B: DB-5.625
121-5622
20 m x 0.18 mm, 0.36 μ m

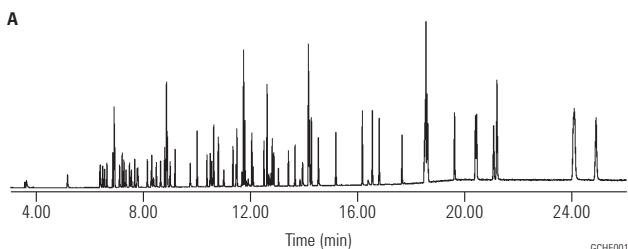
Carrier: He constant-flow mode 1.1 mL/min

Oven: 40°C (1 min), 25°C/min to 320°C
4.80 min hold

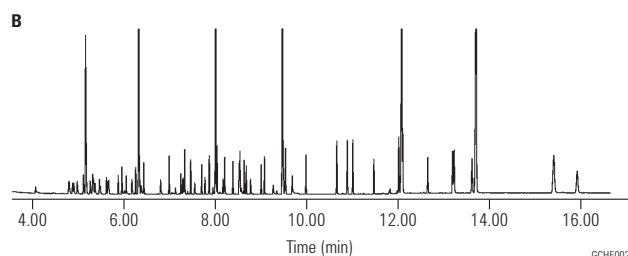
Injection: Splitless 0.5 μ L injected at 300°C,
QuickSwap pressure 5.0 psi during
acquisition, 80.0 psi during backflush
with inlet set to 1.0 psi during backflush

Detector: Agilent 5975C Performance Turbo MSD
equipped with 6 mm large-aperture
drawout lens, part no. G2589-20045

Translating 0.25 mm ID column method to 0.18 mm
ID format results in 32% reduction in analysis time.
Resolution of 77 peaks of interest is also maintained
for the faster 0.18 mm ID separation.



U.S. EPA Method 8270, 5 ng/mL System Performance Check Compounds
Chromatogram using a DB-5.625, 30 m x 0.25 mm, 0.5 μ m



U.S. EPA Method 8270, 5 ng/mL System Performance Check Compounds
Chromatogram using a DB-5.625, 20 m x 0.18 mm, 0.36 μ m

Tetrachlorodibenzo-p-furans

Column A: DB-225
122-2232
30 m x 0.25 mm, 0.25 μ m

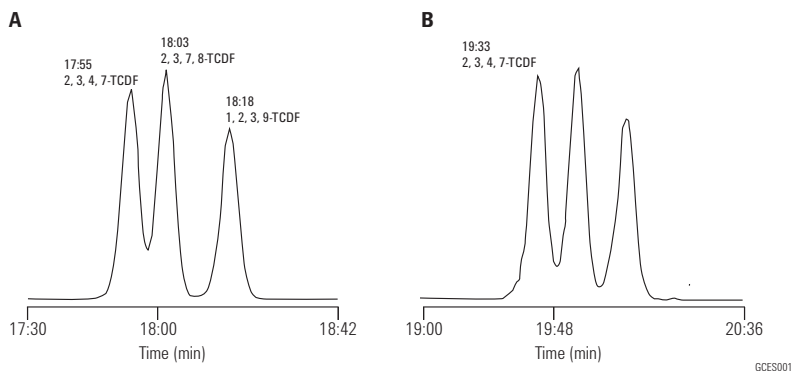
Column B: DB-225ms
122-2932
30 m x 0.25 mm, 0.25 μ m

Carrier: Helium at 12 mL/min

Oven: 160-250°C at 7°/min
250°C until compounds elute

Injection: Splitless, 240°C

Detector: VG Autospec Ultima



Note the separation between 2,3,7,8-TCDF and 2,3,4,7-TCDF on DB-225 is also easily achievable
(and actually a little better!) on DB-225ms.

PBDEs by ECD

Column: DB-XLB
 15 m x 0.18 mm, 0.07 µm
 Agilent Technologies
 custom column

Carrier: Hydrogen at 72 cm/sec at 100°C
 (4.0 mL/min), constant flow mode

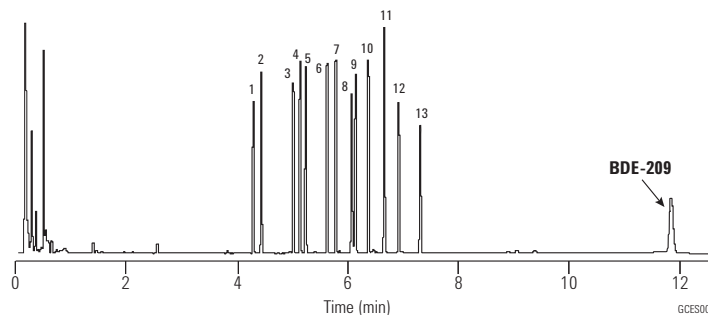
Oven: 100°C for 0.5 min
 100°C to 300°C at 30°C/min
 300°C for 5 min

Injection: Split, 250°C
 Split ratio 20:1

Detector: ECD, 300°C
 Peak, Congener (2.5 mg/mL)

Sample: 1 µL

- | | |
|-----------------------------------|---|
| 1. 2,2',4-TriBDE (BDE-17) | 8. 2,2',3,4,4'-PentaBDE (BDE-85) |
| 2. 2,4,4'-TriBDE (BDE-28) | 9. 2,2',4,4',5,6'-HexaBDE (BDE-154) |
| 3. 2,3',4',6-Tetra-BDE (BDE-71) | 10. 2,2',4,4',5,5'-HexaBDE (BDE-153) |
| 4. 2,2',4,4'-Tetra-BDE (BDE-47) | 11. 2,2',3,4,4',5'-HexaBDE (BDE-138) |
| 5. 2,3',4,4'-TetraBDE (BDE-66) | 12. 2,2',3,4,4',5',6-HeptaBDE (BDE-183) |
| 6. 2,2',4,4',6-PentaBDE (BDE-100) | 13. 2,3,3',4,4',5,6-HeptaBDE (BDE-190) |
| 7. 2,2',4,4',5-PentaBDE (BDE-99) | 14. DecaBDE (BDE-209) (12.5 mg/mL) |



Special thanks to Accustandard, Inc. of New Haven, CT, for PBDE standards.

Aroclors 1016-1268 (without 1221)

Column: DB-XLB
 121-1232
 30 m x 0.18 mm, 0.18 µm

Carrier: Helium at 37 cm/sec, measured at 150°C

Oven: 100°C for 1 min
 100-265°C at 1.2°/min

Injection: Hot on-column, 250°C

Detector: MSD, 340°C transfer line, SIM

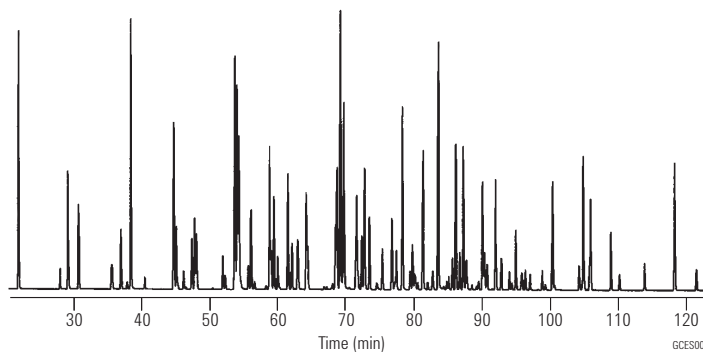
Sample: 1 µL in isoctane, 12.5 ppm

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730

Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267



Congeners in DIN Method PCBs

Column: DB-XLB
122-1236
30 m x 0.25 mm, 0.50 µm

Carrier: Helium at 34.2 cm/sec, measured at 150°C

Oven: 100°C for 1 min
100-320°C at 5.6°/min

Injection: Hot on-column, 250°C
Split flow 100 mL/min

Detector: MSD, 300°C transfer line
SIM of 221.9, 255.9, 291.9, 325.8,
359.8, 395.8, 429.7, 463.7

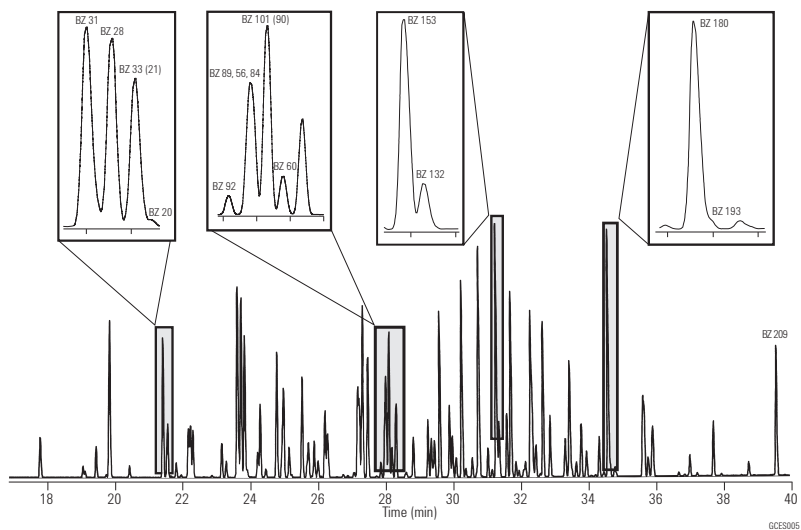
Sample: 2 µL dilute Aroclor mixture

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, single taper, deactivated,
4 mm ID, G1544-80730

Syringe: 10 µL tapered, FN 23-26s/42/HP,
5181-1267



**Extended Temperature Program Resolving
Congeners 52 and 138**

Column: DB-XLB
122-1236
30 m x 0.25 mm, 0.50 µm

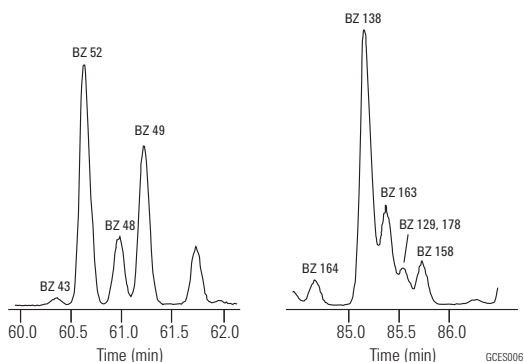
Carrier: Helium at 34.2 cm/sec, measured at 150°C

Oven: 100°C for 1 min
100-275°C at 1.6°/min

Injection: Hot on-column, 250°C
Split flow 100 mL/min

Detector: MSD, 300°C transfer line
SIM of 221.9, 255.9, 291.9, 325.8,
359.8, 395.8, 429.7, 463.7

Sample: 2 µL dilute Aroclor mixture



PCBs by EPA Method 8082

Column: DB-35ms
123-3832
30 m x 0.32 mm, 0.25 µm

Column: DB-XLB
123-1236
30 m x 0.32 mm, 0.50 µm

Carrier: Helium at 45 cm/sec (EPC in constant flow mode)

Oven: 110°C for 0.5 min
110-320°C at 15°C/min
320°C for 5 min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: µECD, 350°C
Nitrogen makeup gas
(column + makeup flow = 30 mL/min constant flow)

Sample: 50 pg per component

- | | |
|---------------------------------|--------------------------------|
| 1. IUPAC 1 | 12. IUPAC 151 |
| 2. Tetrachloro-m-xylene (IS/SS) | 13. IUPAC 153 |
| 3. IUPAC 5 | 14. IUPAC 141 |
| 4. IUPAC 18 | 15. IUPAC 137 |
| 5. IUPAC 31 | 16. IUPAC 187 |
| 6. IUPAC 52 | 17. IUPAC 183 |
| 7. IUPAC 44 | 18. IUPAC 180 |
| 8. IUPAC 66 | 19. IUPAC 170 |
| 9. IUPAC 101 | 20. IUPAC 206 |
| 10. IUPAC 87 | 21. Decachlorobiphenyl (IS/SS) |
| 11. IUPAC 110 | |

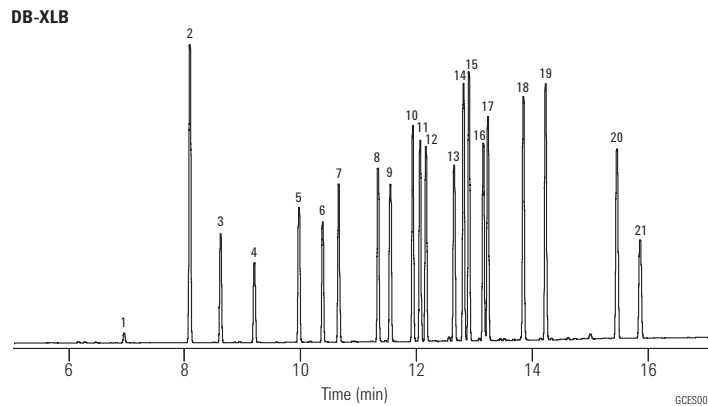
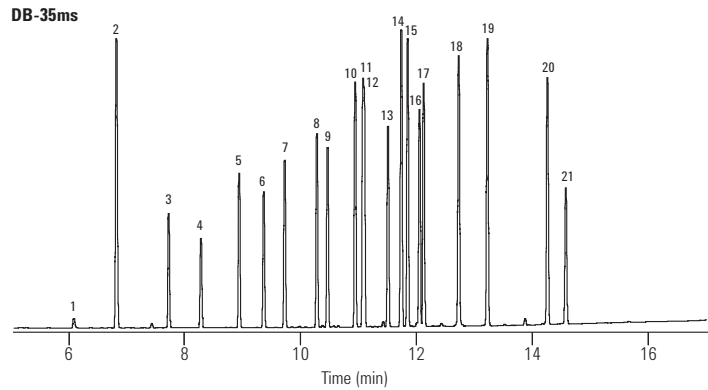
IS/SS - Internal Standard/Surrogate Standard

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316

Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267



GCES007

Pyrethrins

Column: DB-1
123-1032
30 m x 0.32 mm, 0.25 µm

Carrier: Helium at 39 cm/sec, measured at 150°C

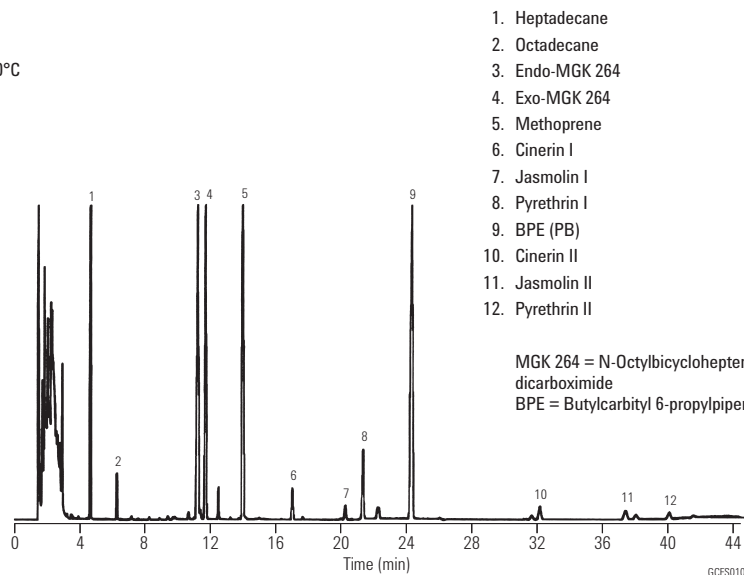
Oven: 180°C for 11 min
180-200°C at 10°/min
200°C for 8 min
200-210°C at 10°/min
210°C for 18 min
210-245°C at 30°/min
245°C for 4 min

Injection: Split, 250°C
Split ratio 1:20

Detector: FID, 300°C
Helium makeup gas at 30 mL/min

Sample: 1 µL

*Chromatogram courtesy of Khan Nguyen
and Richard Moorman of Sandoz Agro Inc.*

**Organotin Compounds I**

Column: HP-1
19091Z-012
25 m x 0.32 mm, 0.17 µm

Carrier: Helium, 100 kPa

Oven: 50°C for 1 min
50-260°C at 15°C/min

Injection: Splitless

Detector: AED, 330°C

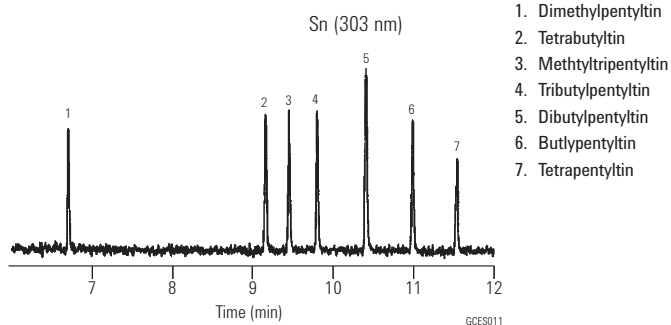
Sample: 1 µL

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, single taper, deactivated,
4 mm ID, G1544-80730

Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267



Organotin Compounds II

Column: HP-5
19091J-002
25 m x 0.20 mm, 0.11 µm

Carrier: Helium, 0.75 mL/min constant flow

Oven: 60-360°C at 5°C/min

Injection: Splitless, 300°C

Detector: AED, 300°C
 Hg selective at 254 nm

Sample: 1 µL

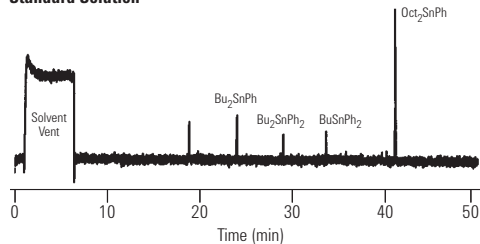
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

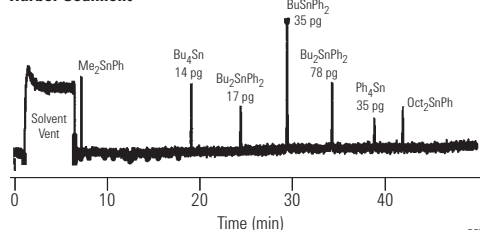
Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730

Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Standard Solution



Harbor Sediment



GCES013

PBDEs

Column: DB-XLB
122-1231
30 m x 0.25 mm, 0.10 µm

Carrier: Helium at 38 cm/sec at 100°C (1.2 mL/min), constant flow mode

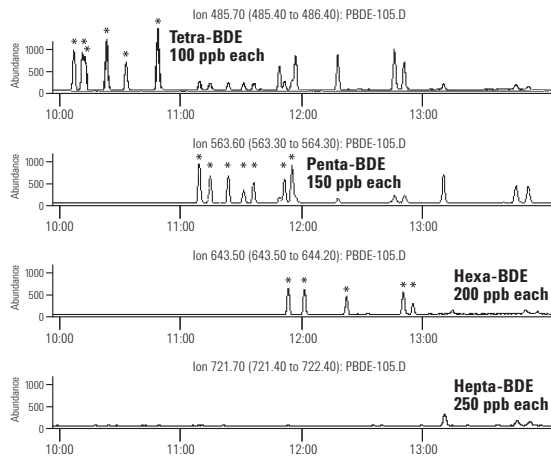
Oven: 100°C for 1 min; 100°C to 340°C at 20°C/min, 340°C for 12 min

Injection: Cool on-column, oven-track mode

Detector: Agilent 5973 MSD, 325°C transfer line, EI SIM (ions monitored: 231.8, 248.0, 327.9, 398.6, 400.5, 405.8, 845.7, 563.6, 643.5, 721.4, 799.3)

Sample: 0.5 µL

For a complete Application Note, visit www.agilent.com/chem, select "Online Literature" from the Literature Library and type 5989-0094EN into the "Keyword" field.



GCES014

**Semivolatile Compounds,
EPA Method 8270**
**Column: HP-5ms
19091S-133
30 m x 0.25 mm, 0.50 µm**
Carrier: Ramped flow 1.2 mL/min for 0.0 min
Ramp at 99 mL/min to 2.0 mL/min
2.0 mL/min for 0.35 min
Ramp at 10 mL/min to 1.2 mL/min

Oven: 40°C for 1.0 min
40-100°C at 15°C/min
100-240°C at 20°C/min
240-310°C at 10°C/min

Injection: Splitless, 250°C
30 mL/min purge flow at 0.35 min

Detector: 5973 MSD, 310°C transfer line
Scan range 35-500 amu, 3.25 scans/sec

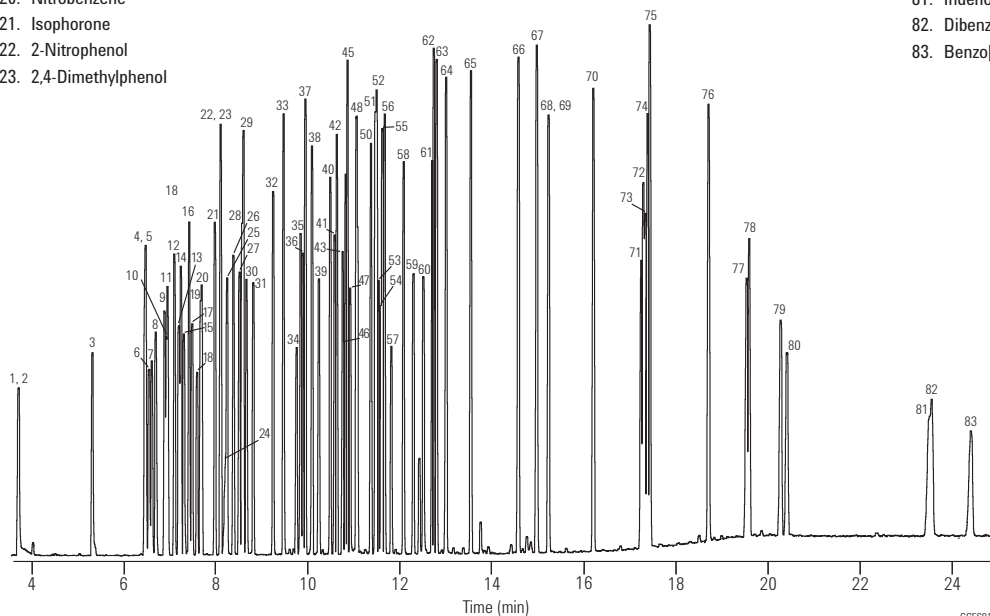
Sample: 1 µL of 50 ng standard

Suggested Supplies
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated,
4 mm ID, 5181-3316

Syringe: 10 µL tapered, FN 23-26s/42/HP,
5181-1267

- | | | | |
|----------------------------------|---------------------------------|---------------------------------|---------------------------------|
| 1. n-Nitrosodimethylamine | 24. Benzoic acid | 43. 3-Nitroaniline | 62. Phenanthrene |
| 2. Pyridine | 25. Bis(2-chloroethoxy) methane | 44. Acenaphthene-d10 | 63. Anthracene |
| 3. 2-Fluorophenol | 26. 2,4-Dichlorophenol | 45. Acenaphthene | 64. Carbazole |
| 4. Phenol-d5 | 27. 1,2,4-Trichlorobenzene | 46. 2,4-Dinitrophenol | 65. Di-n-butylphthalate |
| 5. Phenol | 28. Naphthalene-d8 | 47. 4-Nitrophenol | 66. Fluoranthene |
| 6. Aniline | 29. Naphthalene | 48. Dibenzofuran | 67. Pyrene |
| 7. Bis(2-chloroethyl) ether | 30. 4-Chloroaniline | 49. 2,4-Dinitrotoluene | 68. Terphenyl-d14 |
| 8. 2-Chlorophenol | 31. Hexachlorobutadiene | 50. Diethylphthalate | 69. Benzidine |
| 9. 1,3-Dichlorobenzene | 32. 4-Chloro-3-methylphenol | 51. 4-Chlorophenyl-phenyl ether | 70. Butylbenzylphthalate |
| 10. 1,4-Dichlorobenzene-d4 | 33. 2-Methylnaphthalene | 52. Fluorene | 71. 3,3'-Dichlorobenzidine |
| 11. 1,4-Dichlorobenzene | 34. Hexachlorocyclopentadiene | 53. 4-Nitroaniline | 72. Benzo[a]anthracene |
| 12. Benzyl alcohol | 35. 2,4,6-Trichlorophenol | 54. 4,6-Dinitro-2-methylphenol | 73. Chrysene-d12 |
| 13. 1,2-Dichlorobenzene | 36. 2,4,5-Trichlorophenol | 55. n-Nitrosodiphenylamine | 74. Chrysene |
| 14. 2-Methylphenol | 37. 2-Fluorobiphenyl | 56. Azobenzene | 75. Bis(2-ethylhexyl) phthalate |
| 15. Bis(2-chloroisopropyl) ether | 38. 2-Chloronaphthalene | 57. 2,4,6-Tribromophenol | 76. Di-n-octylphthalate |
| 16. 4-Methylphenol | 39. 2-Nitroaniline | 58. 4-Bromophenyl-phenylether | 77. Benzo[b]fluoranthene |
| 17. n-Nitroso-di-n-propylamine | 40. Dimethylphthalate | 59. Hexachlorobenzene | 78. Benzo[k]fluoranthene |
| 18. Hexachloroethane | 41. 2,6-Dinitrotoluene | 60. Pentachlorophenol | 79. Benzo[a]pyrene |
| 19. Nitrobenzene-d5 | 42. Acenaphthylene | 61. Phenanthrene-d10 | 80. Perylene-d12 |
| 20. Nitrobenzene | | | 81. Indeno[1,2,3-cd]pyrene |
| 21. Isophorone | | | 82. Dibenz[a,h]anthracene |
| 22. 2-Nitrophenol | | | 83. Benzo[g,h,i]perylene |
| 23. 2,4-Dimethylphenol | | | |



A variety of Agilent HP-5ms and DB-5ms columns can be used for 8270 and similar semivolatiles applications. The column shown above was chosen to maximize inertness and robustness to residues with a thicker 0.5 µm film, but the price paid is a slightly longer run time.

An HP-5ms, 30 m x 0.25 mm ID, 0.25 µm, P/N 19091S-433 would give shorter run times, with slightly less inertness and robustness.

A DB-5ms, 30 m x 0.25 mm ID, 0.25 µm, P/N 122-5532, would give slightly less inertness, but offer better resolution of PAHs such as Benzo[b]fluoranthene and Benzo[k]fluoranthene. A DB-5ms, 20 m x 0.18 mm x 0.18 µm, P/N 121-5522, can offer significantly reduced run times with a modest loss of inertness.

EPA Method 525.2

Column: DB-5ms
122-5532
30 m x 0.25 mm, 0.25 µm

Carrier: Helium, at 32 cm/sec, measured at 45°C, constant flow mode

Oven: 45°C for 1 min
45-130°C at 30°/min
130°C for 3 min
130-180°C at 12°/min
180-240°C at 7°/min
240-325°C at 12°/min
325°C for 5 min

Injection: Splitless, 300°C
1.0 min purge activation time
Focus Liner

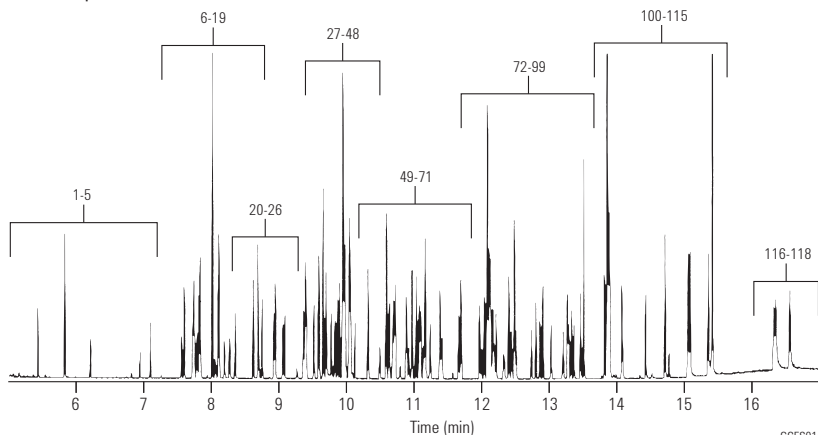
Detector: MSD, 325°C transfer line
Full scan m/z 45-450

Sample: Composite mixture of Accustandard Method 525.2 standards (M-525.2-SV-ASL, M-525.2-FS-ASL, M-525.2-CP-ASL, M-525.2-NP1-ASL, M-525.2-NP2-ASL); target compounds at 2 ng/µL, IS/SS at 5 ng/µL

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730
Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Compound	RT	m/z	Compound	RT	m/z	Compound	RT	m/z
1. Isophorone	5.85	82	37. γ-BHC	14.52	181	72. γ-Chlordane	18.88	373
2. 1,3-Dimethyl-2-nitrobenzene (SS)	6.65	134	38. Terbufos	14.62	57	73. Tetrachlorvinphos (Stirifos)	18.95	109
3. Dichlorvos	7.41	109	39. Pronamide	14.69	173	74. Butachlor	19.03	176/160
4. Hexachlorocyclo-pentadiene	8.87	237	40. Diazinon	14.76	137/179	75. Pyrene-d10 (SS)	19.13	212
5. EPTC	9.17	128	41. Phenanthrene-d10 (IS)	14.85	188	76. Pyrene	19.18	202
6. Mevinphos	10.09	127	42. Chlorothalonil	14.89	266	77. α-Chlordane	19.21	375/373
7. Butylate	10.18	57/146	43. Phenanthrene	14.92	178	78. Endosulfan I	19.22	195
8. Vernolate	10.42	128	44. Terbacil	15.02	161	79. trans-Nonachlor	19.28	409
9. Dimethyl phthalate	10.45	163	45. Methyl paraoxon	15.04	109	80. Fenamiphos	19.33	303/154
10. Terrazole (Etridazole)	10.47	211/183	46. Disulfoton	15.05	88	81. Napropamide	19.39	72
11. 2,6-Dinitrotoluene	10.56	165	47. Anthracene	15.06	178	82. Tricyclazole	19.61	189
12. Tillam (Pebulate)	10.61	128	48. δ-BHC	15.20	181	83. p,p'-DDE	19.76	246
13. Acenaphthylene	10.65	152	49. 2,4,5-Trichlorobiphenyl	15.59	256	84. DEF	19.84	57/169
14. Acenaphthene-d10 (IS)	11	164	50. Metribuzin	15.95	198	85. 2,2',4,4',5,6'-Hexachlorobiphenyl	19.90	360
15. Chloroneb	11.17	191	51. Alachlor	16.14	160	86. Dieldrin	19.92	79
16. 2-Chlorobiphenyl	11.19	188	52. Simetryn	16.23	213	87. Carboxin	19.97	143
17. Tebuthiuron	11.37	156	53. Ametryn	16.33	227/170	88. Endrin	20.43	67/81
18. 2,4-Dinitrotoluene	11.51	165	54. Heptachlor	16.36	100	89. Chlorobenzilate	20.56	139
19. Molinate	11.68	126	55. Prometryne	16.40	241/184	90. Endosulfan II	20.68	195
20. Diethyl phthalate	12.21	149	56. Prebane (Terbutryne)	16.72	226/185	91. p,p'-DDD	20.77	235/165
21. Fluorene	12.35	166	57. Bromacil	16.79	205	92. Endrin aldehyde	21.01	67
22. Propachlor	12.46	120	58. Di-n-butyl phthalate	16.90	149	93. Norflurazon	21.36	145
23. Ethoprop	12.82	158	59. 2,2',4,4'-Tetrachlorobiphenyl	17.02	292	94. Benzyl butyl phthalate	21.49	149
24. Cycloate	12.86	83/154	60. Metolachlor	17.11	162	95. Endosulfan sulfate	21.53	272
25. Chlorpropham	13.08	127	61. Dursban (Chlorpyrifos)	17.15	197/97	96. p,p'-DDT	21.61	235/165
26. Trifluralin	13.14	306	62. Cyanazine	17.23	225/68	97. Hexazinone	21.68	171
27. α-BHC	13.69	181	63. Dacthal (DCPA methyl ester)	17.27	301	98. Bis(2-ethylhexyl) adipate	21.87	129
28. 2,3-Dichlorobiphenyl	13.74	222/152	64. Aldrin	17.29	66	99. Triphenylphosphate (SS)	21.98	326/325
29. Hexachlorobenzene	13.77	284	65. Triadimefon	17.43	57	100. Endrin ketone (breakdown product)	22.52	67/317
30. Gesatamine (Atraton)	13.99	196/169	66. Diphenamid	17.73	72/167	101. 2,2',3,3',4,4',6-Heptachlorobiphenyl	22.59	394/396
31. Prometon	14.14	225/168	67. MGK-264 (Isomer A)	17.78	164/66	102. Benz[a]anthracene	22.66	228
32. Atrazine	14.26	200/215	68. MGK-264 (Isomer B)	18.11	164	103. Chrysene-d12 (IS)	22.68	240
33. Simazine	14.27	201/186	69. Heptachlor epoxide	18.28	81	104. 2,2',3,3',4,5',6,6'-Octachlorobiphenyl	22.70	430/428
34. β-BHC	14.28	181	70. 2,2',3',4,6-Pentachlorobiphenyl	18.34	326	105. Methoxychlor	22.73	227
35. Pentachlorophenol	14.35	266	71. Merphos	18.36	209/153	106. Chrysene	22.74	228
36. Propazine	14.35	214/172				107. Bis(2-ethylhexyl) phthalate	23.10	149
						108. Fenarimol	23.80	139
						109. cis-Permethrin	24.38	183
						110. trans-Permethrin	24.50	183
						111. Benzo[b]fluoranthene	25.06	252
						112. Benzo[k]fluoranthene	25.12	252
						113. Fluridone	25.66	328
						114. Benzo[a]pyrene	25.67	252
						115. Perylene-d12 (SS)	25.78	264
						116. Indeno[1,2,3-c,d]pyrene	27.63	276
						117. Dibenzo[a,h]anthracene	27.69	278
						118. Benzo[g,h,i]perylene	28.11	276



GCES016

EPA Method 8061 (Phthalate Esters)

Column: DB-5ms
121-5522
20 m x 0.18 mm, 0.18 µm

Carrier: Helium at 49 cm/sec, measured at 80°C
constant flow program

Oven: 80°C for 0.5 min
80-160°C at 30°/min
160-320°C at 15°/min

Injection: Splitless, 300°C
30 sec purge activation time

Detector: MSD, 325°C transfer line
Full scan m/z 50-400

Sample: 1 µL of 20 ng/µL
Method 8061 mixture
(Accustandard) in hexane

Suggested Supplies

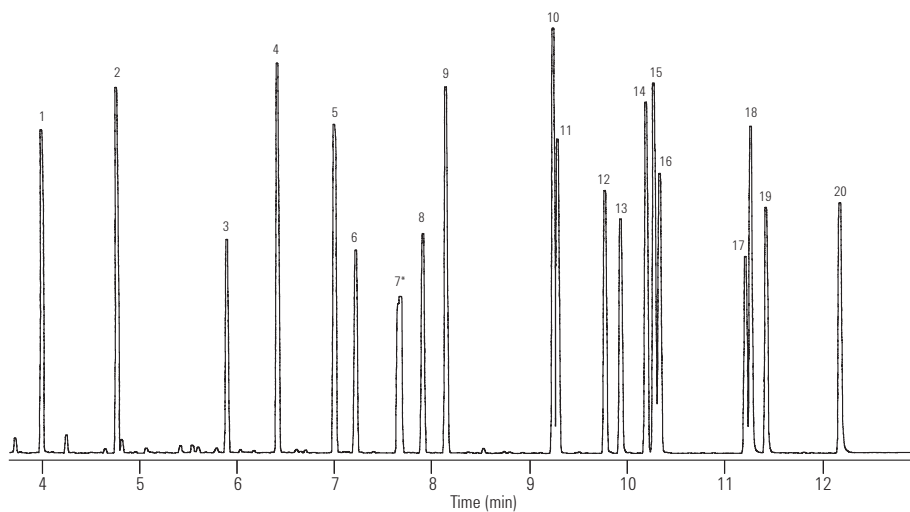
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated, 4 mm ID,
5181-3316

Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

1. Dimethyl phthalate
2. Diethyl phthalate
3. Benzyl benzoate (IS)
4. Diisobutyl phthalate
5. Di-n-butyl phthalate
6. Bis(4-methoxyethyl) phthalate
7. Bis(4-methyl-2-pentyl) phthalate *
8. Bis(2-ethoxyethyl) phthalate
9. Diamyl phthalate
10. Dihexyl phthalate
11. Butyl benzyl phthalate
12. Hexyl 2-ethylhexyl phthalate
13. Bis(2-n-butoxyethyl) phthalate
14. Dicyclohexyl phthalate
15. Bis(2-ethylhexyl) phthalate
16. Diphenyl phthalate (SS)
17. Diphenyl isophthalate (SS)
18. Di-n-octyl phthalate
19. Dibenzyl phthalate (SS)
20. Dinonyl phthalate

* Two isomers
IS - Internal Standard
SS - Surrogate Standard



GCES017



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

PAHs

Column: DB-17ms
122-4732
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at: 34.1 cm/sec,
measured at 150°C

Oven: 95°C for 0.5 min
95-340°C at 5°/min
340°C for 5 min

Injection: Split, 300°C
Split ratio 1:40

Detector: MSD, 340°C transfer line
Scan 80-330 amu

Sample: 2 µL, PAH standard

Suggested Supplies

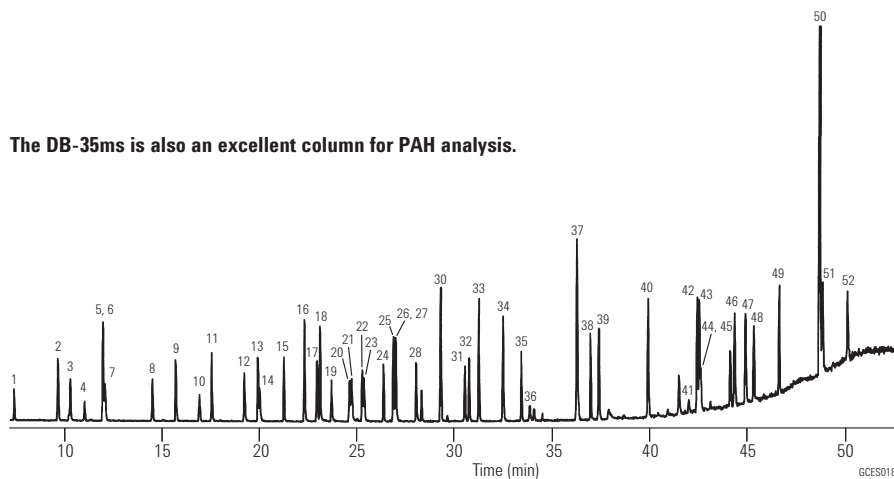
Septum: 11 mm Advanced Green septa,
5183-4759

Liner: Direct connect, single taper,
deactivated, 4 mm ID,
G1544-80730

Syringe: 10 µL tapered,
FN 23-26s/42/HP,
5181-1267

	Ions	Ions	
1. Naphthalene	128	27. 3,6-Dimethylphenanthrene	206, 191
2. 2-Methylnaphthalene	142, 141	28. 1,3-Dinitronaphthalene	126, 218
3. 1-Methylnaphthalene	142, 141	29. 1,5-Dinitronaphthalene	218, 114
4. Azulene	128	30. Fluoranthene	202
5. Acenaphthene	154	31. 2,2'-Dinitrobiphenyl	198, 139
6. Biphenyl	154	32. Pyrene	202
7. 2,6-Dimethylnaphthalene	156, 155	33. 2-Methylfluoranthene	216, 215
8. Acenaphthalene	152	34. 2,3-Benzofluorene	216, 215
9. Dibenzofuran	168, 139	35. Dodecahydrotriphenylene	240, 198
10. Dibenzo-p-dioxin	184	36. 1-Amino-4-nitronaphthalene	188, 115
11. Fluorene	166, 165	37. 9-Phenylanthracene	254, 253
12. 1-Nitronaphthalene	127, 173	38. 1,2-Benzanthracene	228
13. 9,10-Dihydroanthracene	179, 180	39. Chrysene	240
14. 2-Nitronaphthalene	127, 173	40. Benz[a]anthracene-7,12-dione	258, 202
15. 2-Nitrobiphenyl	152, 115	41. 2,7-Dinitrofluorene	256, 163
16. Dibenzothiophene	184	42. Benzo[b]fluoranthene	252
17. Phenanthrene	178	43. Benzo[k]fluoranthene	252
18. Anthracene	178	44. 7,12-Dimethylbenz[a]anthracene	256, 241
19. 3-Nitrobiphenyl	199, 152	45. Benzo[e]pyrene	252
20. 4-Nitrobiphenyl	199, 152	46. Benzo[a]pyrene	252
21. 5,6-Benzoquinoline	179	47. Perylene	252
22. Carbazole	167	48. 3-Methylcholanthrene	268
23. 2-Methylanthracene	192, 191	49. 9,10-Diphenylanthracene	330
24. 1,2,3,4-Tetrahydrofluoranthene	178, 206	50. 1,2,3,4-Dibenzanthracene	278
25. 2-Phenylnaphthalene	204	51. 1,2,5,6-Dibenzanthracene	278
26. 9-Methylanthracene	192, 191	52. Benzo[g,h,i]perylene	276

The DB-35ms is also an excellent column for PAH analysis.



Phenols

Column: DB-5ms
122-5532
30 m x 0.25 mm, 0.25 µm

Column: DB-XLB
122-1232
30 m x 0.25 mm, 0.25 µm

Carrier: He at 1.2 mL/min Constant Flow

Oven: 40°C for 2.00 min
40-100°C at 40°C/ min
100°C for 0.50 min
100-140°C at 2°C/min
140-340°C at 30°C/min

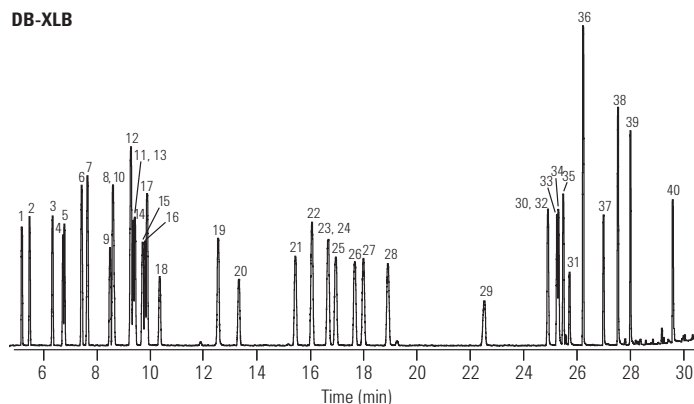
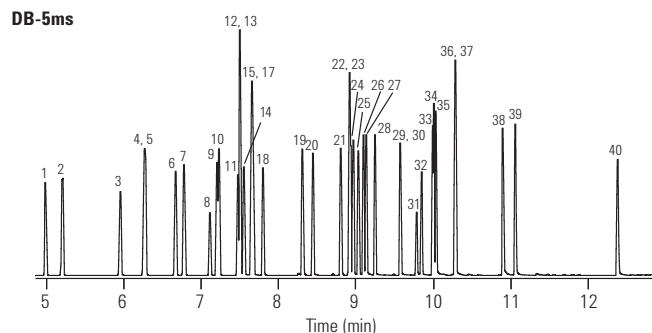
Injection: Pulsed Splitless, 200°C
Pulse Pressure & Time: 25.0 psi for 1.00 min
Purge Flow & Time: 50.0 mL/min for 0.25 min
Gas Saver Flow & Time: 20.0 mL/min for 3.00 min

Detector: MSD, 320°C Transfer Line
Quadrapole at 150°C
Source at 230°C

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730
Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

1. Phenol
2. 2-Chlorophenol
3. 2-Methylphenol
4. 4-Methylphenol
5. 3-Methylphenol
6. 2-Chloro-5-methylphenol
7. 2,6-Dimethylphenol
8. 2-Nitrophenol
9. 2,4-Dimethylphenol
10. 2,5-Dimethylphenol
11. 2,4-Dichlorophenol
12. 2,3-Dimethylphenol
13. 2,5-Dichlorophenol
14. 2,3-Dichlorophenol
15. 2-Chlorophenol
16. 4-Chlorophenol
17. 3,4-Dimethylphenol
18. 2,6-Dichlorophenol
19. 4-Chloro-2-methylphenol
20. 4-Chloro-3-methylphenol
21. 2,3,5-Trichlorophenol
22. 2,4-Dibromophenol
23. 2,4,6-Trichlorophenol
24. 2,4,5-Trichlorophenol
25. 2,3,4-Trichlorophenol
26. 3,5-Dichlorophenol
27. 2,3,6-Trichlorophenol
28. 3,4,-Dichlorophenol
29. 3-Nitrophenol
30. 2,5-Dinitrophenol
31. 2,4-Dinitrophenol
32. 4-Nitrophenol
33. 2,3,5,6-Tetrachlorophenol
34. 2,3,4,5-Tetrachlorophenol
35. 2,3,4,6-Tetrachlorophenol
36. 3,4,5-Trichlorophenol
37. 2-Methyl-4,6-dinitrophenol
38. Pentachlorophenol
39. Dinoseb
40. 2-Cyclohexyl-4,6-dinitrophenol



GCE5019

High resolution phenol analysis by GC/MS

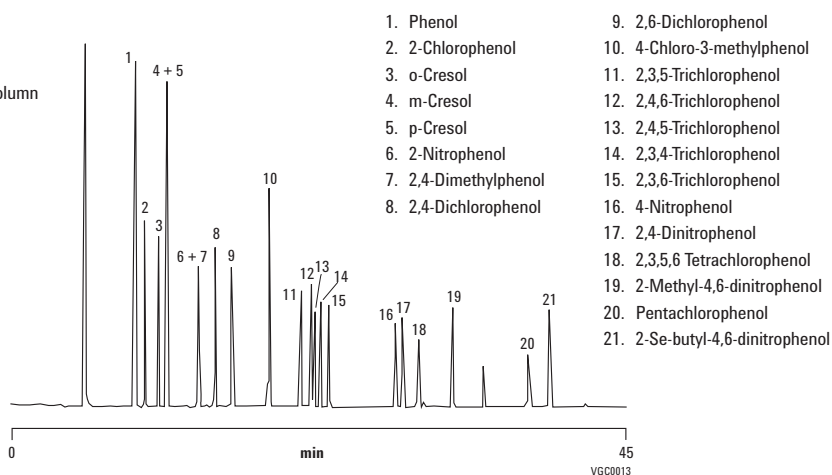
Column: VF-5ms
CP8944
30 m x 0.25 mm, 0.25 µm

Sample Conc: Approx. 5-10 ng per component on column

Carrier: Helium, 70 kPa

Injection: Split, 1:200, T=275°C

Detector: Ion Trap MS



Phenols according to EPA Method 8040

Column: CP-Sil 8 CB
CP7454
50 m x 0.32 mm, 0.25 µm

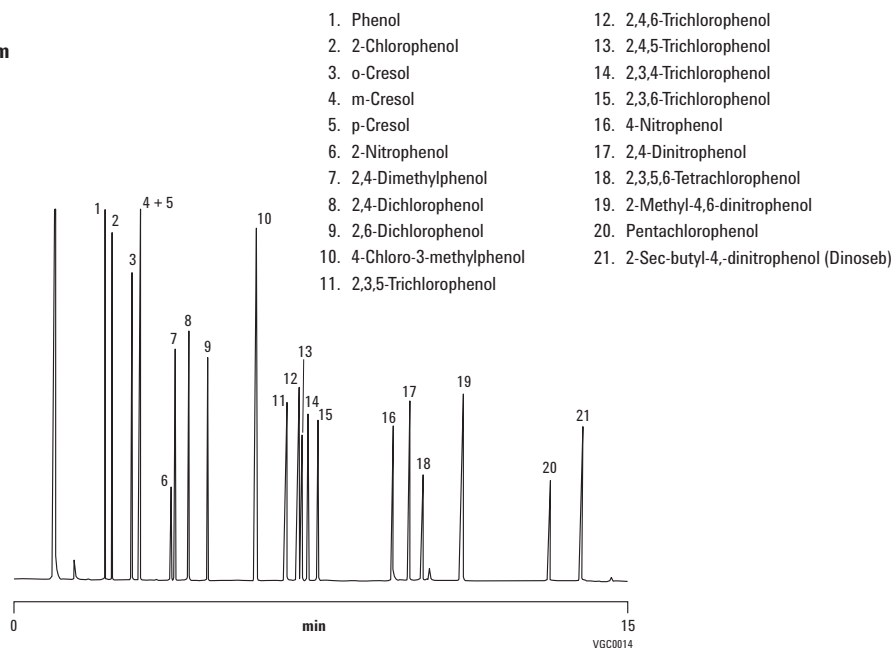
Sample Conc: 1 ppm

Oven: 80°C to 200°C, 8°C/min

Carrier: H₂, 150 kPa (1.5 bar, 21 psi)

Injection: Split, 100 mL/min

Detector: FID



EPA Method 552.2

Column: DB-35ms
123-3832
30 m x 0.32 mm, 0.25 μ m

Column: DB-XLB
123-1236
30 m x 0.32 mm, 0.50 μ m

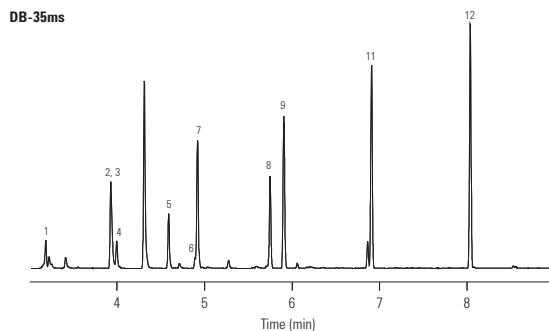
Carrier: Helium at 45 cm/sec
(EPC in constant flow mode)

Oven: 40°C for 0.5 min
40-200°C at 15°C/min
200°C for 2 min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: μ ECD, 350°C
Nitrogen makeup gas
(column + makeup flow =
30 mL/min constant flow)

Sample: 50 pg per component



1. Chloroacetic acid
2. Bromoacetic acid
3. Dichloroacetic acid
4. Dalapon
5. Trichloroacetic acid
6. 1,2,3-Trichloropropane (IS)
7. Bromochloroacetic acid
8. Bromodichloroacetic acid
9. Dibromoacetic acid
10. 2,3-Dibromopropionic acid (SS)
11. Chlorodibromoacetic acid
12. Tribromoacetic acid

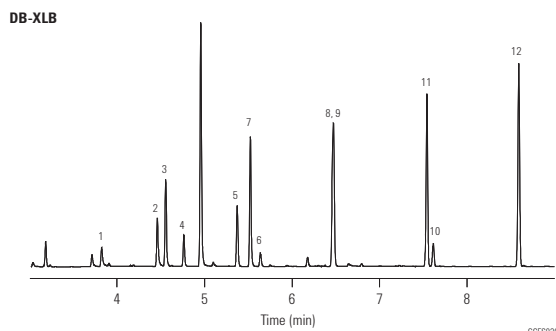
IS - Internal Standard
SS - Surrogate Standard

Suggested Supplies

Septum: 11 mm Advanced Green septa,
5183-4759

Liner: Direct connect, dual taper,
deactivated, 4 mm ID,
G1544-80700

Syringe: 10 μ L tapered,
FN 23-26s/42/HP, 5181-1267



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

EPA Volatiles by GC/MS (Split Injector)

Column: DB-VRX
122-1564
60 m x 0.25 mm, 1.40 µm

Carrier: Helium at 30 cm/sec, measured at 45°C

Oven: 45°C for 10 min
45-190°C at 12°/min
190°C for 2 min
190-225°C at 6°/min
225°C for 1 min

Sampler: Purge and Trap (O.I.A. 4560)
Purge: Helium for 11 min at 40 mL/min
Trap: Tenax/Silica Gel/Carbosieve
Preheat: 175°C
Desorb: 220°C for 0.6 min

Injection: Split, 110°C
Split flow 30 mL/min

Detector: MSD, 235°C transfer line
Full scan 35-260 amu (m/z 44 subtracted)

Suggested Supplies

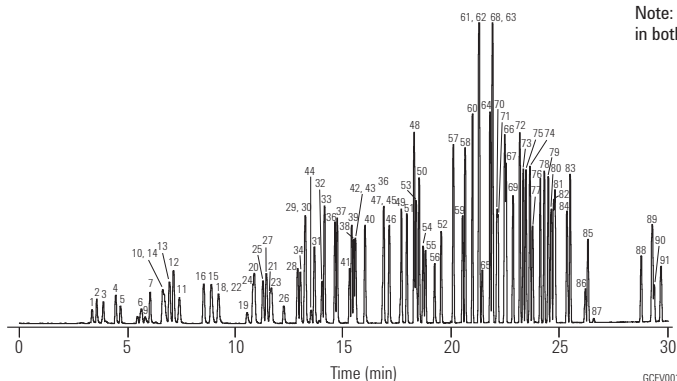
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal kit, 5188-5367

- | | | |
|------------------------------|-----------------------------------|---------------------------------|
| 1. Dichlorodifluoromethane | 32. Carbon tetrachloride | 63. o-Xylene |
| 2. Chloromethane | 33. Benzene | 64. Styrene |
| 3. Vinyl chloride | 34. 1,2-Dichloroethane | 65. Bromoform |
| 4. Bromomethane | 35. 2,2-Dimethylhexane | 66. Isopropylbenzene |
| 5. Chloroethane | 36. Fluorobenzene (IS) | 67. 4-Bromofluorobenzene (SS) |
| 6. Trichlorofluoromethane | 37. 1,4-Difluorobenzene (IS) | 68. 1,1,2,2-Tetrachloroethane |
| 7. Diethyl ether | 38. Trichloroethene | 69. Bromobenzene |
| 8. 1,1-Dichloroethene | 39. 1,2-Dichloropropane | 70. 1,2,3-Trichloropropane |
| 9. Acetone | 40. Methyl methacrylate | 71. trans-1,4-Dichloro-2-butene |
| 10. Iodomethane | 41. Dibromomethane | 72. n-Propylbenzene |
| 11. Carbon disulfide | 42. Bromodichloromethane | 73. 2-Chlorotoluene |
| 12. Allyl chloride | 43. 2-Nitropropane | 74. 1,3,5-Trimethylbenzene |
| 13. Methylene chloride | 44. Chloroacetonitrile | 75. 4-Chlorotoluene |
| 14. Acrylonitrile | 45. cis-1,3-Dichloropropene | 76. tert-Butylbenzene |
| 15. Methyl-tert-butyl ether | 46. 4-Methyl-2-pentanone | 77. Pentachloroethane |
| 16. trans-1,2-Dichloroethene | 47. 1,1-Dichloro-2-propanone | 78. 1,2,4-Trimethylbenzene |
| 17. Hexane | 48. Toluene | 79. sec-Butylbenzene |
| 18. 1,1-Dichloroethane | 49. trans-1,3-Dichloropropene | 80. 1,3-Dichlorobenzene |
| 19. 2-Butanone | 50. Ethyl methacrylate | 81. p-Isopropyltoluene |
| 20. cis-1,2-Dichloroethene | 51. 1,1,2-Trichloroethane | 82. 1,4-Dichlorobenzene |
| 21. 2,2-Dichloropropane | 52. Tetrachloroethene | 83. n-Butylbenzene |
| 22. Propionitrile | 53. 1,3-Dichloropropane | 84. 1,2-Dichlorobenzene |
| 23. Methyl acrylate | 54. 2-Hexanone | 85. Hexachloroethane |
| 24. Methacrylonitrile | 55. Dibromochloromethane | 86. 1,2-Dibromo-3-chloropropane |
| 25. Bromochloromethane | 56. 1,2-Dibromoethane | 87. Nitrobenzene |
| 26. Tetrahydrofuran | 57. 1-Chloro-3-fluorobenzene (IS) | 88. 1,2,4-Trichlorobenzene |
| 27. Chloroform | 58. Chlorobenzene | 89. Hexachlorobutadiene |
| 28. Pentafluorobenzene (IS) | 59. 1,1,1,2-Tetrachloroethane | 90. Naphthalene |
| 29. 1,1,1-Trichloroethane | 60. Ethylbenzene | 91. 1,2,3-Trichlorobenzene |
| 30. 1-Chlorobutane | 61. m-Xylene | |
| 31. 1,1-Dichloropropene | 62. p-Xylene | |

IS - Internal Standard
SS - Surrogate Standard
Note: Some compounds not present in both chromatograms



Environmental Applications, Volatiles

EPA Volatiles by GC/MS (Split Injector)

Column: DB-VRX
122-1564
60 m x 0.25 mm, 1.40 µm

Carrier: Helium at 30 cm/sec, measured at 45°C

Oven: 45°C for 10 min
45-190°C at 12°/min
190°C for 2 min
190-225°C at 6°/min
225°C for 1 min

Sampler: Purge and Trap (O.I.A. 4560)
Purge: Helium for 11 min at 40 mL/min
Trap: Tenax/Silica Gel/Carbosieve
Preheat: 175°C
Desorb: 220°C for 0.6 min

Injection: Split, 110°C
Split flow 30 mL/min

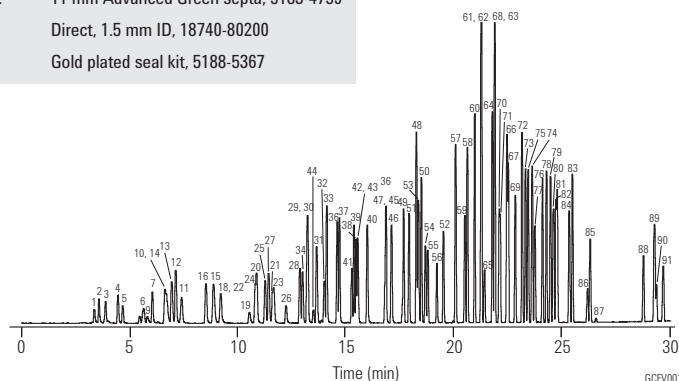
Detector: MSD, 235°C transfer line
Full scan 35-260 amu (m/z 44 subtracted)

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal kit, 5188-5367



Column: DB-624
122-1364
60 m x 0.25 mm, 1.4 µm

Carrier: Helium at 31 cm/sec, measured at 40°C

Oven: 45°C for 3 min
45-90°C at 8°/min
90°C for 4 min
90-200°C at 6°/min
200°C for 5 min

Sampler: Purge and Trap (O.I.A. 4560)
Purge: Helium for 11 min at 40 mL/min
Trap: Tenax/Silica Gel/Carbosieve
Preheat: 175°C
Desorb: 220°C for 0.6 min

Injection: Split, 110°C
Split flow 30 mL/min

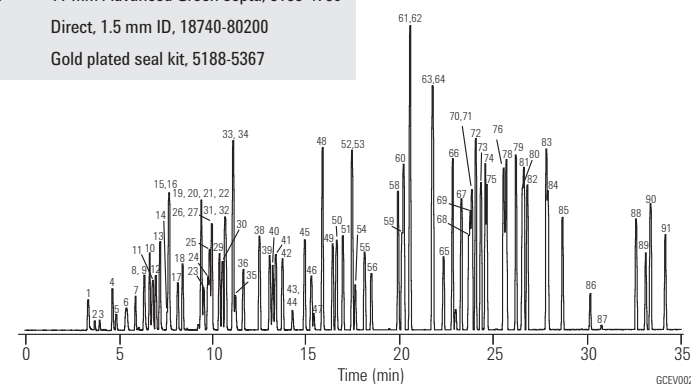
Detector: MSD, 235°C transfer line
Full scan 35-260 amu (m/z 44 subtracted)

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal kit, 5188-5367



1. Dichlorodifluoromethane	21. 2,2-Dichloropropane	41. Dibromomethane	61. m-Xylene	81. p-Isopropyltoluene
2. Chloromethane	22. Propionitrile	42. Bromodichloromethane	62. p-Xylene	82. 1,4-Dichlorobenzene
3. Vinyl chloride	23. Methyl acrylate	43. 2-Nitropropane	63. o-Xylene	83. n-Butylbenzene
4. Bromomethane	24. Methacrylonitrile	44. Chloroacetonitrile	64. Styrene	84. 1,2-Dichlorobenzene
5. Chloroethane	25. Bromochloromethane	45. cis-1,3-Dichloropropane	65. Bromoform	85. Hexachloroethane
6. Trichlorofluoromethane	26. Tetrahydrofuran	46. 4-Methyl-2-pentanone	66. Isopropylbenzene	86. 1,2-Dibromo-3-chloropropane
7. Diethyl ether	27. Chloroform	47. 1,1-Dichloro-2-propanone	67. 4-Bromofluorobenzene (SS)	87. Nitrobenzene
8. 1,1-Dichloroethene	28. Pentafluorobenzene (IS)	48. Toluene	68. 1,1,1,2-Tetrachloroethane	88. 1,2,4-Trichlorobenzene
9. Acetone	29. 1,1,1-Trichloroethane	49. trans-1,3-Dichloropropene	69. Bromobenzene	89. Hexachlorobutadiene
10. Iodomethane	30. 1-Chlorobutane	50. Ethyl methacrylate	70. 1,2,3-Trichloropropane	90. Naphthalene
11. Carbon disulfide	31. 1,1-Dichloropropene	51. 1,1,2-Trichloroethane	71. trans-1,4-Dichloro-2-butene	91. 1,2,3-Trichlorobenzene
12. Allyl chloride	32. Carbon tetrachloride	52. Tetrachloroethene	72. n-Propylbenzene	
13. Methylene chloride	33. Benzene	53. 1,3-Dichloropropane	73. 2-Chlorotoluene	IS - Internal Standard
14. Acrylonitrile	34. 1,2-Dichloroethane	54. 2-Hexanone	74. 1,3,5-Trimethylbenzene	SS - Surrogate Standard
15. Methyl-tert-butyl ether	35. 2,2-Dimethylhexane	55. Dibromochloromethane	75. 4-Chlorotoluene	
16. trans-1,2-Dichloroethene	36. Fluorobenzene (IS)	56. 1,2-Dibromoethane	76. tert-Butylbenzene	Note: Some compounds not present in both chromatograms
17. Hexane	37. 1,4-Difluorobenzene (IS)	57. 1-Chloro-3-fluorobenzene (IS)	77. Pentachloroethane	
18. 1,1-Dichloroethane	38. Trichloroethene	58. Chlorobenzene	78. 1,2,4-Trimethylbenzene	
19. 2-Butanone	39. 1,2-Dichloropropane	59. 1,1,1,2-Tetrachloroethane	79. sec-Butylbenzene	
20. cis-1,2-Dichloroethene	40. Methyl methacrylate	60. Ethylbenzene	80. 1,3-Dichlorobenzene	

High Speed VOC, EPA Method 8260

Column: DB-VRX
121-1524
20 m x 0.18 mm, 1.00 µm

Carrier: Helium at 55 cm/sec (1.5 mL/min)

Oven: 45°C for 3.0 minutes
45-190°C at 36°C/min
190-225°C at 20°C/min
225°C for 0.5 min

Sampler: Purge and Trap (Tekmar 3100)
Purge: 11 min
Trap: Vocarb 3000
Preheat: 245°C
Desorb: 250°C for 1 min
Bake: 260°C for 10 min
Line & valve: 100°C

Injection: Split, 150°C
Split ratio 60:1

Detector: Agilent 5975 MSD,
Scan range: 35-260 amu
Scan rate: 3.25 scans/sec
Quad temperature: 150°C
Source temperature: 200°C
Transfer line temp: 200°C

Sample: 5 mL
• Halogenated and aromatic analytes at 40 ppb
• Internal standards at 20 ppb
• Polar analytes (i.e., ethers, alcohols and ketones at 100-800 ppb)

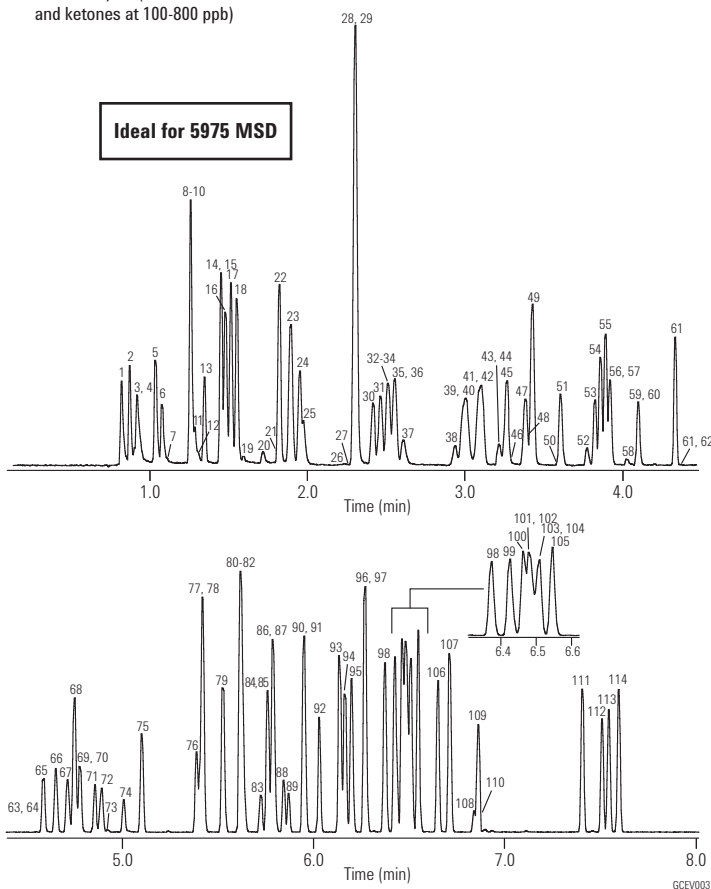
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885

- | | |
|-------------------------------|-------------------------------|
| 1. Dichlorodifluoromethane | 43. Crotonaldehyde |
| 2. Chloromethane | 44. 2-Chloroethanol |
| 3. Hydroxypropionitrile | 45. 1,1-Dichloropropene |
| 4. Vinyl chloride | 46. 1-Butanol |
| 5. Bromomethane | 47. Carbon tetrachloride |
| 6. Chloroethane | 48. Chloroacetonitrile |
| 7. Ethanol | 49. Benzene |
| 8. Acetonitrile | 50. tert-Butylmethyl ether |
| 9. Acrolein | 51. Fluorobenzene (IS) |
| 10. Trichlorofluoromethane | 52. 2-Pentanone |
| 11. Isopropyl alcohol | 53. Dibromomethane |
| 12. Acetone | 54. 1,2-Dichloropropane |
| 13. Ethyl ether | 55. Trichloroethene |
| 14. 1,1-Dichloroethene | 56. Bromodichloromethane |
| 15. tert-Butyl alcohol | 57. 2-Nitropropane |
| 16. Acrylonitrile | 58. 1,4-Dioxane |
| 17. Methylene chloride | 59. Epichlorohydrin |
| 18. Allyl chloride | 60. Methyl methacrylate |
| 19. Allyl alcohol | 61. cis-1,3-Dichloropropene |
| 20. 1-Propanol | 62. Propiolactone |
| 21. Propargyl alcohol | 63. Bromoacetone |
| 22. trans-1,2-Dichloroethene | 64. Pyridine |
| 23. MTBE | 65. trans-1,3-Dichloropropene |
| 24. 1,1-Dichloroethane | 66. 1,1,2-Trichloroethane |
| 25. Propionitrile | 67. Toluene-d8 (IS) |
| 26. 2-Butanone | 68. Toluene |
| 27. Diisopropyl ether | 69. 1,3-Dichloropropane |
| 28. cis-1,2-Dichloroethene | 70. Paraldehyde |
| 29. Methacrylonitrile | 71. Ethyl methacrylate |
| 30. Bromochloromethane | 72. Dibromochloromethane |
| 31. Chloroform | 73. 3-Chloropropionitrile |
| 32. 2,2-Dichloropropane | 74. 1,2-Dibromoethane |
| 33. Ethyl acetate | 75. Tetrachloroethene |
| 34. Ethyl-tert-butyl ether | 76. 1,1,1,2-Tetrachloroethane |
| 35. Methyl acrylate | 77. 1-Chlorohexane |
| 36. Dibromofluoromethane (IS) | 78. Chlorobenzene |
| 37. Isobutanol | 79. Ethylbenzene |
| 38. Dichloroethane-d4 (IS) | 80. Bromoform |
| 39. Pentafluorobenzene | 81. m-Xylene |
| 40. 1,2-Dichloroethane | 82. p-Xylene |
| 41. 1,1,1-Trichloroethane | 83. trans-Dichlorobutene |
| 42. 1-Chlorobutane | 84. 1,3-Dichloro-2-propanol |



- | | |
|-------------------------------|----------------------------------|
| 85. Styrene | 100. sec-Butylbenzene |
| 86. 1,1,2,2-Tetrachloroethane | 101. 1,3-Dichlorobenzene |
| 87. o-Xylene | 102. Benzylchloride |
| 88. 1,2,3-Trichloropropane | 103. 1,4-Dichlorobenzene-d4 (IS) |
| 89. cis-Dichlorobutene | 104. 1,4-Dichlorobenzene |
| 90. 4-Bromofluorobenzene (IS) | 105. Isopropyltoluene |
| 91. Isopropylbenzene | 106. 1,2-Dichlorobenzene |
| 92. Bromobenzene | 107. Butylbenzene |
| 93. Propylbenzene | 108. 1,2-Dibromo-3-chloropropane |
| 94. 2-Chlorotoluene | 109. Hexachloroethane |
| 95. 4-Chlorotoluene | 110. Nitrobenzene |
| 96. 1,3,5-Trimethylbenzene | 111. 1,2,4-Trichlorobenzene |
| 97. Pentachloroethane | 112. Naphthalene |
| 98. tert-Butylbenzene | 113. Hexachlorobutadiene |
| 99. 1,2,4-Trimethylbenzene | 114. 1,2,3-Trichlorobenzene |

**Extended Analyte List
for EPA Method 8021**

Column: DB-624
124-1374
75 m x 0.45 mm, 2.55 µm

Column: DB-VRX
124-1574
75 m x 0.45 mm, 2.55 µm

Carrier: Helium at 9 mL/min,
measured at 35°C

Oven: 35°C for 12 min
35-60°C at 5°/min
60°C for 1 min
60-200°C at 17°/min
200°C for 5 min

Sampler: Purge and Trap (O.I.A. 4560)
Trap: Vocarb 3000
Preheat: 175°C
Desorb: 260°C for 1 min

Injection: J&W LVI (Low Volume
Injector), 150°C

Detector: A: PID (O.I.A. 4430),
200°C Helium makeup gas
at 20 mL/min
B: ELCD (O.I.A. 4420),
with NiCat reaction tube in
the halogen mode, 950°C
reactor temperature

Sample: 20 ppb per component
in 5 mL water

- | | | |
|------------------------------|-----------------------------------|----------------------------------|
| 1. Dichlorodifluoromethane | 25. Trichloroethene | 49. cis-1,4-Dichlorobutene |
| 2. Chloromethane | 26. 1,2-Dichloropropane | 50. 1,1,2,2-Tetrachloroethane |
| 3. Vinyl chloride | 27. Dibromomethane | 51. Bromobenzene |
| 4. Bromomethane | 28. Trifluorotoluene (IS) | 52. 1,2,3-Trichloropropane |
| 5. Chloroethane | 29. Bromodichloromethane | 53. n-Propylbenzene |
| 6. Trichlorofluoromethane | 30. 2-Chloroethyl vinyl ether | 54. 2-Chlorotoluene |
| 7. 2-Chloropropane (IS) | 31. cis-1,3-Dichloropropene | 55. 1,3,5-Trimethylbenzene |
| 8. 1,1-Dichloroethene | 32. Toluene | 56. 4-Chlorotoluene |
| 9. Iodomethane | 33. trans-1,3-Dichloropropene | 57. tert-Butylbenzene |
| 10. Allyl chloride | 34. 1,1,2-Trichloroethane | 58. 1,2,4-Trimethylbenzene |
| 11. Methylene chloride | 35. Tetrachloroethene | 59. sec-Butylbenzene |
| 12. trans-1,2-Dichloroethene | 36. 1,3-Dichloropropane | 60. 1,3-Dichlorobenzene |
| 13. 1,1-Dichloroethane | 37. Dibromochloromethane | 61. p-Isopropyltoluene |
| 14. Chloroprene | 38. 1,2-Dibromoethane | 62. 1,4-Dichlorobenzene |
| 15. cis-1,2-Dichloroethene | 39. 1-Chloro-3-fluorobenzene (IS) | 63. Benzyl chloride |
| 16. 2,2-Dichloropropane | 40. Chlorobenzene | 64. n-Butylbenzene |
| 17. Bromochloromethane | 41. 1,1,1,2-Tetrachloroethane | 65. 1,2-Dichlorobenzene |
| 18. Chloroform | 42. Ethylbenzene | 66. Bis(2-chloroisopropyl) ether |
| 19. 1,1,1-Trichloroethane | 43. m-Xylene | 67. 1,2-Dibromo-3-chloropropane |
| 20. Carbon tetrachloride | 44. p-Xylene | 68. 1,2,4-Trichlorobenzene |
| 21. 1,1-Dichloropropene | 45. Styrene | 69. Hexachlorobutadiene |
| 22. Benzene | 46. o-Xylene | 70. Naphthalene |
| 23. 1,2-Dichloroethane | 47. Bromoform | 71. 1,2,3-Trichlorobenzene |
| 24. Fluorobenzene (IS) | 48. Isopropylbenzene | |

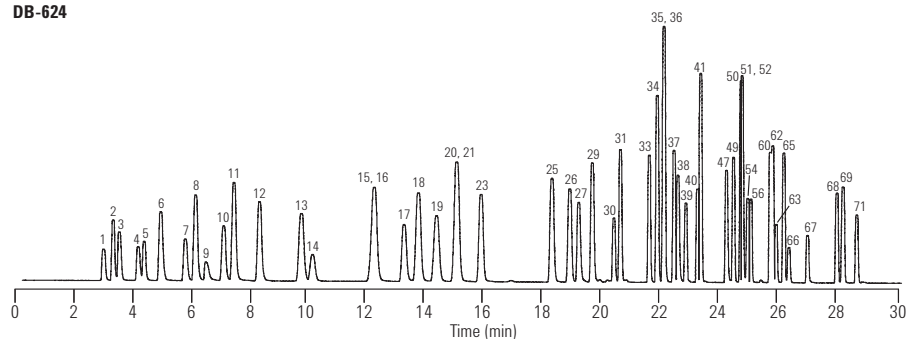
Suggested Supplies

Liner: Direct, 1.5 mm ID,
18740-80200

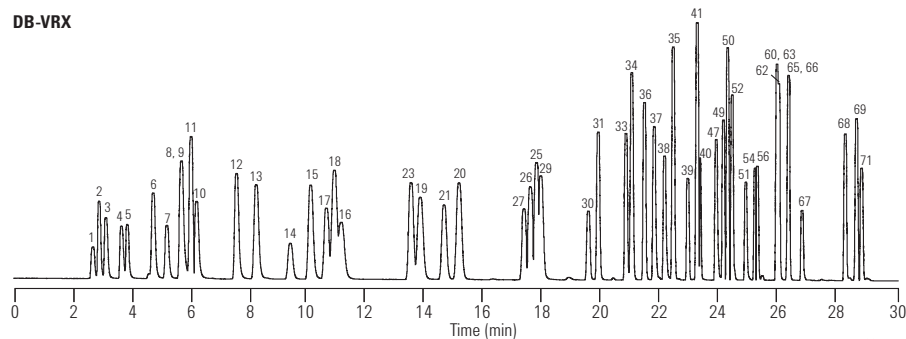
Seal: Gold plated seal,
18740-20885

Syringe: 11 mm Advanced Green
septa, 5183-4759

DB-624



DB-VRX



GCEV004

Fast VOC Analysis

Column: DB-624
121-1324
20 m x 0.18 mm, 1.00 µm

Carrier: Helium at 37 cm/sec,
(constant flow mode)

Oven: 35°C for 4 min
35-200°C at 15°/min
200°C for 0.1 min
60-200°C at 17°/min

Sampler: Purge and trap (Tekmar LSC 3000)
Purge: Helium for 11 min at 50 mL/min
Trap:
Preheat: 250°C
Desorb: 260°C for 2 min
Line & valve: 100°C

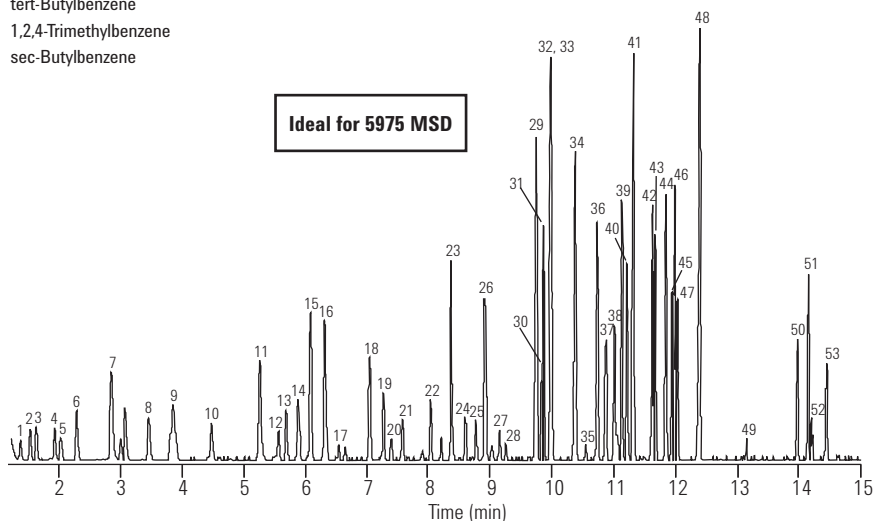
Detector: MSD, 250°C transfer line
Full scan 35 -260 amu
3.25 scans per second

Sample: 10 ppb per component in 25 mL water

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885

- | | | |
|-------------------------------|----------------------------|---------------------------------|
| 1. Dichlorofluoromethane | 31. Ethylbenzene | 45. 1,3-Dichlorobenzene |
| 2. Chloromethane | 32. m-Xylene | 46. 4-Isopropyltoluene |
| 3. Vinyl chloride | 33. p-Xylene | 47. 1,4-Dichlorobenzene |
| 4. Bromomethane | 34. o-Xylene | 48. 1,2-Dichlorobenzene |
| 5. Chloroethane | 35. Bromoform | 49. 1,2-Dibromo-3-chloropropane |
| 6. Trichlorofluoromethane | 36. Isopropylbenzene | 50. 1,2,4-Trichlorobenzene |
| 7. 1,1-Dichloroethene | 37. Bromofluorobenzene | 51. Hexachlorobutadiene |
| 8. Methylene chloride | 38. Bromobenzene | 52. Naphthalene |
| 9. trans-1,2-Dichloroethene | 39. n-Propylbenzene | 53. 1,2,3-Trichlorobenzene |
| 10. 1,1-Dichloroethane | 40. 2-Chlorotoluene | |
| 11. 2,2-Dichloropropane | 41. 1,3,5-Trimethylbenzene | |
| 12. Bromochloromethane | 42. tert-Butylbenzene | |
| 13. Chloroform | 43. 1,2,4-Trimethylbenzene | |
| 14. 1,1,1-Trichloroethane | 44. sec-Butylbenzene | |
| 15. Carbon tetrachloride | | |
| 16. Benzene | | |
| 17. Fluorobenzene | | |
| 18. Trichloroethene | | |
| 19. 1,2-Dichloropropane | | |
| 20. Dibromomethane | | |
| 21. Bromodichloromethane | | |
| 22. cis-1,3-Dichloropropene | | |
| 23. Toluene | | |
| 24. trans-1,3-Dichloropropene | | |
| 25. 1,1,2-Trichloroethane | | |
| 26. Tetrachloroethene | | |
| 27. Dibromochloromethane | | |
| 28. 1,2-Dibromomethane | | |
| 29. Chlorobenzene | | |
| 30. 1,1,1,2-Tetrachloroethane | | |



GCEV005



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

EPA Method 551

Column: DB-1
122-1033
30 m x 0.25 mm, 1.00 µm

Carrier: Helium at 24.8 cm/sec, measured at 150°C

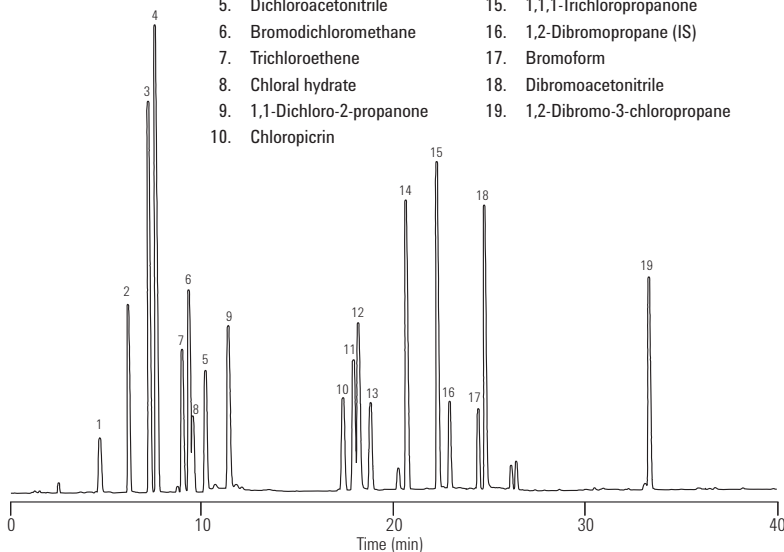
Oven: 35°C for 9 min
35-40°C at 10°/min
40°C for 3 min
40-150°C at 6°/min
150°C for 1 min

Injection: Splitless, 200°C
15 sec purge activation time

Detector: ECD, 300°C

Sample: 1 µL of 50 pg/µL, AccuStandard

- | | |
|-----------------------------|---------------------------------|
| 1. Chloroform | 11. Dibromochloromethane |
| 2. 1,1,1-Trichloroethane | 12. Bromochloroacetonitrile |
| 3. Carbon tetrachloride | 13. 1,2-Dibromoethane |
| 4. Trichloroacetonitrile | 14. Tetrachloroethene |
| 5. Dichloroacetonitrile | 15. 1,1,1-Trichloropropanone |
| 6. Bromodichloromethane | 16. 1,2-Dibromopropane (IS) |
| 7. Trichloroethene | 17. Bromoform |
| 8. Chloral hydrate | 18. Dibromoacetonitrile |
| 9. 1,1-Dichloro-2-propanone | 19. 1,2-Dibromo-3-chloropropane |
| 10. Chloropicrin | |



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316

Seal: Gold plated seal, 18740-20885

Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

GCEV008

European Red List Volatiles

Column: DB-5.625
122-5632
30 m x 0.25 mm, 0.50 µm

Column: DB-624
122-1334
30 m x 0.25 mm, 1.40 µm

Carrier: Helium at 35 cm/sec, measured at 40°C

Oven: 40°C for 2 min
40-140°C at 12°/min

Injection: Split, 250°C
Split ratio 1:50

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

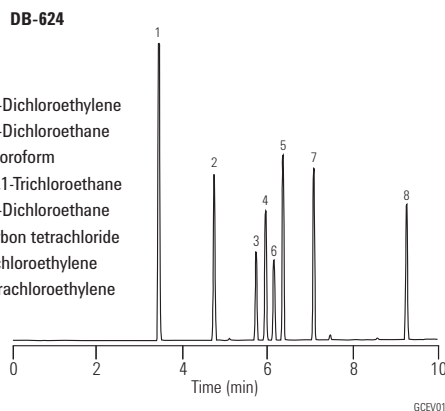
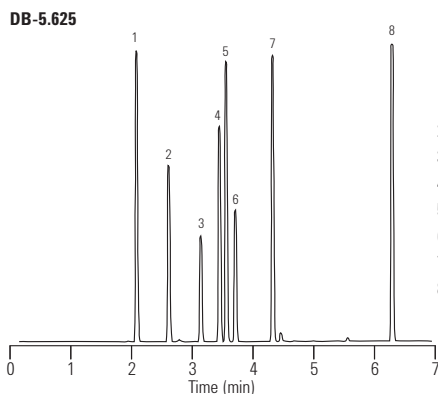
Sample: 1 µL of headspace of neat mixture

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885



GCEV010

**FactorFour cyano columns
eliminate unstable baselines**

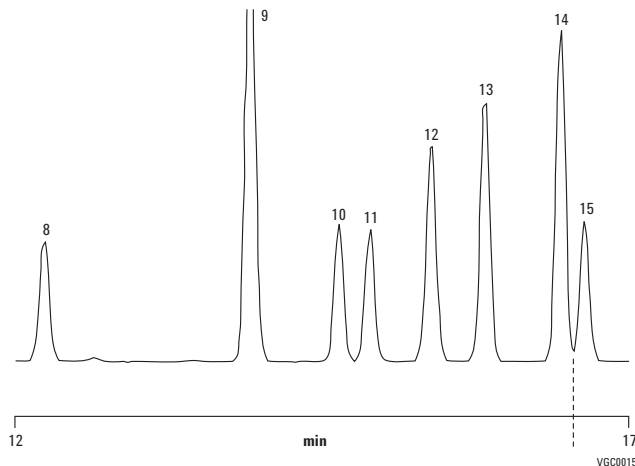
Column: VF-624ms
CP9105
60 m x 0.32 mm, 1.80 µm

Carrier: Helium 1 mL/min

Oven: Trap 150°C,
Manifold 40°C,
Transfer line 185°C

Injection: Split 1:100, T=250°C

Detector: Ion Trap MS



- 8. 1,1-Dichloroethane
- 9. 1,2-Dichloroethylene (cis)
- 10. Bromochloromethane
- 11. Chloroform
- 12. 1,1,1-Trichloroethane
- 13. 1,1-Dichloro-1-propylene
- 14. Benzene
- 15. 1,2-Dichloroethane

Halogenated hydrocarbons C1 to C2

Column: CP-SilicaPLOT
CP8570
30 m x 0.53 mm, 6.00 µm

Sample: 500 µL

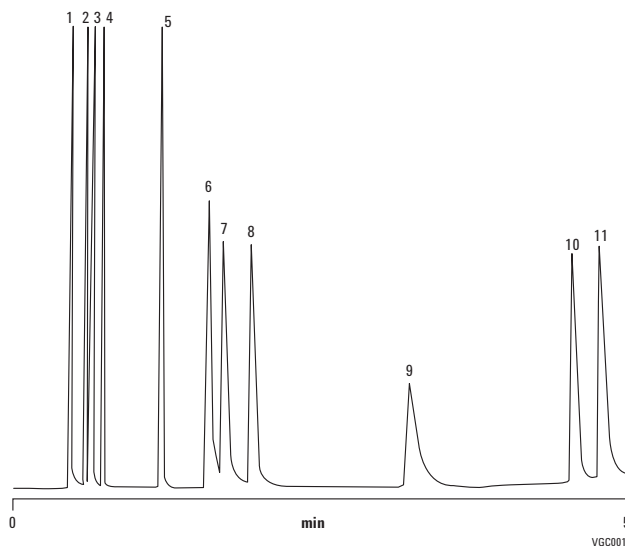
Sample Conc: 2 vol. % in air

Carrier: He, 40 kPa (0.4 bar, 7.2 ps)

Oven: 50°C (15 min) to 120°C, 10°C/min

Injection: Splitter, split flow 53 mL/min (split ratio 1:14)

Detector: TCD



- 1. Unretained
- 2. CFC 116
- 3. CFC 13
- 4. CFC 23
- 5. CFC 32
- 6. CFC 125
- 7. CFC 143A
- 8. CFC 22
- 9. CFC 134A
- 10. CFC 152A
- 11. CFC 124

*Courtesy of J. Stoel, Dupont de Nemours Nederland,
Dordrecht, The Netherlands*

Environmental Applications, Air Analysis

**EPA Air Analysis Compendium Method
TO-14 Standard**

Column: DB-1
123-1063
60 m x 0.32 mm, 1.00 µm

Carrier: Helium at 25 cm/sec measured off of
CO₂ at 35°C constant flow mode

Oven: 35°C for 5 min
35-120°C at 5°/min
120-220°C at 30°/min
220°C for 5 min

Injection: Entech 7100 cryogenic sample
preconcentrator

Detector: MSD
Full scan of m/z 40-250

Sample: 400 mL of a 10 ppbV TO-14 standard
and 100 mL of a 20 ppbV IS/SS standard

Suggested Supplies

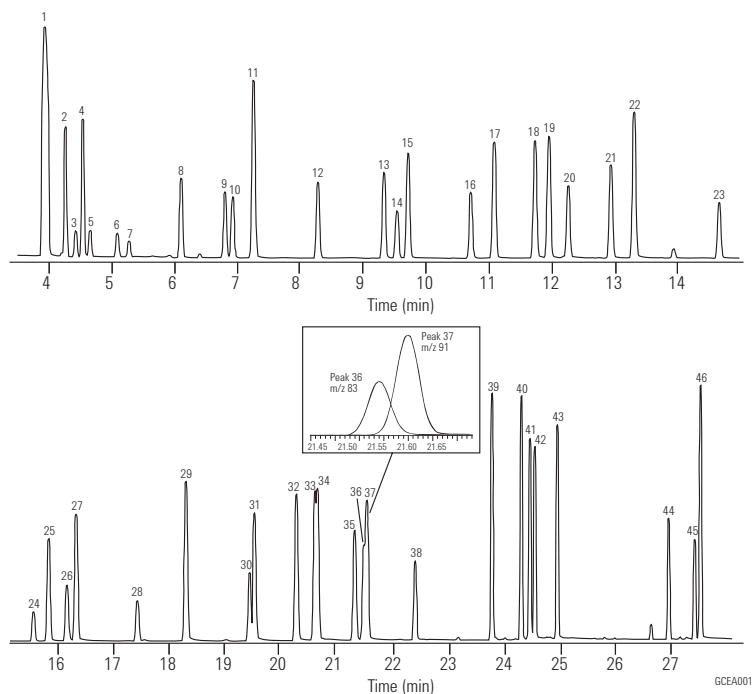
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885

- | | |
|---|-------------------------------|
| 1. CO ₂ | 24. trans-1,3-Dichloropropene |
| 2. Freon 12 (Dichlorodifluoromethane) | 25. 1,1,2-Trichloroethane |
| 3. Chloromethane | 26. Toluene-d8 (SS) |
| 4. Freon 114 (1,1,2-Dichloro-1,1,2,2-tetrafluoroethane) | 27. Toluene |
| 5. Vinyl chloride | 28. 1,2-Dibromoethane |
| 6. Bromomethane | 29. Tetrachloroethene |
| 7. Chloroethane | 30. Chlorobenzene-d5 (SS) |
| 8. Freon 11 (Trichlorofluoromethane) | 31. Chlorobenzene |
| 9. 1,1-Dichloroethene | 32. Ethylbenzene |
| 10. Methylene chloride | 33. m-Xylene |
| 11. Freon 113 (1,1,2-Trichloro-1,2,2-trifluoroethane) | 34. p-Xylene |
| 12. 1,1-Dichloroethane | 35. Styrene |
| 13. cis-1,2-Dichloroethene | 36. 1,1,2,2-Tetrachloroethane |
| 14. Bromochloromethane (IS) | 37. o-Xylene |
| 15. Chloroform | 38. 4-Bromofluorobenzene (SS) |
| 16. 1,2-Dichloroethane | 39. 1,3,5-Trimethylbenzene |
| 17. 1,1,1-Trichloroethane | 40. 1,2,4-Trimethylbenzene |
| 18. Benzene | 41. 1,3-Dichlorobenzene |
| 19. Carbon tetrachloride | 42. 1,2-Dichlorobenzene |
| 20. 1,4-Difluorobenzene (IS) | 43. 1,4-Dichlorobenzene |
| 21. 1,2-Dichloropropane | 44. 1,2,4-Trichlorobenzene |
| 22. Trichloroethene | 45. 1,2-Dibromobenzene (IS) |
| 23. cis-1,3-Dichloropropene | 46. Hexachloro-1,3-butadiene |

Agilent wishes to thank Entech Instruments for providing
this chromatogram.



EPA Air Analysis Method TO-15 (1 ppbV Standard)

Column: DB-5ms
123-5563
60 m x 0.32 mm, 1.00 µm

Carrier: Helium, 1.5 mL/min

Oven: 35°C for 5 min
35-140°C at 6°C/min
140-220°C at 15°C/min
220°C for 3 min

Sampler: Entech 7100 cryogenic
sample preconcentrator

Detector: GC/MS 6890/5973N
Scan 29-180 amu 0-6 min
33-280 amu 6-30 min
Electron Impact 70 eV

Sample: 400 mL sample load,
All compounds at 10 ppbV except
Formaldehyde (50 ppbV),
Acetaldehyde (20 ppbV),
Propanol (20 ppbV),
Acetone (30 ppbV),
2-Butanone (30 ppbV)

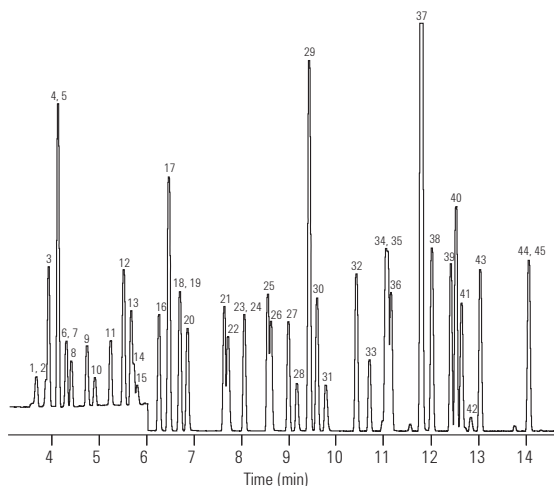
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

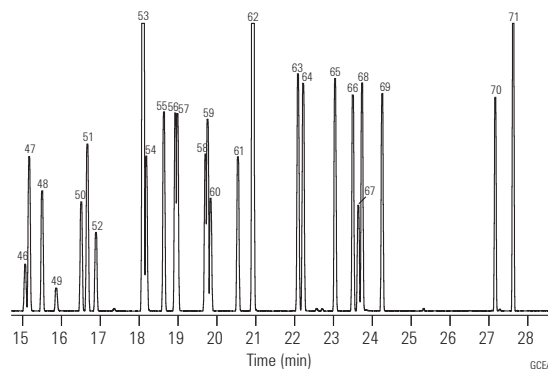
Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885

Quantitation Ion		Quantitation Ion		Quantitation Ion	
1. Formaldehyde	30	26. n-Hexane	57	51. Tetrachloroethene	166
2. Propene	41	27. cis-1,2-Dichloroethene	96	52. 1,2-Dibromoethane	107
3. Dichlorodifluoromethane	85	28. Ethyl acetate	43	53. Chlorobenzene-d5 (IS)	117
4. Chloromethane	50	29. Bromochloromethane (IS)	128	54. Chlorobenzene	112
5. Dichlorotetrafluoroethane	85	30. Chloroform	83	55. Ethylbenzene	91
6. Acetaldehyde	29	31. Tetrahydrofuran	42	56. m-Xylene	91
7. Vinyl chloride	62	32. 1,1,1-Trichloroethane	97	57. p-Xylene	91
8. 1,3-Butadiene	39	33. 1,2-Dichloroethane	62	58. Styrene	104
9. Bromomethane	94	34. Benzene	78	59. o-Xylene	91
10. Chloroethane	64	35. Carbon tetrachloride	117	60. Bromoform	173
11. Bromoethene	106	36. Cyclohexane	56	61. 1,1,2,2-Tetrachloroethane	83
12. Trichlorofluoromethane	101	37. 1,4-Difluorobenzene (IS)	114	62. 4-Bromofluorobenzene	95
13. Acetone	58	38. 2,2,4-Trimethylpentane (Isooctane)	57	63. 4-Ethyltoluene	105
14. Propanal	29	39. n-Heptane	41	64. 1,3,5-Trimethylbenzene	105
15. Isopropyl alcohol	45	40. Trichloroethene	130	65. 1,2,4-Trimethylbenzene	105
16. 1,1-Dichloroethene	61	41. 1,2-Dichloropropane	63	66. 1,3-Dichlorobenzene	146
17. 1,1,2-Trichloro-1,2,2-trifluoroethane	101	42. 1,4-Dioxane	88	67. Benzyl chloride	91
18. Methylene chloride	49	43. Bromodichloromethane	83	68. 1,4-Dichlorobenzene	146
19. 3-Chloro-1-propene (Allyl chloride)	76	44. 4-Methyl-2-pentanone (MIBK)	43	69. 1,2-Dichlorobenzene	146
20. Carbon disulfide	76	45. cis-1,3-Dichloropropene	75	70. 1,2,4-Trichlorobenzene	180
21. trans-1,2-Dichloroethene	96	46. trans-1,3-Dichloropropene	75	71. Hexachlorobutadiene	225
22. tert-Butyl methyl ether (MTBE)	73	47. Toluene	91		
23. 1,1-Dichloroethane	63	48. 1,1,2-Trichloroethane	97		
24. Vinyl acetate	43	49. 2-Hexanone	43		
25. 2-Butanone (MEK)	72	50. Dibromochloromethane	129		



Agilent wishes to thank Entech Instruments for providing this chromatogram.



GCEA002

Formaldehyde, 50ppb

Column: DB-5ms
123-5563
60 m x 0.32 mm, 1.00 µm

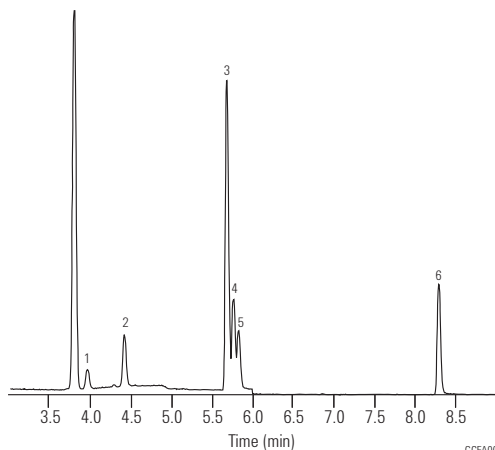
Carrier: Helium, 1.5 mL/min

Oven: 35°C for 5 min
35-85°C at 10°C/min

Sampler: Entech 7100 cryogenic sample preconcentrator

Detector: GC/MS 6890/5973N
Scan 29-180 amu 0-6 min
33-280 amu 6-30 min
Electron Impact 70 eV

Sample: 100 cc 50 ppb Formaldehyde/20 ppb others



1. Formaldehyde
2. Acetaldehyde
3. Acetone-d6
4. Acetone
5. Propanol
6. 2-Butanone

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885

Agilent wishes to thank Entech Instruments for providing this chromatogram.

Sulfur in Air

Column: DB-5ms
123-5563
60 m x 0.32 mm, 1.00 µm

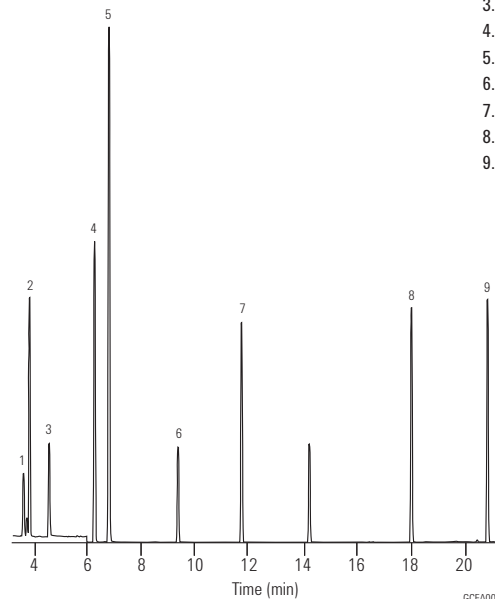
Carrier: Helium, 1.5 mL/min

Oven: 35°C for 5 min
35-140°C at 6°C/min
140-220°C at 15°C/min
220°C for 3 min

Sampler: Entech 7100 cryogenic sample preconcentrator

Detector: GC/MS 6890/5973N
Scan 29-180 amu 0-6 min
33-280 amu 6-30 min
Electron Impact 70 eV

Sample: 400 cc 10 ppb Sulfurs



1. Hydrogen Sulfide
2. Carbonyl Sulfide
3. Methyl Mercaptan
4. Dimethyl Sulfide
5. Carbon Disulfide
6. Bromochloromethane
7. 1,4-Difluorobenzene
8. Chlorobenzene-d5
9. 4-Bromofluorobenzene

Agilent wishes to thank Entech Instruments for providing this chromatogram.

C1 and C2 Halocarbons (Freons)

Column: GS-GasPro
113-4362
60 m x 0.32 mm,

Carrier: Helium at 35 cm/sec, constant velocity

Oven: 40°C for 2 min,
40-120°C at 10°/min
120°C for 3 min
120-200°C at 10°/min

Injection: Splitless, 250°C
0.20 min purge activation time

Detector: MSD, 280°C,
full scan 45-180 amu

Sample: 1.0 µL of 100 ppm mixture
of Accustandard M-REF &
M-REF-X in methanol

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

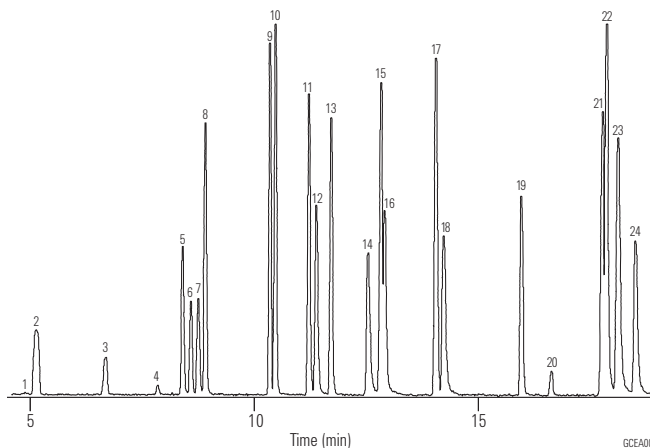
Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316

Seal: Gold plated seal, 18740-20885

Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

	Freon #
1. Chlorotrifluoromethane*	13
2. Trifluoromethane	23
3. Bromotrifluoromethane	13B1
4. Chloropentafluoroethane	115
5. Pentafluoroethane	125
6. 1,1,1-Trifluoroethane	143a
7. Dichlorodifluoromethane	12
8. Chlorodifluoromethane	22
9. 1,1,1,2-Tetrafluoroethane	134a
10. Chloromethane	40
11. 1,1,2,2-Tetrafluoroethane	134
12. Bromochlorodifluoromethane	12B1
13. 1,1-Difluoroethane	152a
14. 1,2-Dichloro-1,1,2,2-tetrafluoroethane	114
15. 2-Chloro-1,1,1,2-tetrafluoroethane	124
16. 1-Chloro-1,1-difluoroethane	142b
17. Dichlorofluoromethane	21
18. Trichlorofluoromethane	11
19. Chloroethane	160
20. Dichloromethane	
21. 1,1-Dichloro-1-fluoroethane	141b
22. 2,2-Dichloro-1,1,1-trifluoroethane	123
23. 1,1,2-Trichloro-1,2,2-trifluoroethane	113
24. 1,2-Dibromo-1,1,2,2-tetrafluoroethane	114B2

*Peak not shown



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

N₂O I

Column: HP PLOT Q
19095P-Q04
30 m x 0.53 mm, 40 μm

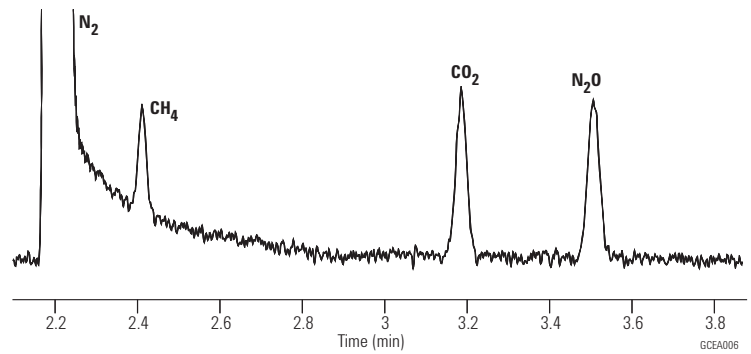
Carrier: Helium, 5 psi (approximately 8 mL/min)

Oven: 35°C isothermal

Injection: 250 μL, injected
Split ratio 1:3

Detector: TCD, 200°C

Sample: approximately 200 ppmV methane
200 ppmV CO₂
250 ppmV N₂O (nitrogen balance gas)



N₂O II

Column: HP PLOT
19095P-MS6
30 m x 0.53 mm, 25.00 μm

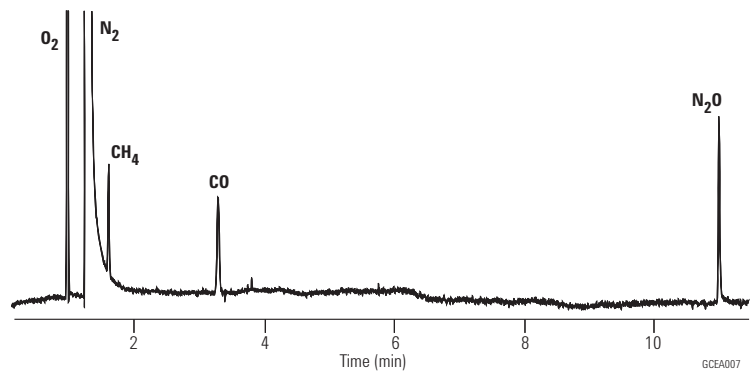
Carrier: Helium, 6 psi (approximately 10 mL/min)

Oven: 50°C (5 min), 25°C/min to 200°C and hold

Injection: 250 μL injected
Split ratio 1:4

Detector: TCD, 250°C
Column compensation on

Sample: approximately 200 ppmV methane
200 ppmV CO₂
250 ppmV N₂O (nitrogen balance gas)



N₂O III

Column: GS-CarbonPLOT
113-3133
30 m x 0.32 mm, 3.00 μm

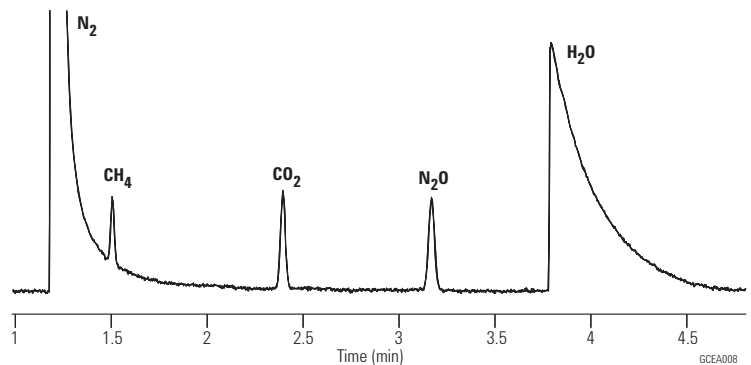
Carrier: Helium, 12 psi (approximately 3 mL/min)

Oven: 35°C isothermal

Injection: 250 μL injected
Split ratio 1:4

Detector: TCD, 200°C

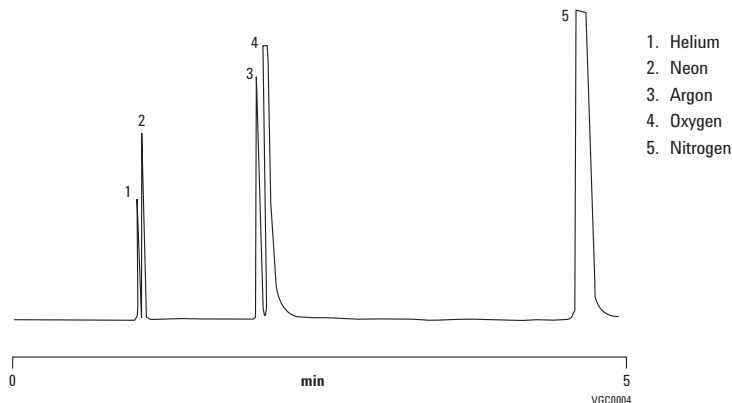
Sample: approximately 200 ppmV methane
200 ppmV CO₂
250 ppmV N₂O (nitrogen balance gas)



**Permanent gases on a thick film
Molesieve column**

Column: CP-Molesieve 5Å
CP7538
25 m x 0.53 mm, 50.00 µm

Sample: 10 µL
Sample Conc: % range
Carrier: H₂
Oven: 30°C
Injection: Split, 100 mL/min
Detector: TCD

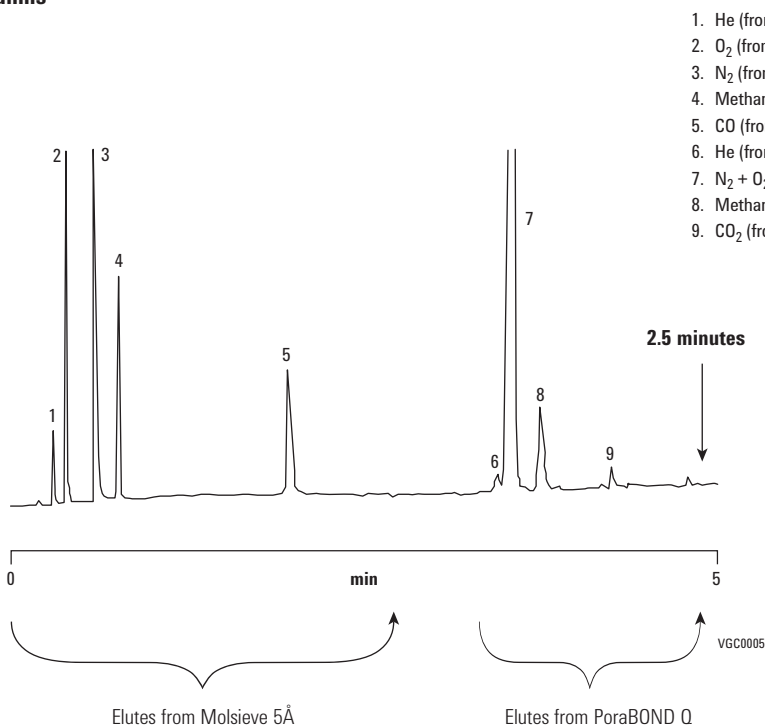


1. Helium
2. Neon
3. Argon
4. Oxygen
5. Nitrogen

**Fast analysis of permanent gases
and CO₂ using tandem PLOT columns**

Column: CP-Sil PAH UltiMetal
CP7429

Sample: 10 µL
Sample Conc: % level
Carrier: H₂, 60 kPA
Oven: 45°C
Injection: Split 50 mL/min
Detector: µ-TCD



1. He (from ms-5A)
2. O₂ (from ms-5A)
3. N₂ (from ms-5Å)
4. Methane (from ms-5Å)
5. CO (from ms-5Å)
6. He (from PBQ)
7. N₂ + O₂ + CO (from PBQ)
8. Methane (from PBQ)
9. CO₂ (from PBQ)

Foods, Flavors and Fragrance Applications

Spearmint Oil

Column A: DB-1
122-1032
30 m x 0.25 mm, 0.25 µm

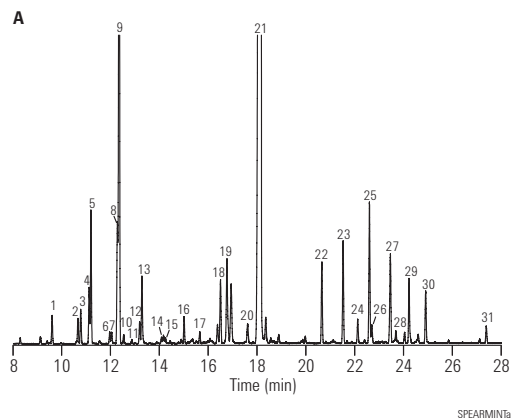
Column B: DB-1
121-1022
20 m x 0.18 mm, 0.18 µm

Carrier: A: Helium 25 cm/sec measured at 40°C
 B: Hydrogen 47 cm/sec measured at 40°C

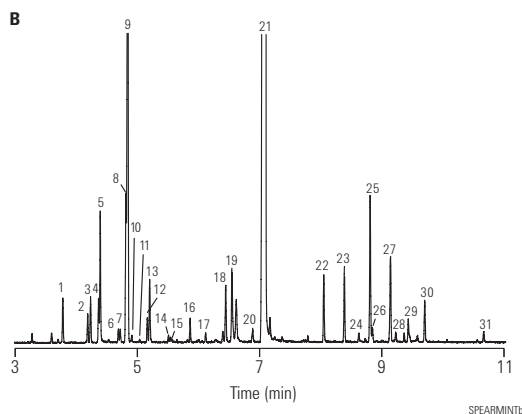
Oven: A: 40°C hold 1 min, 5°C/min to 290°C
 B: 40°C hold 0.38 min, 13°C/min to 290°C
 hold 13.09 min

Injection: 250°C, Split 40:1, 1 µL injection

Original Method with a DB-1, 30 m x 0.25 mm, 0.25 µm column and Helium carrier



Faster Method with a high efficiency DB-1, 20 m x 0.18 mm, 0.18 µm column and Hydrogen carrier



Using hydrogen as a carrier gas in conjunction with the high efficiency column resulted in an overall speed gain of 61% compared to the original method. In addition, the resolution was well maintained throughout the method translation process.

1. α -Pinene
2. Sabinene
3. β -Pinene
4. 3-Octanol
5. Myrcene
6. α -Terpinene
7. ρ -Cymene
8. 1,8-Cineol
9. Limonene
10. cis-OCimene
11. trans-OCimene
12. γ -Terpinene
13. trans-Sabinene hydrate
14. Terpinolene
15. Linalool
16. 3-Octyl acetate
17. Isomenthone
18. Terpinen-4-ol
19. Dihydrocarveol
20. trans-Carveol
21. l-Carvone
22. trans-Dihydrocarveol acetate
23. cis-Carvyl acetate
24. cis-Jasmone
25. β -Bourbonene
26. α -Bourbonene
27. β -Caryophyllene
28. α -Copaene
29. trans- β -Farnesene
30. Germacrene-d
31. Viridiflorol

Fragrance Allergens

Column: HP-5MS
19091S-433
30 m x 0.25 mm, 0.25 µm

Carrier: Helium, 1.2 mL/min,
 constant pressure of 70 kPa

Oven: 50°C - 1 min - 8°C/min - 250°C,
 250-300°C @ 35°C/min
 300°C Hold, 5 min
 5973N MSD in scan (40-350 amu)
 Solvent Delay, 3.0 min

Injection: Split, 250°C
 Split ratio 1:50

Sample: 1 µL, 50 ppm standard

Suggested Supplies

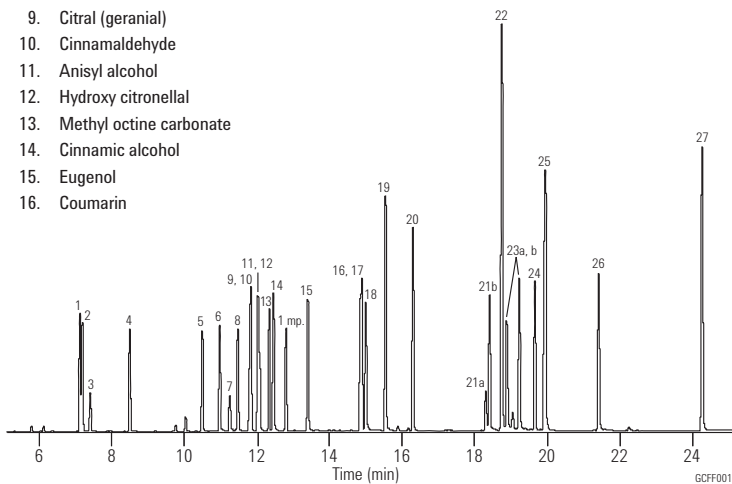
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop,
 glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP,
 5181-1273

- | | | |
|-----------------------------|----------------------------|--------------------------|
| 1. Limonene | 17. Cinnamyl acetate | 23a. Farnesol 1 |
| 2. Benzyl alcohol | 18. Isoeugenol | 23b. Farnesol 2 |
| 3. Phenyl acetaldehyde | 19. Alpha isomethyl ionone | 24. Hexyl cinnamaldehyde |
| 4. Linalool | 20. Lilial (BMHCA) | 25. Benzyl benzoate |
| 5. Methyl heptin carbonate | 21a. Lyril 1 | 26. Benzyl salicylate |
| 6. Citronellol | 21b. Lyril 2 | 27. Benzyl cinnamate |
| 7. Neral | 22. Amyl cinnamyl alcohol | |
| 8. Geraniol | | |
| 9. Citral (geranial) | | |
| 10. Cinnamaldehyde | | |
| 11. Anisyl alcohol | | |
| 12. Hydroxy citronellal | | |
| 13. Methyl octine carbonate | | |
| 14. Cinnamic alcohol | | |
| 15. Eugenol | | |
| 16. Coumarin | | |



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Fusel Oil Standard & Brandy Sample

Column: DB-624
122-1364
60 m x 0.25 mm, 1.4 μm

Carrier: H₂, 50 cm/sec, Constant

Oven: 40°C for 5 min
10°C/min to 250°C

Detector: FID, 300°C

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

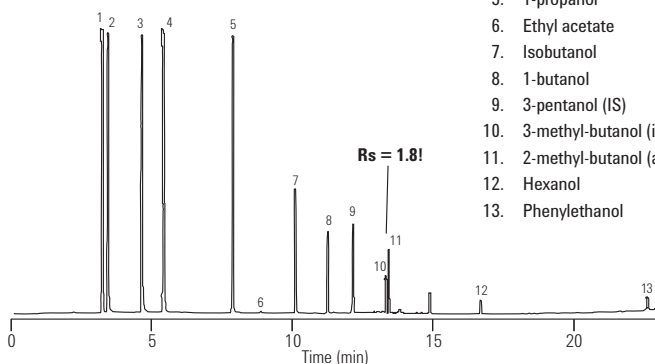
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

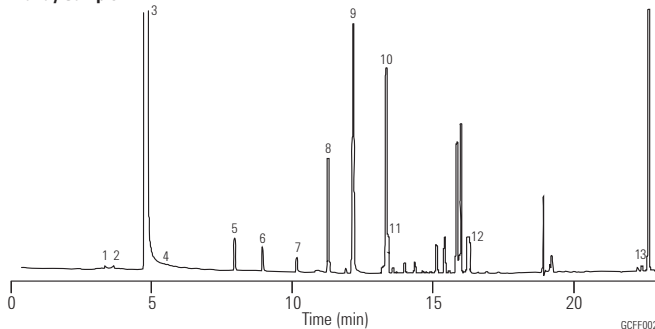
Syringe: 5 μL tapered, FN 23-26s/42/HP, 5181-1273

1. Acetaldehyde
2. Methanol
3. Ethanol
4. Acetone
5. 1-propanol
6. Ethyl acetate
7. Isobutanol
8. 1-butanol
9. 3-pentanol (IS)
10. 3-methyl-butanol (isoamyl alcohol)
11. 2-methyl-butanol (active amyl alcohol)
12. Hexanol
13. Phenylethanol

Fusel Oil Standard



Brandy Sample



Fragrance Reference Standard I

Column: DB-1
122-1032
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 25 cm/sec, measured at 150°C

Oven: 40°C for 1 min
40-290°C at 5°/min

Injection: Split, 250°C
Split ratio 1:50

Detector: MSD, 300°C transfer line

Sample: 1 µL of a 1:20 dilution of neat sample in acetone

Suggested Supplies

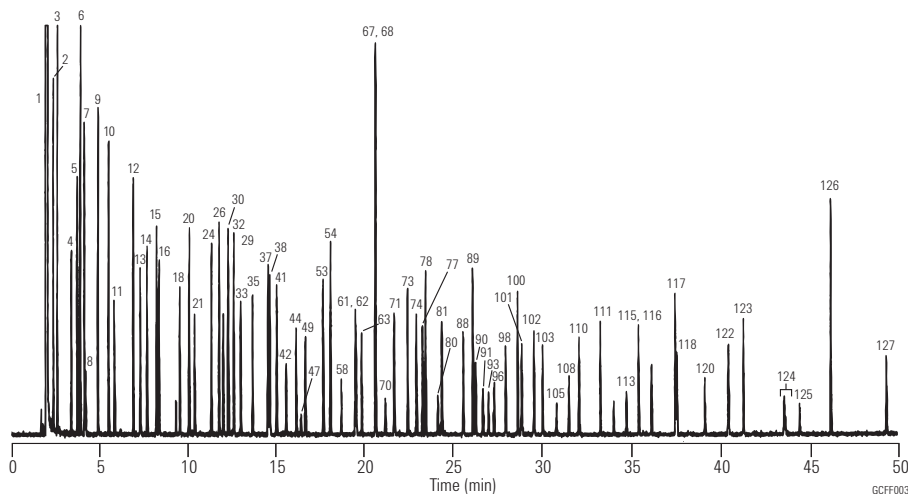
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP, 5181-1273

- | | | | |
|--|-------------------------|----------------------------------|-----------------------------------|
| 1. Acetone | 46. Menthone | 80. Florazone (isomer 1) | 113. Tonalid |
| 2. 2,3-Butanedione (diacetyl) | 47. Isoborneol | 81. Florazone (isomer 2) | 114. Nonadec-1-ene |
| 3. Ethyl acetate | 48. Isomenthone | 82. β-Caryophyllene | 115. Isopropylmyristate |
| 4. 2,3-Pentanedione (acetyl propionyl) | 49. Borneol | 83. Citronellyl propionate | 116. Ethyl pentadecanoate |
| 5. Ethyl propionate | 51. Terpinen-4-ol | 85. 3,7-Guaiaiene | Nonadecane |
| 6. Methyl butyrate | 52. α-Terpineol | 88. Dodecanol | 117. Ethyl hexadecanoate |
| 7. 3-Methylbutyl alcohol | 53. Ethyl octanoate | 89. Ethyl undecanoate | 118. Musk T (ethylene brassylate) |
| 8. 2-Methylbutyl alcohol | 54. Octyl acetate | 90. Eugenyl acetate | 119. Eicosane |
| 9. Isobutyl acetate | 56. Fenchyl acetate | 91. Frambione (raspberry ketone) | 120. Cinnamyl phenyl acetate |
| 10. Ethyl butyrate | 57. Citronellol | 93. Isoamyl salicylate | 121. Heneicosane |
| 11. Furfural | 58. Neral | 94. δ-Cadinene | 122. Phenyl ethyl cinnamate |
| 12. Ethyl isovalerate | 59. Carvone | 95. cis-Nerolidol | 123. Ethyl octadecanoate |
| 13. Hexanol | 60. Geraniol | 96. Rosatol (rosetone) | 124. Herculyn D (tetrahydro & |
| 14. Allyl butyrate | 61. Linalyl acetate | Geranyl butyrate | dihydro methyl abietate) |
| 15. Ethyl pentanoate | 62. Geranial | 97. trans-Nerolidol | 125. Cinnamyl cinnamate |
| 16. Hexylene glycol | 63. Hydroxycitronellal | 98. n-Amyl salicylate | 126. Cetearyl octanoate |
| 17. α-Thujone | 64. Citronellyl formate | 99. Phenylethyl tiglate | 127. Cetearyl decanoate |
| 18. Benzaldehyde | 66. Bornyl acetate | 100. Ethyl dodecanoate | |
| 19. α-Pinene | 67. Vertenex (isomer 1) | 101. Benzophenone | |
| 20. Camphene | 68. Ethyl nonanoate | 102. Dibenzyl ether | |
| 21. 3,5,5-Trimethylhexanol | 69. Geranyl formate | 103. γ-Dodecalactone | |
| 22. Sabinene | 70. Vertenex (isomer 2) | 104. Citronellyl tiglate | |
| 23. β-Pinene | 71. γ-Nonalactone | 105. Evernyl | |
| 24. Ethyl hexanoate | 72. Citronellyl acetate | 106. Geranyl tiglate | |
| 25. Myrcene | 73. Hydroxycitronellal | 107. Geranyl-2-methyl valerate | |
| 26. Hexyl acetate | 74. Geranyl acetate | 108. Celestocide | |
| cis-Linalool oxide | 76. Diphenyl oxide | 109. Heptadec-1-ene | |
| Methyl benzoate | 78. Ethyl decanoate | 110. Benzyl benzoate | |
| trans-Linalool oxide | 79. α-Copaene | 111. Ethyl tetradecanoate | |
| 28. Methyl-cresol | | 112. Benzyl salicylate | |
| 29. Benzyl alcohol | | | |
| 30. para-Cymene | | | |
| 31. 1,8-Cineol | | | |
| 32. Limonene | | | |
| 33. 2,6-Dimethylhept-5-enal | | | |
| 34. γ-Terpinene | | | |
| 35. Octanol | | | |
| 37. Ethyl heptanoate | | | |
| 38. Linalool | | | |
| 39. Benzene ethanol | | | |
| 41. Rose oxide, cis-rose | | | |
| 42. Rose oxide, trans-rose | | | |
| 43. Camphor | | | |
| 44. Citronellal | | | |
| 45. Benzyl acetate | | | |



Many thanks to Carl Frey, Manager of Analytical Services, Dragoco, and Kevin Myung, Director of Flavor and Perfumery Research, Bush Boake Allen, Inc. for contributing to this work.

Fragrance Reference Standard II

Column: DB-WAX
122-7032
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 25 cm/sec,
measured at 150°C

Oven: 45°C for 2 min
45-250°C at 3°/min
250°C for 34 min

Injection: Split, 250°C
Split ratio 1:50

Detector: MSD, 250°C transfer line

Sample: 1 µL of a 1:20 dilution of neat sample
in acetone

Suggested Supplies

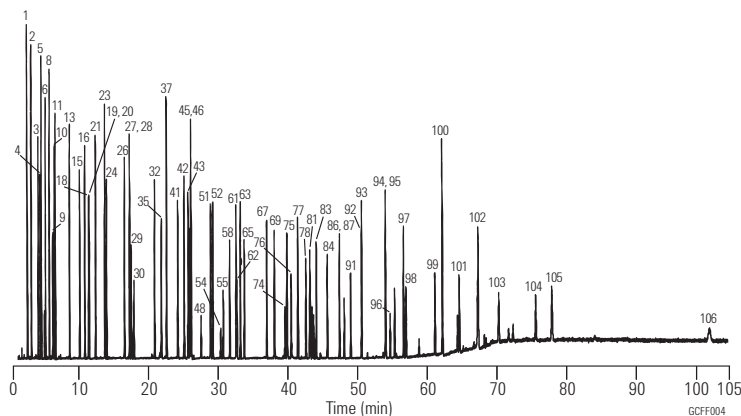
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop,
glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP,
5181-1273

- | | | |
|---|--------------------------|-----------------------------------|
| 1. Acetone | 46. Octanol | 75. Florazone (isomer 2) |
| 2. Ethyl acetate | 47. β-Caryophyllene | 76. Hydroxycitronellal |
| 3. Ethyl propionate | 48. Vertenex (isomer 2) | 77. Dodecanol |
| 4. 2,3-Butanedione (diacetyl) | 49. Terpinen-4-ol | 78. Diphenyl oxide |
| 5. Methyl butyrate | 50. Methyl benzoate | 79. Citronellyl tiglate |
| 6. Isobutyl acetate | 51. Hexylene glycol | 80. Eugenyl methyl ether |
| 7. α-Pinene | 52. Ethyl decanoate | 81. γ-Nonalactone |
| 8. Ethyl butyrate | 53. Citronellyl acetate | 83. Ethyl tetradecanoate |
| 9. 2,3-Pentanedione (acetyl propionyl) | 54. Isoborneol | 84. n-Amyl salicylate |
| 10. Camphene | 55. Neral | 85. Geranyl tiglate |
| 11. Ethyl isovalerate | 56. α-Terpineol | 86. Ethyl pentadecanoate |
| 12. β-Pinene | 57. Geranyl formate | 87. Isopropylmyristate |
| 13. Ethyl pentanoate | 58. Borneol | 90. Phenylethyl tiglate |
| 14. Myrcene | 59. β-Bisabolene | 91. Rosatol (rosetone) |
| 15. Allyl butyrate | 60. Benzyl acetate | 92. Eugenyl acetate |
| 16. Limonene | 61. Neryl acetate | 93. Ethyl hexadecanoate |
| 17. 1,8-Cineol | 62. Geranial | 94. γ-Dodecalactone |
| 18. 3,5-Trimethylhexanol | 63. Ethyl undecanoate | 95. Dibenzyl ether |
| 19. 3-Methylbutyl alcohol | 64. δ-Cadinene | 96. Tonalid |
| 20. 2-Methylbutyl alcohol | 65. Geranyl acetate | 97. Ethyl octadecanoate |
| 21. Ethyl hexanoate | 66. Citronellol | 98. Benzophenone |
| 22. γ-Terpinene | 67. Ethyl dodecanoate | 99. Benzyl benzoate |
| 23. p-Cymene | 68. Geraniol | 100. Cetearyl octanoate |
| 24. Hexyl acetate | 69. Benzyl alcohol | 101. Musk T (ethylene brassylate) |
| 25. Terpinolene | 70. Geranyl butyrate | 102. Cetearyl decanoate |
| 26. Ethyl heptanoate | 71. Nonadecane | 103. Frambione (raspberry ketone) |
| 27. 2,6-Dimethylhept-5-enal (MelonalTM) | 72. Benzene ethanol | 104. Cinnamyl phenyl acetate |
| 28. Rose oxide, cis-rose | 73. Nonadec-1-ene | 105. Phenyl ethyl cinnamate |
| 29. Hexanol | 74. Florazone (isomer 1) | 106. Cinnamyl cinnamate |



Many thanks to Carl Frey, Manager of Analytical Services, Dragoco, and Kevin Myung, Director of Flavor and Perfumery Research, Bush Boake Allen, Inc. for contributing to this work.

Lavender Oil Characterization

Column: DB-1ms Ultra Inert
122-0132UI
30 m x 0.25 mm, 0.25 µm

Instrument: Agilent 7890A/5975B MSD and a 6890N FID equipped

Sampler: Agilent 7683B, 5.0 µL syringe (Agilent p/n 5188-5246), 1.0 µL injection

Carrier: Helium 40 cm/s, constant flow MSD system, 35 cm/s FID system

Inlet: 200:1 split

Oven: 62°C 12.5 min hold, 3°C/min to 92°C, then 5°C/min to 165°C, then 100°C/min to 310°C, 2.5 minute hold

Detector: MSD source at 300°C, quadrupole at 180°C, transfer line at 280°C, scan range 45-450 amu

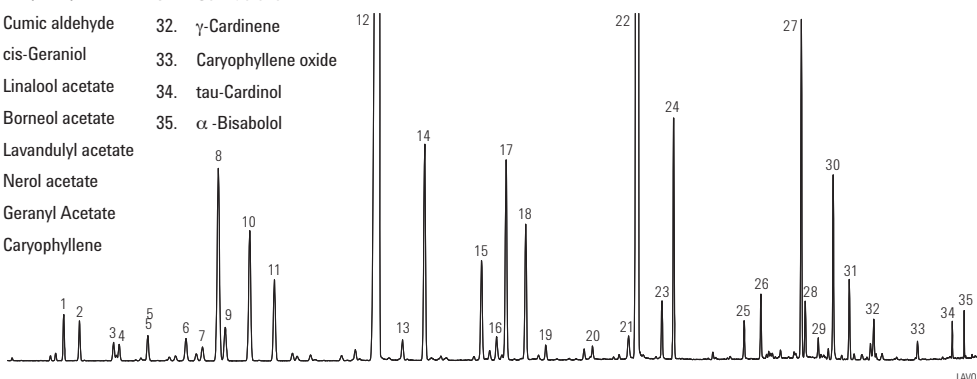
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split liner, single taper MS certified liner with restriction to hold glass wool, 5188-6576

Syringe: 5 µL tapered, FN 23-26s/42/HP, 5181-1273

- | | | |
|------------------------|------------------------|-------------------------|
| 1. α-Pinene | 16. Lavandulol | 28. α-Santaloene |
| 2. Camphene | 17. Terpinen-4-ol | 29. α-Bergamotene |
| 3. 1-Octen-3-ol | 18. α-Terpinol | 30. β-Farnesene |
| 4. 3-Octanone | 19. Hexyl butyrate | 31. Germacrene D |
| 5. β-Myrcene | 20. Cumin aldehyde | 32. γ-Cardinene |
| 6. 3-Carene | 21. cis-Geraniol | 33. Caryophyllene oxide |
| 7. o-Cymene | 22. Linalool acetate | 34. tau-Cardinol |
| 8. Eucalyptol | 23. Borneol acetate | 35. α-Bisabolol |
| 9. D-Limonene | 24. Lavandulyl acetate | |
| 10. β-trans-Ocimene | 25. Nerol acetate | |
| 11. β-cis-Ocimene | 26. Geranyl Acetate | |
| 12. β-Linalool | 27. Caryophyllene | |
| 13. Octen-1-ol acetate | | |
| 14. Camphor | | |
| 15. Borneol | | |



GC/MS total ion chromatogram of lavender oil sample on an Agilent J&W DB-1ms Ultra Inert 30 m x 0.25 mm x 0.25 µm capillary GC column (p/n 122-0132UI). The well-resolved, sharp peaks observed on the column ensure reliable analysis and fingerprinting of lavender oils

Lavender Oil Spiked with Camphor

Column: DB-WaxFF
127-7023FF
20 m x 0.10 mm, 0.20 µm

Carrier: H₂, 38 psi, 0.33 min, 5 psi/min to 45 psi, hold

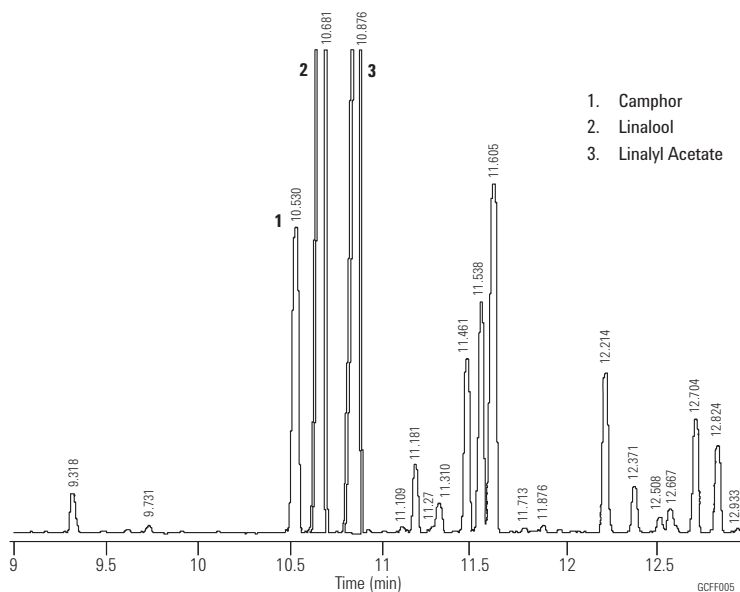
Oven: 50°C, 0.33 min
10°C/min to 200°C
200°C hold until last peak elutes

Injection: Split, 250°C
Split ratio 1:650

Detector: FID, 250°C
Column + make-up (N₂) in constant flow

Sample: 0.5 µL

1. Camphor
2. Linalool
3. Linalyl Acetate



Special thanks to Mr. Marin, MANE, France.

Perfume

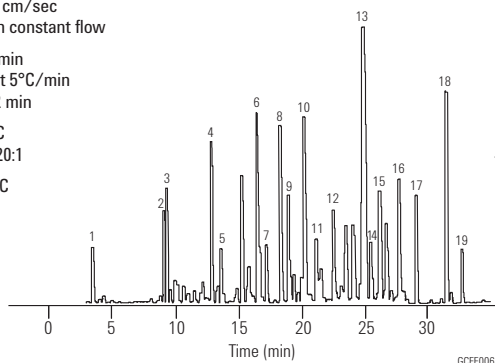
Column: HP-INNOWax
19091N-133
30 m x 0.25 mm, 0.25 µm

Carrier: Helium, 30 cm/sec
0.9 mL/min constant flow

Oven: 80°C for 1 min
80-250°C at 5°C/min
250°C for 2 min

Injection: Split, 250°C
Split ratio 20:1

Detector: MSD, 280°C



- | | |
|--------------------------|-----------------------|
| 1. Limonene | 11. Commamyl acetate |
| 2. Linalool | 12. Acetylcedrene |
| 3. Linalyl acetate | 13. Diethyl phthalate |
| 4. Benzyl acetate | 14. Tonalid |
| 5. Citronellol | 15. Coumarin |
| 6. Benzene ethanol | 16. Musk xylene |
| 7. α-Methyl Ionone | 17. Benzyl benzoate |
| 8. Carvocrol and geraiol | 18. Benzyl salicylate |
| 9. Isoamyl salicylate | 19. Musk ketone |
| 10. n-Amyl salicylate | |

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 µL tapered, FN 23-26s/42/HP, 5181-1273

Flavor Mixture

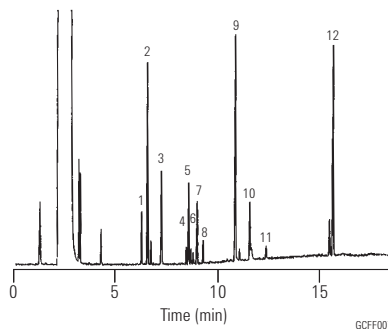
Column: ULTRA 2
19091B-112
25 m x 0.32 mm, 0.52 µm

Carrier: Helium, 90 kPa., 2.2 mL/min
constant flow

Oven: 80°C for 1 min
80-210°C at 8°C/min
210°C for 2 min

Injection: Split, 250°C
Split ratio 20:1

Detector: IRD, 280°C
Wide Band MCT, 550
to 4000 cm⁻¹



- | | |
|-------------------|-------------------------------|
| 1. Fenchone | 8. Citral |
| 2. Thujone | 9. Eugenol |
| 3. Benzaldehyde | 10. Vanillin |
| 4. trans-Carveol | 11. trans-Isoeugenol |
| 5. Farnesol | 12. trans-Citronellyl tiglate |
| 6. cis-Carveol | 13. cis-Citronellyl tiglate |
| 7. trans-Geraniol | |

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: General purpose split/splitless liner, taper, glass wool, 5183-4711
Seal: Gold plated seal, 18740-20885
Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Chiral Compounds in Essential Oils and Fragrances

Column: HP Chiral β
19091G-B233
30 m x 0.25 mm, 0.25 µm

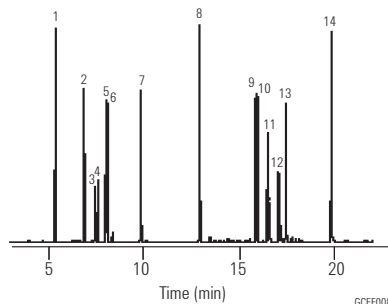
Carrier: Hydrogen, 39 cm/sec,
Constant pressure

Oven: 65°C for 1 min
65-170°C at 5°C/min

Injection: Split, 250°C
Split ratio 30:1

Detector: FID, 300°C

Sample: 1 µL
0.25 ng/µL each analyte
in Hexane



- | | |
|------------------------|--------------------------|
| 1. 1,2-Dimethylbenzene | 8. (R)-(+)-Citronellal |
| 2. Myrcene | 9. 1S,2R,5S-(+)-Menthol |
| 3. (-)-Camphene | 10. 1R,2S,5R-(-)-Menthol |
| 4. (+)-Camphene | 11. α-Terpineol |
| 5. (+)-β-Pinene | 12. (+/-)-Isoborneol |
| 6. 1S-(-)-β-Pinene | 13. (+)-Borneol |
| 7. Cineole | 14. trans-Cinnamaldehyde |

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 µL tapered, FN 23-26s/42/HP, 5181-1273

Menthol

Column: Cyclodex- β
112-2532
30 m x 0.25 mm, 0.25 μ m

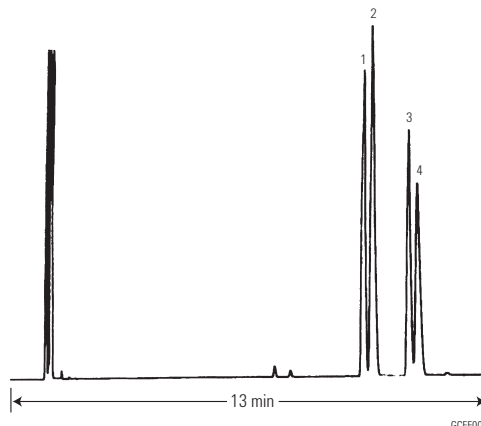
Carrier: Hydrogen, 55 cm/sec

Oven: 105°C isothermal

Injection: Split, 250°C
Split ratio 1:100

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Sample: 1 μ L of 1 μ g/ μ L each chloroform



- 1. (+)-Neomenthol
- 2. (-)- Neomenthol
- 3. (+)-Menthol
- 4. (-)-Menthol

Lemon Oil

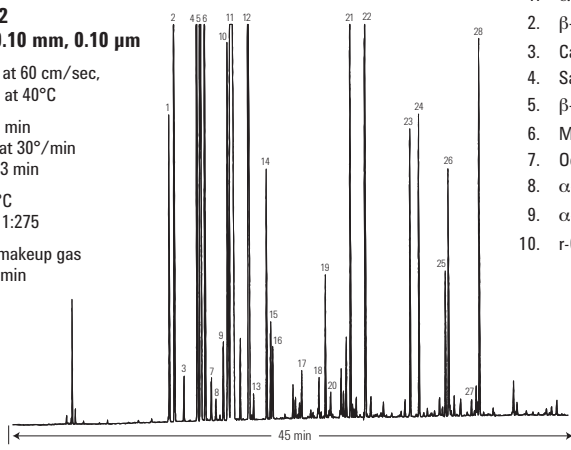
Column: DB-5
127-5022
20 m x 0.10 mm, 0.10 μ m

Carrier: Hydrogen at 60 cm/sec,
measured at 40°C

Oven: 40°C for 3 min
40-185°C at 30°/min
185°C for 3 min

Injection: Split, 275°C
Split ratio 1:275

Detector: Nitrogen makeup gas
at 30 mL/min



- | | | |
|---------------------------|-------------------------|----------------------------------|
| 1. α -Thujone | 11. δ -Limonene | 21. Neral |
| 2. β -Thujone | 12. γ -Trepinene | 22. Geranial |
| 3. Camphene | 13. Octanol | 23. Nerylacetate |
| 4. Sabinene | 14. Terpinolene | 24. Geranylacetate |
| 5. β -Pinene | 15. Linalool | 25. β -Caryophyllene |
| 6. Myrcene | 16. Nonanal | 26. trans- α -Bergamotene |
| 7. Octanal | 17. Citronellal | 27. α -Humulene |
| 8. α -Phellandrene | 18. Trepinen-4-ol | 28. β -Bisabolene |
| 9. α -Terpinene | 19. α -Trepineol | |
| 10. r-Cymene | 20. Decanal | |

Suggested Supplies

- Septum:** 11 mm Advanced Green septa, 5183-4759
- Liner:** Split, single taper, low pressure drop, glass wool, 5183-4647
- Seal:** Gold plated seal, 18740-20885
- Syringe:** 5 μ L tapered, FN 23-26s/42/HP, 5181-1273

Fast analysis of lemon oil using Rapid-MS

Column: Rapid MS

Sample: 0.3 μ L

Sample Conc: Pure lemon oil

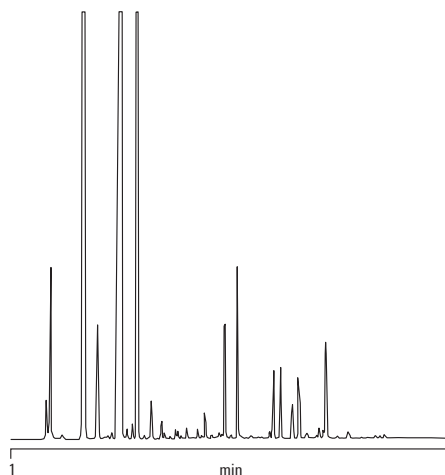
Solvent: Pure product

Carrier: He, 100 kPa (1.0 bar, 14 psi)

Oven: 40°C (2 min)
200°C, 20°C/min

Injection: Split

Detector: Ion Trap



VGC0017

Cold-Pressed Orange Oil

Column: DB-5
127-5022
20 m x 0.10 mm, 0.10 μ m

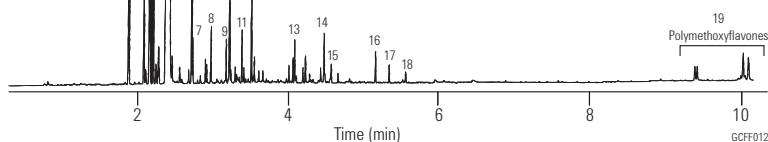
Carrier: Hydrogen at 60 cm/sec, measured at 70°C

Oven: 70°C for 1 min
70-250°C at 30°/min
250-310°C at 20°/min
310°C for 2 min

Injection: Split, 275°C
Split ratio 1:275

Detector: FID, 350°C
Nitrogen makeup gas at 30 mL/min

- | | |
|------------------------|-------------------------|
| 1. α -Pinene | 11. Neral |
| 2. Sabinene | 12. Geranial |
| 3. Myrcene | 13. Dodecenal |
| 4. Octanal | 14. Valencene |
| 5. Limonen | 15. Cadinene |
| 6. Linalool | 16. β -Sinensal |
| 7. Nonanal | 17. α -Sinensal |
| 8. Citronellal | 18. Nootkatone |
| 9. α -Terpineol | 19. Polymethoxyflavones |
| 10. Decanal | |



Chromatogram courtesy of Tastemaker

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 μ L tapered, FN 23-26s/42/HP, 5181-1273

Peppermint Oil

Column: DB-WAX
122-7062
60 m x 0.25 mm, 0.25 μ m

Carrier: Helium at 25 cm/sec
(0.73 mL/min)

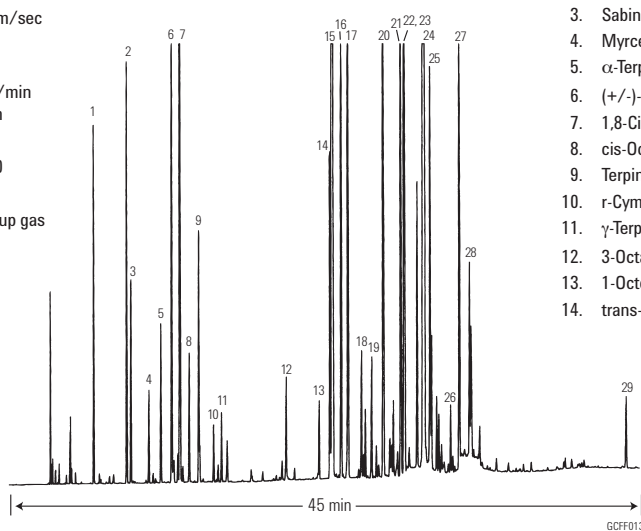
Oven: 75°C for 8 min
75-200°C at 4°/min
200°C for 5 min

Injection: Split, 270°C
Split ratio 1:150

Detector: FID, 270°C
Nitrogen makeup gas
at 30 mL/min

Sample: 1 μ L neat

- | | |
|----------------------------|----------------------------|
| 1. α -Pinene | 15. (+/-)-Methone |
| 2. β -Pinene | 16. Methofuran |
| 3. Sabinene | 17. d-Isomethone |
| 4. Myrcene | 18. β -Bourbonene |
| 5. α -Terpinene | 19. Linalool |
| 6. (+/-)-Limonene | 20. Menthyl acetate |
| 7. 1,8-Cineol | 21. Neomenthol |
| 8. cis- α -Cimene | 22. Trepinen-4-ol |
| 9. Terpinene | 23. β -Caryophyllene |
| 10. r-Cymene | 24. (+/-)-Menthol |
| 11. γ -Terpinolene | 25. Pulegone |
| 12. 3-Octanol | 26. α -Terpineol |
| 13. 1-Octen-3-ol | 27. Germacrene-D |
| 14. trans-Sabinene hydrate | 28. Piperitone |
| | 29. Viridiflorol |



Thanks to Mr. William Faas of A.M. Todd Company for providing the sample and assisting with peak identification.

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 μ L tapered, FN 23-26s/42/HP, 5181-1273

Spearmint Oil (Western)

Column: DB-WAX
122-7062
60 m x 0.25 mm, 0.25 µm

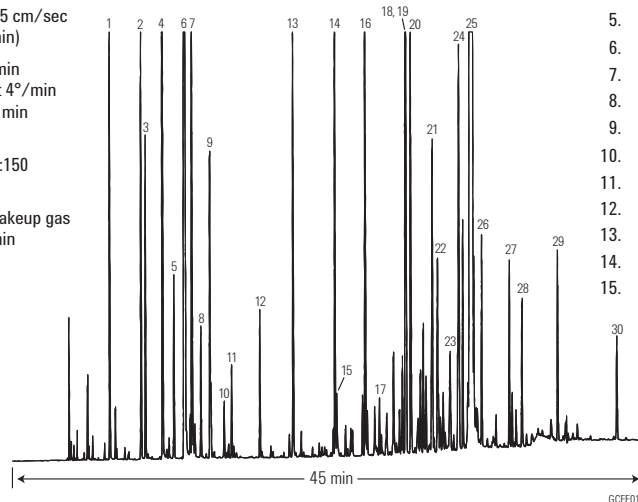
Carrier: Helium at 25 cm/sec
(0.73 mL/min)

Oven: 75°C for 8 min
75-200°C at 4°/min
200°C for 5 min

Injection: Split, 270°C
Split ratio 1:150

Detector: FID, 270°C
Nitrogen makeup gas
at 30 mL/min

Sample: 1 µL neat



- | | |
|----------------------------|-------------------------|
| 1. α-Pinene | 16. β-Bourbonene |
| 2. β-Pinene | 17. Linalool |
| 3. Sabinene | 18. Trepinen-4-ol |
| 4. Myrcene | 19. β-Caryophyllene |
| 5. α-Terpinene | 20. Dihydrocarvone |
| 6. (+/-)-Limonene | 21. trans-Dihydrocarvyl |
| 7. 1,8-Cineol | 22. trans-β-Farnesene |
| 8. cis-OCimene | 23. α-Terpineol |
| 9. γ-Terpinene | 24. Germacrene-D |
| 10. r-Cymene | 25. (+/-)-Carvone |
| 11. Terpinolene | 26. cis-Carvylacetate |
| 12. 3-Octylacetate | 27. trans-Carveol |
| 13. 3-Octanol | 28. cis-Carveol |
| 14. trans-Sabinene hydrate | 29. cis-Jasmone |
| 15. (+/-)-Methone | 30. Viridiflorol |

Suggested Supplies

- Septum:** 11 mm Advanced Green septa, 5183-4759
- Liner:** Split, single taper, low pressure drop, glass wool, 5183-4647
- Seal:** Gold plated seal, 18740-20885
- Syringe:** 5 µL tapered, FN 23-26s/42/HP, 5181-1273

Thanks to Mr. William Faas of A.M. Todd Company for providing the sample and assisting with peak identification.

Ylang Ylang Oil

Column: DB-XLB
122-1232
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 34 cm/sec, measured at 50°C

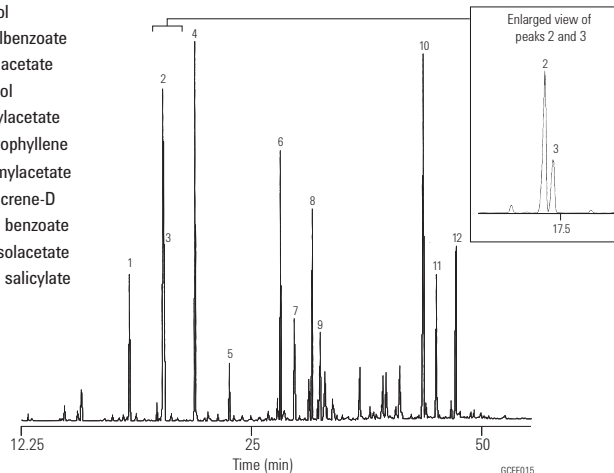
Oven: 50°C for 1 min
50-250°C at 3.5°/min

Injection: Split, 250°C
Split ratio 1:125

Detector: MSD, 310°C transfer line
full scan at m/z 35-550

Sample: 1 µL of 10% oil in methylene chloride

1. r-Methylansiole
2. Linalool
3. Methylbenzoate
4. Benzylacetate
5. Geraniol
6. Geranylacetate
7. β-Caryophyllene
8. Cinnamylacetate
9. Germacrene-D
10. Benzyl benzoate
11. Faneosolacetate
12. Benzyl salicylate



Suggested Supplies

- Septum:** 11 mm Advanced Green septa, 5183-4759
- Liner:** Split, single taper, low pressure drop, glass wool, 5183-4647
- Seal:** Gold plated seal, 18740-20885
- Syringe:** 5 µL tapered, FN 23-26s/42/HP, 5181-1273

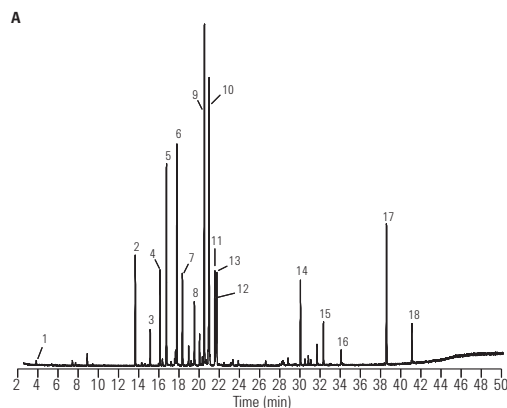
Ylang Ylang Oil II

Column: DB-WAX
121-7022
20 m x 0.18 mm, 0.18 μm

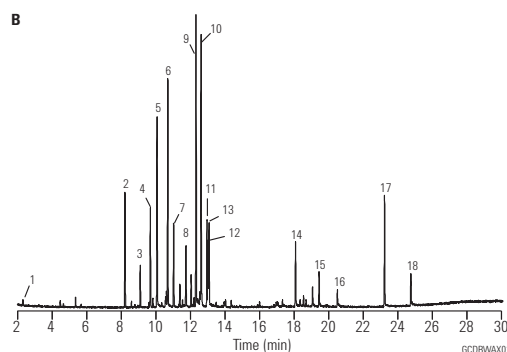
Carrier: A: Helium 26.3 cm/sec measured at 45°C
 B: Hydrogen 44.3 cm/sec measured at 45 °C

Oven: A: 45°C hold 1.28 min
 4.68°C/min to 250°C hold 21.81 min

B: 45°C hold 0.77 min
 7.79°C/min to 250°C hold 13.09 min



1. α-Pinene
2. Methyl-p-cresol
3. α-Copaene
4. α-Gurjunene
5. Linalool
6. β-Caryophyllene
7. Methyl benzoate
8. α-Caryophyllene
9. Germacrene-d
10. Benzyl acetate
11. Farnescene
12. δ-Cadinene
13. Geranial acetate
14. trans-Cinnamyl acetate
15. β-Bisbolene
16. Farnesyl acetate
17. Benzyl benzoate
18. Benzyl salicylate


Rosemary Oil

Column: Cyclosil-B
112-6632
30 m x 0.25 mm, 0.25 μm

Carrier: Hydrogen at 40 cm/sec,
 measured at 60°C

Oven: 55°C for 1 min
 50-180°C at 5°/min

Injection: Split, 250°C
 Split ratio 50:1

Detector: FID, 340°C

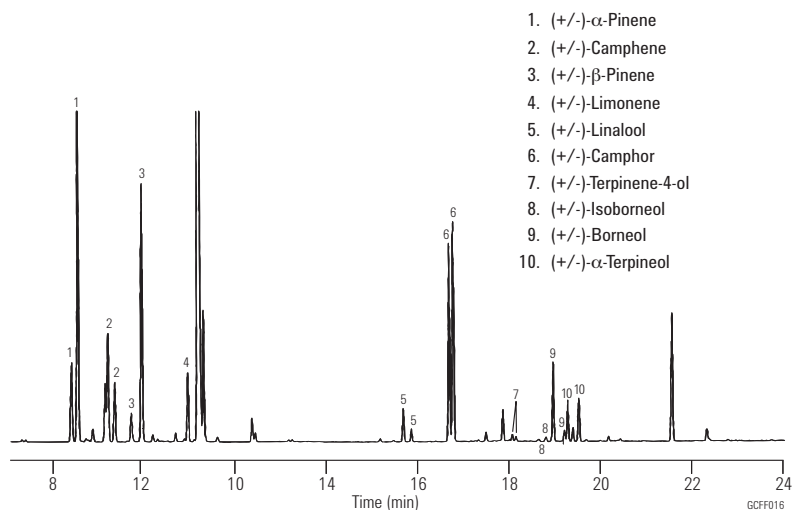
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop,
 glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 μL tapered, FN 23-26s/42/HP,
 5181-1273



1. (+/-)-α-Pinene
2. (+/-)-Camphene
3. (+/-)-β-Pinene
4. (+/-)-Limonene
5. (+/-)-Linalool
6. (+/-)-Camphor
7. (+/-)-Terpinene-4-ol
8. (+/-)-Isoborneol
9. (+/-)-Borneol
10. (+/-)-α-Terpineol

Citrus Flavored Carbonated Beverage (Soda)

Column: Cyclosil-B
112-6632
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 37 cm/sec,
measured at 40°C

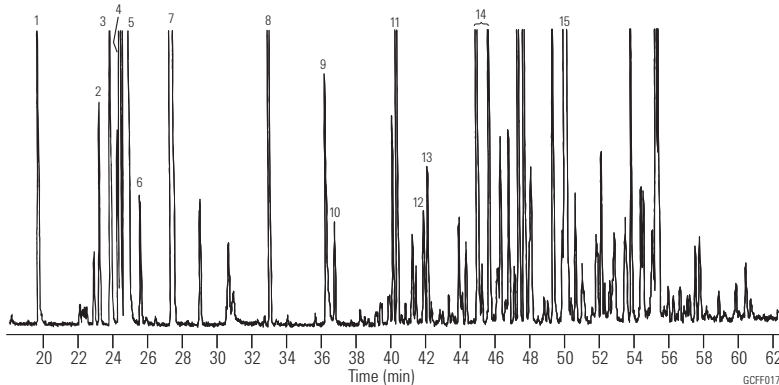
Oven: 40-190°C at 2 min

Sampler: Headspace
no stir, NaCl 1g/10 mL sample
Adsorption: 27°C for 68 min
Desorption: 250°C for 15 min

Injection: Split, 1:5
Polyacrylate fiber, 85 µm

Detector: MSD, 280°C transfer line

- | | |
|------------------|----------------------|
| 1. S(-)-Limonene | 7. 2-Ethyl-1-Hexanol |
| 2. p-Cymene | 8. Linalool |
| 3. (+)-Limonene | 9. Decanol |
| 4. Octanol | 10. Terpinen-4-ol |
| 5. γ-Terpinene | 11. Phenethylalcohol |
| 6. Nonanol | 12. α-Terpineol |
| | 13. BHT |



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop,
glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP,
5181-1273

Alcohol Beverage Standard

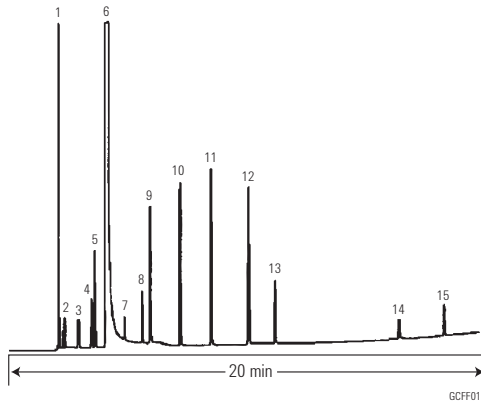
Column: HP-FFAP
19091F-105
50 m x 0.20 mm, 0.30 µm

Carrier: Hydrogen

Oven: 60°C for 4 min
60-200°C at 6°C/min
200°C for 2 min

Detector: FID

1. Acetaldehyde
2. Acetone
3. Ethyl formate
4. Ethyl acetate
5. Methanol
6. Ethanol
7. Diacetyl
8. sec-Butanol
9. n-Propanol
10. Isobutanol
11. n-Butanol
12. Isoamyl alcohol
13. n-Amyl alcohol
14. Acetic acid
15. Propionic acid



Bourbon

Column: HP-INNOWax
19091N-133
30 m x 0.25 mm, 0.25 µm

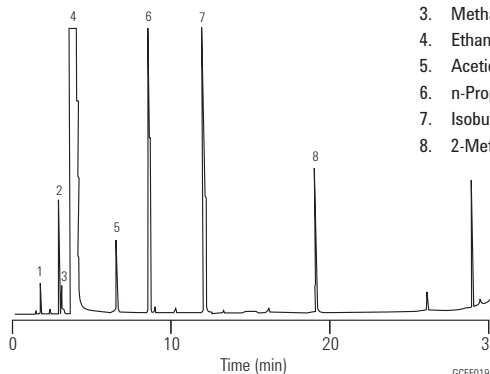
Carrier: Helium, 33 cm/sec, 15.5 psi (35°C)
1.5 mL/min constant flow

Oven: 35°C for 5 min
35-150°C at 5°C/min
150-250°C at 20°C/min
250°C for 2 min

Injection: Split, 220°C
Split ratio 25:1

Detector: FID 280°C

Sample: 1 µL



1. Acetaldehyde
2. Ethyl acetate
3. Methanol
4. Ethanol
5. Acetic acid
6. n-Propanol
7. Isobutanol
8. 2-Methyl-1-butanol or 3-Methyl-1-Butanol

Alditol Acetates

Column: DB-225
122-2231
30 m x 0.25 mm, 0.15 µm

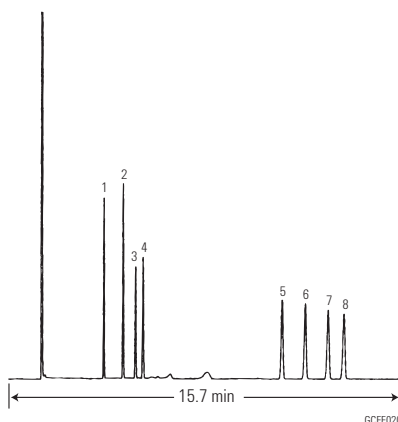
Carrier: Hydrogen a 36.5 cm/sec

Oven: 220°C isothermal

Injection: Split, 225°C
Split ratio 1:50

Detector: FID, 250°C
Nitrogen makeup gas at 30 mL/min

Sample: 1 µL



1. Rhamnitol
2. Fucitol
3. Ribitol
4. Arabinitol
5. Mannitol
6. Galactitol
7. Glucitol
8. Inositol

Strawberry Syrup

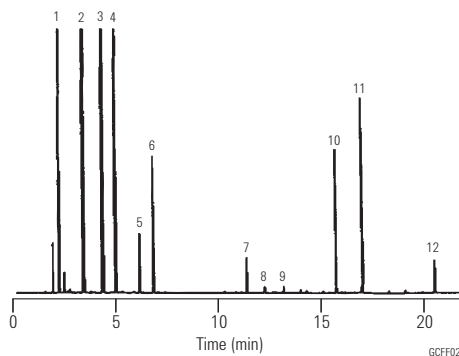
Column: HP-INNOWax
19091N-213
30 m x 0.32 mm, 0.50 µm

Carrier: Helium, 40 cm/sec, 11.7 psi (60°C)
2.5 mL/min constant flow

Oven: 60°C for 1 min
60-250°C at 10°C/min
250°C for 2 min

Injection: Split, 220°C
Split ratio 60:1

Detector: FID 275°C

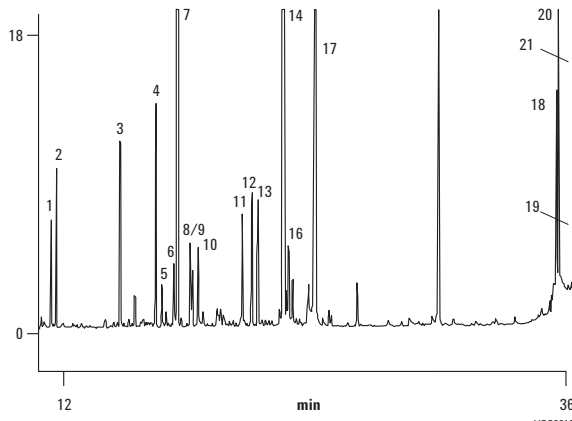


1. Ethyl acetate
2. Ethyl butyrate
3. Isoamyl acetate
4. Amyl acetate
5. Isoamyl butyrate
6. Amyl butyrate
7. Ethyl benzoate
8. Citronellol
9. Geraniol
10. Ethyl-3-phenyl oxiran carboxylate
11. Strawberry aldehyde
12. Benzyl benzoate

Separation of TMS-derivatized sugars using VF-1ms

Column: VF-1ms
CP8912
30 m x 0.25 mm, 0.25 µm

Sample: 5 µL, splitless 1 µL
Sample Conc: 40 ppb
Carrier: He, 1.0 mL/min
Oven: 105°C to 240°C, 4°C/min to 300°C, 20°C/min
Injection: Split; 1:15
Detector: MS

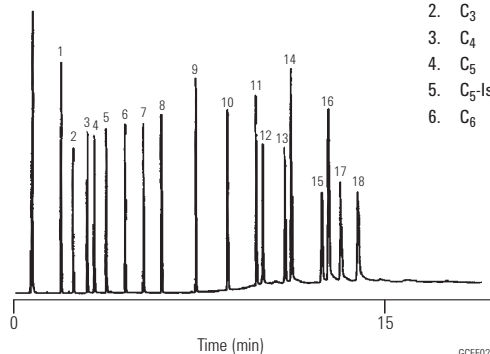


1. Threitol
2. Erythritol
3. Rhamnose 1
4. Rhamnose 2
5. Xylose 1
6. Arabitol
7. Ribitol
8. 3-O-Methylglucose 1
9. Xylose 2
10. Rhamnitol
11. 3-O-Methylglucose 2
12. Glucuron acid-1,5-lacton
13. Ribose 2
14. Manitol
15. Sorbitol (not identified)
16. Galactitol
17. Glucuron acid
18. Lactulose
19. Lactose
20. Sucrose
21. Threhalose

Free Fatty Acids

Column: HP-INNOWax
19091N-133
30 m x 0.25 mm, 0.25 µm

Carrier: Helium 42 cm/sec, 24 psi (120°C) 1.8 mL/min constant flow
Oven: 120°C for 1 min
120-250°C at 10°C/min
250°C for 5 min
Injection: Split, 250°C
Split ratio 40:1
Detector: FID 280°C
Sample: 1 µL
0.05 to 0.11% each in methylene chloride



- | | | |
|------------------------|-----------------------|-----------------------|
| 1. C ₂ | 7. C ₇ | 13. C ₁₆ |
| 2. C ₃ | 8. C ₈ | 14. C _{16:1} |
| 3. C ₄ | 9. C ₁₀ | 15. C ₁₈ |
| 4. C ₅ | 10. C ₁₂ | 16. C _{18:1} |
| 5. C ₅ -Iso | 11. C ₁₄ | 17. C _{18:2} |
| 6. C ₆ | 12. C _{14:1} | 18. C _{18:3} |

Suggested Supplies

- Septum:** 11 mm Advanced Green septa, 5183-4759
- Liner:** Split, single taper, low pressure drop, glass wool, 5183-4647
- Seal:** Gold plated seal, 18740-20885
- Syringe:** 5 µL tapered, FN 23-26s/42/HP, 5181-1273



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Organic Acids

Column: DB-FFAP
122-3232
30 m x 0.25 mm, 0.25 µm

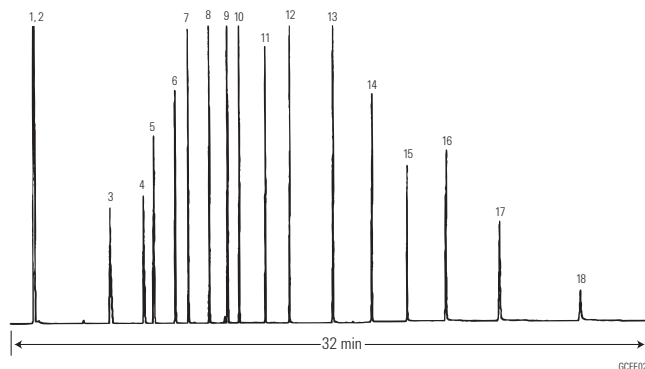
Carrier: Helium at 40 cm/sec, measured at 100°C

Oven: 100°C for 5 min
 100-250°C at 10°/min
 250°C for 12 min

Injection: Split, 250°C
 Split ratio 1:50

Detector: FID, 300°C
 Nitrogen makeup gas at 30 mL/min

- | | | |
|--------------------|----------------------------------|--------------------------------------|
| 1. Acetone | 7. Isovaleric acid | 13. Decanoic acid |
| 2. Formic acid | 8. Valeric acid (pentanoic acid) | 14. Dodecanoic acid |
| 3. Acetic acid | 9. Isocaproic acid | 15. Tetradecanoic acid |
| 4. Propionic acid | 10. Caproic acid (hexanoic acid) | 16. Hexadecanoic acid |
| 5. Isobutyric acid | 11. Heptanoic acid | 17. Octadecanoic acid |
| 6. Butyric acid | 12. Octanoic acid | 18. Arachidic acid (eicosanoic acid) |



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP, 5181-1273

Acids

Column: VF-WAXms
CP9205
30 m x 0.25 mm, 0.25 µm

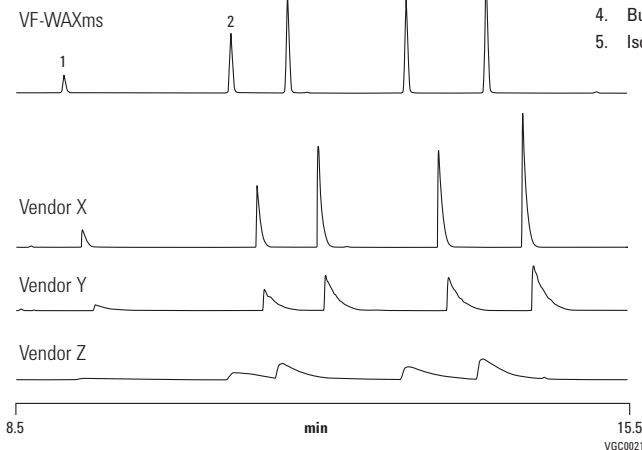
Sample: Acid sample, 0.1% (Cyclohexane), 1.0 µL

Carrier: Hydrogen, 75 kPa

Oven: 60°C to 200°C, 5°C/min

Injection: 250 °C, split 100 mL/min

- | |
|---------------------|
| 1. Acetic acid |
| 2. Propionic acid |
| 3. Iso-butyric acid |
| 4. Butyric acid |
| 5. Iso-valeric acid |



Bacterial Fatty Acid Methyl Esters

Column: DB-5
122-5032
30 m x 0.25 mm, 0.25 µm

Carrier: Hydrogen at 42 cm/sec

Oven: 150°C for 4 min
 150-250°C at 4°/min

Injection: Split ratio 1:100

Detector: FID
 Nitrogen makeup gas at 30 mL/min

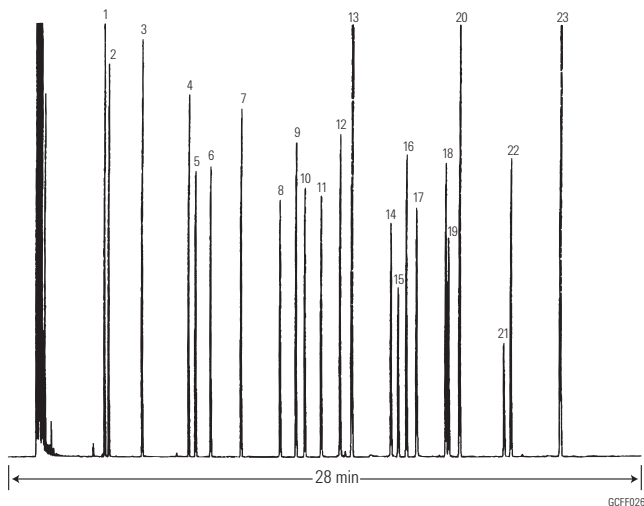
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP, 5181-1273



- | | |
|---------------------------------|---|
| 1. C _{11:0} | Methylundecanoate |
| 2. 2-OH C _{10:0} | Methyl 2-hydroxydecanoate |
| 3. C _{12:0} | Methyl laurate |
| 4. C _{13:0} | Methyl tridecanoate |
| 5. 2-OH C _{12:0} | Methyl 2-hydroxydodecanoate |
| 6. 3-OH C _{12:0} | Methyl 3-hydroxydodecanoate |
| 7. C _{14:0} | Methyl myristate |
| 8. 12-Me C _{14:0} | Methyl 12-methyltetradecanoate |
| 9. C _{15:0} | Methyl pentadecanoate |
| 10. 2-OH C _{14:0} | Methyl 2-hydroxytetradecanoate |
| 11. 3-OH C _{14:0} | Methyl 3-hydroxytetradecanoate |
| 12. C _{16:1} | Methyl palmitoleate |
| 13. C _{16:0} | Methyl palmitate |
| 14. 14-Me C _{16:0} | Methyl 14-methylhexadecanoate |
| 15. 9,10-diMe C _{16:0} | Methyl cis-9,10-methyl hexadecanoate |
| 16. C _{17:0} | Methyl heptadecanoate |
| 17. 2-OH C _{16:0} | Methyl 2-hydroxyhexadecanoate |
| 18. C _{18:1} | Methyl oleate |
| 19. C _{18:1} | Methyl elaidate |
| 20. C _{18:0} | Methyl stearate |
| 21. 9,10-diMe C _{18:0} | Methyl cis-9,10-methylene octadecanoate |
| 22. C _{19:0} | Methyl nonadecanoate |
| 23. C _{20:0} | Methyl arachidate |



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

FAMES I

Column: DB-23
 122-2362
 60 m x 0.25 mm, 0.25 μ m

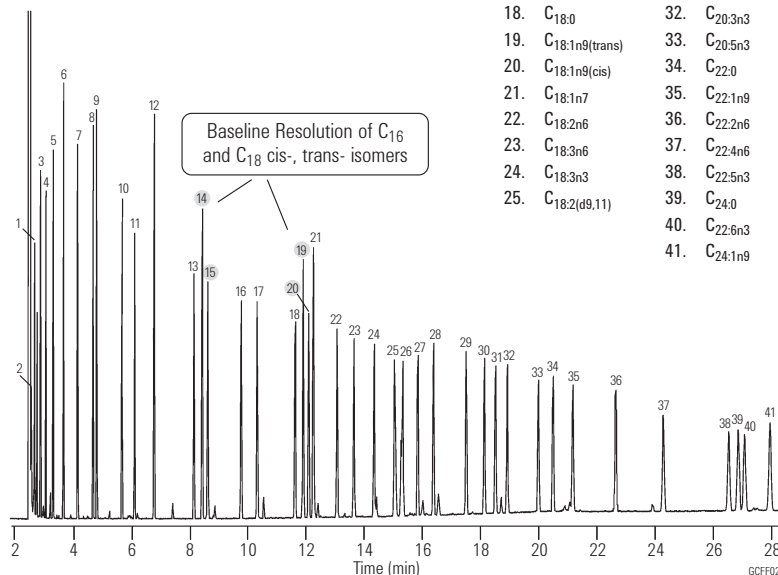
Carrier: Hydrogen at 43 cm/sec
 Constant pressure mode

Oven: 130°C for 1.0 min
 130-170°C at 6.5°C/min
 170-215°C at 2.75°C/min
 215°C for 12 min
 215-230°C at 40°C/min
 230°C for 3 min

Injection: Split, 270°C
 Split ratio 50:1

Detector: FID, 280°C

- | | | | |
|----------------------|-------------------------|--------------------------------|-------------------------------|
| 1. C _{6:0} | 6. C _{11:0} | 12. C _{15:0} | 26. C _{18:2(d10,12)} |
| 2. C _{7:0} | 7. C _{12:0} | 13. C _{16:0} | 27. C _{20:0} |
| 3. C _{8:0} | 8. BHT | 14. C _{16:1n7(trans)} | 28. C _{20:1n9} |
| 4. C _{9:0} | 9. C _{13:0} | 15. C _{16:1n7(cis)} | 29. C _{20:2n6} |
| 5. C _{10:0} | 10. C _{14:0} | 16. C _{17:0} | 30. C _{20:3n6} |
| | 11. C _{14:1n5} | 17. C _{17:1} | 31. C _{20:4n6} |
| | | 18. C _{18:0} | 32. C _{20:3n3} |
| | | 19. C _{18:1n9(trans)} | 33. C _{20:5n3} |
| | | 20. C _{18:1n9(cis)} | 34. C _{22:0} |
| | | 21. C _{18:1n7} | 35. C _{22:1n9} |
| | | 22. C _{18:2n6} | 36. C _{22:2n6} |
| | | 23. C _{18:3n6} | 37. C _{22:4n6} |
| | | 24. C _{18:3n3} | 38. C _{22:5n3} |
| | | 25. C _{18:2(d9,11)} | 39. C _{24:0} |
| | | | 40. C _{22:6n3} |
| | | | 41. C _{24:1n9} |



Chromatogram provided courtesy of Steve Watkins and
 Jeremy Ching, FAME Analytics, <http://www.fameanalytics.com>

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop,
 glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 μ L tapered, FN 23-26s/42/HP,
 5181-1273

FAMES II

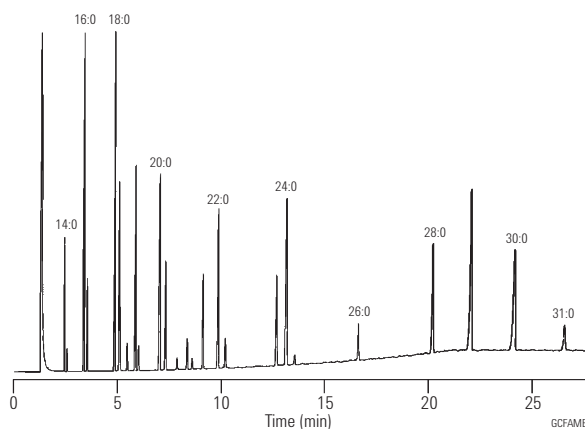
Column: DB-225ms
 122-2932
 30 m x 0.25 mm, 0.25 μ m

Carrier: Hydrogen at 40 cm/sec

Oven: 200°C for 1 min
 200-260°C at 3°/min

Injection: Split 1:50, 250°C

Detector: FID
 Nitrogen make-up gas at 30 mL/min



The higher isothermal upper temperature limit of DB-225ms (260°C vs. 220°C for DB-225) allows the elution of higher molecular weight FAMES (above 24:0) while maintaining a reasonable run time.

Separation of cis/trans FAME isomers

Column: Select FAME
CP7421
200 m x 0.25 mm

Sample: 0.5 µL

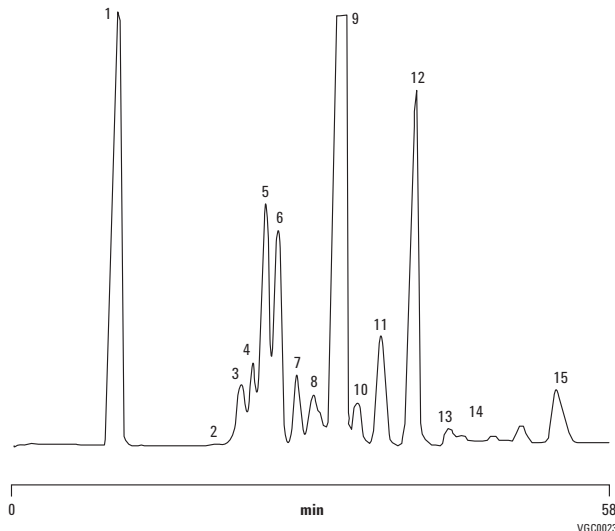
Sample Conc: Ca. 5 g per component on the column

Carrier: Helium, 520 kPa

Oven: 185°C

Injection: Split, 1:20

Detector: FID



1. C18:0
2. C18:1 7 trans
3. C18:1 8 trans
4. C18:1 9 trans
5. C18:1 10 trans
6. C18:1 11 trans
7. C18:1 12 trans
8. C18:1 13 trans + ?
9. C18:1 9 cls
10. C18:1 10 cls
11. C18:1 11 cls
12. C18:1 12 cls
13. C18:1 13 cls
14. C18:1 14 cls
15. C18:1 15 cls

69 Component FAME Mix

Column: HP-88
112-8867
60 m x 0.25 mm, 0.2 µm

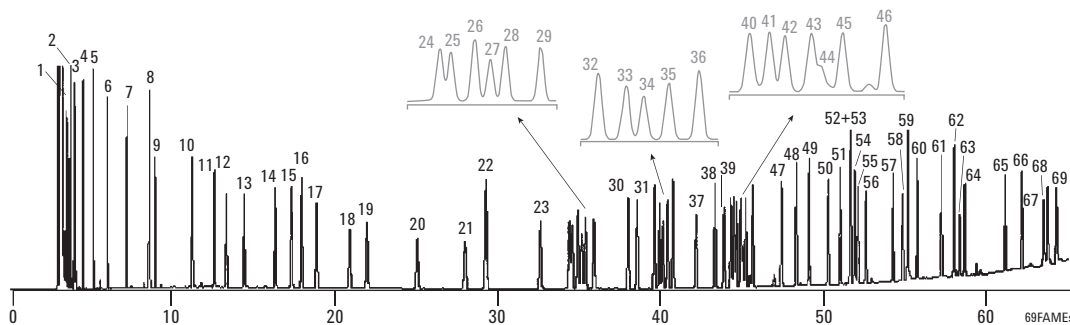
Carrier: He at 1.4 mL/min constant flow

Oven: 125°C
125°C to 145°C at 8°/min
145°C for 26 min
145°C to 220°C at 2°/min
220°C for 1 min

Injection: Split, 250°C
Split ratio 50:1
1 µL of 70 ppm each in CHCl₃

Detector: FID, 260°C

- | | | | | |
|-----------------|---------------------|------------------------|---------------------------|----------------------------|
| 1. nC6:0 | 16. C15:1 (14c) | 31. C19:1 (10t) | 46. C18:2 (10t,12c) | 61. nC24:0 |
| 2. nC7:0 | 17. nC16:0 | 32. nC19:0 | 47. nC21:0 | 62. C22:3 (13c,16c,19c) |
| 3. nC8:0 | 18. C16:1 (9t) | 33. C19:1 (7t) | 48. C20:2 (11c,14c) | 63. C22:4 (7c,10c,13c,16c) |
| 4. nC9:0 | 19. C16:1 (9c) | 34. C18:2 (9c,12c) | 49. C21:1 (12c) | 64. C24:1 (15c) |
| 5. nC10:0 | 20. nC17:0 | 35. C19:1 (7c) | 50. C20:3 (8c,11c,14c) | 65. C22:5 (DPA) |
| 6. nC11:0 | 21. C17:1 (10t) | 36. C19:1 (10c) | 51. nC22:0 | 66. C22:6 (DHA) |
| 7. nC12:0 | 22. C17:1 (10c) | 37. C18:3 g(6c,9c,12c) | 52. C22:1 (13t) | 67. C18:1-12 Hydroxy (9t) |
| 8. C12:1 (11c) | 23. nC18:0 | 38. nC20:0 | 53. C20:4 (5c,8c,11c,14c) | 68. C18:0 12 Hydroxy |
| 9. nC13:0 | 24. C18:1 (6t) | 39. C18:3 (9c,12c,15c) | 54. C20:3 (11c,14c,17c) | 69. C18:1-12 Hydroxy (9c) |
| 10. nC14:0 | 25. C18:1 (9t) | 40. C20:1 (5c) | 55. C21:2 (12c,15c) | |
| 11. C14:1 (9t) | 26. C18:1 (11t) | 41. C19:2 (10c,13c) | 56. C22:1 (13c) | |
| 12. C14:1 (9c) | 27. nC18:1 (6c) | 42. C20:1 (11t) | 57. nC23:0 | |
| 13. nC15:0 | 28. C18:1 (9c) | 43. C18:2 CONJ | 58. C20:5 (EPA) | |
| 14. C15:1 (10t) | 29. C18:1 (11c) | 44. C20:1 (8c) | 59. C22:2 (13c,16c) | |
| 15. C15:1 (10c) | 30. nC18:2 (9t,12t) | 45. C20:1 (11c) | 60. C23:1 (14c) | |



FAME Standard I

Column: DB-WAX
127-7012
10 m x 0.10 mm, 0.10 µm

Carrier: Hydrogen at 77 cm/sec,
measured at 40°C

Oven: 40°C for 0.5 min
40-195°C at 25°/min
195-205°C at 3°/min
205-230°C at 8°/min
230°C for 1 min

Injection: Split, 250°C
Split ratio 1:30

Detector: FID, 250°C

Suggested Supplies

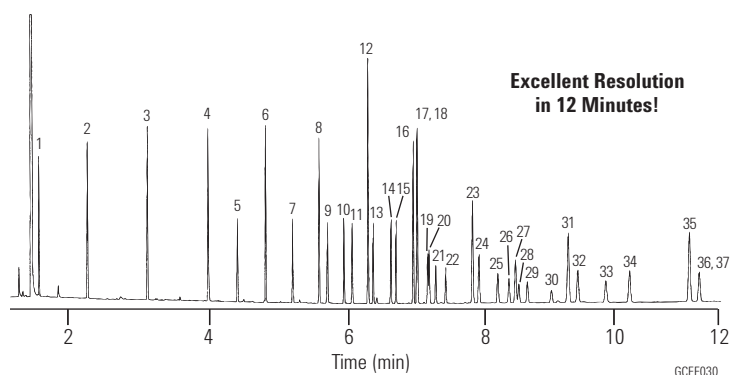
Septum: 11 mm Advanced Green septa,
5183-4759

Liner: Split, single taper, low pressure
drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP,
5181-1273

1. Butyric acid methyl ester (C_{4:0})
2. Caproic acid methyl ester (C_{6:0})
3. Caprylic acid methyl ester (C_{8:0})
4. Capric acid methyl ester (C_{10:0})
5. Undecanoic acid methyl ester (C_{11:0})
6. Lauric acid methyl ester (C_{12:0})
7. Tridecanoic acid methyl ester (C_{13:0})
8. Myristic acid methyl ester (C_{14:0})
9. Myristoleic acid methyl ester (C_{14:1})
10. Pentadecanoic acid methyl ester (C_{15:0})
11. cis-10-Pentadecenoic acid methyl ester (C_{15:1})
12. Palmitic acid methyl ester (C_{16:0})
13. Palmitoleic acid methyl ester (C_{16:1})
14. Heptadecanoic acid methyl ester (C_{17:0})
15. cis-10-Heptadecenoic acid methyl ester (C_{17:1})
16. Stearic acid methyl ester (C_{18:0})
17. Oleic acid methyl ester (C_{18:1n9c})
18. Elaidic acid methyl ester (C_{18:1n9t})
19. Linoleic acid methyl ester (C_{18:2n6c})
20. Linolelaidic acid methyl ester (C_{18:2n6t})
21. γ-Linolenic acid methyl ester (C_{18:3n6})
22. Linolenic acid methyl ester (C_{18:3n3})
23. Arachidic acid methyl ester (C_{20:0})
24. cis-11-Eicosenoic acid methyl ester (C_{20:1})
25. cis-11,14-Eicosadienoic acid methyl ester (C_{20:2})
26. cis-8,11,14-Eicosatrienoic acid methyl ester (C_{20:3n6})
27. Heneicosanoic acid methyl ester (C_{21:0})
28. cis-11,14,17-Eicosatrienoic acid methyl ester (C_{20:3n3})
29. Arachidonic acid methyl ester (C_{20:4n6})
30. cis-5,8,11,14,17-Eicosapentaenoic acid methyl ester (C_{20:5n3})
31. Behenic acid methyl ester (C_{22:0})
32. Erucic acid methyl ester (C_{22:1n9})
33. cis-13,16-Docosadienoic acid methyl ester (C_{22:2})
34. Tricosanoic acid methyl ester (C_{23:0})
35. Lignoceric acid methyl ester (C_{24:0})
36. cis-4,7,10,13,16,19-Docosahexaenoic acid methyl ester (C_{22:6n3})
37. Nervonic acid methyl ester (C_{24:1})



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

FAME Standard II

Column: DB-225
127-2222
20 m x 0.10 mm, 0.10 µm

Carrier: Hydrogen at 59.3 cm/sec,
measured at 35°C

Oven: 35° for 0.5 min
35-195°C at 25°/min
195-205°C at 3°/min
205-230°C at 8°/min
230°C for 1 min

Injection: Split, 250°C
Split ratio 1:30

Detector: FID, 250°C

Suggested Supplies

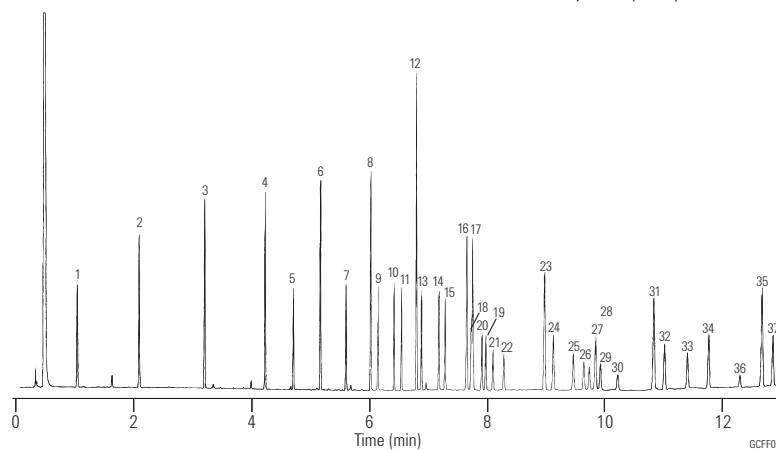
Septum: 11 mm Advanced Green septa,
5183-4759

Liner: Split, single taper, low pressure
drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP,
5181-1273

1. Butyric acid methyl ester (C4:0)
2. Caproic acid methyl ester (C6:0)
3. Caprylic acid methyl ester (C8:0)
4. Capric acid methyl ester (C10:0)
5. Undecanoic acid methyl ester (C11:0)
6. Lauric acid methyl ester (C12:0)
7. Tridecanoic acid methyl ester (C13:0)
8. Myristic acid methyl ester (C14:0)
9. Myristoleic acid methyl ester (C14:1)
10. Pentadecanoic acid methyl ester (C15:0)
11. cis-10-Pentadecenoic acid methyl ester (C15:1)
12. Palmitic acid methyl ester (C16:0)
13. Palmitoleic acid methyl ester (C16:1)
14. Heptadecanoic acid methyl ester (C17:0)
15. cis-10-Heptadecenoic acid methyl ester (C17:1)
16. Stearic acid methyl ester (C18:0)
17. Oleic acid methyl ester (C18:1n9c)
18. Elaidic acid methyl ester (C18:1n9t)
19. Linoleic acid methyl ester (C18:2n6c)
20. Linolelaidic acid methyl ester (C18:2n6t)
21. γ-Linolenic acid methyl ester (C18:3n3)
22. Linolenic acid methyl ester (C18:3n3)
23. Arachidic acid methyl ester (C20:0)
24. cis-11-Eicosenoic acid methyl ester (C20:1)
25. cis-11,14-Eicosadienoic acid methyl ester (C20:2)
26. cis-8,11,14-Eicosatrienoic acid methyl ester (C20:3n6)
27. Heneicosanoic acid methyl ester (C21:0)
28. cis-11,14,17-Eicosatrienoic acid methyl ester (C20:3n3)
29. Arachidonic acid methyl ester (C20:4n6)
30. cis-5,8,11,14,17-Eicosapentaenoic acid methyl ester (C20:5n3)
31. Behenic acid methyl ester (C22:0)
32. Erucic acid methyl ester (C22:1n9)
33. cis-13,16-Docosadienoic acid methyl ester (C22:2)
34. Tricosanoic acid methyl ester (C23:0)
35. Lignoceric acid methyl ester (C24:0)
36. cis-4,7,10,13,16,19-Docosahexaenoic acid methyl ester (C22:6n3)
37. Nervonic acid methyl ester (C24:1)



GCFF031

**Canola Oil Margarine
Partially Hydrogenated FAMES
AOCS Method 1c-89**

Column: DB-23
122-2362
60 m x 0.25 mm, 0.25 μ m

Carrier: Helium at 15 cm/sec (0.44 mL/min),
measured at 150°C

Oven: 150-200°C at 1.3°/min
200°C for 10 min

Injection: Split, 210°C
Split 1:100

Detector: FID, 210°C

Sample: 1 μ L

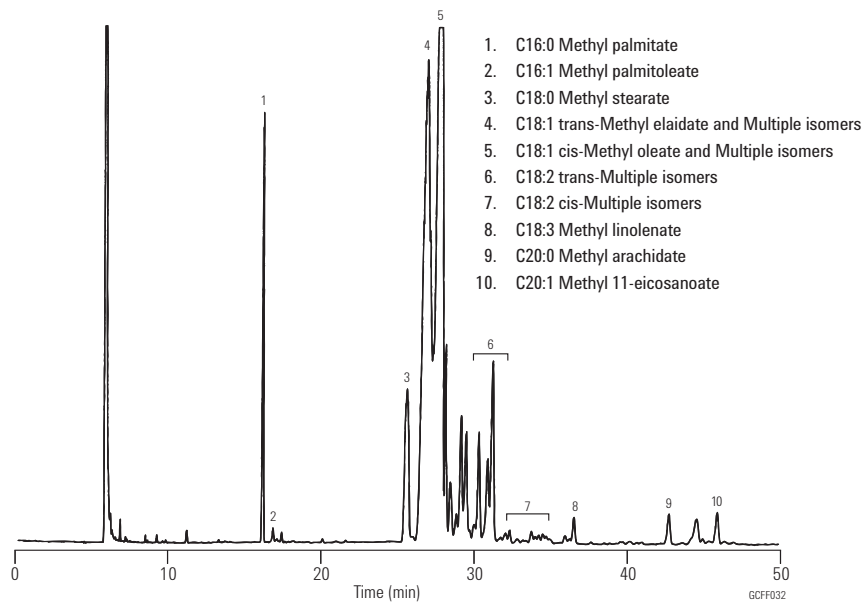
Suggested Supplies

Septum: 11 mm Advanced Green septa,
5183-4759

Liner: Split, single taper, low pressure
drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 μ L tapered, FN 23-26s/42/HP,
5181-1273



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Butter Triglycerides I

Column: DB-5ht
123-5731
30 m x 0.32 mm, 0.10 µm

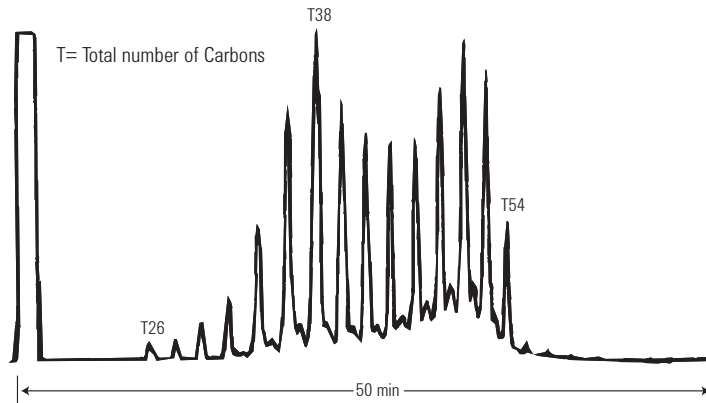
Carrier: Hydrogen at 55 cm/sec, measured at 250°C

Oven: 35-250°C at 70°/min
250-400°C at 5°/min
400°C for 20 min

Injection: Cool on-column

Detector: FID, 400°C
Nitrogen makeup gas at 30 mL/min
Baseline corrected

Sample: 1 µL of 9 µg/µL in toluene
(approx. 1% w/w solution)



Butter Triglycerides II

Column: DB-17ht
123-1831
30 m x 0.32 mm, 0.15 µm

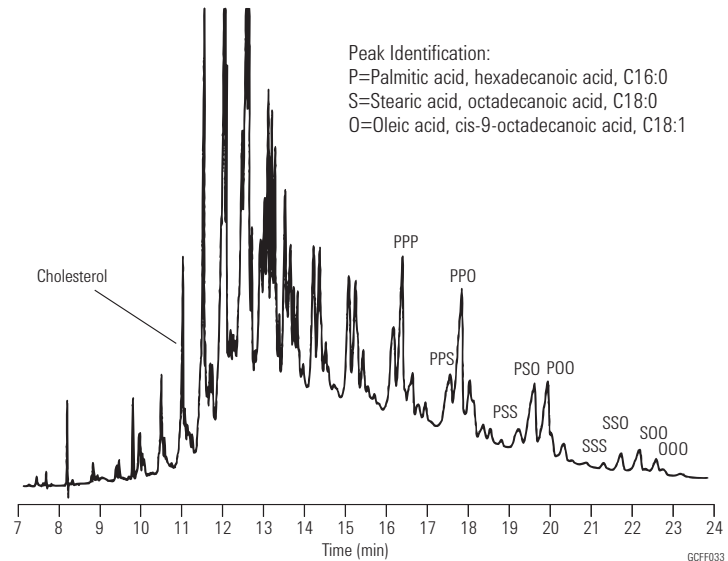
Carrier: Hydrogen at 40 cm/sec

Oven: 250-365°C at 5°/min
365°C for 1 min

Injection: Cool on-column

Detector: FID, 400°C
Nitrogen makeup gas at 30 mL/min
Baseline corrected

Sample: 1 µL of 9 µg/µL in toluene
(approx. 1% w/w solution)



Fast screening of FAME isomers in butter

Column: VF-23ms
 CP8822
 30 m x 0.25 mm, 0.25 µm

Sample: 0.5 µL ca. 5 ng per component on column

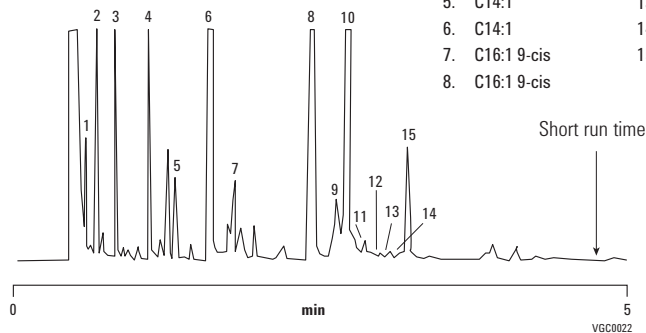
Carrier: Hydrogen, 70 kPa

Oven: 185°C

Injection: Split, 1:100
 T=275°C

Detector: FID

- | | |
|----------------|-----------------------------|
| 1. C8:0 | 9. C18:1 trans |
| 2. C10:0 | 10. C18:1 9-cis |
| 3. C12:0 | 11. C18:1 13-cis |
| 4. C14:0 | 12. C18:2 9-trans, 12-trans |
| 5. C14:1 | 13. C18:2 9-cis, 12-trans |
| 6. C14:1 | 14. C18:2 9-trans, 12-cis |
| 7. C16:1 9-cis | 15. C18:2 9-cis, 12-cis |
| 8. C16:1 9-cis | |



Triglycerides C28-C54

Column: VF-1ms
 CP8907
 15 m x 0.25 mm, 0.25 µm

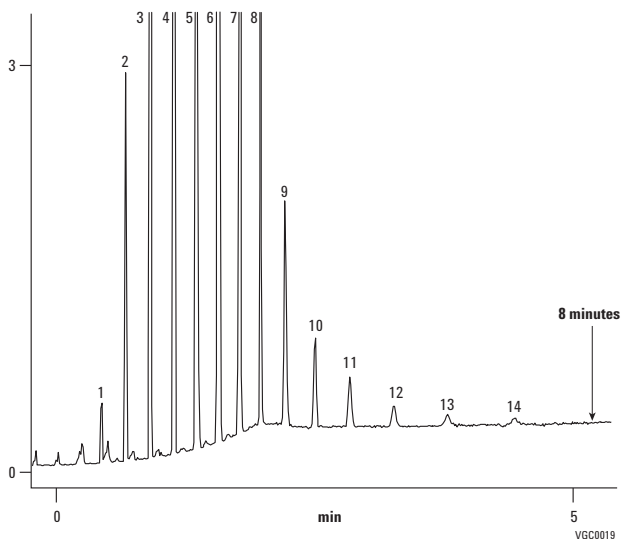
Carrier: Helium, 2 mL/min

Oven: 250°C to 375°C, 35°C

Injection: Split 1:10, T=340°C

Detector: MS-1200L Triple Quad operated in single quad mode

- | |
|-------------|
| 1. Tri-C28 |
| 2. Tri-C30 |
| 3. Tri-C32 |
| 4. Tri-C34 |
| 5. Tri-C36 |
| 6. Tri-C38 |
| 7. Tri-C40 |
| 8. Tri-C42 |
| 9. Tri-C44 |
| 10. Tri-C46 |
| 11. Tri-C48 |
| 12. Tri-C50 |
| 13. Tri-C52 |
| 14. Tri-C54 |



Pesticides in sunflower oil

Column: VF-5ms
CP8960
60 m x 0.25 mm, 0.25 μm

Oven: 70°C (3.0 min), 25°C to 190°C/min (0.0 min)
to 10°C/min to 320°C
(10 min)

Sample: 5 μL, splitless

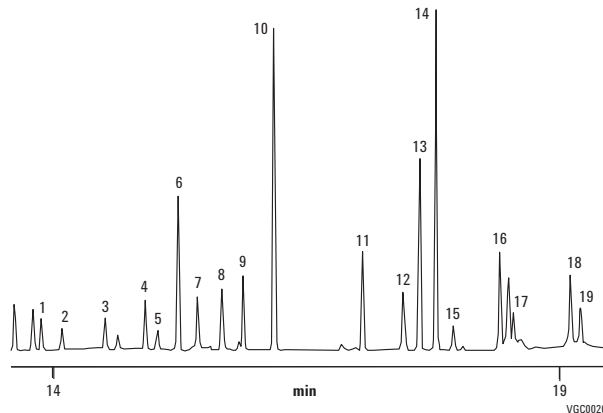
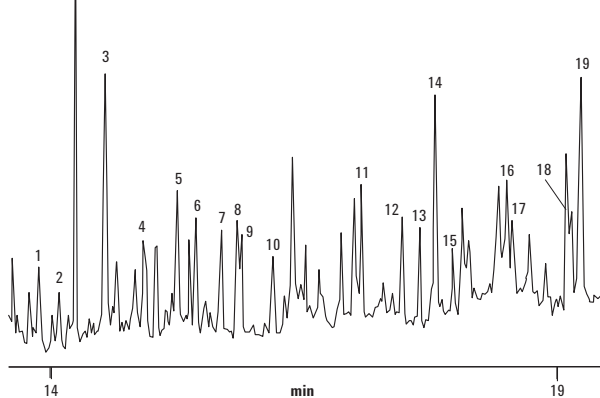
Injection: 1079 with carbofrit liner

Sample Conc: 40 ppb

Detector: Ion Trap in MS/MS, full scan (left chromatogram)
MS/MS (right chromatogram)

Carrier: He, 1.2 mL/min, constant flow

- | | | | |
|----------------------|------------------------|----------------------|------------------------|
| 1. β-HCH | 10. Bromofos | 1. β-HCH | 10. Promofos |
| 2. γ-HCH | 11. o,p'-DDE | 2. γ-HCH | 11. o,p'-DDE |
| 3. δ-HCH | 12. α-Endosulfan | 3. δ-HCH | 12. α-Endosulfan |
| 4. + Vinclozolin | 13. p,p'-DDE | 4. + Vinclozolin | 13. p,p'-DDE |
| 5. Pyrimiphos methyl | 14. o,p'-DDD | 5. Methyl parathion | 14. o,p'-DDD |
| 6. + Malathion | 15. Dieldrin | 6. Pyrimiphos methyl | 15. Dieldrin |
| 7. Chlorpyrifos | 16. p,p'-DDD | 7. + Fenitrothion | 16. p,p'-DDD |
| 8. Ethyl parathion | 17. b Endosulfan | 8. Chlorpyrifos | 17. b Endosulfan |
| 9. Pyrimiphos ethyl | 18. p,p'-DDT | 9. Pyrimiphos ethyl | 18. p,p'-DDT |
| | 19. Endosulfan sulfate | | 19. Endosulfan sulfate |



VGC0020



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Industrial Chemical Applications

Alcohols I

Column: DB-624
125-1334
30 m x 0.53 mm, 3.00 μ m

Carrier: Helium at 30 cm/sec,
measured at 40°C

Oven: 40°C for 5 min
40-260°C at 10°C/min
260°C for 3 min

Injection: Split, 250°C
Split ratio 1:10

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Sample: 1 μ L of 0.01-0.05% each solvent in CS₂

Suggested Supplies

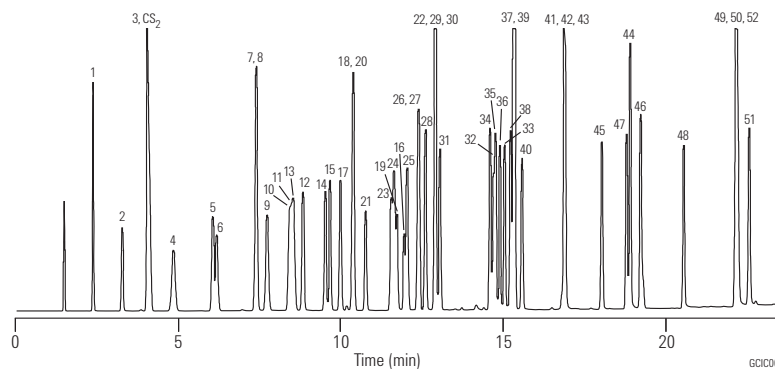
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop,
glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 μ L tapered, FN 23-26s/42/HP,
5181-1273

- | | |
|--|--|
| 1. Methanol | 28. 3-Methyl-2-buten-1-ol |
| 2. Ethanol | 29. Cyclopentanol |
| 3. Isopropanol | 30. 3-Hexanol |
| 4. tert-Butanol | 31. 2-Hexanol |
| 5. 2-Propen-1-ol (allyl alcohol) | 32. 4-Hydroxy-4-methyl-2-pentanone |
| 6. 1-Propanol | 33. Furfuryl alcohol |
| 7. 2-Propyn-1-ol (propargyl alcohol) | 34. cis-3-Hexen-1-ol |
| 8. sec-Butanol | 35. 1-Hexanol |
| 9. 2-Methyl-2-buten-2-ol | 36. cis-2-Hexen-1-ol |
| 10. Isobutanol | 37. Cyclohexanol |
| 11. 2-Methoxyethanol (methyl Cellosolve) | 38. 3-Heptanol |
| 12. 3-Buten-1-ol | 39. 2-Heptanol |
| 13. 2-Methyl-2-butanol (tert-amyl alcohol) | 40. 2-Butoxyethanol (butyl Cellosolve) |
| 14. 1-Butanol | 41. cis-4-Hepten-1-ol |
| 15. 2-Buten-1-ol (crotyl alcohol) | 42. trans-2-Hepten-1-ol |
| 16. Ethylene glycol | 43. 1-Heptanol |
| 17. 1-Penten-3-ol | 44. Benzyl alcohol |
| 18. 2-Pentanol | 45. 2-Ethyl-1-hexanol |
| 19. Glycidol | 46. a-Methylphenethyl alcohol |
| 20. 3-Pentanol | 47. 1-Octanol |
| 21. 2-Ethoxyethanol (Cellosolve) | 48. 1-Nonanol |
| 22. Propylene glycol | 49. 2-Phenoxyethanol |
| 23. 3-Methyl-1-butanol (isoamyl alcohol) | 50. a-Ethylphenethyl alcohol |
| 24. 2-Methyl-1-butanol (active amyl alcohol) | 51. b-Ethylphenethyl alcohol |
| 25. 4-Methyl-2-pentanol | 52. 1-Decanol |
| 26. 1-Pentanol | |
| 27. 2-Penten-1-ol | |



Alcohols II

Column: DB-WAXetr
123-7354
50 m x 0.32 mm, 1.00 µm

Carrier: Helium at 50 cm/sec,
measured at 40°C

Oven: 40°C for 5 min
40-230°C at 10°/min
230°C for 5 min

Injection: Split, 250°C
Split ratio 1:5

Detector: FID, 250°C
Nitrogen makeup gas at 35 mL/min

Sample: 1 µL of 0.15%
each solvent in CS₂

Suggested Supplies

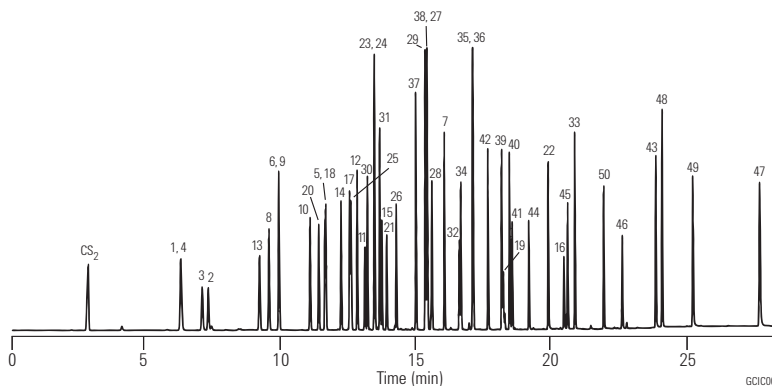
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop,
glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP,
5181-1273

- | | |
|--|--|
| 1. Methanol | 26. 1-Pentanol |
| 2. Ethanol | 27. 2-Penten-1-ol |
| 3. Isopropanol | 28. 3-Methyl-2-buten-1-ol |
| 4. tert-Butanol | 29. Cyclopentanol |
| 5. 2-Propen-1-ol (allyl alcohol) | 30. 3-Hexanol |
| 6. 1-Propanol | 31. 2-Hexanol |
| 7. 2-Propyn-1-ol (propargyl alcohol) | 32. 4-Hydroxy-4-methyl-2-pentanone |
| 8. sec-Butanol | 33. Furfuryl alcohol |
| 9. 2-Methyl-3-buten-2-ol | 34. cis-3-Hexen-1-ol |
| 10. Isobutanol | 35. cis-2-Hexen-1-ol |
| 11. 2-Methoxyethanol (methyl Cellosolve) | 36. Cyclohexanol |
| 12. 3-Buten-1-ol | 37. 3-Heptanol |
| 13. 2-Methyl-2-butanol (tert-amyl alcohol) | 38. 2-Heptanol |
| 14. 1-Butanol | 39. 2-Butoxyethanol (butyl Cellosolve) |
| 15. 2-Buten-1-ol (crotyl alcohol) | 40. cis-4-Hepten-1-ol |
| 16. Ethylene glycol | 41. trans-2-Hepten-1-ol |
| 17. 1-Penten-3-ol | 42. 1-Heptanol |
| 18. 2-Pentanol | 43. Benzyl alcohol |
| 19. Glycidol | 44. 2-Ethyl-1-hexanol |
| 20. 3-Pentanol | 45. 1-Octanol |
| 21. 2-Ethoxyethanol (Cellosolve) | 46. 1-Nonanol |
| 22. Propylene glycol | 47. 2-Phenoxyethanol |
| 23. 3-Methyl-1-butanol (isoamyl alcohol) | 48. a-Ethylphenethyl alcohol |
| 24. 2-Methyl-1-butanol (active amyl alcohol) | 49. b-Ethylphenethyl alcohol |
| 25. 4-Methyl-2-pentanol | 50. 1-Decanol |



Alcohols III

Column: HP-InnoWax
19095N-123
30 m x 0.53 mm, 1.00 µm

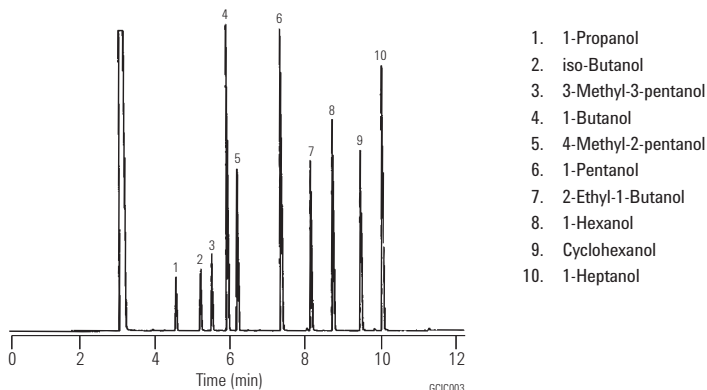
Carrier: Helium, 29 cm/sec, 3.0 psi (45°C)

Oven: 45°C for 1 min
45-150°C at 10°C/min
4 mL/min constant flow

Injection: Split, 250°C
Split ratio 25:1

Detector: FID 250°C

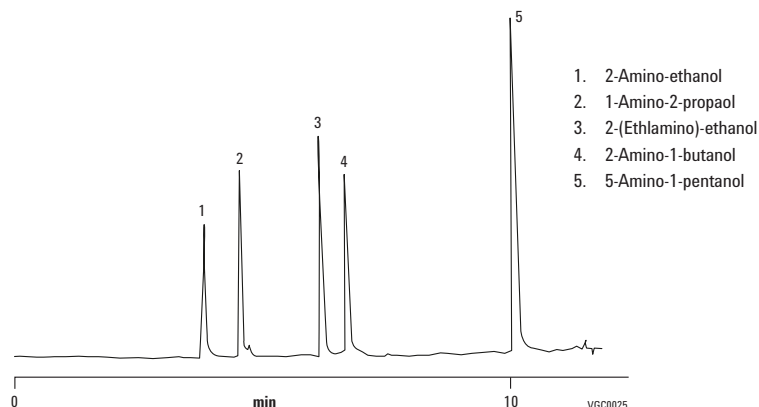
Sample: 1 µL



Analysis of amino alcohols in water

Column: CP-Sil 5 CB
CP7640
50 m x 0.53 mm, 2.00 µm

Sample: 0.2 µL
Sample Conc: 1 ppm
Solvent: Water
Carrier: He, 0.7 mL/min, 70 kPa (0.7 bar, 9 psi)
Oven: 65°C to 100°C, 10°C/min
Injection: Splitless
Detector: MS

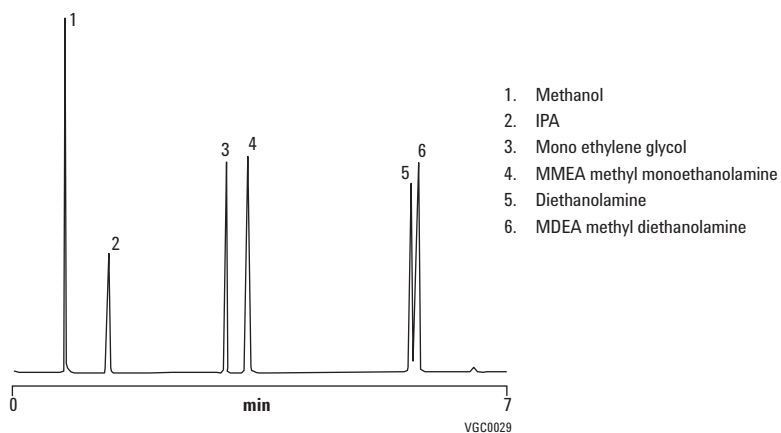


Victor Berezkin and Aleksey B. Lapin, Institute of Petrochemical Synthesis, Russian Academy of Science, Moscow, Russia.

Amines and alcohols

Column: CP-Volamine
CP7446
15 m x 0.32 mm

Sample: 0.5 µL
Sample Conc: 1000 ppm, approx. 5 ng per component on the column
Solvent: Methanol
Carrier: Helium, 50 kPa, 55 cm/s
Oven: 35°C (0.5 min) to 240°C, 30°C/min
Injection: Split
Detector: MS

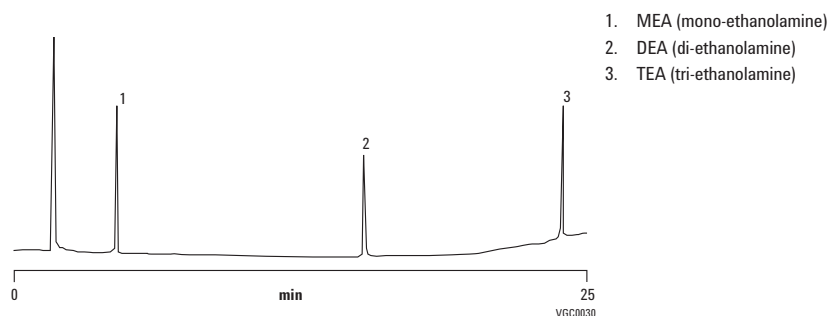


Courtesy of J. Luong, Dow Chemical Canada

Analysis of ethanolamines

Column: CP-Sil 8 CB for Amines
CP7596
30 m x 0.32 mm, 1.00 µm

Sample Conc: 5-10 ng per component on the column
Solvent: Methanol
Carrier: Helium, 50 kPa (0.5 bar, 7 psi)
Oven: 60°C (5 min) to 220°C, 6°C/min
Injection: Split
Detector: FID



Ethoxyethanol

Column: HP-FFAP
19095F-123
30 m x 0.53 mm, 1.00 µm

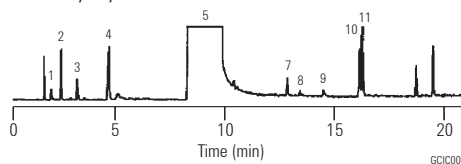
Carrier: Helium, 10 mL/min

Oven: 60°C for 1 min
60-100°C at 5°C/min
100-210°C at 10°C/min

Injection: Split ratio 10:1

Detector: TCD

- | | |
|--------------------------|---------------------------------|
| 1. Ethylene oxide | 7. Hydroxy acetate |
| 2. Ethyl formate | 8. Acetic acid |
| 3. Ethyl alcohol | 9. Formic acid |
| 4. Water | 10. Ethylene glycol/monoformate |
| 5. 2-Ethoxyethanol | 11. Ethylene glycol/monoacetate |
| 6. 2-Ethoxyethyl acetate | |



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP, 5181-1273

Organic Acids

Column: DB-WAXetr
125-7332
30 m x 0.53 mm, 1.00 µm

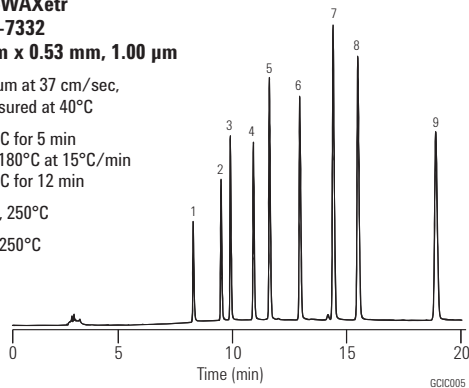
Carrier: Helium at 37 cm/sec, measured at 40°C

Oven: 125°C for 5 min
125-180°C at 15°C/min
180°C for 12 min

Injection: Split, 250°C

Detector: FID, 250°C

- | |
|----------------------------------|
| 1. Acetic acid |
| 2. Propionic acid |
| 3. Isobutyric acid |
| 4. Butyric acid |
| 5. Isovaleric acid |
| 6. Valeric acid (pentanoic acid) |
| 7. Isocaproic acid |
| 8. Caproic acid (hexanoic acid) |
| 9. Heptanoic acid |



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP, 5181-1273

Free Organic Acids/C4-C5 Isomers

Column: HP-INNOWax
19091N-133
30 m x 0.25 mm, 0.25 µm

Carrier: Helium 42 cm/sec, 24 psi (120°C)
1.8 mL/min constant flow

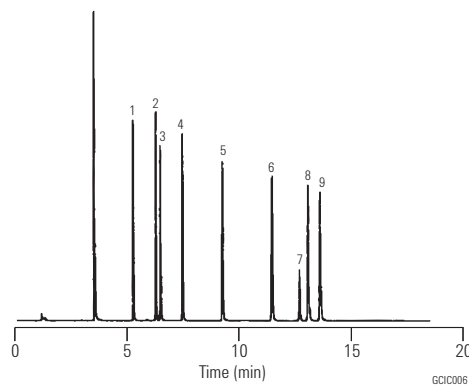
Oven: 110°C for 1 min
110-133 at 2°C/min
133-160°C at 3°C/min

Injection: Split, 250°C
Split ratio 40:1

Detector: FID 300°C

Sample: 1 µL

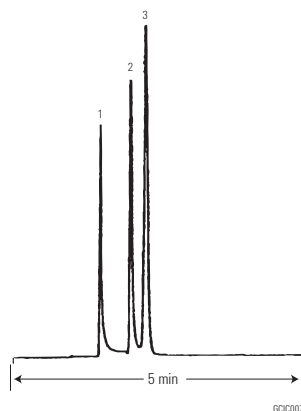
- | |
|-----------------------------------|
| 1. Isobutyric acid |
| 2. Butyric acid |
| 3. Valerolactone |
| 4. 2-Methyl butyric acid |
| 5. Valeric acid |
| 6. 4-Pentenoic acid |
| 7. trans-2-Methyl-2-butenoic acid |
| 8. trans-3-Pentenoic acid |
| 9. trans-2-Pentenoic acid |



Volatile Amines

Column: DB-1
125-1035
30 m x 0.53 mm, 5.00 µm

Oven: 30°C isothermal
 Sampler: Headspace
 Injection: Split ratio 1:10
 Detector: FID
 Nitrogen makeup gas at 30 mL/min



- 1. Methylamine
- 2. Dimethylamine
- 3. Trimethylamine

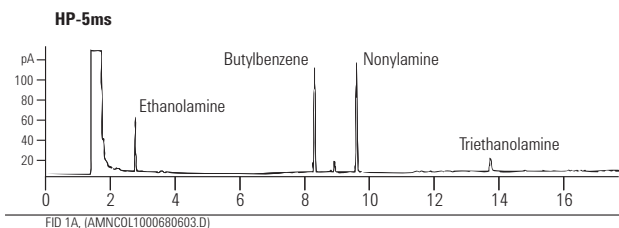
Trace Active Amines, 10 ng on-column

Column: HP-5MS
19091S-213
30 m x 0.32 mm, 1.00 µm

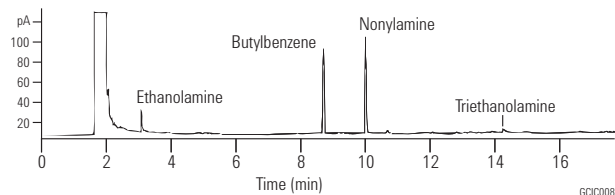
Carrier: Helium, constant pressure 9.79 psi
 Oven: 75°C for 0.5 min
 75-250°C at 10°C/min
 250-320°C at 25°C/min
 320°C for 5 min

Injection: On-column
 Oven tracking mode

Detector: FID 300°C
 Sample: 0.5 µL of each standard in methanol



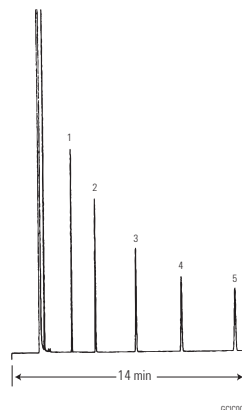
Another 5% Phenyl Amines Column



Primary Amines

Column: CAM
112-2132
30 m x 0.25 mm, 0.25 µm

Carrier: Hydrogen at 40 cm/sec
 Oven: 110°C isothermal
 Injection: Split
 Detector: FID
 Nitrogen makeup gas at 30 mL/min



- 1. n-Octylamine
- 2. n-Nonylamine
- 3. n-Decylamine
- 4. Benylamine
- 5. Dicyclohexylamine

Polyethylenamines

Column: DB-5ms
122-5536
30 m x 0.25 mm, 0.50 µm

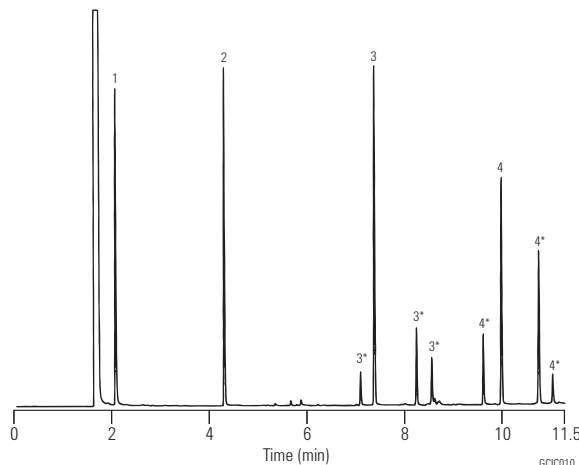
Carrier: Helium at 30 cm/sec, measured at 100°C

Oven: 100°C for 1 min
100-320°C at 20°C/min

Injection: Split, 250°C
Split ratio 1:50

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Sample: 1 µL of 100 ng/µL standard in methanol



1. Ethylenediamine
2. Diethylenetriamine
3. Triethylenetetramine
- 3.* Branched and piperazine analogs of peak #3
4. Tetraethylenepentamine
- 4.* Branched and piperazine analogs of peak #4

Amines and Nitriles

Column: DB-5ms
122-5536
30 m x 0.25 mm, 0.50 µm

Carrier: Helium at 22 cm/sec, measured at 40°C

Oven: 40°C for 1 min
40-260°C at 10°C/min

Injection: Split, 250°C
Split ratio 1:50

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Sample: 1 µL of 100 ng/µL standard in methanol

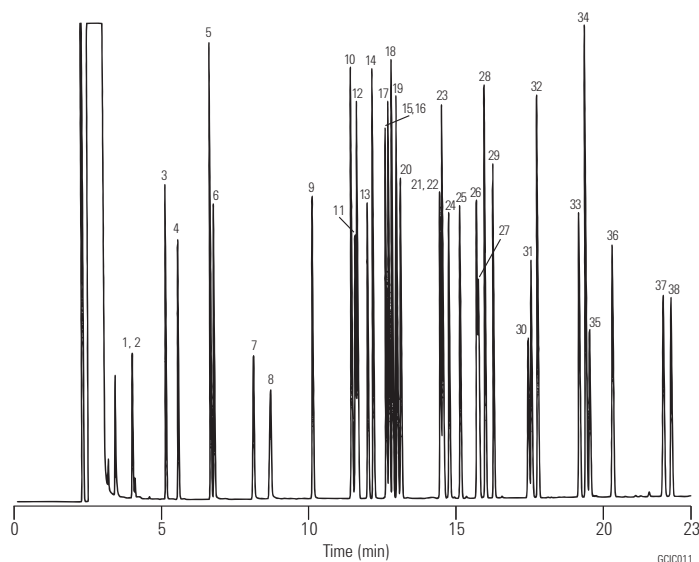
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP, 5181-1273

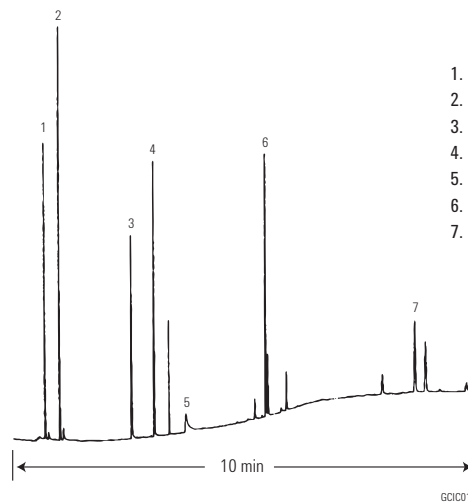


- | | |
|-----------------------------|--------------------------|
| 1. Diethylamine | 20. 2-Cyanopyridine |
| 2. Propionitrile | 21. 2-Chloroaniline |
| 3. Diisopropylamine | 22. n-Nonylamine |
| 4. Triethylamine | 23. 2,4-Dimethylaniline |
| 5. Pyridine | 24. 4-Chlorobenzonitrile |
| 6. Pyrimidine | 25. 2,6-Dimethylaniline |
| 7. Pyrazole | 26. 3-Chloroaniline |
| 8. Acrylamide | 27. 4-Chloroaniline |
| 9. Pyridazine | 28. N,N-Diethylaniline |
| 10. Aniline | 29. n-Decylamine |
| 11. 3-Bromopyridine | 30. 4-Bromoaniline |
| 12. Benzonitrile | 31. 3,4-Diaminotoluene |
| 13. 3-Cyanopyridine | 32. 2,6-Diethylaniline |
| 14. Benzylamine | 33. 2-Nitroaniline |
| 15. n-Octylamine | 34. Dicyclohexylamine |
| 16. 1-Methyl-2-pyrrolidine | 35. 3,4-Dichloroaniline |
| 17. N,N-Dimethylbenzylamine | 36. 3-Nitroaniline |
| 18. Phenylethylamine | 37. 4-Nitroaniline |
| 19. N-Benzylmethylamine | 38. Diphenylaniline |

Amines in Water

Column: CAM
112-2132
30 m x 0.25 mm, 0.25 μ m

Carrier: Hydrogen at 38 cm/sec
Oven: 120-220°C at 10°C/min
Injection: Split
Detector: FID
Nitrogen makeup gas at 30 mL/min



1. Ethylenediamine
2. Piperazine
3. Diethylenetriamine
4. N-(2-Aminoethyl) piperazine
5. Aminoethylethanolamine
6. Triethylenetetramine (4 isomers)
7. Tetraethylenepentamine (4 isomers)

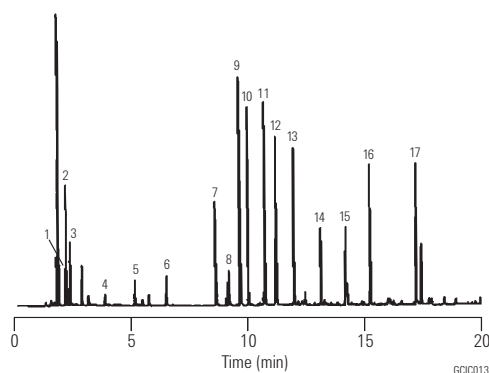
Aldehydes and Acids

Column: HP-INNOWax
19091N-213
30 m x 0.32 mm, 0.50 μ m

Carrier: Helium, 40 cm/sec, 11.7 psi (60°C)
Oven: 60°C for 1 min
60-250°C at 10°C/min
2.5 mL/min constant flow
Injection: Split, 250°C
Split ratio 40:1
Detector: FID 275°C
Sample: 0.5 μ L

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 μ L tapered, FN 23-26s/42/HP, 5181-1273



1. Butanal
2. 2-Methyl butanal
3. Pentanal
4. Hexanal
5. Heptanal
6. Octanal
7. Acetic acid
8. Decanal
9. Propanoic acid
10. iso-Butyric acid
11. Butyric acid
12. iso-Valeric acid
13. Valeric acid
14. Hexanoic acid
15. Heptanoic acid
16. Octanoic acid
17. Decanoic acid



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Aldehydes and Ketones

Column: DB-1
123-1034
30 m x 0.32 mm, 3.00 µm

Column: DB-WAX
123-7033
30 m x 0.32 mm, 0.50 µm

Carrier: Helium at 32 cm/sec,
measured at 40°C

Oven: 40°C for 5 min
40-210°C at 10°C/min 40°C for 5 min
40-210°C at 10°C/min

Injection: Split, 250°C
Split ratio 1:100

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

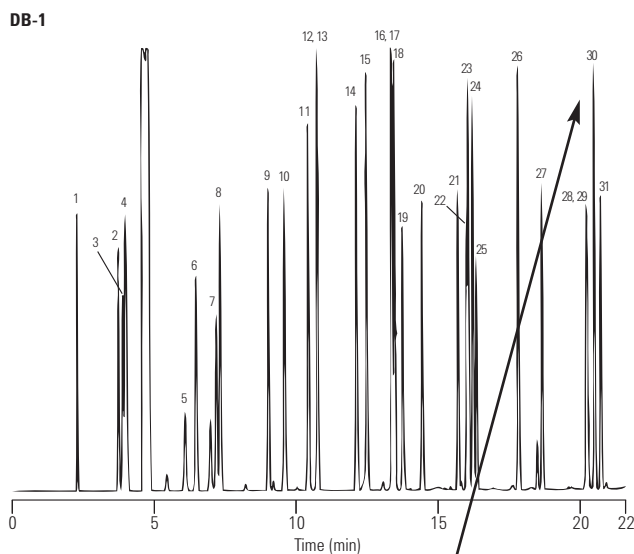
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

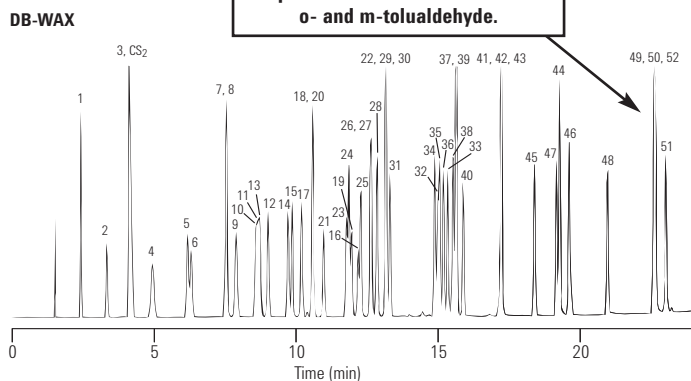
Liner: Split, single taper, low pressure drop,
glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP,
5181-1273



DB-1 provides the best overall resolution; however, DB-WAX provides better resolution of o- and m-tolualdehyde.



1. Acetaldehyde
2. Acrolein
3. Acetone
4. Propionaldehyde
5. Isobutyraldehyde
6. Methacrolein
7. Butyraldehyde
8. 2-Butanone (MEK)
9. Crotonaldehyde
10. 3-Methyl-2-butanone
11. 2-Pentanone
12. 3-Pentanone
13. Valeraldehyde (pentanal)
14. 4-Methyl-2-pentanone (MIBK)
15. 2-Methyl-3-pentanone
16. 3-Hexanone
17. Cyclopentanone
18. 2-Hexanone
19. Hexanal
20. Furfural
21. 4-Heptanone
22. 3-Heptanone
23. 2-Heptanone
24. Cyclohexanone
25. Heptanal
26. Benzaldehyde
27. Octyl aldehyde
28. o-Tolualdehyde
29. m-Tolualdehyde
30. p-Tolualdehyde
31. Nonyl aldehyde

GC0014

Formaldehyde Underderivatized

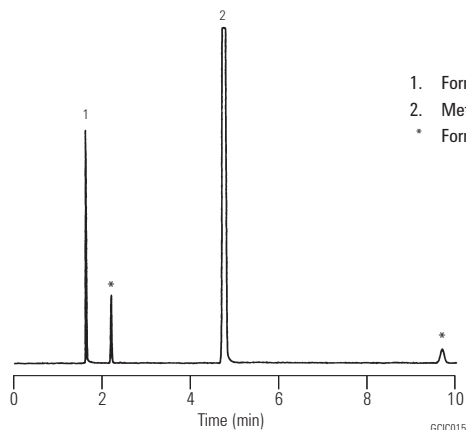
Column: DB-WAX
123-7033
30 m x 0.32 mm, 0.50 μ m

Carrier: Helium at 36 cm/sec,
measured at 35°C

Oven: 35°C isothermal

Injection: Split, 200°C
Split ratio 1:100

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min



- 1. Formaldehyde
- 2. Methanol
- * Formaldehyde by-products

DNPB Derivative

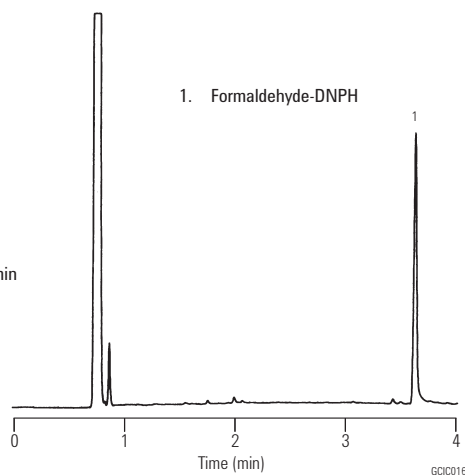
Column: DB-1
123-1012
15 m x 0.32 mm, 0.25 μ m

Carrier: Helium at 35 cm/sec,
measured at 150°C

Oven: 150-250°C at 20°C/min

Injection: Split, 300°C
Split ratio 1:100

Detector: ECD, 375°C
Nitrogen makeup gas at 35 mL/min



- 1. Formaldehyde-DNPB

Suggested Supplies

- | | |
|----------|---|
| Septum: | 11 mm Advanced Green septa, 5183-4759 |
| Liner: | General purpose split/splitless liner, taper, glass wool, 5183-4711 |
| Seal: | Gold plated seal, 18740-20885 |
| Syringe: | 10 μ L tapered, FN 23-26s/42/HP, 5181-1267 |

PFBHA Derivative

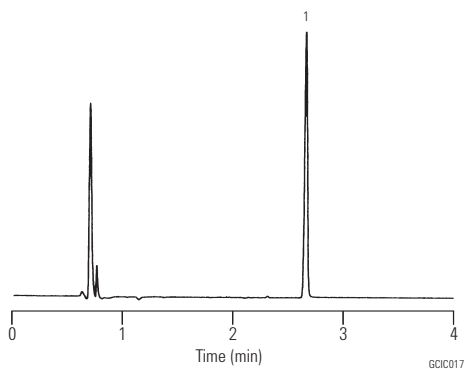
Column: DB-1
123-1012
15 m x 0.32 mm, 0.25 μ m

Carrier: Helium at 40 cm/sec,
measured at 60°C

Oven: 60-100°C at 10°C/min

Injection: Split, 250°C
Split ratio 1:100

Detector: FID, 375°C
Nitrogen makeup gas at 35 mL/min



- 1. Formaldehyde-PFBHA

Aromatics I

Column: DB-1
125-1034
30 m x 0.53 mm, 3.00 µm

Carrier: Helium at 30 cm/sec,
measured at 40°C

Oven: 40°C for 5 min
40-260°C at 10°C/min

Injection: Split, 250°C
Split ratio 1:10

Detector: FID, 300°C
Nitrogen makeup gas at
30 mL/min

- | | | |
|------------------|---|--|
| 1. Benzene | 10. Isopropylbenzene (cumene) | 23. Isobutylbenzene |
| 2. Fluorobenzene | 11. Bromobenzene | 24. sec-Butylbenzene |
| 3. Toluene | 12. Propylbenzene | 25. 1,2,3-Trimethylbenzene (hemimellitene) |
| 4. Chlorobenzene | 13. 2-Chlorotoluene | 26. 1,2-Dichlorobenzene |
| 5. Ethylbenzene | 14. 3-Chlorotoluene | 27. Iodobenzene |
| 6. m-Xylene | 15. 4-Chlorotoluene | 28. Styrene oxide |
| 7. p-Xylene | 16. 1,3,5-Trimethylbenzene (mesitylene) | 29. Butylbenzene |
| 8. Styrene | 17. α-Methylstyrene | 30. 4-Chlorostyrene |
| 9. o-Xylene | 18. tert-Butylbenzene | 31. Nitrobenzene |
| | 19. 1,2,4-Trimethylbenzene (pseudocumene) | 32. 4-tert-Butyltoluene |
| | 20. 4-Methylstyrene | 33. 1,3,5-Trichlorobenzene |
| | 21. 1,3-Dichlorobenzene | 34. 2-Nitrotoluene |
| | 22. 1,4-Dichlorobenzene | 35. 1,3-Diisopropylbenzene |
| | | 36. 1,4-Diisopropylbenzene |
| | | 37. 1,2,4-Trichlorobenzene |
| | | 38. 3-Nitrotoluene |
| | | 39. 4-Nitrotoluene |
| | | 40. 1,2,3-Trichlorobenzene |
| | | 41. 1-Chloro-4-nitrobenzene |
| | | 42. 1,2,4,5-Tetrachlorobenzene |
| | | 43. Pentachlorobenzene |

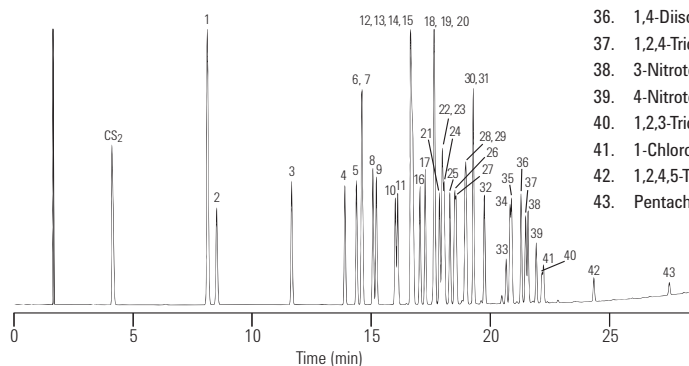
Suggested Supplies

Septum: 11 mm Advanced Green septa,
5183-4759

Liner: General purpose split/splitless
liner, taper, glass wool, 5183-4711

Seal: Gold plated seal, 18740-20885

Syringe: 10 µL tapered, FN 23-26s/42/HP,
5181-1267



GCIC018



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Aromatics II

Column: DB-WAX
125-7032
30 m x 0.53 mm, 1.00 µm

Carrier: Helium at 30 cm/sec,
measured at 40°C

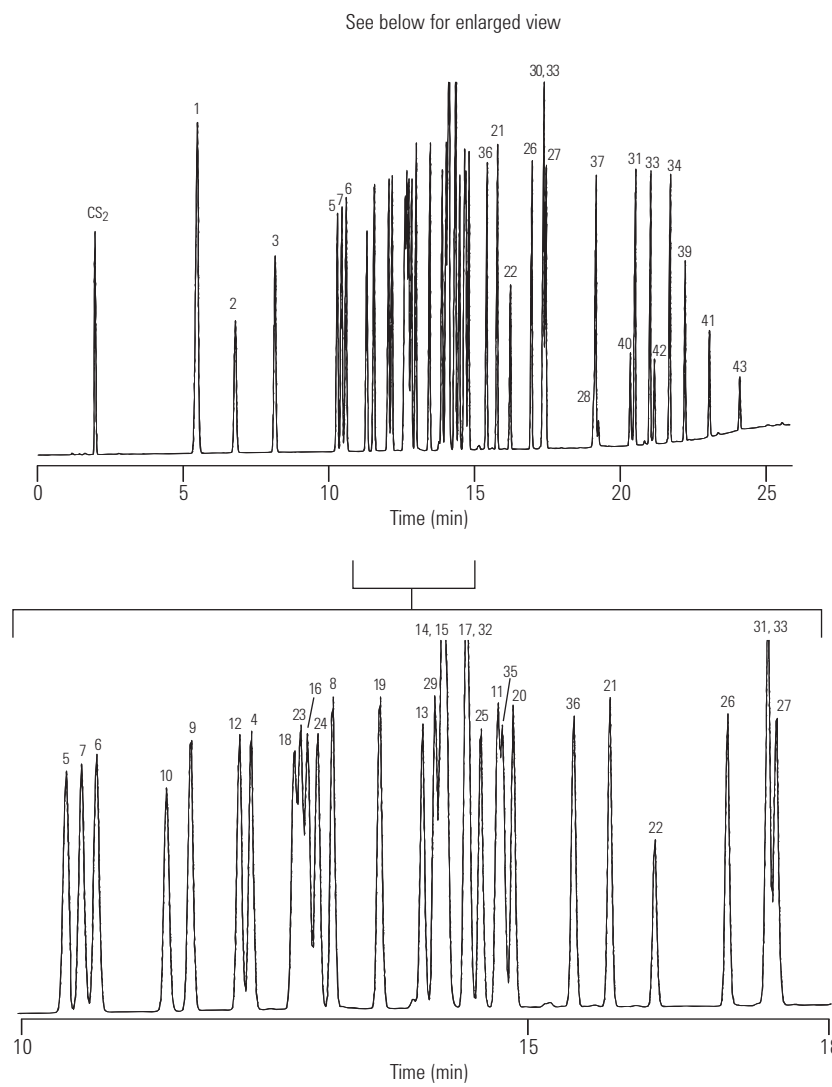
Oven: 40°C for 5 min
40-230°C at 10°C/min
230°C for 7 min

Injection: Split, 250°C
Split ratio 1:10

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: General purpose split/splitless liner, taper, glass wool, 5183-4711
Seal: Gold plated seal, 18740-20885
Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267



1. Benzene
2. Fluorobenzene
3. Toluene
4. Chlorobenzene
5. Ethylbenzene
6. m-Xylene
7. p-Xylene
8. Styrene
9. o-Xylene
10. Isopropylbenzene (cumene)
11. Bromobenzene
12. Propylbenzene
13. 2-Chlorotoluene
14. 3-Chlorotoluene
15. 4-Chlorotoluene
16. 1,3,5-Trimethylbenzene (mesitylene)
17. α-Methylstyrene
18. tert-Butylbenzene
19. 1,2,4-Trimethylbenzene (pseudocumene)
20. 4-Methylstyrene
21. 1,3-Dichlorobenzene
22. 1,4-Dichlorobenzene
23. Isobutylbenzene
24. sec-Butylbenzene
25. 1,2,3-Trimethylbenzene (hemimellitene)
26. 1,2-Dichlorobenzene
27. Iodobenzene
28. Styrene oxide (peak not shown)
29. Butylbenzene
30. 4-Chlorostyrene
31. Nitrobenzene
32. 4-tert-Butyltoluene
33. 1,3,5-Trichlorobenzene
34. 2-Nitrotoluene
35. 1,3-Diisopropylbenzene
36. 1,4-Diisopropylbenzene
37. 1,2,4-Trichlorobenzene
38. 3-Nitrotoluene
39. 4-Nitrotoluene
40. 1,2,3-Trichlorobenzene
41. 1-Chloro-4-nitrobenzene
42. 1,2,4,5-Tetrachlorobenzene
43. Pentachlorobenzene

GCIC019

Impurities in Styrene

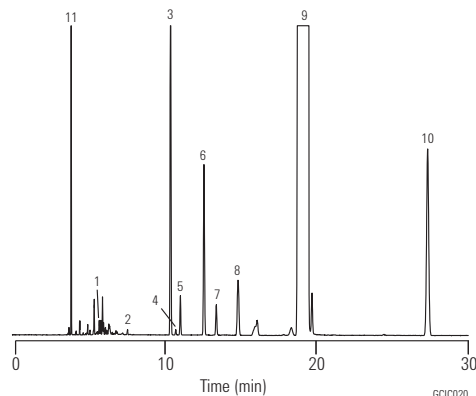
Column: DB-WAXetr
123-7363
60 m x 0.32 mm, 0.50 µm

Carrier: Helium at 29.4 cm/sec,
measured at 70°C

Oven: 80°C isothermal

Injection: Split, 230°C
Split ratio 1:150

Detector: FID, 240°C



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop,
glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP,
5181-1273

- | | |
|---------------------|---------------------|
| 1. Benzene | 7. o-Xylene |
| 2. Toluene | 8. n-Propylbenzene |
| 3. Ethylbenzene | 9. Styrene |
| 4. p-Xylene | 10. α-Methylstyrene |
| 5. m-Xylene | 11. Heptane (IS) |
| 6. Isopropylbenzene | |

Impurities in Ethylbenzene

Column: HP-INNOWax
19091N-216
60 m x 0.32 mm, 0.50 µm

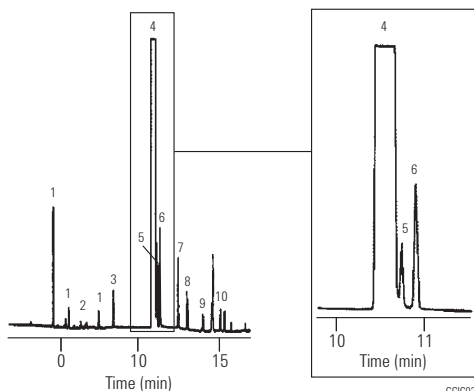
Carrier: Helium, 32 cm/sec, 19.9 psi (60°C)
2.5 mL/min constant flow

Oven: 60°C for 1 min
60-92°C at 4°C/min
92°C for 4.5 min
92-220°C at 20°C/min

Injection: Split, 220°C
Split ratio 100:1
ASTM Method D5060

Detector: FID 270°C

Sample: 0.5 µL
Neat, 99%+



1. Hydrocarbon
2. Benzene
3. Toluene
4. Ethylbenzene
5. p-Xylene
6. m-Xylene
7. Cumene
8. o-Xylene
9. Propylbenzene
10. Styrene

Pyrolysates of Polystyrene

Column: ULTRA 1
19091A-015
50 m x 0.20 mm, 0.33 µm

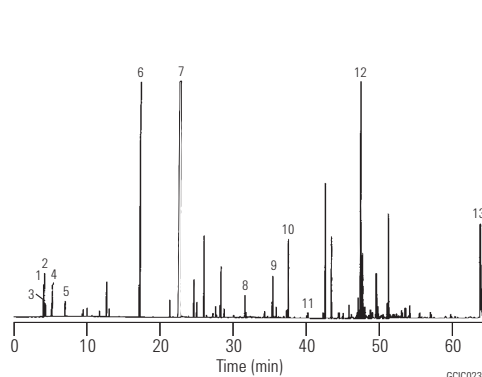
Carrier: Helium, 30 psi, 12 mL/min

Oven: 0-280 at 5°C/min

Injection: Split, 280°C
Split ratio 30:1
Pyrolyzer 600°C

Detector: FID 300°C

Sample: 100 mg pyrolyzed



- | | |
|--------------|---|
| 1. Propylene | 7. Styrene |
| 2. Propane | 8. C ₂ H ₅ -C(Ph) = CH ₂ |
| 3. 1-Butene | 9. C ₄ H ₉ -CH ₂ CH ₂ -Ph |
| 4. Butene | 10. C ₄ H ₉ -C(Ph) = CH ₂ |
| 5. Pentane | 11. C ₄ H ₉ -CH=C(Ph)CH ₃ |
| 6. Toluene | 12. Styrene dimer |
| | 13. Styrene trimer |

Esters I

Column: DB-1
125-1034
30 m x 0.53 mm, 3.00 µm

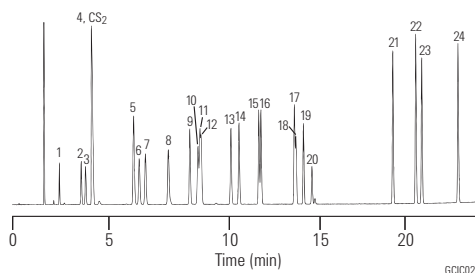
Carrier: Helium at 30 cm/sec,
 measured at 40°C

Oven: 40°C for 5 min
 40-260°C at 10°/min

Injection: Split, 250°C
 Split ratio 1:10

Detector: FID, 300°C
 Nitrogen makeup gas at 30 mL/min

- | | | |
|-------------------|------------------------|---------------------------|
| 1. Methyl formate | 7. Methyl propionate | 13. sec-Butyl acetate |
| 2. Ethyl formate | 8. Isopropyl acetate | 14. Isobutyl acetate |
| 3. Methyl acetate | 9. Ethyl acrylate | 15. Propyl propionate |
| 4. Vinyl acetate | 10. tert-Butyl acetate | 16. Butyl acetate |
| 5. Ethyl acetate | 11. Ethyl propionate | 17. Isoamyl acetate |
| 6. Propyl formate | 12. Propyl acetate | 18. Amyl acetate |
| | | 19. 2-Ethoxyethyl acetate |
| | | 20. 2-Methylbutyl acetate |
| | | 21. Methyl benzoate |
| | | 22. Benzyl acetate |
| | | 23. Ethyl benzoate |
| | | 24. Propyl benzoate |



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: General purpose split/splitless liner,
 taper, glass wool, 5183-4711

Seal: Gold plated seal, 18740-20885

Syringe: 10 µL tapered, FN 23-26s/42/HP,
 5181-1267

Esters II

Column: DB-624
125-1334
30 m x 0.53 mm, 3.00 µm

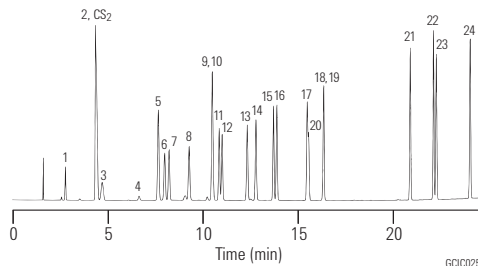
Carrier: Helium at 30 cm/sec,
 measured at 40°C

Oven: 40°C for 5 min
 40-260°C at 10°/min
 260°C for 3 min

Injection: Split, 250°C
 Split ratio 1:10

Detector: FID, 300°C
 Nitrogen makeup gas at 30 mL/min

- | | | |
|-------------------|------------------------|---------------------------|
| 1. Methyl formate | 7. Methyl propionate | 13. sec-Butyl acetate |
| 2. Ethyl formate | 8. Isopropyl acetate | 14. Isobutyl acetate |
| 3. Methyl acetate | 9. Ethyl acrylate | 15. Propyl propionate |
| 4. Vinyl acetate | 10. tert-Butyl acetate | 16. Butyl acetate |
| 5. Ethyl acetate | 11. Ethyl propionate | 17. Isoamyl acetate |
| 6. Propyl formate | 12. Propyl acetate | 18. Amyl acetate |
| | | 19. 2-Ethoxyethyl acetate |
| | | 20. 2-Methylbutyl acetate |
| | | 21. Methyl benzoate |
| | | 22. Benzyl acetate |
| | | 23. Ethyl benzoate |
| | | 24. Propyl benzoate |



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: General purpose split/splitless liner,
 taper, glass wool, 5183-4711

Seal: Gold plated seal, 18740-20885

Syringe: 10 µL tapered, FN 23-26s/42/HP,
 5181-1267

Esters III

Column: HP-InnoWax
19095N-123
30 m x 0.53 mm, 1.00 µm

Carrier: Helium 29 cm/sec, 3.0 psi (45°C)
4 mL/min constant flow

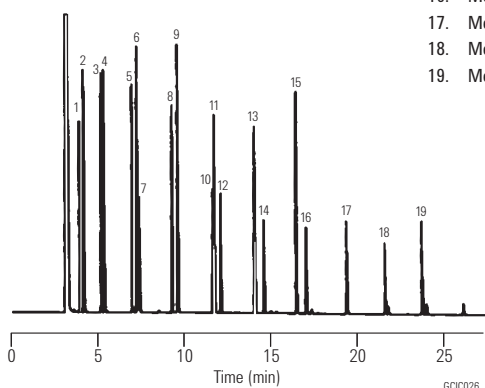
Oven: 45°C for 1 min
45-200°C at 5°C/min

Injection: Split, 250°C
Split ratio 25:1

Detector: FID 250°C

Sample: 1 µL

- | | | |
|----------------------|---------------------|---------------------------|
| 1. Ethyl propionate | 6. Ethyl valerate | 11. Propyl caproate |
| 2. Propyl acetate | 7. Butyl propionate | 12. Methyl decanoate |
| 3. Ethyl butyrate | 8. Propyl valerate | 13. Butyl caproate |
| 4. Propyl propionate | 9. Ethyl caproate | 14. Methyl dodecanoate |
| 5. Propyl butyrate | 10. Butyl valerate | 15. Butyl heptanoate |
| | | 16. Methyl tetradecanoate |
| | | 17. Methyl hexadecanoate |
| | | 18. Methyl octadecanoate |
| | | 19. Methyl eicosenoate |



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: General purpose split/splitless liner, taper, glass wool, 5183-4711

Seal: Gold plated seal, 18740-20885

Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Ethers

Column: DB-624
125-1334
30 m x 0.53 mm, 3.00 µm

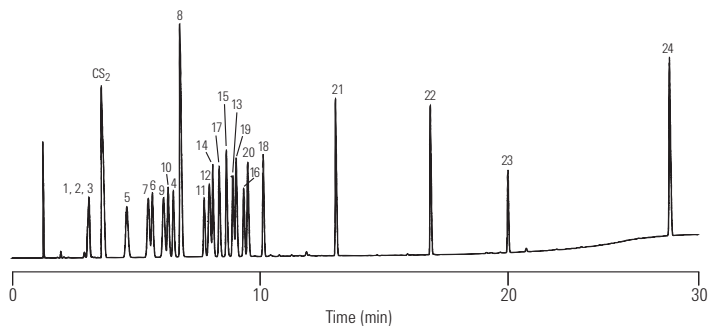
Carrier: Helium at 30 cm/sec,
measured at 40°C

Oven: 40°C for 5 min
40-260°C at 10°C/min
260°C for 3 min

Injection: Split, 250°C
Split ratio 1:10

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

- | | |
|---|--|
| 1. Furan | 13. Diglyme (diethylene glycol dimethyl ether) |
| 2. Ethyl vinyl ether | 14. Propyl ether |
| 3. Ethyl ether | 15. Allyl ether |
| 4. 1,3-Dioxalane | 16. 1,4-Dioxane |
| 5. Methyl-tert-butyl ether (MTBE) | 17. Butyl ethyl ether |
| 6. Allyl ethyl ether | 18. Epichlorohydrin |
| 7. Isopropyl ether | 19. Tetrahydropyran |
| 8. Tetrahydrofuran (THF) | 20. Acetal (acetaldehyde diethyl acetal) |
| 9. tert-Amyl methyl ether | 21. Butyl ether |
| 10. Butyl methyl ether | 22. Pentyl ether |
| 11. Glyme (propylene glycol dimethyl ether) | 23. Triglyme (triethylene glycol dimethyl ether) |
| 12. tert-Amyl methyl ether | 24. Benzyl ether |



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: General purpose split/splitless liner, taper, glass wool, 5183-4711

Seal: Gold plated seal, 18740-20885

Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

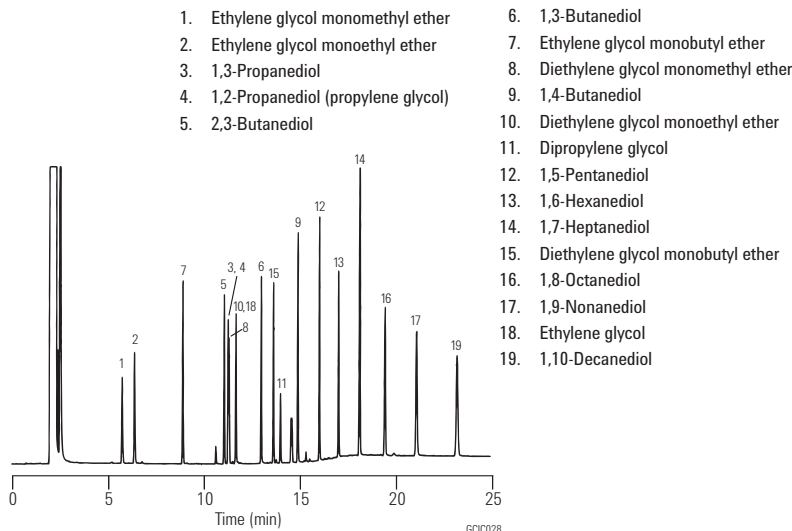
Glycols I

**Column: DB-WAX
124-7032
30 m x 0.45 mm, 0.85 µm**

Carrier: Helium at 35 cm/sec, measured at 50°C
Oven: 50°C for 2 min
50-220°C at 10°/min
Injection: Megabore Direct, 250°C
Detector: FID, 280°C
Nitrogen makeup gas at 30 mL/min
Sample: 1 µL

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: General purpose split/splitless liner, taper, glass wool, 5183-4711
Seal: Gold plated seal, 18740-20885
Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267



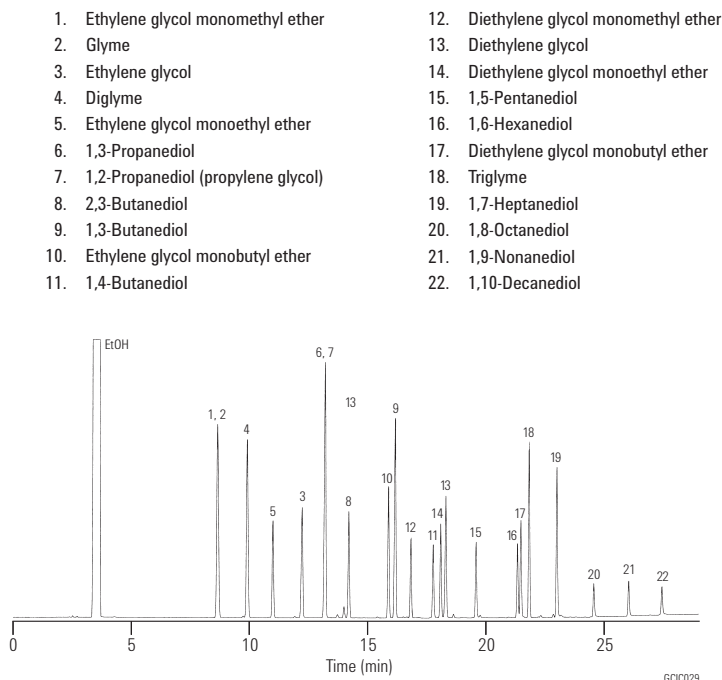
Glycols II

**Column: DB-624
125-1334
30 m x 0.53 mm, 3.00 µm**

Carrier: Helium at 30 cm/sec, measured at 40°C
Oven: 40°C for 5 min
40-260°C at 10°/min
260°C for 3 min
Injection: Split, 250°C
Split ratio 1:10
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct connect, dual taper, deactivated, 4 mm ID, G1544-80700
Seal: Gold plated seal, 18740-20885
Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267



Glycols III

Column: DB-1
124-1032
30 m x 0.45 mm, 1.27 µm

Carrier: Helium at 35 cm/sec,
measured at 50°C

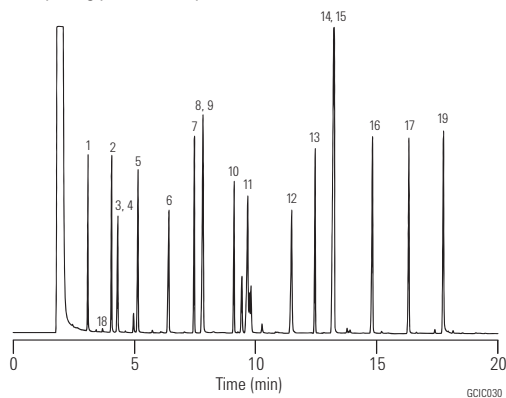
Oven: 50°C for 2 min
50-260°C at 10°/min

Injection: Split, 250°C

Detector: FID, 280°C
Nitrogen makeup gas at 30 mL/min

Sample: 1 µL

- | | |
|---------------------------------------|---------------------------------------|
| 1. Ethylene glycol monomethyl ether | 11. Dipropylene glycol |
| 2. Ethylene glycol monoethyl ether | 12. 1,5-Pentanediol |
| 3. 1,3-Propanediol | 13. 1,6-Hexanediol |
| 4. 1,2-Propanediol | 14. 1,7-Heptanediol |
| 5. 2,3-Butanediol | 15. Diethylene glycol monobutyl ether |
| 6. 1,3-Butanediol | 16. 1,8-Octanediol |
| 7. Ethylene glycol monobutyl ether | 17. 1,9-Nonanediol |
| 8. Diethylene glycol monomethyl ether | 18. Ethylene glycol |
| 9. 1,4-Butanediol | 19. 1,10-Decanediol |
| 10. Diethylene glycol monoethyl ether | |



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, dual taper, deactivated,
4 mm ID, G1544-80700

Seal: Gold plated seal, 18740-20885

Syringe: 10 µL tapered, FN 23-26s/42/HP,
5181-1267

Triethylene Glycol and Impurities

Column: DB-1
124-1032
30 m x 0.45 mm, 1.27 µm

Carrier: Helium at 35 cm/sec,
measured at 50°C

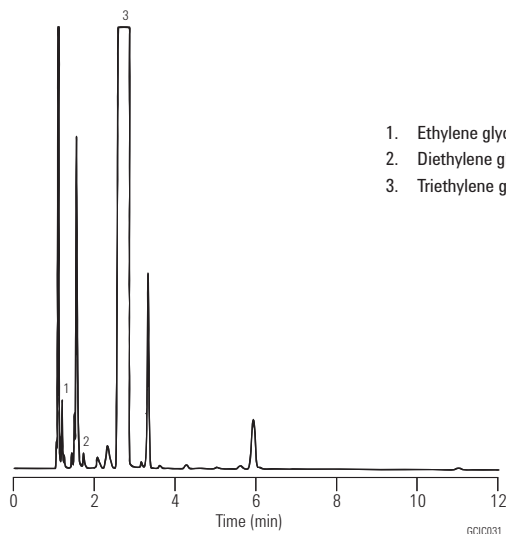
Oven: 170°C isothermal

Injection: Split, 250°C
Split ratio 1:50

Detector: FID, 280°C
Nitrogen makeup gas at 30 mL/min

Sample: 0.5 µL

1. Ethylene glycol
2. Diethylene glycol
3. Triethylene glycol



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop,
glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP,
5181-1273

Ethylene Glycol Mixture

Column: ULTRA 1
19091A-002
12 m x 0.20 mm, 0.33 μ m

Carrier: Helium, 25 cm/sec

Oven: 100°C for 0.5 min
100-200°C at 20°C/min

Injection: Split, 250°C
Split ratio 100:1

Detector: FID

Sample: 1 μ L

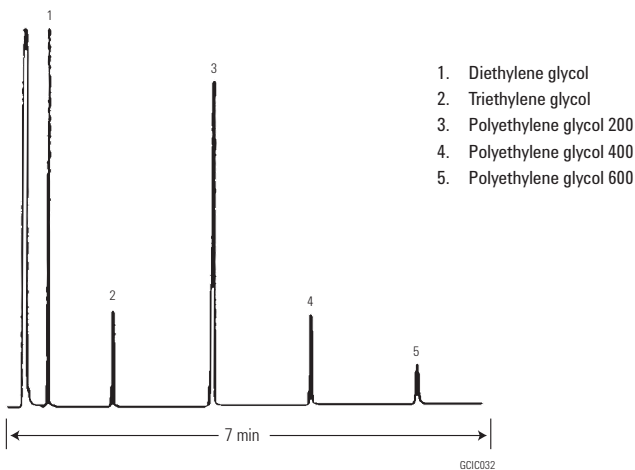
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Liner, splitless, single-taper, glass wool, deactivated, 5062-3587

Seal: Gold plated seal, 18740-20885

Syringe: 10 μ L tapered, FN 23-26s/42/HP, 5181-1267

**Glycols/Diols**

Column: HP-1
19095Z-023
30 m x 0.53 mm, 0.88 μ m

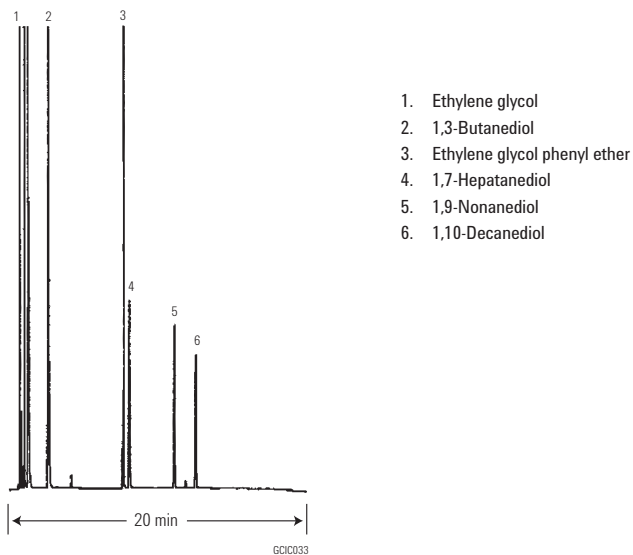
Carrier: Helium

Oven: 50°C for 3 min
50-180°C at 8°C/min

Injection: On-column

Detector: FID 250°C

Sample: 1 μ L



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Halogenated Hydrocarbons I

Column: DB-624
123-1334
30 m x 0.32 mm, 1.80 µm

Carrier: Helium at 35 cm/sec

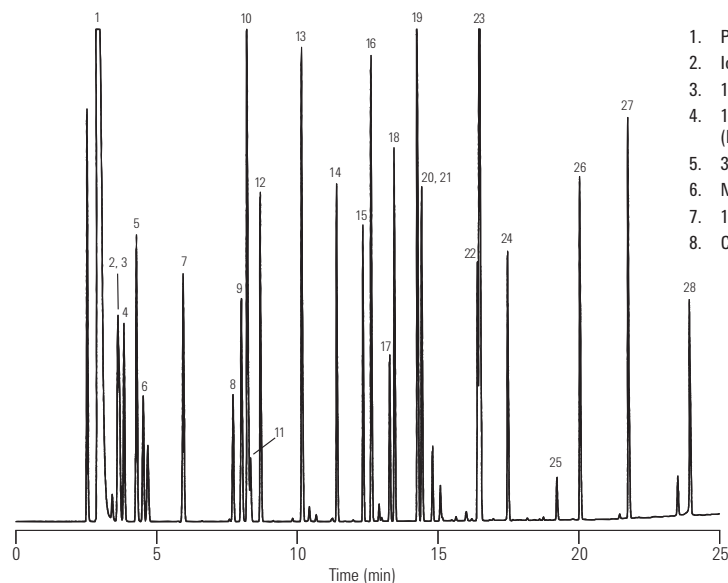
Oven: 35°C for 5 min
35-245°C at 10°/min

Injection: Split, 250°C
Split ratio 1:50

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: General purpose split/splitless liner, taper, glass wool, 5183-4711
Seal: Gold plated seal, 18740-20885
Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267



- | | |
|---|--|
| 1. Pentane | 9. 1,1,1-Trichloroethane |
| 2. Iodomethane | 10. 1-Chlorobutane |
| 3. 1,1-Dichloroethene | 11. Carbon tetrachloride |
| 4. 1,1,2-Trichlorotrifluoroethane (Freon-113) | 12. 1,2-Dichloroethane |
| 5. 3-Chloropropene (allyl chloride) | 13. 1,2-Dichloropropane |
| 6. Methylene chloride | 14. cis-1,2-Dichloropropene |
| 7. 1,1-Dichloroethane | 15. trans-1,2-Dichloropropene |
| 8. Chloroform | 16. 1,1,2-Trichloroethane |
| | 17. 1,1,1,2-Tetrachloroethane |
| | 18. 1,2-Dibromoethane (EDB) |
| | 19. 1-Chlorohexane |
| | 20. trans-1,4-Dichloro-2-butene |
| | 21. Iodoform |
| | 22. Hexachlorobutadiene |
| | 23. 1,2,3-Trichloropropane |
| | 24. 1,1,2,2-Tetrachloroethane |
| | 25. Pentachloroethane |
| | 26. 1,2-Dibromo-3-chloropropane (DBCP) |
| | 27. Hexachloroethane |
| | 28. Hexachlorocyclopentadiene |

GCIC034

Halogenated Hydrocarbons II

Column: DB-1
123-1034
30 m x 0.32 mm, 3.00 µm

Carrier: Helium at 35 cm/sec, measured at 35°C

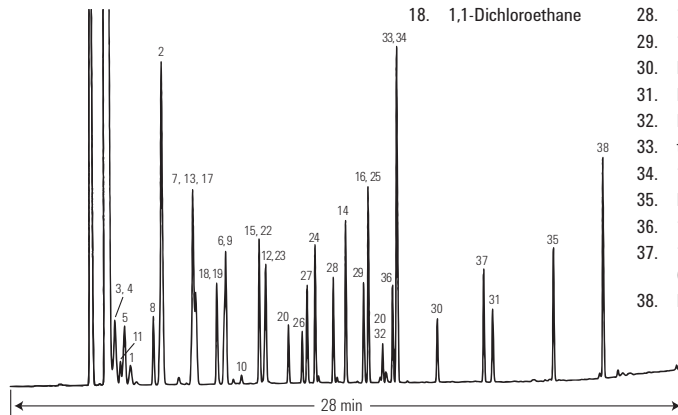
Oven: 35°C for 5 min
35-245°C at 10°/min
245°C for 2 min

Injection: Split, 250°C
Split ratio 1:100

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Sample: In pentane

- | | | |
|---|--------------------------|--|
| 1. 1,1,2-Trichlorotrifluoroethane (Freon-113) | 9. 1,1,1-Trichloroethane | 19. 1,2-Dichloroethane |
| 2. 1,1-Dichloroethene | 10. Carbon tetrachloride | 20. Iodoform |
| 3. Bromoethane (ethyl bromide) | 11. Methylene chloride | 21. cis-1,3-Dichloropropene |
| 4. Iodomethane | 12. Trichloroethene | 22. Dibromomethane |
| 5. 3-Chloropropene (allyl chloride) | 13. Chloroform | 23. Bromodichloromethane |
| 6. 1-Chlorobutane | 14. Tetrachloroethene | 24. 1,3-Dichloropropane |
| 7. 2,2-Dichloropropane | 15. 1,2-Dichloropropane | 25. 1,1-Dichloropropane |
| 8. trans-1,2-Dichloroethene | 16. 1-Chlorohexane | 26. trans-1,3-Dichloropropene |
| | 17. Bromochloromethane | 27. 1,1,2-Trichloroethane |
| | 18. 1,1-Dichloroethane | 28. 1,2-Dibromoethane (EDB) |
| | | 29. 1,1,1,2-Tetrachloroethane |
| | | 30. Pentachloroethane |
| | | 31. Hexachloroethane |
| | | 32. Bromoform |
| | | 33. trans-1,4-Dichloro-2-butene |
| | | 34. 1,2,3-Trichloropropane |
| | | 35. Hexachlorobutadiene |
| | | 36. 1,1,2,2-Tetrachloroethane |
| | | 37. 1,2-Dibromo-3-chloropropane (DBCP) |
| | | 38. Hexachlorocyclopentadiene |



GCIC035

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: General purpose split/splitless liner, taper, glass wool, 5183-4711
Seal: Gold plated seal, 18740-20885
Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Chlorinated Isooctane

Column: HP-INNOWax
19091N-136
60 m x 0.25 mm, 0.25 µm

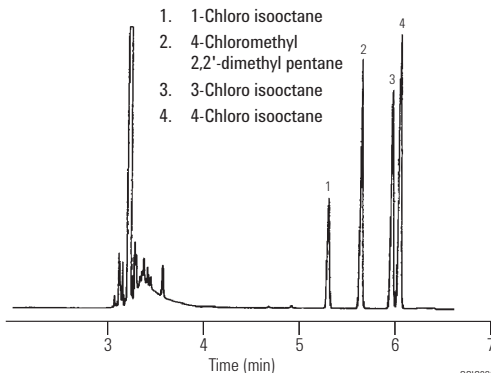
Carrier: Helium, 33 cm/sec,
35.7 psi (80°C) 2 mL/min

Oven: 80°C isothermal

Injection: Split, 250°C
Split ratio 150:1

Detector: FID 300°C

Sample: Monochloro isomers, 0.5 µL



Suggested Supplies

- Septum:** 11 mm Advanced Green septa, 5183-4759
- Liner:** General purpose split/splitless liner, taper, glass wool, 5183-4711
- Seal:** Gold plated seal, 18740-20885
- Syringe:** 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Solvents I

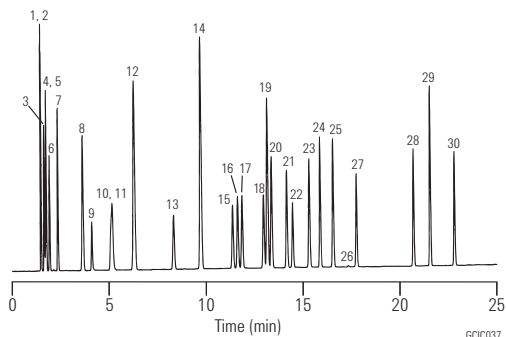
Column: DB-WAXetr
125-7332
30 m x 0.53 mm, 1.00 µm

Carrier: Helium at 30 cm/sec,
measured at 40°C

Oven: 40°C for 5 min
40-140°C at 5°/min

Injection: Split, 250°C

Detector: FID, 250°C



- | | | |
|-----------------------------------|------------------|----------------------------|
| 1. 3-Methylpentane | 11. Benzene | 21. Propylbenzene |
| 2. Hexane | 12. Decane | 22. Chlorobenzene |
| 3. Isooctane | 13. Toluene | 23. Mesitylene |
| 4. Methyl-tert-butyl ether (MTBE) | 14. Undecane | 24. Styrene |
| 5. Heptane | 15. Ethylbenzene | 25. 1,2,4-Trimethylbenzene |
| 6. Cyclohexane | 16. p-Xylene | 26. Naphthalene |
| 7. Octane | 17. m-Xylene | 27. 4-Chlorotoluene |
| 8. Nonane | 18. Cumene | 28. 1,3-Dichlorobenzene |
| 9. Methanol | 19. Dodecane | 29. 1,4-Dichlorobenzene |
| 10. Ethanol | 20. o-Xylene | 30. 1,2-Dichlorobenzene |

Suggested Supplies

- Septum:** 11 mm Advanced Green septa, 5183-4759
- Liner:** General purpose split/splitless liner, taper, glass wool, 5183-4711
- Seal:** Gold plated seal, 18740-20885
- Syringe:** 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Solvents II

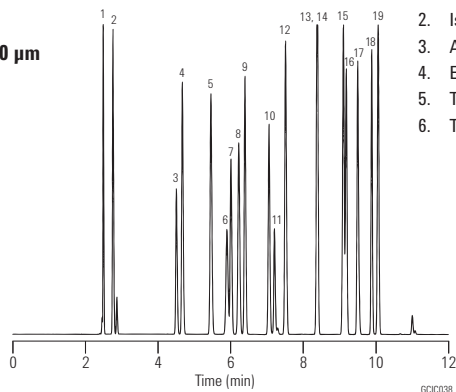
Column: DB-WAXetr
123-7354
50 m x 0.32 mm, 1.00 µm

Carrier: Helium at 41 cm/sec,
measured at 50°C

Oven: 50°C for 5 min
50-170°C at 10°/min

Injection: Split, 250°C
Split ratio 1:100

Detector: FID, 280°C
Nitrogen makeup gas
at 30 mL/min



- | | | |
|--------------------|----------------------------|-----------------------|
| 1. Hexane | 7. Ethyl acetate | 15. Isobutyl acetate |
| 2. Isooctane | 8. Isopropyl acetate | 16. Chloroform |
| 3. Acetone | 9. Methyl ethyl ketone | 17. sec-Butyl alcohol |
| 4. Ethyl formate | 10. Isopropyl alcohol | 18. Toluene |
| 5. Tetrahydrofuran | 11. Methylene chloride | 19. n-Propanol |
| 6. Trichloroethane | 12. Benzene | |
| | 13. 2-Pentanone | |
| | 14. Methyl isobutyl ketone | |

Suggested Supplies

- Septum:** 11 mm Advanced Green septa, 5183-4759
- Liner:** General purpose split/splitless liner, taper, glass wool, 5183-4711
- Seal:** Gold plated seal, 18740-20885
- Syringe:** 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Solvents III

Column: DB-200
122-2033
30 m x 0.25 mm, 0.50 µm

Carrier: Helium at 31 cm/sec

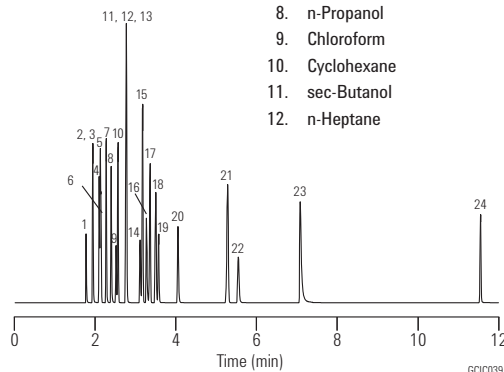
Oven: 45°C for 7 min
45-145°C at 20°/min

Injection: Split, 250°C
Split ratio 1:100

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Sample: 0.5 µL of 0.5-1.0 µg/µL
standard in water

- | | |
|-----------------------|-------------------------------|
| 1. Methanol | 13. Acetone |
| 2. Ethanol | 14. Acetonitrile |
| 3. Ethyl ether | 15. Benzene |
| 4. Isopropanol | 16. Tetrahydrofuran (THF) |
| 5. n-Hexane | 17. Trichloroethylene |
| 6. Methylene chloride | 18. n-Butanol |
| 7. tert-Butanol | 19. Ethyl acetate |
| 8. n-Propanol | 20. Methyl ethyl ketone (MEK) |
| 9. Chloroform | 21. Toluene |
| 10. Cyclohexane | 22. 1,4-Dioxane |
| 11. sec-Butanol | 23. Pyridine |
| 12. n-Heptane | 24. Dimethylformamide (DMF) |



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop,
glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP,
5181-1273

Solvents IV

Column: HP-1
19091Z-205
50 m x 0.20 mm, 0.50 µm

Carrier: Helium, 30 psi

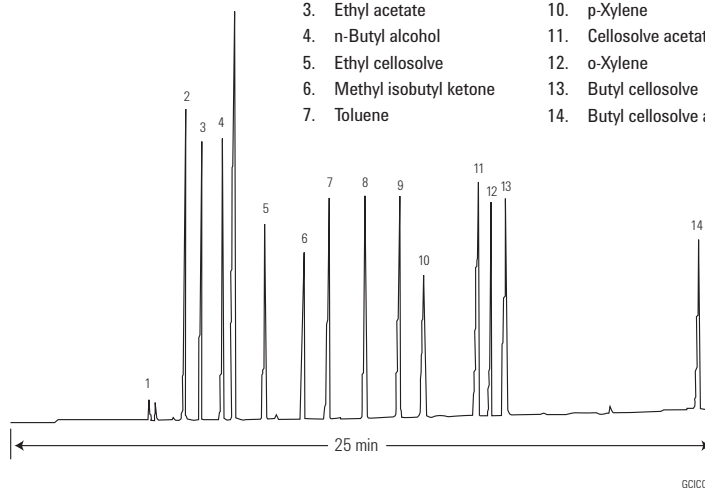
Oven: 70-200°C at 5°C/min
200°C for 2 min

Injection: Split

Detector: TCD

Sample: 1 µL

- | | |
|---------------------------|------------------------------|
| 1. Isopropanol | 8. n-Butyl acetate |
| 2. Methyl ethyl ketone | 9. Diacetone alcohol |
| 3. Ethyl acetate | 10. p-Xylene |
| 4. n-Butyl alcohol | 11. Cellosolve acetate |
| 5. Ethyl cellosolve | 12. o-Xylene |
| 6. Methyl isobutyl ketone | 13. Butyl cellosolve |
| 7. Toluene | 14. Butyl cellosolve acetate |



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop,
glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP,
5181-1273

Aromatic Solvents

Column: DB-200
122-2032
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 31 cm/sec

Oven: 50°C for 5 min
50-160°C at 10°/min

Injection: Split, 250°C
Split ratio 1:100

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Sample: 0.5 µL of 0.5 µg/µL
standard in hexane

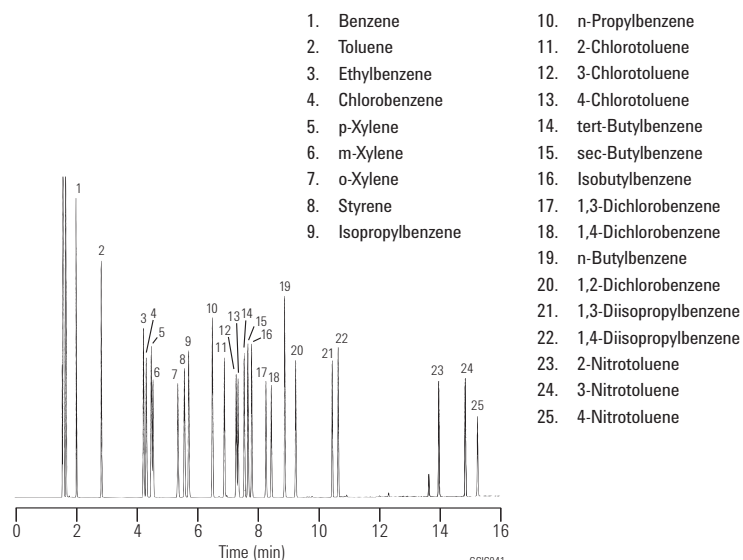
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: General purpose split/splitless liner,
taper, glass wool, 5183-4711

Seal: Gold plated seal, 18740-20885

Syringe: 10 µL tapered, FN 23-26s/42/HP,
5181-1267



Common Industrial Solvents

Column: HP-1
19091Z-212
25 m x 0.32 mm, 1.05 µm

Carrier: Helium, 35 kPa

Oven: 30-140°C at 10°C/min

Injection: Split ratio 200:1

Detector: IRD, 200°C

Sample: 1 µL

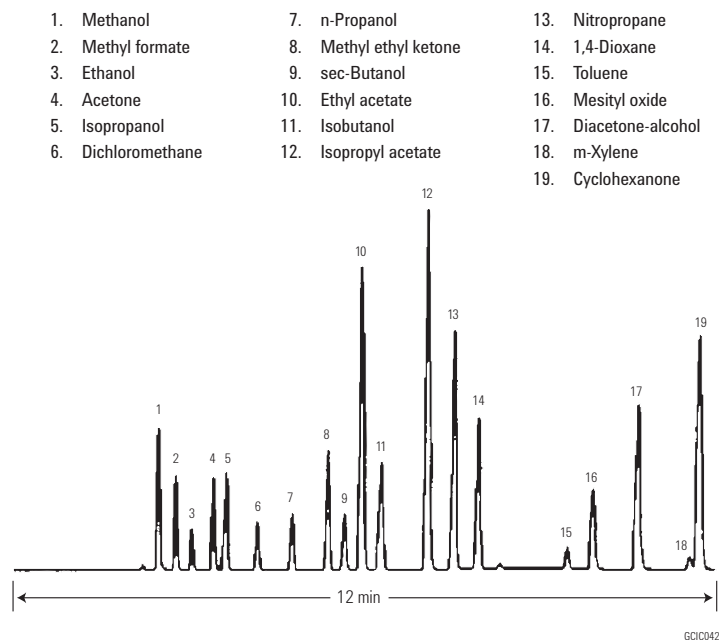
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop,
glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP,
5181-1273



Analysis of solvents

Column: CP-PoraBOND Q
CP7354

25 m x 0.53 mm, 10.00 µm

Sample: 5 µL

Sample Conc: 0.1% per compound

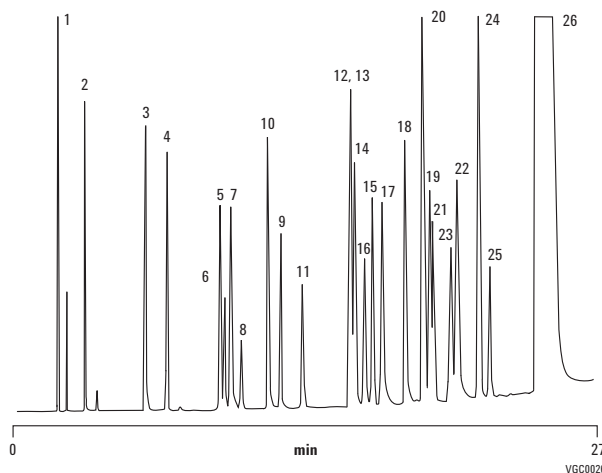
Solvent: DMSO

Carrier: He, 25 kPa (0.25 bar, 3.5 psi)

Oven: 100°C (2 min) to 300°C, 5°C/min

Injection: Split, T=250°C

Detector: FID, T=250°C



- | | |
|----------------------|---------------------------|
| 1. Methane | 14. Tetrahydrofuran |
| 2. Methanol | 15. Ethyl acetate |
| 3. Ethanol | 16. 2-Methoxyethanol |
| 4. Acetonitrile | 17. Isobutanol |
| 5. Acetone | 18. Butanol |
| 6. Dichloromethane | 19. Hexane |
| 7. 2-Propanol | 20. Benzene |
| 8. Dimethyl sulfide | 21. Trichloroethylene |
| 9. Diethyl ether | 22. Cyclohexane |
| 10. 1-propanol | 23. 1,4-Dioxane |
| 11. Pentane | 24. Pyridine |
| 12. 2-Butanone | 25. N,N-dimethylformamide |
| 13. Trichloromethane | 26. Dimethyl sulfoxide |

Nitrogen Based Solvents I

Column: DB-1

125-1034

30 m x 0.53 mm, 3.00 µm

Carrier: Helium at 30 cm/sec,
measured at 40°C

Oven: 40°C for 5 min
40-260°C at 10°/min

Injection: Split, 250°C
Split ratio 1:10

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

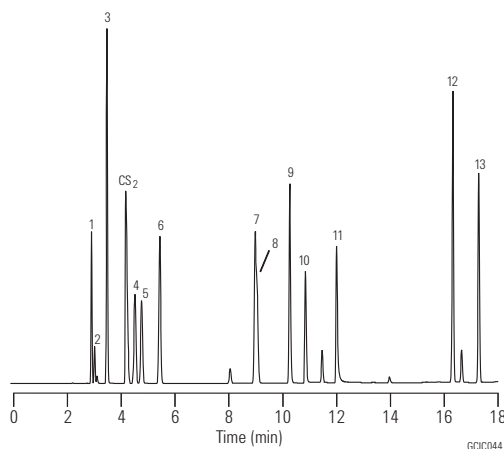
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop,
glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP,
5181-1273



- | |
|-------------------------------|
| 1. Acetonitrile |
| 2. Acrolein |
| 3. Acrylonitrile |
| 4. Propionitrile |
| 5. Methacrolein |
| 6. Methacrylonitrile |
| 7. Triethylamine |
| 8. Ethyl acrylate |
| 9. Pyridine |
| 10. DMF (dimethylformamide) |
| 11. DMSO (dimethyl sulfoxide) |
| 12. Benzonitrile |
| 13. 1-Methyl-2-pyrrolidinone |

Nitrogen Based Solvents II

Column: DB-624
125-1334
30 m x 0.53 mm, 3.00 µm

Carrier: Helium at 30 cm/sec,
measured at 40°C

Oven: 40°C for 5 min
40-260°C at 10°/min
260°C for 3 min

Injection: Split, 250°C
Split ratio 1:10

Detector: FID, 300°C
Nitrogen makeup gas
at 30 mL/min

- | | |
|----------------------|-------------------------------|
| 1. Acetonitrile | 8. Ethyl acrylate |
| 2. Acrolein | 9. Pyridine |
| 3. Acrylonitrile | 10. DMF (dimethylformamide) |
| 4. Propionitrile | 11. DMSO (dimethyl sulfoxide) |
| 5. Methacrolein | 12. Benzonitrile |
| 6. Methacrylonitrile | 13. 1-Methyl-2-pyrrolidinone |
| 7. Triethylamine | |

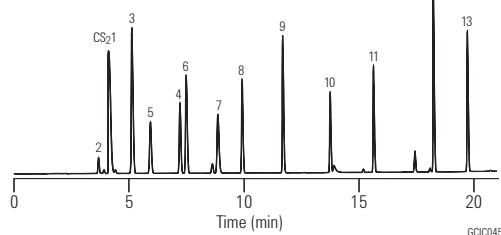
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop,
glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP,
5181-1273

**Acrylate Impurities I**

Column: DB-200
125-2032
30 m x 0.53 mm, 1.00 µm

Carrier: Helium at 34.5 cm/sec
measured at 35°C

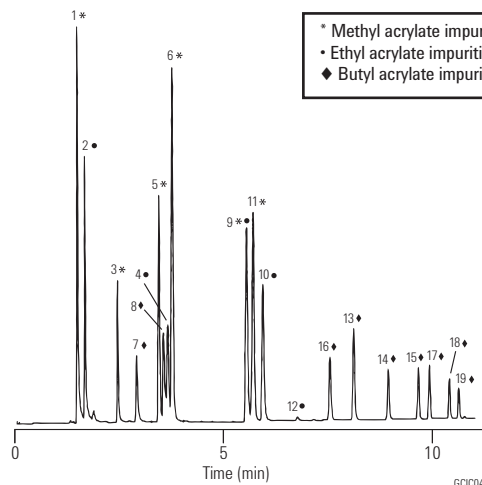
Oven: 35°C for 5 min,
35 - 200°C at 10°/min

Injection: Split, 230°C
Split ratio 1:10

Detector: FID, 250°C

* Methyl acrylate impurities
• Ethyl acrylate impurities
◆ Butyl acrylate impurities

1. Methanol
2. Ethanol
3. Methyl acetate
4. Ethyl acetate
5. Methyl acrylate
6. Methyl propionate
7. Isobutanol
8. Butanol
9. Ethyl acrylate
10. Ethyl propionate
11. Methyl methacrylate
12. Isopropyl acrylate
13. Isobutyl acetate
14. Butyl acetate
15. Isobutyl acrylate
16. Dibutyl ether
17. Isobutyl propionate
18. Butyl acrylate
19. Butyl propionate

**Suggested Supplies**

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop,
glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP,
5181-1273



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Acrylate Impurities II

Column: DB-1701
125-0732
30 m x 0.53 mm, 1.00 µm

Carrier: Helium at 36.8 cm/sec
measured at 35°C

Oven: 35°C for 5 min,
35-200°C at 10°/min

Injection: Split, 230°C
Split ratio 1:10

Detector: FID, 250°C

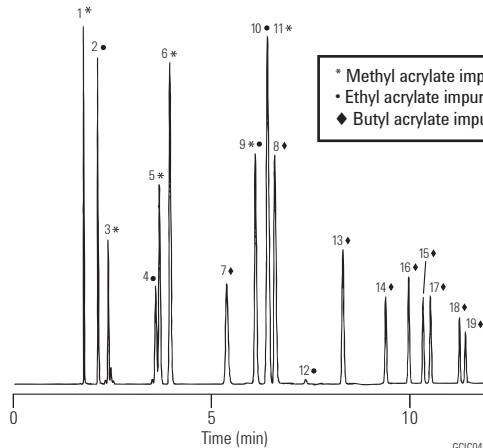
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop,
glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP,
5181-1273



1. Methanol
2. Ethanol
3. Methyl acetate
4. Ethyl acetate
5. Methyl acrylate
6. Methyl propionate
7. Isobutanol
8. Butanol
9. Ethyl acrylate
10. Ethyl propionate
11. Methyl methacrylate
12. Isopropyl acrylate
13. Isobutyl acetate
14. Butyl acetate
15. Isobutyl acrylate
16. Dibutyl ether
17. Isobutyl propionate
18. Butyl acrylate
19. Butyl propionate

Acrylates

Column: HP-FFAP
19095F-121
10 m x 0.53 mm, 1.00 µm

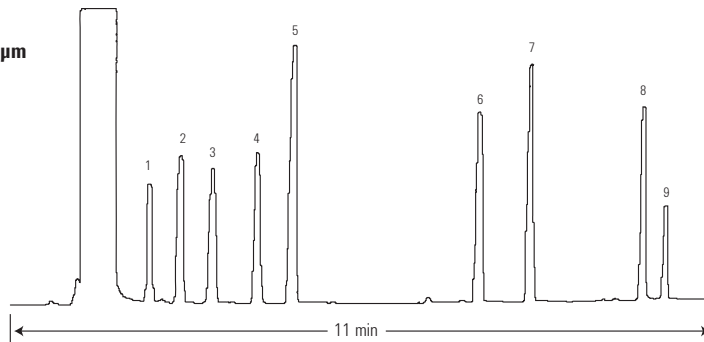
Carrier: Hydrogen

Oven: 35°C for 1 min
35-60°C at 10°/min
60-160°C at 15°/min

Injection: On-column

Detector: FID

Sample: 1 µL



1. Methyl methacrylate
2. Ethyl methacrylate
3. sec-Butyl methacrylate
4. Allyl acrylate
5. n-Butyl acrylate
6. Hexyl methacrylate
7. Cyclohexyl methacrylate
8. Hydroxypropyl acrylate
9. Unknown



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Anilines

Column: DB-35ms
128-3822
25 m x 0.20 mm, 0.33 µm

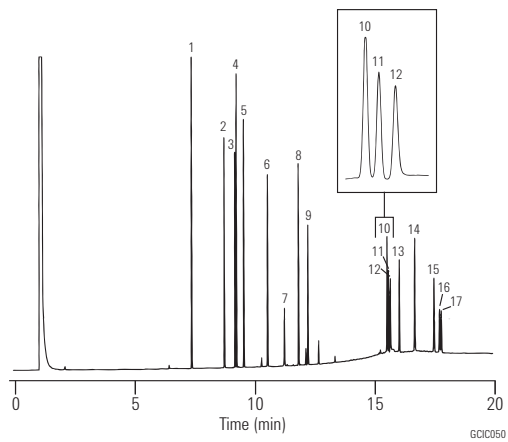
Carrier: Helium at 35 cm/sec,
measured at 50°C

Oven: 50°C for 2 min
50-340°C at 20°/min
340°C for 10 min

Injection: Splitless, 280°C
0.50 min purge activation time

Detector: FID, 320°C
Nitrogen makeup gas at 30 mL/min

Sample: 1 µL of 5 ng
on-column per component



1. o-Toluidine
2. 4-Chloroaniline
3. 2-Methoxy-5-methylaniline
4. 2,4,5-Trimethylaniline
5. 4-Chloro-2-methylaniline
6. 2,4-Diaminotoluene
7. 2,4-Diaminoanisole
8. 2-Aminonaphthalene
9. 2-Methyl-5-nitroaniline
10. 4,4'-Oxydianiline
11. 4,4'-Methylenedianiline
12. Benzidine
13. 2-Aminoazotoluene
14. o-Tolidine
15. 4,4'-Thiodianiline
16. 3,3'-Dimethoxybenzidine
17. 3,3'-Dichlorobenzidine

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated,
4 mm ID, 5181-3316

Seal: Gold plated seal, 18740-20885

Syringe: 10 µL tapered, FN 23-26s/42/HP,
5181-1267

Substituted Anilines

Column: DB-5ms
122-5536
30 m x 0.25 mm, 0.50 µm

Carrier: Helium at 33.3 cm/sec,
measured at 150°C

Oven: 40°C for 5 min
40-290°C at 12°/min
290°C for 10 min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: MSD, 325°C transfer line

Sample: 1 µL of 25 ng/µL standard

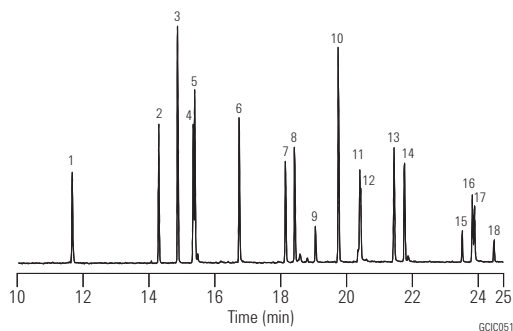
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated,
4 mm ID, 5181-3316

Seal: Gold plated seal, 18740-20885

Syringe: 10 µL tapered, FN 23-26s/42/HP,
5181-1267



- | | m/z |
|---------------------------------|------------|
| 1. Aniline | 93 |
| 2. 2-Chloroaniline | 127 |
| 3. 2,6-Dimethylaniline | 121 |
| 4. 3-Chloroaniline | 127 |
| 5. 4-Chloroaniline | 127 |
| 6. 4-Bromoaniline | 171 |
| 7. 2-Nitroaniline | 138 |
| 8. 3,4-Dichloroaniline | 161 |
| 9. 3-Nitroaniline | 65 |
| 10. 2,4,5-Trichloroaniline | 195 |
| 11. 4-Chloro-2-nitroaniline | 172 |
| 12. 4-Nitroaniline | 138 |
| 13. 2-Chloro-4-nitroaniline | 172 |
| 14. 2,6-Dichloro-4-nitroaniline | 176 |
| 15. 2-Chloro-4,6-dinitroaniline | 217 |
| 16. 2,6-Dibromo-4-nitroaniline | 266 |
| 17. 2,4-Dinitroaniline | 183 |
| 18. 2-Bromo-4,6-dinitroaniline | 261 |

Phenols I

Column: HP-5MS
19091S-433
30 m x 0.25 mm, 0.25 µm

Carrier: Helium, 33 cm/sec,
constant flow

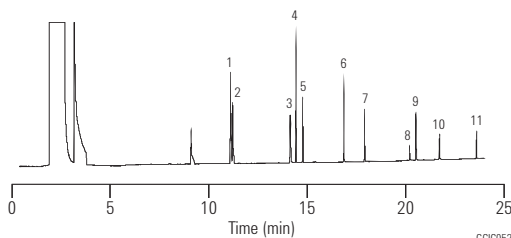
Oven: 35°C for 5 min
35-220°C at 8°C/min

Injection: Splitless, 250°C

Detector: FID, 300°C

Sample: 1 µL
20 µg/mL phenols in
methylene chloride

- | | |
|----------------------------|--------------------------------|
| 1. Phenol | 7. 2,4,6-Trinitrophenol |
| 2. 2-Chlorophenol | 8. 2,4-Dinitrophenol |
| 3. 2-Nitrophenol | 9. 4-Nitrophenol |
| 4. 2,4-Dimethylphenol | 10. 2-Methyl-4,6-dinitrophenol |
| 5. 2,4-Dichlorophenol | 11. Pentachlorophenol |
| 6. 4-Chloro-3-methylphenol | |



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730

Seal: Gold plated seal, 18740-20885

Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Phenols II

Column: DB-5ms
122-5536
30 m x 0.25 mm, 0.50 µm

Carrier: Helium at 22 cm/sec,
measured at 100°C

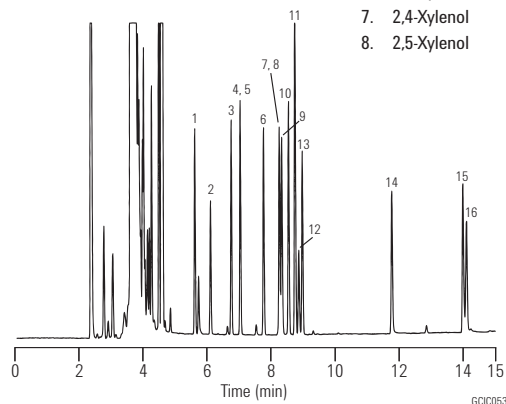
Oven: 100°C for 1 min
100-270°C at 10°C/min

Injection: Split, 250°C
Split ratio 1:50

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Sample: 1 µL of 50 ng/µL standard
in toluene/p-xylene

- | | |
|-------------------|---------------------------|
| 1. Phenol | 9. 2-Nitrophenol |
| 2. 2-Chlorophenol | 10. 3,5-Xylenol |
| 3. o-Cresol | 11. 2,3-Xylenol |
| 4. m-Cresol | 12. 2,4-Dichlorophenol |
| 5. p-Cresol | 13. 3,4-Xylenol |
| 6. 2,6-Xylenol | 14. 2,4,6-Trichlorophenol |
| 7. 2,4-Xylenol | 15. 2,4-Dinitrophenol |
| 8. 2,5-Xylenol | 16. 1-Naphthol |



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730

Seal: Gold plated seal, 18740-20885

Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

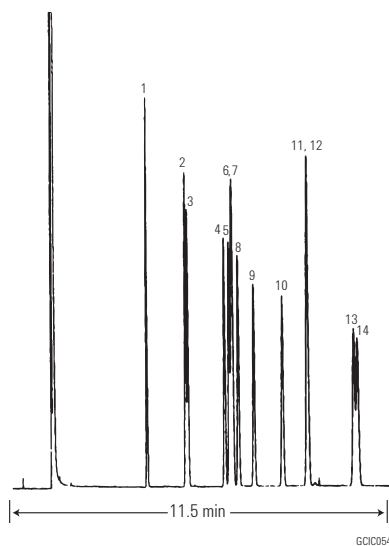
Phenols III

**Column: DB-WAX
122-7032
30 m x 0.25 mm, 0.25 µm**

Carrier: Hydrogen at 43 cm/sec
Oven: 165°C isothermal
Injection: Split, 250°C
Split ratio 1:50
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 µL tapered, FN 23-26s/42/HP, 5181-1273

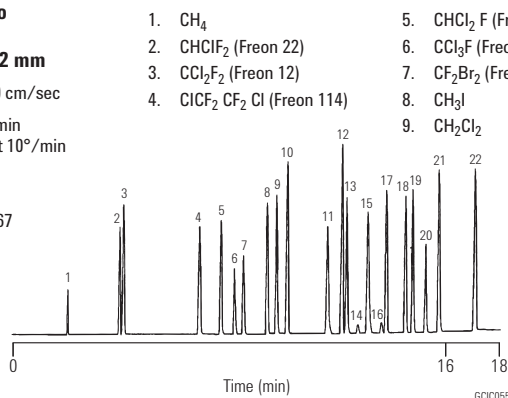


1. 2,6-Xylenol
2. 2-Cresol
3. Phenol
4. 2-Ethylphenol
5. 2,5-Xylenol
6. 4-Cresol
7. 2,4-Xylenol
8. 3-Cresol
9. 2-Isopropylphenol
10. 2,3-Xylenol
11. 3,5-Xylenol
12. 4-Ethylphenol
13. 3,4-Xylenol
14. 2,3,5-Trimethylphenol

Halocarbons

**Column: GS-GasPro
113-4332
30 m x 0.32 mm**

Carrier: Helium at 30 cm/sec
Oven: 130°C for 4 min
130-225°C at 10°/min
225°C Hold
Injection: Split, 250°C
Split ratio 1:67
Detector: FID, 250°C
Sample: 1 µL



- | | | | |
|---|---|--|---|
| 1. CH ₄ | 5. CHCl ₂ F (Freon 21) | 10. trans-ClCH=CHCl | 16. ? from CCl ₄ |
| 2. CHClF ₂ (Freon 22) | 6. CCl ₃ F (Freon 11) | 11. CF ₃ CCl ₃ (Freon 113) | 17. CH ₃ CH ₂ I |
| 3. CCl ₂ F ₂ (Freon 12) | 7. CF ₂ Br ₂ (Freon 12B2) | 12. cis-ClCH=CHCl | 18. CH ₂ Br ₂ |
| 4. ClCF ₂ CF ₂ Cl (Freon 114) | 8. CH ₃ I | 13. CHCl ₃ | 19. CHCl ₂ Br |
| | 9. CH ₂ Cl ₂ | 14. ? from CCl ₄ | 20. C ₄ F ₉ I |
| | | 15. CCl ₄ | 21. CHClBr ₂ |
| | | | 22. CH ₃ CH ₂ CH ₂ I |

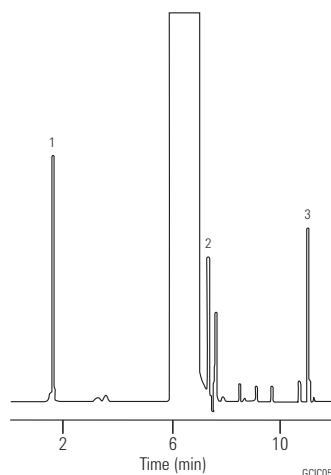
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885

Ethylene Oxide

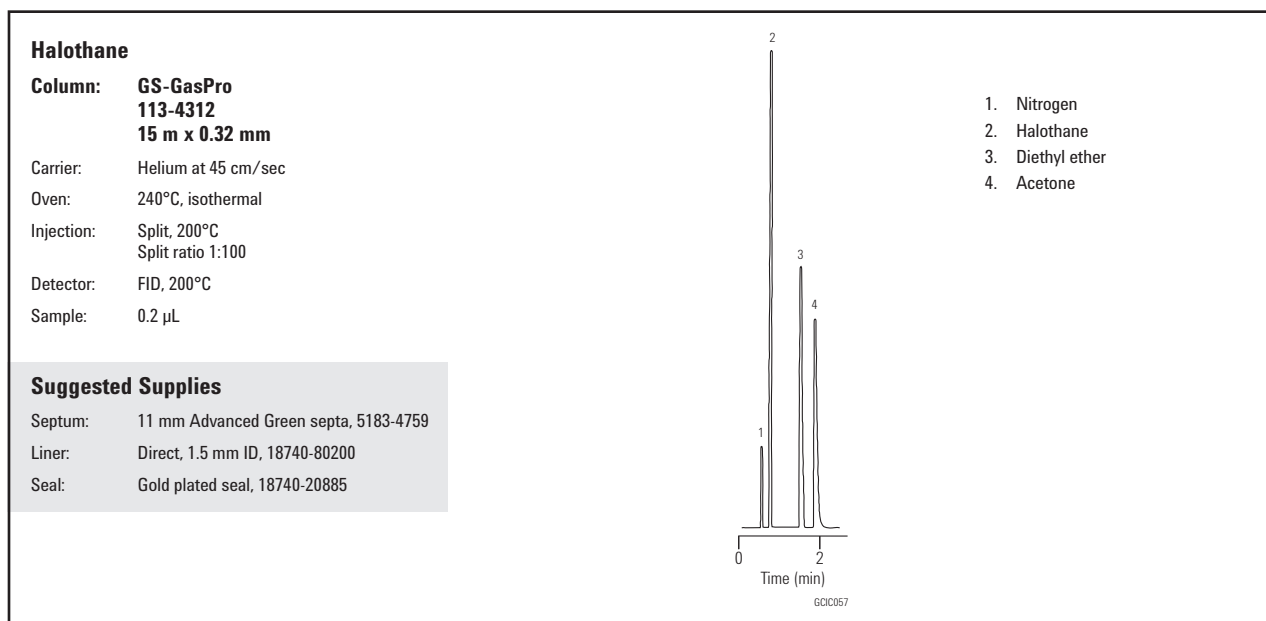
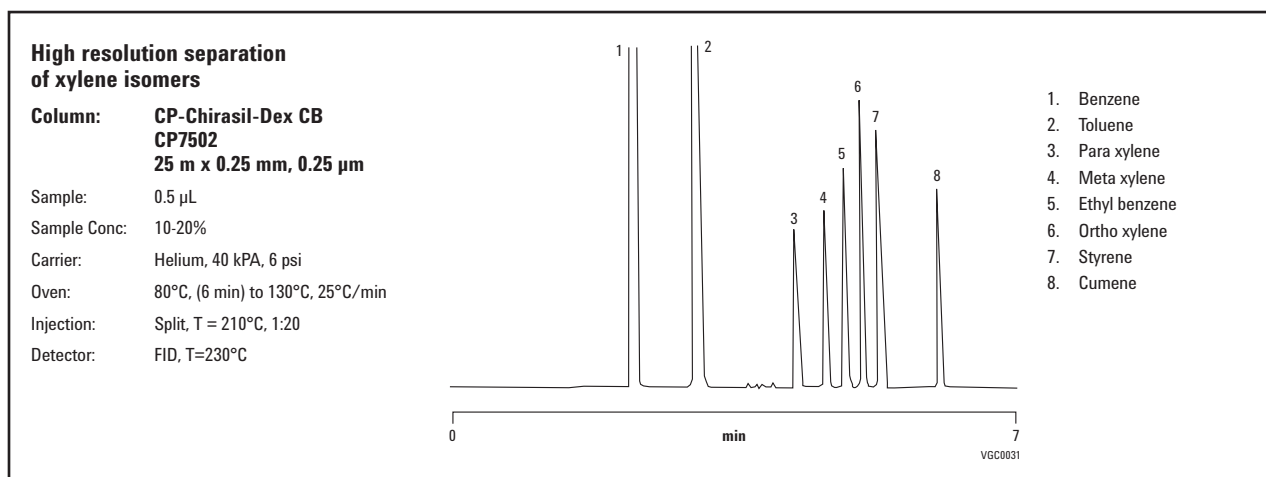
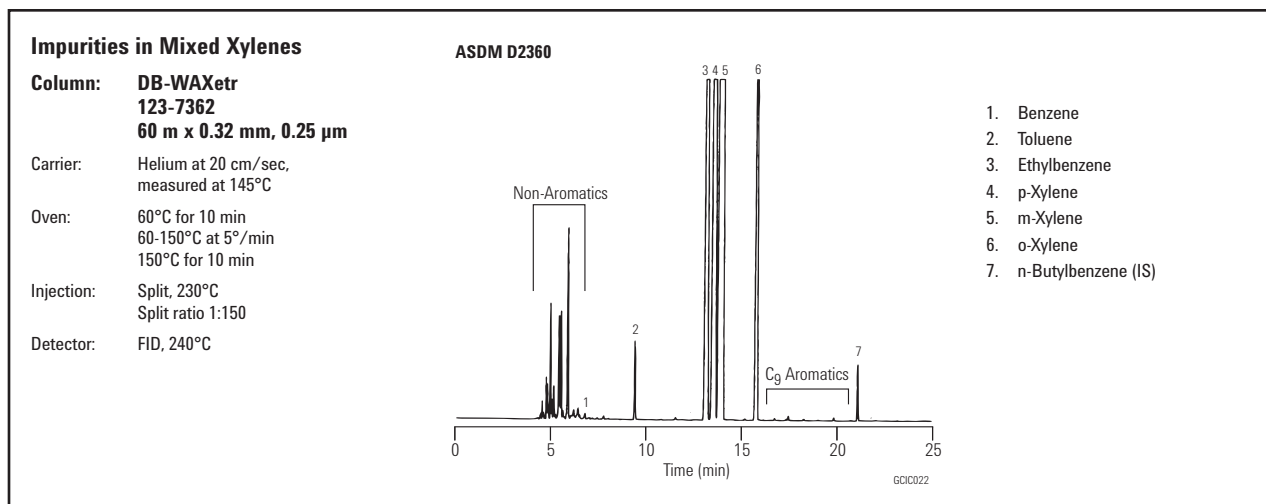
**Column: DB-WAX
122-7032
30 m x 0.25 mm, 0.25 µm**

Carrier: Helium at 1 mL/min
Oven: 60°C for 2 min
60-180°C at 16°/min
Injection: Split, 250°C
Split ratio 1:50
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min



1. Ethylene oxide
2. 2-Chloroethanol
3. Ethylene glycol (solvent: Dimethylformamide)

(Courtesy of J. Chromatogr. Sci., 28:97 [1990])



Inorganic Gases

Column: GS-GasPro
113-4332
30 m x 0.32 mm

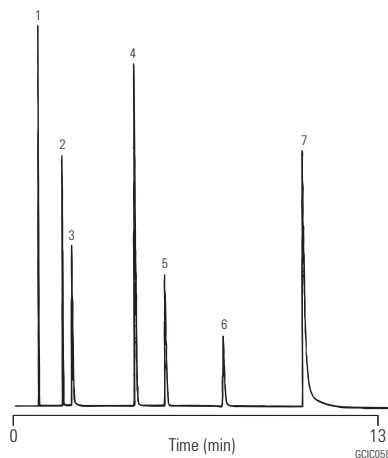
Carrier: Helium at 53 cm/sec

Oven: 25°C for 3 min
25-200°C at 10°/min
200°C Hold

Injection: Split, 200°C
Split ratio 1:50

Detector: TCD, 250°C

Sample: 50 µL



1. Nitrogen
2. CO₂
3. SF₆
4. COS
5. H₂S
6. Ethylene oxide
7. SO₂

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885

Inorganic Hydride Gases

Column: HP-1
19091Z-205
50 m x 0.20 mm, 0.50 µm

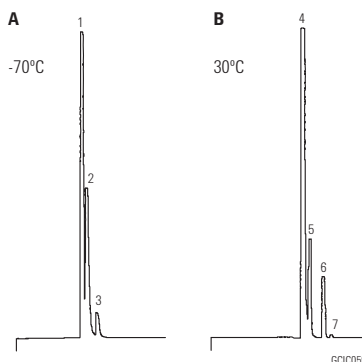
Carrier: Helium, 35 cm/sec

Oven: A: -70°C isothermal
B: 30°C isothermal

Injection: Split ratio 25:1

Detector: FPD, 535 µm filter

Sample: 1 µL



1. Arsine 0.1%
2. Phosphine 0.1%
3. Selenide 0.1%
4. Diborane 0.10 ppm
5. Tetraborane 0.10 ppm
6. Pentaborane 0.10 ppm
7. Dihydropentaborane 0.60 ppm

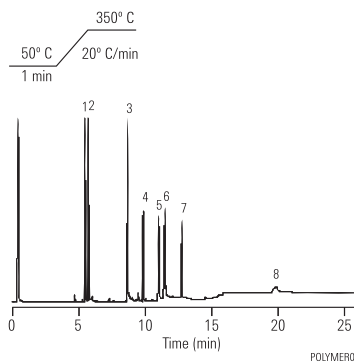
Polymer Additives

Column: HP-35 (use only 10 meters)
19091G-013
30 m x 0.32 mm, 0.15 µm

Carrier: Helium, 6 psi (4 mL/min at 50°C)
hold for 5 min.
ramp to 50 psi (21 mL/min at 350°C) at 5 psi/min.

Injection: EPC on-column, oven track 0.5 µL injection

Detector: FID



1. BHT
2. BHEB
3. Tinuvin P
4. Isonox 129
5. Irgafos 168
6. Irganox 1076
7. MD 1024
8. Irganox 1010

Fast separation of silanes

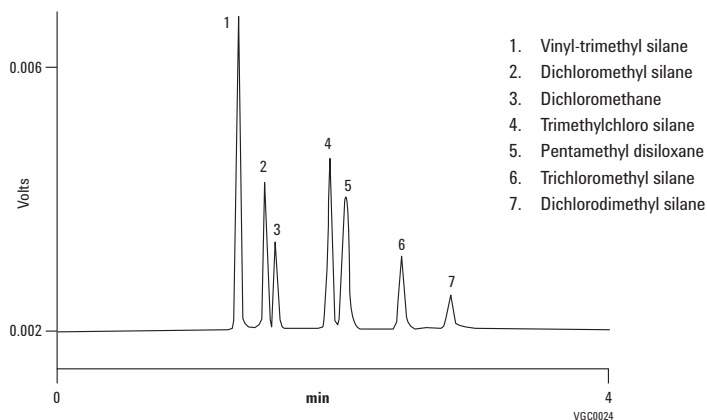
Column: VF-200ms
CP8860
30 m x 0.25 mm, 1.00 µm

Carrier: Hydrogen, ca 1.0 mL/min, 60 kPa

Oven: 50°C

Injection: Split/splitless, in split mode, 1:100

Detector: FID



Sulfur gases

Column: CP-PoraPLOT U
CP7584
25 m x 0.53 mm, 20.00 µm

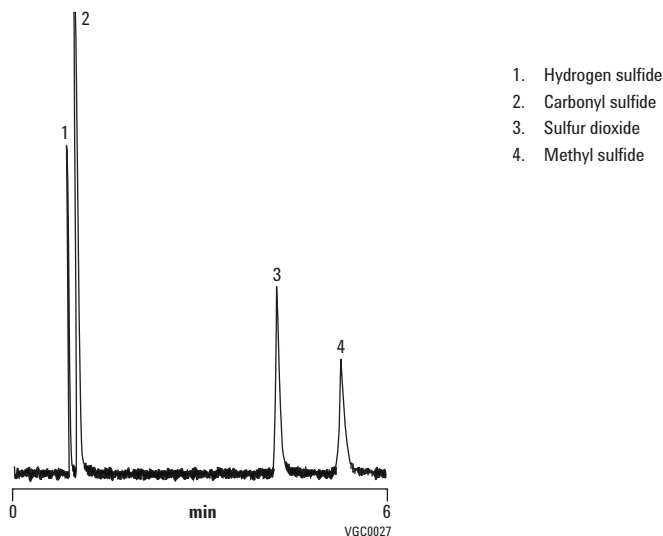
Sample: ±100 ppm

Carrier: H₂

Oven: 50°C

Injection: 100 mL/min

Detector: FPD



Analysis of acetylenes mixture

Column: Select AI203
CP7432
50 m x 0.53 mm

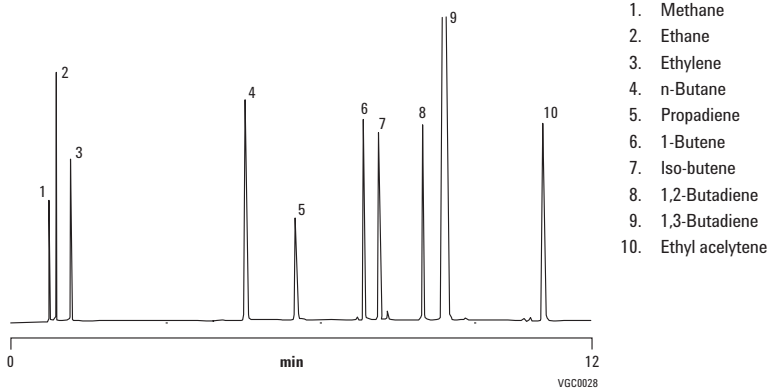
Sample Conc: Approx 100 ppm in nitrogen, synthetic standard

Carrier: Helium, 4 psig, 4 min to 11 psig, 0.5 psig/min, 2 min

Oven: 40°C, 5 min to 160°C, 10°C/min to 200°C, 20°C/min, hold 1 min

Injection: Split 60 mL/min

Detector: FID



Courtesy of J. Luong, Dow Chemical Canada.

Life Science Applications

Benzodiazepines I

Column: DB-5MS Ultra Inert
122-5532UI
30 m x 0.25 mm, 0.25 μ m

Carrier: Hydrogen, 53 cm/sec, constant flow
1.6 for 11 min
1.6 to 2.4 at 60 mL/min₂ hold 2 min
2.4 to 5.0 at 50 mL/min₂ hold 9 min

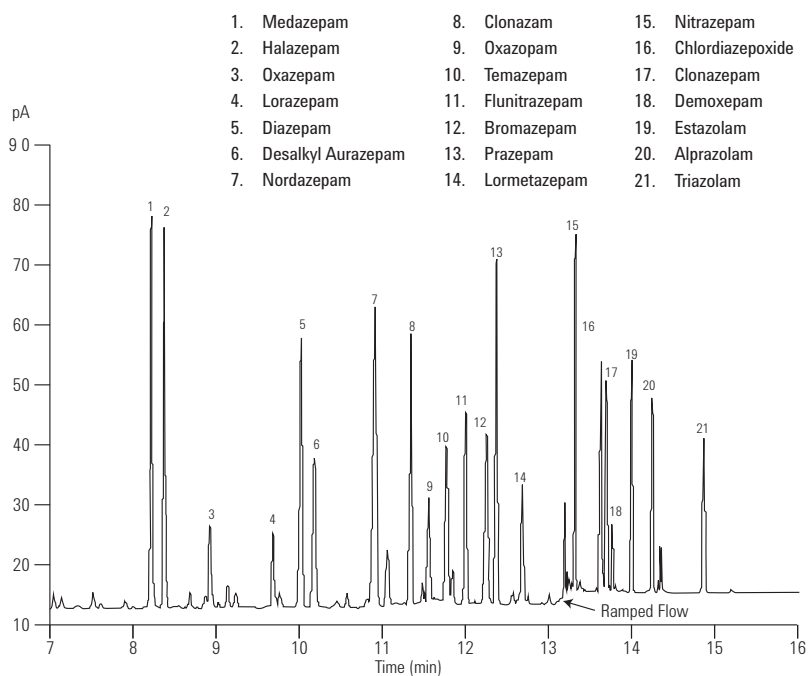
Oven: 170°C for 3.2 min
170-250°C at 24.7°C/min, hold 5.3 min
250-280°C at 18.6°C/min, hold 4.0 min
280-325°C at 50.0°C/min, hold 4 min

Injection: Pulsed Splitless, 280°C
20 psi pulse pressure for 0.38 min
50 mL/min purge at 0.40 min
Direct Connect liner G1544-80730

Detector: FID, 350°C

Sample: 1 μ L of 5-10 ppm

Analysis of benzodiazepines and other drugs is particularly challenging because of their high level of activity. For this reason, all aspects of the sample path – particularly the GC Column – must be as inert as possible.



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Common Drug Screen

Column: DB-5
122-5032
30 m x 0.25 mm, 0.25 µm

Column: DB-17
122-1732
30 m x 0.25 mm, 0.25 µm

Carrier: Hydrogen at 41 cm/sec,
 measured at 80°C

Oven: 80°C for 1 min
 80-280°C at 10°/min
 280°C for 9 min

Injection: Split, 250°C
 Split ratio 1:40

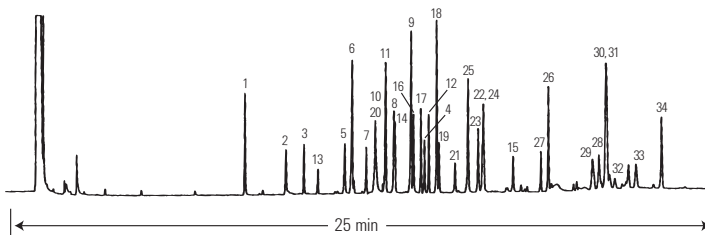
Detector: FID, 300°C

Suggested Supplies

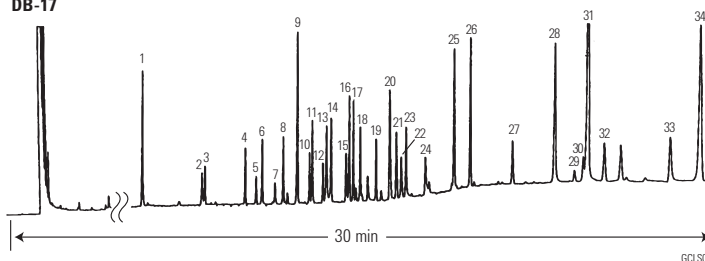
Septum: 11 mm Advanced Green septa, 5183-4759
Liner: General purpose split/splitless liner, taper,
 glass wool, 5183-4711
Seal: Gold plated seal, 18740-20885
Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

	DB-17 Time	DB-5 Time		DB-17 Time	DB-5 Time
1. Nicotine	9.87	8.57	18. Hexobarbital	17.52	15.22
2. Phenmetrazine	11.8	9.95	19. Doxylamine	17.69	15.87
3. Ibuprofen	12.06	10.64	20. Caffeine	18.05	13.11
4. Procaine	13.48	14.82	21. Chlorpheniramine	18.47	16.35
5. Allobarbitol	13.91	12.02	22. Methapyrilene	18.72	16.68
6. Aprobartol	14.14	12.27	23. Thenyldiamine	18.87	16.85
7. Butabarbitol	14.56	12.76	24. Phenobarbitol	19.11	16.29
8. Secobarbitol	14.87	14.31	25. Bromopheniramine	19.71	17.39
9. Pentobarbitol	15.41	13.73	26. Chlorcyclizine	20.75	19.13
10. Phenacetin	15.72	12.94	27. Cocaine	21.32	18.88
11. Amobarbitol	15.87	13.43	28. Pyrrobutamine	22.79	20.89
12. Benzphetamine	16.14	14.96	29. Codeine	24.27	20.66
13. Acetaminophen	16.34	11.12	30. Diazepam	25.27	21.13
14. Hydroxyphenamate	16.47	15.31	31. Morphine	25.36	21.12
15. Dimenhydrinate	16.93	13.79	32. Hydrocodone	25.98	21.26
16. Meprobamate	17.12	14.44	33. Oxymorphone	28.27	22.21
17. Benactyzine	17.26	14.71	34. Heroin	29.32	23.14

DB-5



DB-17



GCL5001

Drug Screen

Column: DB-1ms
122-0132
30 m x 0.25 mm, 0.25 µm

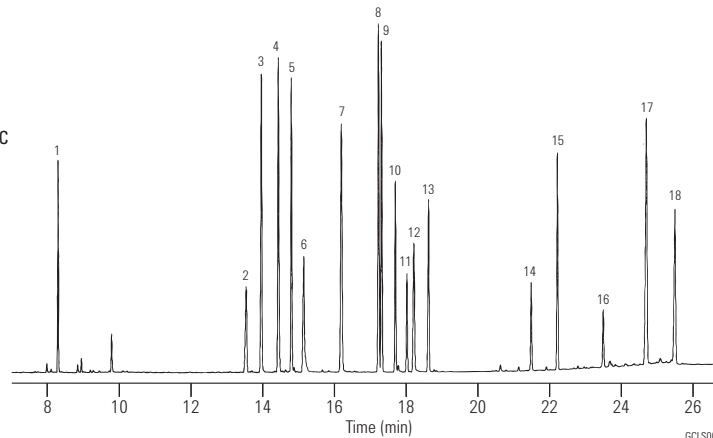
Carrier: Helium at 40 cm/sec,
measured at 50°C

Oven: 50°C for 1.0 min
50-125°C at 25°/min
125-325°C at 10°/min
325°C for 5 min

Injection: Cold Splitless
Optic II injector, 50-250°C
at 10°/sec
45 sec purge
activation time

Detector: FID, 300°C

Sample: 1 µL injection of
50-150 ppm standard



1. Nicotine
2. Caffeine
3. Glutethimide
4. Lidocaine
5. PCP
6. Phenobarbital
7. Methadone primary metabolite
8. Methaqualone
9. Methadone
10. Cocaine
11. Desipramine
12. Carbazepine
13. Trimipramine
14. Heroin
15. Fentanyl
16. Ibogaine
17. Triazolam
18. LSD

Urine Drug Screen

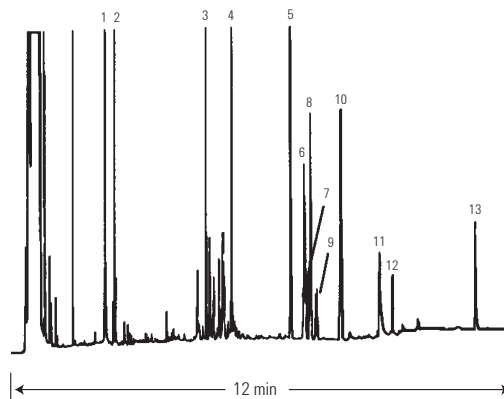
Column: ULTRA 2
19091B-115
50 m x 0.32 mm, 0.52 µm

Carrier: Hydrogen 80 cm/sec

Oven: 45°C for 1.5 min
45-300°C at 6°C/min

Injection: Splitless

Detector: FID

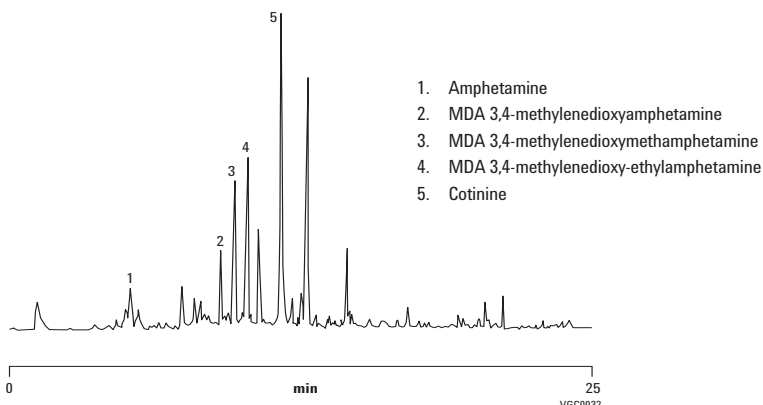


1. Amphetamine
2. Methamphetamine
3. Meperidine
4. Phencyclidine (PCP)
5. Methadone
6. Propoxyphene
7. Amitriptyline
8. Cocaine
9. Imipramine
10. Cyheptamide (ISTD)
11. Codeine
12. Diazepam
13. Flurazepam

Analysis of drugs of abuse in urine via GC/MS

Column: VF-DA
CP8964
12 m x 0.20 mm

Sample: 1 µL
Solvent: Methanol
Carrier: He, ca 1.0 mL/min
Oven: 70°C, 1.2 min to 200°C, 20°C/min to 270°C, 7°C/min to 320°C, 20°C/min
Pressure: 58.7 kPa, 2.2 min to 97 kPa, 58 kPa/min to 132 kPa, 3 kPa/min to 180 kPa, 12 kPa/min
Injection: Splitless
Detector: MS
Derivatization: Acetic acid anhydride to form acetates

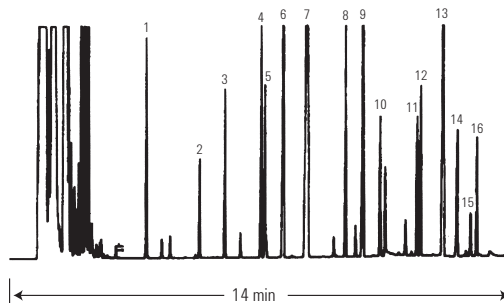


Amphetamines and Precursors – TMS Derivatives

Column: DB-5
121-5023
20 m x 0.18 mm, 0.40 µm

Carrier: Helium at 39 cm/sec, measured at 100°C
Oven: 100-240°C at 10°/min
Injection: Split, 250°C
Split ratio 1:100
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min
Sample: 1 µL of 2 µg/µL each in pyridine

- | | |
|------------------------|---|
| 1. Phenylacetone | 9. Phenacetin |
| 2. Dimethylamphetamine | 10. 3,4-Methylenedioxyamphetamine (MDA) |
| 3. Amphetamine | 11. 3,4-Methylenedioxyethylamphetamine |
| 4. Phentermine | 12. 4-Methyl-2,5-dimethoxyamphetamine (STP) |
| 5. Methamphetamine | 13. Phenyl ephedrine |
| 6. Methyl ephedrine | 14. 3,4-Methylenedioxyethylamphetamine (MDE; Eve) |
| 7. Nicotinamine | 15. Caffeine |
| 8. Ephedrine | 16. Benzphetamine |



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: General purpose split/splitless liner, taper, glass wool, 5183-4711
Seal: Gold plated seal, 18740-20885
Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Anesthetics

Column: DB-5ms EVDX
128-8522
25 m x 0.20 mm, 0.33 μ m

Carrier: Helium at 35 cm/sec, measured at 55°C

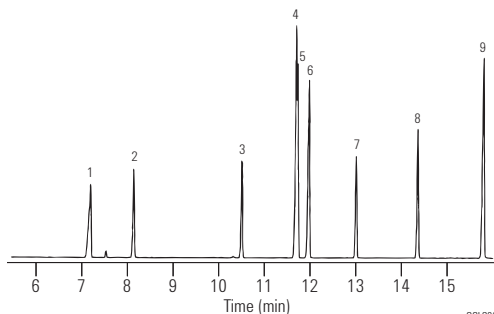
Oven: 55°C for 1 min
55-130°C at 25°/min
130-325°C at 15°/min

Injection: Splitless, 250°C
45 sec purge activation time

Detector: MSD, 280°C transfer line
full scan at m/z 35-400

Sample: 1 μ L of 50-100 ng/ μ L standard in methanol

- | | |
|-----------------|----------------|
| 1. Salicylamide | 6. Mepivacaine |
| 2. Benzocaine | 7. Tetracaine |
| 3. Lidocaine | 8. Butacaine |
| 4. Procaine | 9. Dibucaine |
| 5. Nefopam | |

**Suggested Supplies**

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316

Seal: Gold plated seal, 18740-20885

Syringe: 10 μ L tapered, FN 23-26s/42/HP, 5181-1267

Anticonvulsants

Column: DB-1
125-1032
30 m x 0.53 mm, 1.50 μ m

Carrier: Helium at 8 mL/min

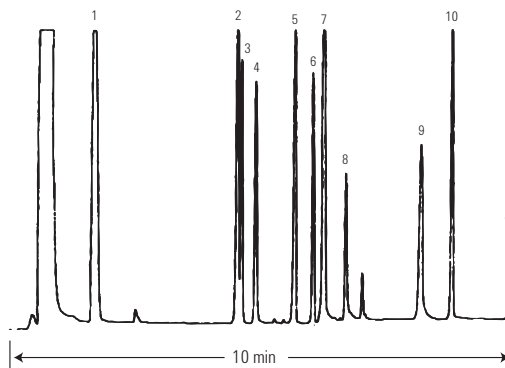
Oven: 160°C for 2 min
160-275°C at 15°/min

Injection: Megabore Direct, 250°C

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Sample: 1 μ L of 100 ng/ μ L in methanol

1. Ethosuximide
2. Methsuximide
3. Phensuximide
4. N-Desmethyl methsuximide
5. Phenylethylmalonamide
6. Phenobarbital
7. Primidone
8. Carbamazepine
9. Phenytoin
10. 5-Methyl-5-phenylhydantoin

**Suggested Supplies**

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730

Seal: Gold plated seal, 18740-20885

Syringe: 10 μ L tapered, FN 23-26s/42/HP, 5181-1267



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Antihistamines

Column: DB-5
123-5032
30 m x 0.32 mm, 0.25 µm

Carrier: Helium at 40 cm/sec, measured at 55°C

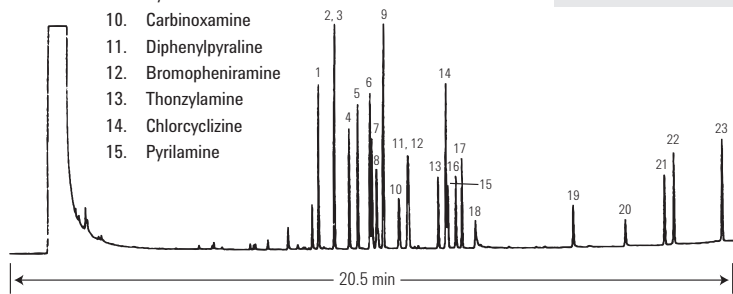
Oven: 55°C for 1 min
55-175°C at 30°/min
175-320°C at 10°/min
320°C for 1 min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Sample: 1 µL of 50 ng/µL each in methanol

- | | |
|----------------------|------------------|
| 1. Pheniramine | 16. Triprolidine |
| 2. Dimenhydrinate | 17. Promethazine |
| 3. Diphenhydramine | 18. Antazoline |
| 4. Doxylamine | 19. Clemizole |
| 5. Phenyltoloxamine | 20. Hydroxyzine |
| 6. Tripelemamine | 21. Meclizine |
| 7. Methapyrilene | 22. Cinnanzine |
| 8. Chlorpheniramine | 23. Buclizine |
| 9. Cyclizine | |
| 10. Carbinoxamine | |
| 11. Diphenylpyraline | |
| 12. Bromopheniramine | |
| 13. Thonzylamine | |
| 14. Chlorcyclizine | |
| 15. Pyrilamine | |



GCL5007

Suggested Supplies

- Septum:** 11 mm Advanced Green septa, 5183-4759
- Liner:** Splitless, single taper, deactivated, 4 mm ID, 5181-3316
- Seal:** Gold plated seal, 18740-20885
- Syringe:** 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Antiepileptic Drugs

Column: ULTRA 2
19091B-012
25 m x 0.32 mm, 0.17 µm

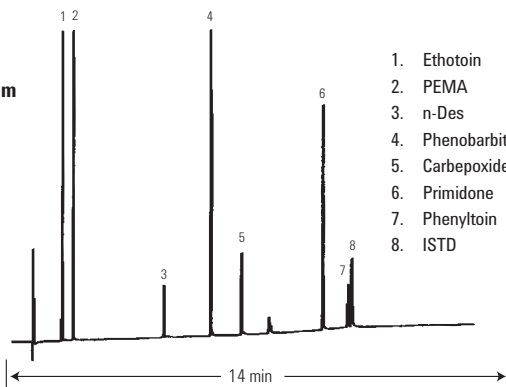
Carrier: Helium, 14 psi

Oven: 100-230°C at 15°C/min

Injection: Split ratio 35:1

Detector: NPD

- | |
|----------------------|
| 1. Ethotoin |
| 2. PEMA |
| 3. n-Des |
| 4. Phenobarbital |
| 5. Carboxipide 10/11 |
| 6. Primidone |
| 7. Phenyltoin |
| 8. ISTD |



GCL5008

Suggested Supplies

- Septum:** 11 mm Advanced Green septa, 5183-4759
- Liner:** General purpose split/splitless liner, taper, glass wool, 5183-4711
- Seal:** Gold plated seal, 18740-20885
- Syringe:** 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Tricyclic Antipsychotics

Column: ULTRA 2
19091B-101
12 m x 0.20 mm, 0.33 µm

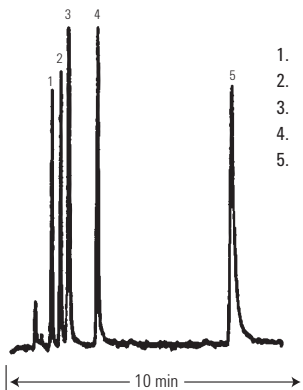
Carrier: Hydrogen, 106 cm/sec

Oven: 250°C for 3 min
250-290°C at 10°C/min
290°C for 10 min

Injection: Split ratio 75:1

Detector: FPD

- | |
|--------------------|
| 1. Triflupromazine |
| 2. Promethazine |
| 3. Promazine |
| 4. Chlorpothixene |
| 5. Thioridazine |



GCL5009

Suggested Supplies

- Septum:** 11 mm Advanced Green septa, 5183-4759
- Liner:** General purpose split/splitless liner, taper, glass wool, 5183-4711
- Seal:** Gold plated seal, 18740-20885
- Syringe:** 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Barbiturates

Column: DB-35ms
122-3832
30 m x 0.25 mm, 0.25 µm

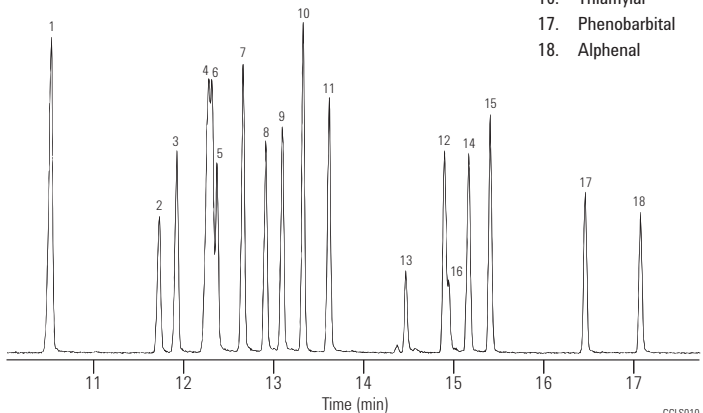
Carrier: Helium at 31 cm/sec, measured at 50°C

Oven: 50°C for 0.5 min
50-150°C at 25°/min
150-300°C at 10°/min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: MSD, 280°C transfer line
full scan at m/z 40-270

- | | | |
|-----------------|------------------|-------------------------|
| 1. Barbital | 6. Butalbital | 11. Secobarbital |
| 2. Allobarbitol | 7. Amobarbital | 12. Hexobarbital |
| 3. Aprobarbital | 8. Talbutal | 13. Thiopental |
| 4. Butabarbital | 9. Pentobarbital | 14. Cyclopentylbarbital |
| 5. Butethal | 10. Methohexital | 15. Mephobarbital |
| | | 16. Thiamylal |
| | | 17. Phenobarbital |
| | | 18. Alphenal |



GCLS010

Suggested Supplies

- Septum:** 11 mm Advanced Green septa, 5183-4759
Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316
Seal: Gold plated seal, 18740-20885
Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Benzodiazepines II

Column: DB-35ms
122-3832
30 m x 0.25 mm, 0.25 µm

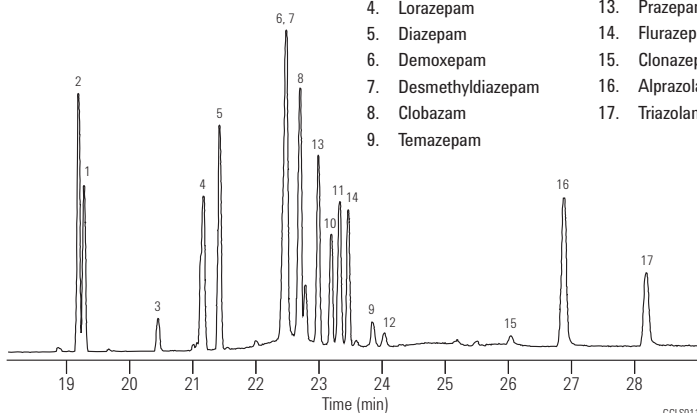
Carrier: Helium at 31 cm/sec, measured at 50°C

Oven: 50°C for 0.5 min
50-150°C at 25°/min
150-340°C at 10°/min
340°C for 6 min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: MSD, 280°C transfer line
full scan at m/z 40-400

- | | |
|----------------------|-------------------|
| 1. Medazepam | 10. Flunitrazepam |
| 2. Halazepam | 11. Delorazepam |
| 3. Oxazepam | 12. Bromazepam |
| 4. Lorazepam | 13. Prazepam |
| 5. Diazepam | 14. Flurazepam |
| 6. Demoxepam | 15. Clonazepam |
| 7. Desmethyldiazepam | 16. Alprazolam |
| 8. Clobazam | 17. Triazolam |
| 9. Temazepam | |



GCLS011

Suggested Supplies

- Septum:** 11 mm Advanced Green septa, 5183-4759
Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316
Seal: Gold plated seal, 18740-20885
Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Fentanyl

Column: DB-1701
125-0732
30 m x 0.53 mm, 1.00 µm

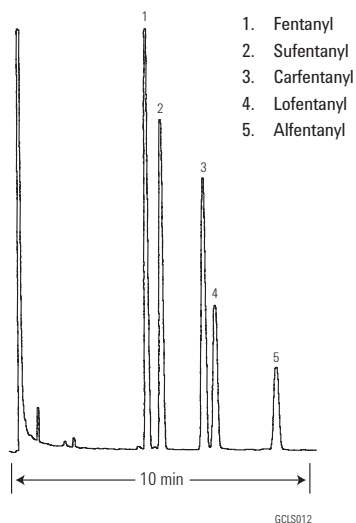
Carrier: Hydrogen at 15 mL/min

Oven: 270°C isothermal

Injection: Split, 250°C
Split ratio 1:5

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Sample: 0.8 µL



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP, 5181-1273

Tocopherols

Column: DB-17ms
122-4732
30 m x 0.25 mm, 0.25 µm

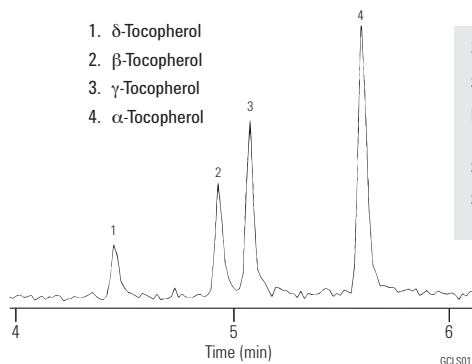
Carrier: Helium at 40 cm/sec,
measured at 150°C

Oven: 300°C for 1 min
300-320°C at 25°/min
320°C for 4 min

Injection: Split, 310°C
Split ratio 1:25

Detector: MSD, 310°C transfer line
full scan at m/z 45-550

Sample: 1 µL of 1-10 ng/µL in isoctane



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µL tapered, FN 23-26s/42/HP, 5181-1273

Hallucinogens

Column: DB-17ms
122-4732
30 m x 0.25 mm, 0.25 µm

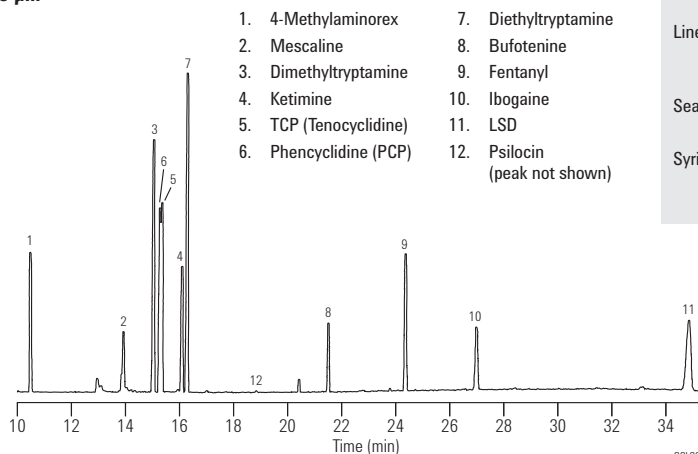
Carrier: Helium at 30 cm/sec,
measured at 50°C

Oven: 50°C for 0.5 min
50-125°C at 25°/min
125-255°C at 10°/min
255-320°C at 25°/min
320°C for 16 min

Injection: Splitless, 250°C
30 sec purge
activation time

Detector: MSD, 300°C
transfer line full scan
at m/z 40-350

Sample: 1 µL of 10-50 ng/µL
standard in methanol



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730

Seal: Gold plated seal, 18740-20885

Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Sedative Hypnotics

Column: DB-5ms EVDX
128-8522
25 m x 0.20 mm, 0.33 µm

Carrier: Helium at 35 cm/sec,
measured at 55°C

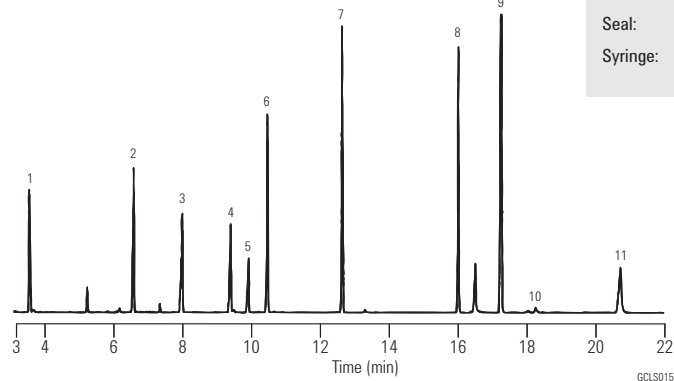
Oven: 55°C for 1 min
55-130°C at 25°/min
130-325°C at 15°/min
325°C for 4 min

Injection: Splitless, 250°C
45 sec purge activation time

Detector: MSD, 280°C transfer line
full scan at m/z 35-400

Sample: 1 µL of 50-100 ng/µL
standard in methanol

- | | |
|------------------|-----------------|
| 1. Ethchlorvynol | 7. Methaqualone |
| 2. Ethinamate | 8. Propiomazine |
| 3. Pyrrithydione | 9. Haloperidol |
| 4. Talbutal | 10. Sulpiride |
| 5. Meprobamate | 11. Droperidol |
| 6. Glutethimide | |

**Suggested Supplies**

Septum: 11 mm Advanced Green septa,
5183-4759

Liner: Direct connect, single taper,
deactivated, 4 mm ID,
G1544-80730

Seal: Gold plated seal, 18740-20885

Syringe: 10 µL tapered,
FN 23-26s/42/HP, 5181-1267

Narcotics

Column: DB-5ms
122-5532
30 m x 0.25 mm, 0.25 µm

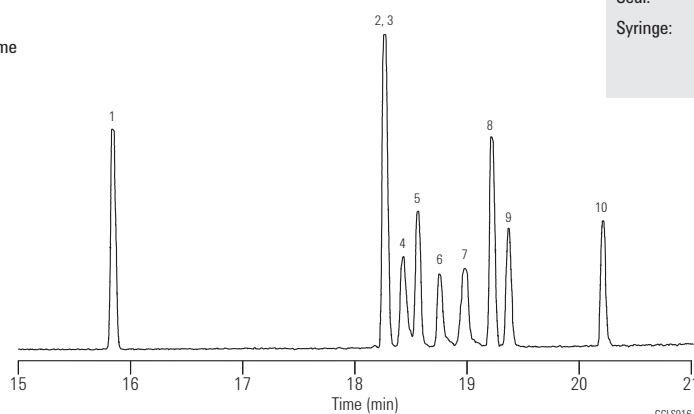
Carrier: Helium at 31 cm/sec,
measured at 50°C

Oven: 50°C for 0.5 min
50-150°C at 25°/min
150-325°C at 10°/min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: MSD, 300°C transfer line
full scan at m/z 40-380

- | | |
|---------------------|-------------------------|
| 1. Dextromethorphan | 6. Morphine |
| 2. Codeine | 7. Normorphine |
| 3. Dihydrocodeine | 8. 6-Acetylcodeine |
| 4. Norcodeine | 9. 6-Monoacetylmorphine |
| 5. Ethylmorphine | 10. Heroin |

**Suggested Supplies**

Septum: 11 mm Advanced Green septa,
5183-4759

Liner: Direct connect, single taper,
deactivated, 4 mm ID,
G1544-80730

Seal: Gold plated seal, 18740-20885

Syringe: 10 µL tapered,
FN 23-26s/42/HP, 5181-1267



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Narcotics and Adulterants

Column: DB-5
123-5032
30 m x 0.32 mm, 0.25 µm

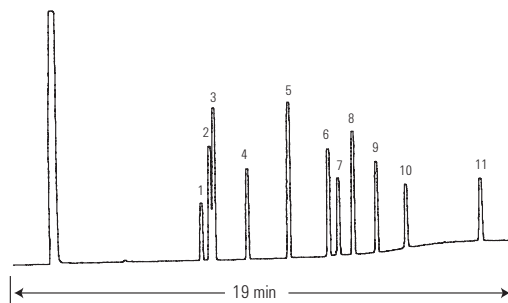
Carrier: Helium at 40 cm/sec, measured at 140°C

Oven: 140-320°C at 12°/min
 320°C for 4 min

Injection: Split, 250°C
 Split ratio 1:75

Detector: FID, 300°C
 Nitrogen makeup gas at 30 mL/min

Sample: 1 µL of 0.5 µg/µL each in methanol



- 1. Caffeine
- 2. Ketamine
- 3. Lidocaine
- 4. Procaine
- 5. Cocaine
- 6. Codeine
- 7. Morphine
- 8. 6-Acetylcodeine
- 9. Diacetylmorphine (Heroin)
- 10. Quinine
- 11. Strychnine

GCLS017

**Over-the-Counter Pain Killers –
 TMS Derivatives**

Column: DB-5
121-5023
20 m x 0.18 mm, 0.40 µm

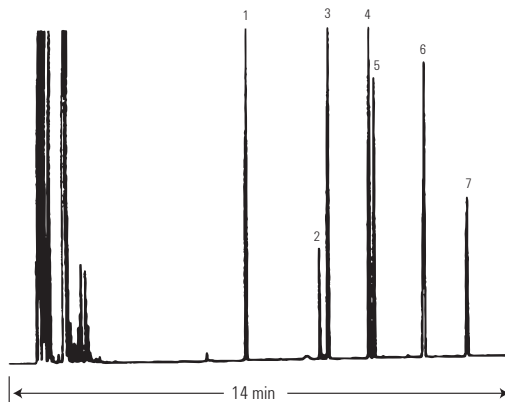
Carrier: Helium at 39 cm/sec, measured at 100°C

Oven: 100-240°C at 10°/min

Injection: Split, 250°C
 Split ratio 1:100

Detector: FID, 300°C
 Nitrogen makeup gas at 30 mL/min

Sample: 1 µL of 2 µg/µL each in pyridine



- 1. Nicotine
- 2. Unknown
- 3. Acetylsalicylic acid (aspirin)
- 4. Ibuprofen
- 5. Acetaminophen
- 6. Unknown
- 7. Caffeine

GCLS018

Aspirin and Ibuprofen in Methanol

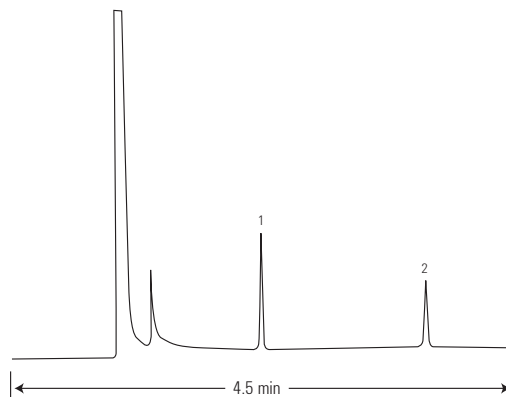
Column: DB-FFAP
122-3232
30 m x 0.25 mm, 0.25 µm

Carrier: Hydrogen at 24 cm/sec,
 measured at 180°C

Oven: 180°C isothermal

Injection: Split, 250°C
 Split ratio 1:50

Detector: FID, 300°C
 Nitrogen makeup gas at 30 mL/min



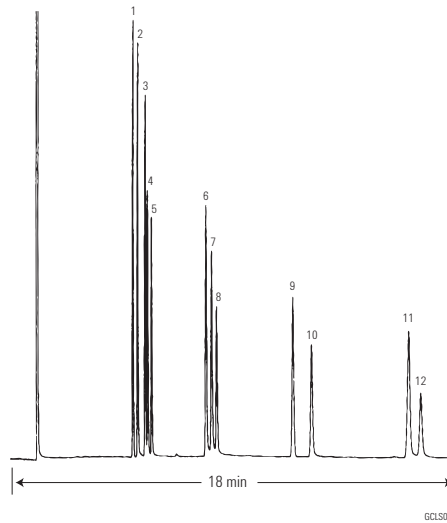
- 1. Aspirin
- 2. Ibuprofen

GCLS019

Free Steroids

Column: DB-17
122-1731
30 m x 0.25 mm, 0.15 µm

Carrier: Hydrogen at 44 cm/sec
Oven: 260°C isothermal
Injection: Split, 250°C
Split ratio 1:100
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min
Sample: 1 µL

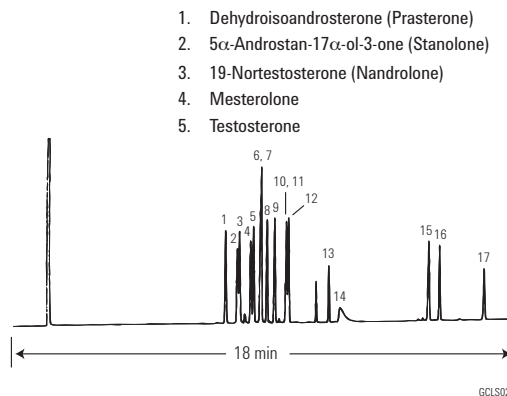


1. Coprostanone (5-β-cholestane)
2. 5-β-Androsterone
3. 5-α-Cholestane
4. Androsterone
5. Epiandrosterone (trans-androsterone)
6. 17-α-Estradiol
7. β-Estradiol
8. Estrone
9. Progesterone
10. Cholesterol
11. Estril
12. Stigmasterol

Anabolic Steroids

Column: DB-1
122-1031
30 m x 0.25 mm, 0.10 µm

Carrier: Helium at 40 cm/sec,
measured at 180°C
Oven: 180-320°C at 10°/min
320°C for 4 min
Injection: Split ratio 1:40
Detector: FID, Nitrogen makeup
gas at 30 mL/min
Sample: 2 µL of 0.125 µg/µL
each in methanol

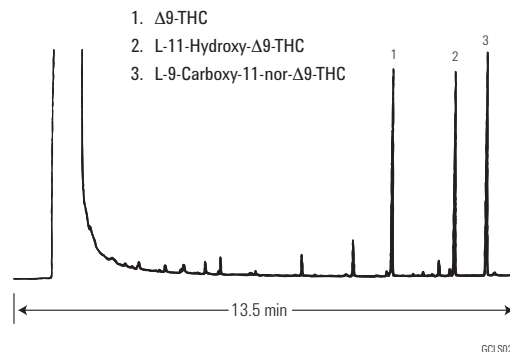


1. Dehydroisoandrosterone (Prasterone)
2. 5α-Androstan-17α-ol-3-one (Stanolone)
3. 19-Nortestosterone (Nandrolone)
4. Mesterolone
5. Testosterone
6. 1-Dehydrotestosterone (Boldenone)
7. 17α-Methyltestosterone
8. 1-Dehydro-17-α-methyltestosterone (Methandrostenolone)
9. Norethandrolone
10. 1-Dehydrotestosterone acetate
11. Oxymetholone
12. 19-Nortestosterone-17-propionate
13. 4-Chlorotestosterone-17-acetate (Clostebol)
14. Stanozolol
15. 1-Dehydrotestosterone benzoate
16. 19-Nortestosterone-17-decanoate
17. 1-Dehydrotestosterone undecylenate

Marijuana (Δ9-THC) and Major Metabolites - TMS Derivatives

Column: DB-5
123-5032
30 m x 0.32 mm, 0.25 µm

Carrier: Helium at 40 cm/sec,
measured at 100°C
Oven: 100°C for 1 min
100-175°C at 30°/min
175-295°C at 12°/min
Injection: Splitless, 250°C
30 sec purge activation time
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min
Sample: 1 µL of 0.1 µg/µL
each in pyridine



1. Δ9-THC
2. L-11-Hydroxy-Δ9-THC
3. L-9-Carboxy-11-nor-Δ9-THC

Suggested Supplies

- | | |
|-----------------|---|
| Septum: | 11 mm Advanced Green septa, 5183-4759 |
| Liner: | Direct connect, single taper, deactivated, 4 mm ID, G1544-80730 |
| Seal: | Gold plated seal, 18740-20885 |
| Syringe: | 10 µL tapered, FN 23-26s/42/HP, 5181-1267 |

Blood Alcohols I (Static Headspace/Split)

Column: DB-ALC1
125-9134
30 m x 0.53 mm, 3.00 µm

Carrier: Helium at 80 cm/sec,
measured at 40°C

Oven: 40°C Isothermal

Sampler: Headspace

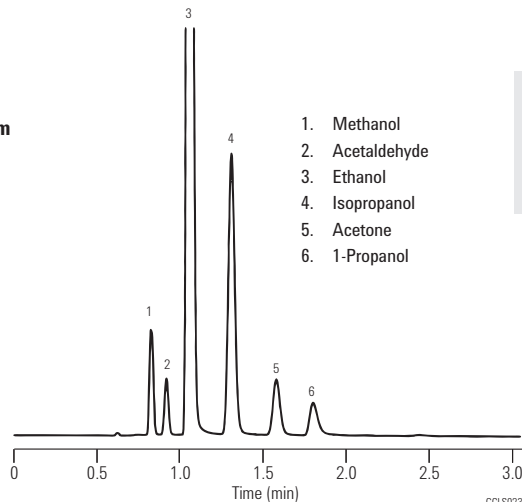
Injection: Split, 250°C
Split ratio 1:10

Detector: FID, 300°C
Nitrogen makeup gas
at 23 mL/min

1. Methanol
2. Acetaldehyde
3. Ethanol
4. Isopropanol
5. Acetone
6. 1-Propanol

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885



GCLS023

Blood Alcohols II (Static Headspace/Split)

Column: DB-ALC2
125-9234
30 m x 0.53 mm, 2.00 µm

Carrier: Helium at 80 cm/sec,
measured at 40°C

Oven: 40°C Isothermal

Sampler: Headspace
Oven: 70°C
Loop: 80°C
Transfer Line: 90°C
Vial Equil. Time: 10 min
Pressurization Time: 0.20 min
Loop Fill Time: 0.20 min
Loop Equil. Time: 0.05 min
Inject Time: 0.1 - 0.2 min
Sample Loop Size: 1.0 mL

Injection: Split, 250°C
Split ratio 1:10

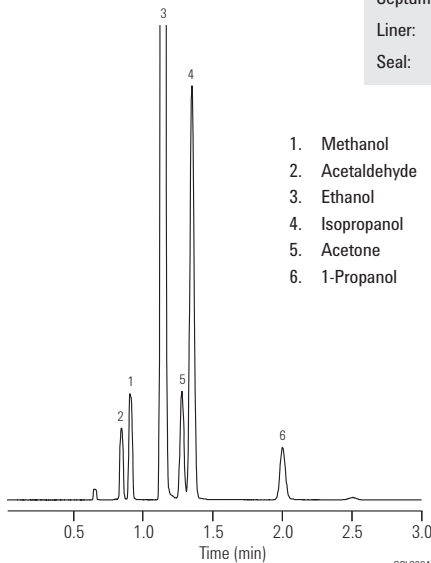
Detector: FID, 300°C
Nitrogen makeup gas
at 23 mL/min

Sample: 0.1% Ethanol,
0.001% Others

1. Methanol
2. Acetaldehyde
3. Ethanol
4. Isopropanol
5. Acetone
6. 1-Propanol

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885



GCLS024

Blood Pollutants I

Column: Blood Alcohol
125-9134
30 m x 0.53 mm, 3.00 µm

Carrier: Helium, 36 cm/sec, measured at 40°C

Oven: 40°C for 5 min
 40-210°C at 10°/min

Injection: Split, 250°C
 Split ratio 1:10

Detector: FID, 300°C

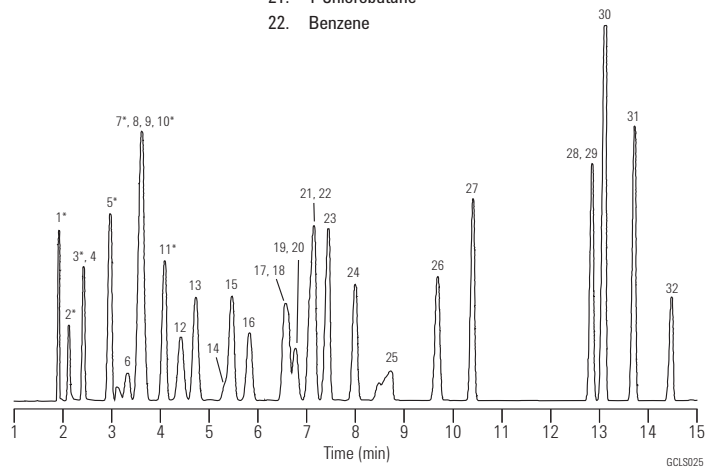
- | | | |
|-----------------------|--------------------------|---------------------------------|
| 1. Methanol* | 11. 1-Propanol | 23. 1-Butanol |
| 2. Acetaldehyde* | 12. MTBE | 24. Heptane |
| 3. Ethanol* | 13. Hexane | 25. Ethylene glycol |
| 4. Diethyl ether | 14. Chloroform | 26. soamyl alcohol |
| 5. Isopropyl alcohol* | 15. sec-Butyl alcohol | 27. Toluene |
| 6. Methylene Chloride | 16. 2-Chlorobutane | 28. Isopropyl amine (not shown) |
| 7. Acetone* | 17. MEK (2-Butanone) | 29. Ethylbenzene |
| 8. Acetonitrile | 18. Ethyl acetate | 30. m,p-Xylene |
| 9. Ethyl formate | 19. 1,1-Trichloroethane | 31. o-Xylene |
| 10. t-Butyl alcohol* | 20. Carbon tetrachloride | 32. DMSO |
| | 21. 1-Chlorobutane | |
| | 22. Benzene | |

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885



GCLIS025

Blood Pollutants II

Column: Blood Alcohol
125-9234
30 m x 0.53 mm, 2.00 µm

Carrier: Helium, 36 cm/sec, measured at 40°C

Oven: 40°C for 5 min
 40-210°C at 10°/min

Injection: Split, 250°C
 Split ratio 1:10

Detector: FID, 300°C

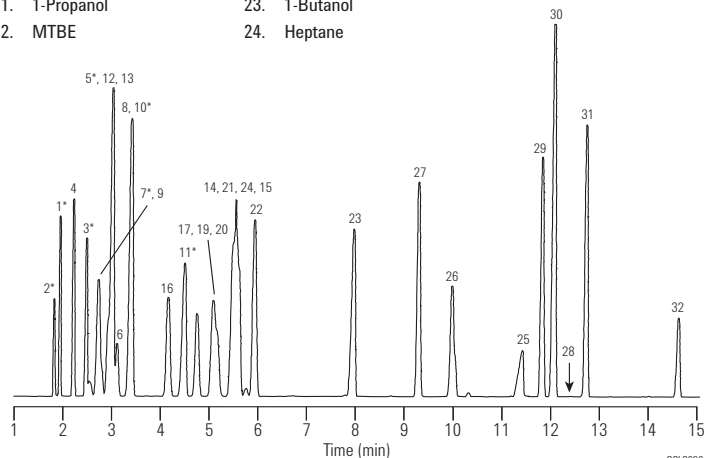
- | | | |
|-----------------------|--------------------------|---------------------------------|
| 1. Methanol* | 13. Hexane | 25. Ethylene glycol |
| 2. Acetaldehyde* | 14. Chloroform | 26. soamyl alcohol |
| 3. Ethanol* | 15. sec-Butyl alcohol | 27. Toluene |
| 4. Diethyl ether | 16. 2-Chlorobutane | 28. Isopropyl amine (not shown) |
| 5. Isopropyl alcohol* | 17. MEK (2-Butanone) | 29. Ethylbenzene |
| 6. Methylene Chloride | 18. Ethyl acetate | 30. m,p-Xylene |
| 7. Acetone* | 19. 1,1-Trichloroethane | 31. o-Xylene |
| 8. Acetonitrile | 20. Carbon tetrachloride | 32. DMSO |
| 9. Ethyl formate | 21. 1-Chlorobutane | |
| 10. t-Butyl alcohol* | 22. Benzene | |
| 11. 1-Propanol | 23. 1-Butanol | |
| 12. MTBE | 24. Heptane | |

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885



GCLIS026

Residual Solvents, USP 467

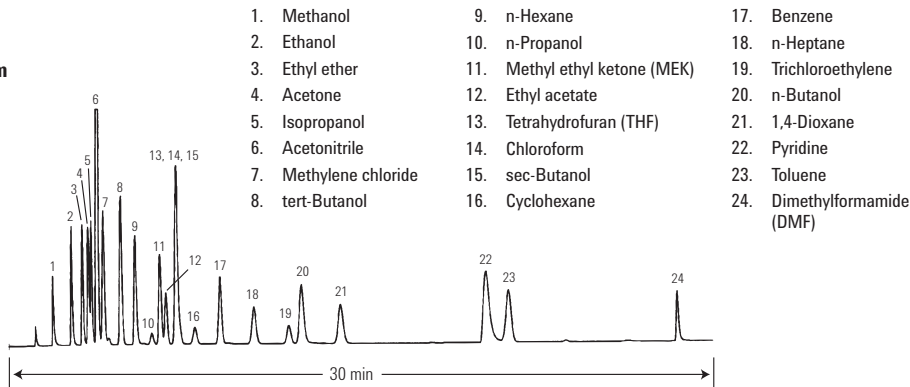
Column: DB-624
125-1334
30 m x 0.53 mm, 3.00 µm

Carrier: Helium at 35 cm/sec,
measured at 40°C

Oven: 40°C for 20 min
40-90°C at 5°/min

Injection: Megabore Direct, 250°C
5 m phenylmethylsilane
deactivated retention gap

Detector: FID, 300°C
Nitrogen makeup gas
at 30 mL/min



GCL5027

Residual Solvents, DMI Diluent

Column: DB-624
123-1364
60 m x 0.32 mm, 1.80 µm

Oven: 50-60°C, 1°C/min
60-115°C, 9.2°C/min
115-220°C, 35°C/min
220°C - hold 6 min

Sampler: Headspace
Platen 140°C
Transfer line, valve 250°C
Sample Loop 2 mL

Injection: Split, 250°C
Split ratio 1:18

Detector: FID, 270°C
Nitrogen makeup

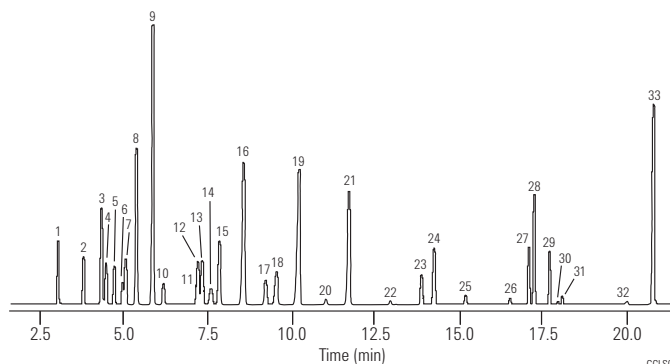
Sample: 5,000 ppm standard

- | | |
|---------------------------------------|--|
| 1. Methanol | 18. 1,2-Dimethoxyethane |
| 2. Ethanol | 19. Heptane |
| 3. Acetone | 20. 1-Methoxy-2-propanol |
| 4. 2-Propanol | 21. Methylcyclohexane |
| 5. Acetonitrile | 22. 2-Ethoxyethanol |
| 6. Methylene chloride | 23. MIBK (2-Pentanone) |
| 7. 2-Methyl-2-propanol (tert-butanol) | 24. Toluene |
| 8. MTBE | 25. 1-Pentanol |
| 9. Hexane | 26. n,n-Dimethylformamide (DMF) |
| 10. 1-Propanol | 27. Ethyl benzene |
| 11. DMI impurity | 28. m,p-Xylene |
| 12. 2-Butanone (MEK) | 29. o-Xylene |
| 13. Ethyl acetate | 30. Dimethyl sulfoxide (DMSO) |
| 14. 2-Butanol | 31. n,n-Dimethylacetamide |
| 15. Tetrahydrofuran | 32. n-Methylpyrrolidone |
| 16. Cyclohexane | 33. 1,3-Dimethyl-2-imidazolidinone (DMI) |
| 17. Isopropyl acetate | |

Suggested Supplies

- Septum:** 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885

Special thanks to Julie Kancler, Brian Wallace, Teledyne.



GCL5028

Residual Solvents

Column: DB-624
123-1364
60 m x 0.32 mm, 1.80 µm

Carrier: Helium, 35-40 cm/sec, set to yield same RT for Hexane on all columns.

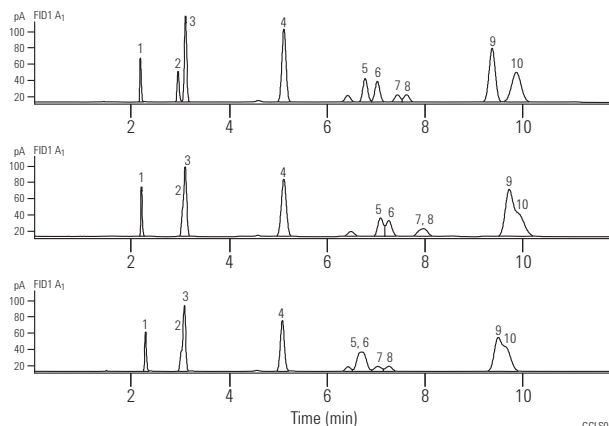
Oven: 40°C Isothermal

Sampler: Ambient Headspace

Injection: Split ratio 1:8

Detector: FID, 240°C

Sample: 4 µL



Peak Numbers	Critical Pair	% Resolution*		
		DB-624	Manufacturer A's 624	Manufacturer B's 624
2,3	ethanol and diethyl ether	100%	0%	0%
5,6	ethyl acetate and 2-butanone	95%	38%	0%
7,8	2-butanol and chloroform	60%	0%	60%
9,10	benzene and isooctane	100%	0%	0%

*Resolution calculated as follows: %R = 100% x valley height/average of peak height 1 + peak height 2

The three chromatograms above show how widely different the two other manufacturer's columns are compared to the DB-624, the original USP G-43 stationary phase column recommended for the analysis of these common organic volatile impurities in pharmaceutical samples.

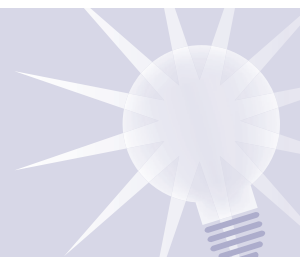
Top Chromatogram: DB-624

Middle Chromatogram: Manufacturer A's "-624"

Bottom Chromatogram: Manufacturer B's "-624"

Tips & Tools

For the latest residual solvent application for USP 467, request publication number **5989-8085EN**.

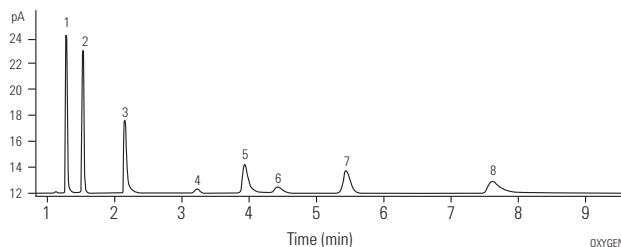


Petroleum Applications

Selected Oxygenates

Column: GS-OxyPLOT
115-4912
10 m x 0.53 mm

Carrier: Helium at 41 cm/s
Oven: 150°C Isothermal
Injection: Split, 1:40, 250°C
Detector: FID, 290°C



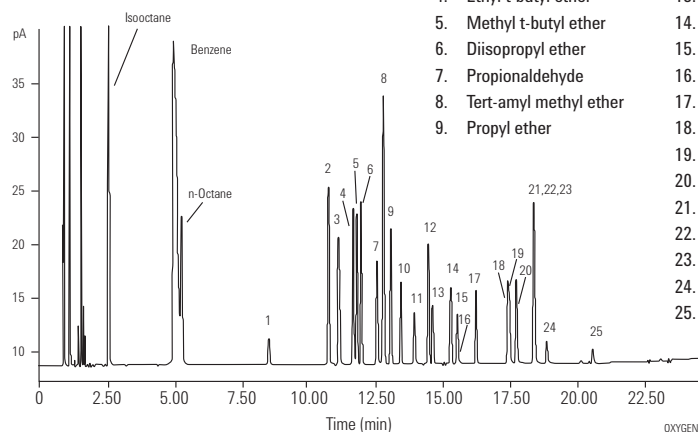
1. n-Dodecane
2. Methyl t-butyl ether
3. n-Tridecane
4. Iso-Buteraldehyde
5. n-Tetradecane
6. Methanol
7. Acetone
8. n-Pentadecane

Trace Oxygenates in Light Hydrocarbon Matrices

Column: DB-1
125-102J
25 m x 0.53 mm, 1.00 µm

Column: GS-OxyPLOT
115-4912
10 m x 0.53 mm

Carrier: Helium (tm = 0.96 min at 50°C)
Oven: 50°C for 5 min
50°C to 240°C
Injection: Split
Detector: FID

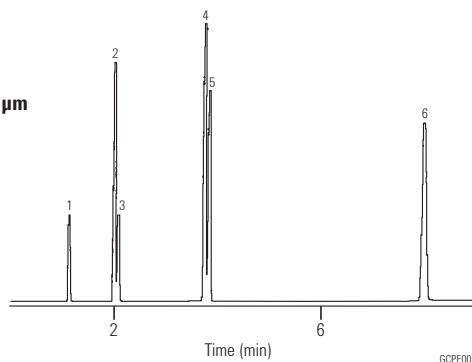


1. Dimethyl ether
2. Diethyl ether
3. Acealdehyde
4. Ethyl t-butyl ether
5. Methyl t-butyl ether
6. Diisopropyl ether
7. Propionaldehyde
8. Tert-amyl methyl ether
9. Propyl ether
10. Isobutylaldehyde
11. Butylaldehyde
12. Methanol
13. Acetone
14. Isovaleraldehyde
15. Valeraldehyde
16. Methyl ethyl ketone
17. Ethanol
18. n-Propanol
19. Isopropanol
20. Allyl alcohol
21. Isobutanol
22. t-Butyl alcohol
23. s-Butyl alcohol
24. n-Butyl alcohol
25. 2-methyl-2 pentanol

Noble Gases

Column: HP PLOT
19095P-MSO
30 m x 0.53 mm, 50 µm

Carrier: Helium, 4 mL/min
Oven: 35°C for 3 min
35-120°C at 25°C/min
120°C for 5 min
Injection: Split ratio 50:1
Detector: TCD
Sample: 250 µL



1. Neon
2. Argon
3. Oxygen
4. Nitrogen
5. Krypton
6. Xenon

Suggested Supplies

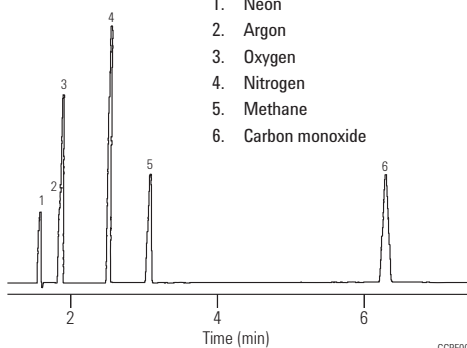
Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885

Permanent Gases

Column: HP PLOT Molesieve
19091P-MS4
30 m x 0.32 mm, 12.00 µm

Carrier: Helium, 2 mL/min
Oven: 40°C Isothermal
Injection: Split ratio 75:1
Detector: TCD
Sample: 250 µL

1. Neon
2. Argon
3. Oxygen
4. Nitrogen
5. Methane
6. Carbon monoxide



Suggested Supplies

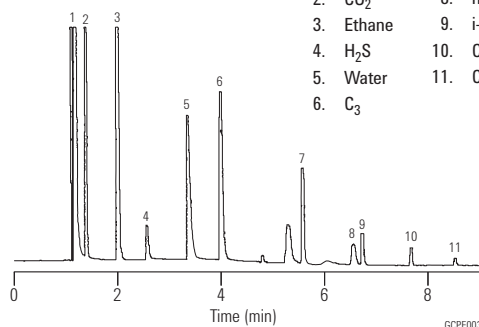
Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885

Baseline Resolution of Air/CO, CO₂, and Methane in a Natural Gas Sample

Column: HP PLOT Q
19095P-Q04
30 m x 0.53 mm, 40 µm

Carrier: Helium (8.6 mL/min @ 60°C)
Oven: 60°C for 2 min
60-240°C at 30°C/min
240°C for 1 min
Injection: Split ratio 12:1
Detector: TCD, 250°C
Sample: 0.25 cc natural gas sample,
Methane, 80%+

1. Air/CO
2. CO₂
3. Ethane
4. H₂S
5. Water
6. C₃
7. i-C₄/n-C₄
8. neo-C₅
9. i-C₅/n-C₅
10. C₆
11. C₇



Suggested Supplies

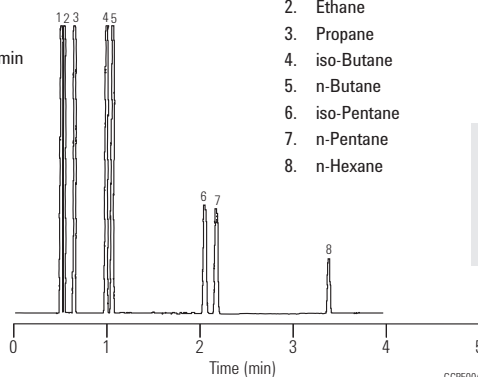
Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885

Natural Gas

Column: HP PLOT Al₂O₃ S
19095P-S21
15 m x 0.53 mm, 15.00 µm

Carrier: Helium, 50 cm/sec (100°C), 6 mL/min
Oven: 100°C for 1.5 min
100-180°C at 30°C/min
Injection: Split, 250°C
Split ratio 50:1
Detector: FID, 250°C
Sample: 5 µL
Natural Gas P/N 5080-8756

1. Methane
2. Ethane
3. Propane
4. iso-Butane
5. n-Butane
6. iso-Pentane
7. n-Pentane
8. n-Hexane



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885

Ethylene

Column: HP PLOT Al₂O₃ S
19095P-S25
50 m x 0.53 mm, 15 μm

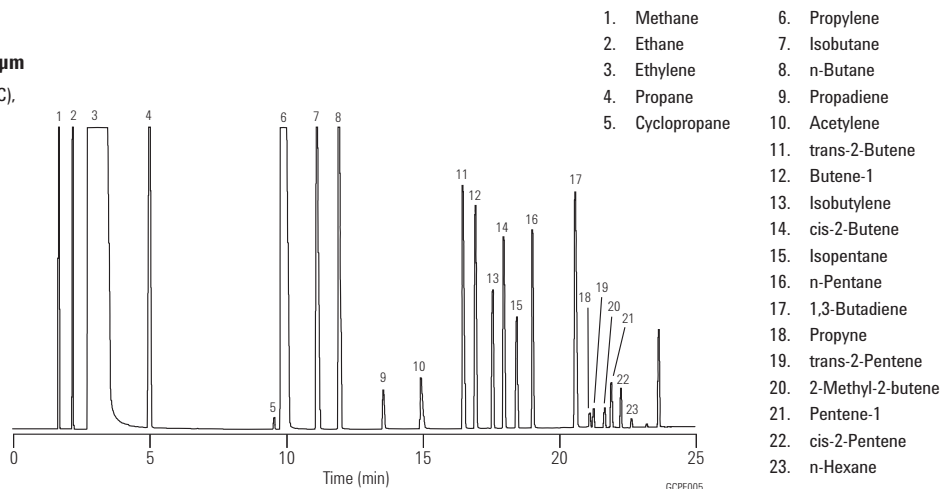
Carrier: Helium, 50 cm/sec (35°C),
7 mL/min constant flow

Oven: 35°C for 2 min
35-100°C at 5°C/min

Injection: Split, 250°C
Split ratio 65:1

Detector: FID, 250°C

Sample: 5 μL
Ethylene 98.4%



Impurities in Ethylene

Column: GS-Alumina KCl
115-3352
50 m x 0.53 mm

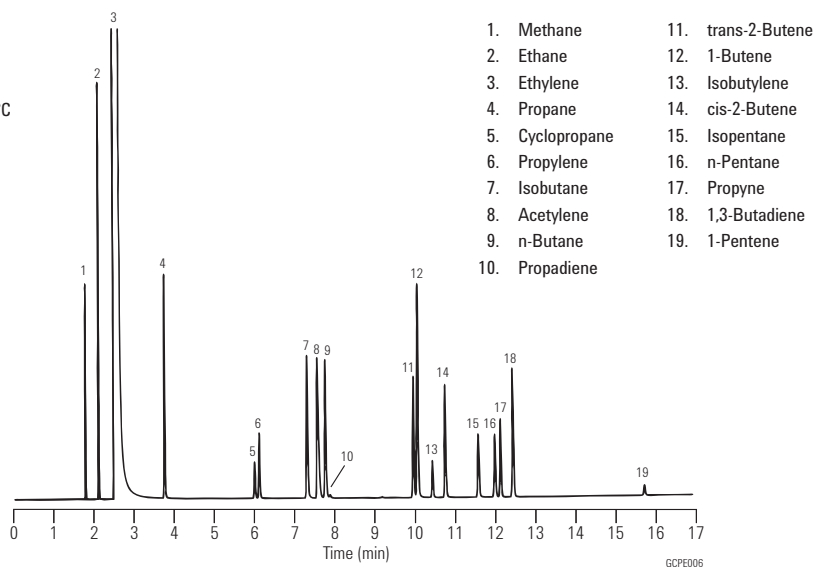
Carrier: Helium at 8 mL/min, measured at 35°C

Oven: 35°C for 2 min
35-190°C at 10°/min
190°C for 3 min

Injection: Split, 200°C
Split ratio 1:40

Detector: FID, 200°C
Nitrogen makeup gas at 20 mL/min

Sample: 0.2 mL of trace hydrocarbons
in ethylene



Impurities in Propylene

Column: GS-Alumina KCI
115-3352
50 m x 0.53 mm

Carrier: Helium at 10 mL/min,
measured at 35°C

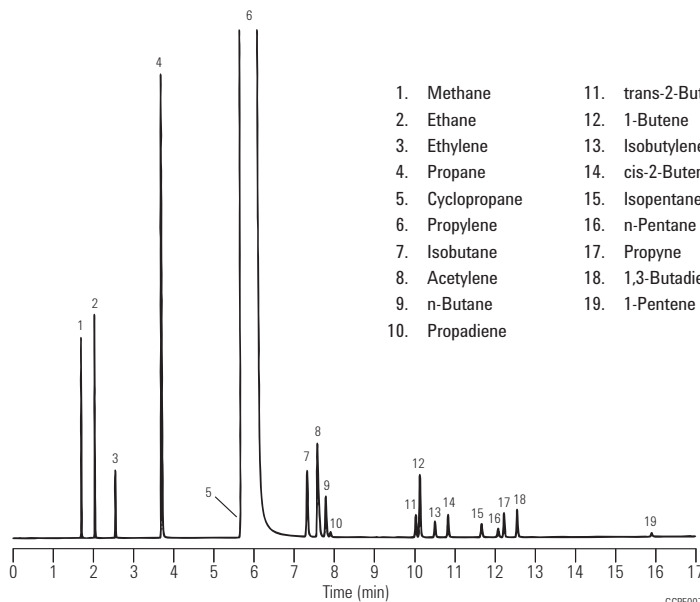
Oven: 35°C for 2 min
35-190°C at 10°/min
190°C for 3 min

Injection: Split, 200°C
Split ratio 1:30

Detector: FID, 200°C
Nitrogen makeup gas
at 20 mL/min

Sample: 0.2 mL of trace
hydrocarbons in propylene

- | | |
|-----------------|--------------------|
| 1. Methane | 11. trans-2-Butene |
| 2. Ethane | 12. 1-Butene |
| 3. Ethylene | 13. Isobutylene |
| 4. Propane | 14. cis-2-Butene |
| 5. Cyclopropane | 15. Isopentane |
| 6. Propylene | 16. n-Pentane |
| 7. Isobutane | 17. Propyne |
| 8. Acetylene | 18. 1,3-Butadiene |
| 9. n-Butane | 19. 1-Pentene |
| 10. Propadiene | |



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885

Propylene

Column: GS-Alumina
115-3552
50 m x 0.53 mm

Carrier: Helium at 10 mL/min,
measured at 35°C

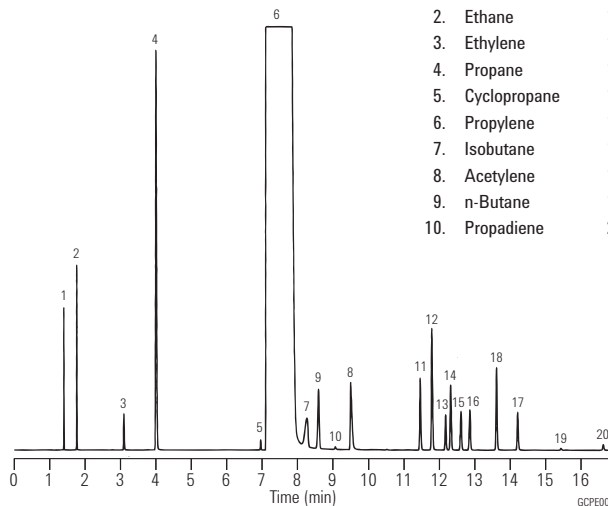
Oven: 35°C for 2 min
35-190°C at 10°/min
190°C for 3 min

Injection: Split, 200°C
Split ratio 1:30

Detector: FID, 200°C
Nitrogen makeup gas
at 20 mL/min

Sample: 0.2 mL of trace
hydrocarbons in propylene

- | | |
|-----------------|--------------------|
| 1. Methane | 11. trans-2-Butene |
| 2. Ethane | 12. 1-Butene |
| 3. Ethylene | 13. Isobutylene |
| 4. Propane | 14. cis-2-Butene |
| 5. Cyclopropane | 15. Isopentane |
| 6. Propylene | 16. n-Pentane |
| 7. Isobutane | 17. Propyne |
| 8. Acetylene | 18. 1,3-Butadiene |
| 9. n-Butane | 19. 1-Pentene |
| 10. Propadiene | 20. n-Hexane |



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885

1,3-Butadiene

Column: DB-624
128-1324
25 m x 0.20 mm, 1.12 µm

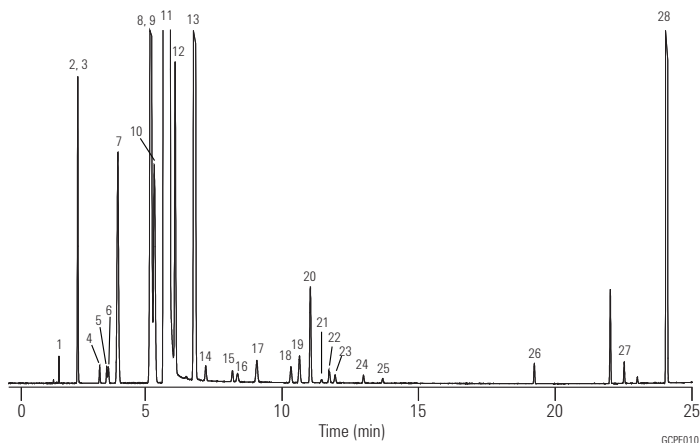
Carrier: Helium at 1.0 mL/min

Oven: -20°C for 3 min
 -20°C-20°C at 4°/min
 20°C-200°C at 8°/min
 200°C for 10 min

Injection: Split, 250°C
 Split ratio 1:150

Detector: FID, 250°C

Sample: 0.5 µL



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885

Agilent Technologies wishes to thank DCG Industries (Pearland, TX) for providing this chromatogram.

Refined Butadiene Standard Component	Gravimetric concentration (PPM)
1. Acetylene	20.7
2. Propane	19.8
3. Propylene	296
4. Propadiene (allene)	21.1
5. Propyne (methylacetylene)	21
6. Cyclopropane	20
7. Isobutane	506
8. Butene-1	999
9. Isobutylene	495
10. n-Butane	494
11. 1,3-Butadiene	balance
12. trans-2-Butene	442
13. cis-2-Butene	1946
14. 1-Butyne (ethylacetylene)	20.2
15. 1,2-Butadiene	28.9
16. 3-Methyl-1-butene	19.8
17. Isopentane	50.1
18. Pentene-1	29.8
19. n-Pentane	50.1
20. 2-Butyne (dimethylacetylene)	150
21. trans-2-Pentene	5.57
22. Isoprene	20
23. cis-2-Pentene	13.9
24. trans-1,3-Pentadiene	13.8
25. cis-1,3-Pentadiene	7.73
26. Benzene	20.3
27. Toluene	20.2
28. Dimer (4-vinylcyclohexene-1)	

1,3-Butadiene Purity

Column: GS-Alumina
115-3552
50 m x 0.53 mm

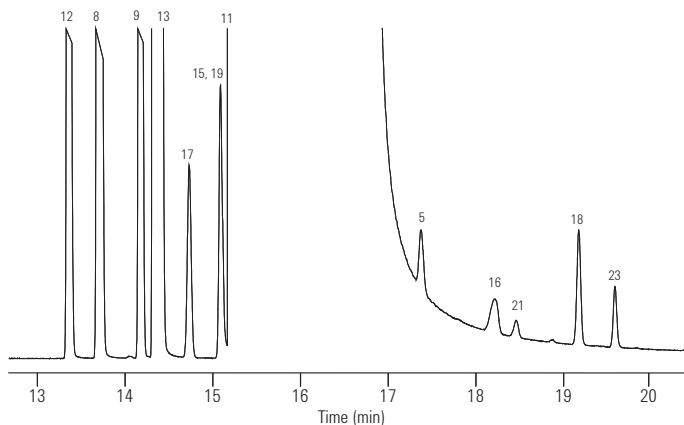
Carrier: Helium, 6.0 mL/min
(constant flow mode)

Oven: 45°C for 3 min
6°/min to 195°C
195°C for 15 min

Injection: Split, 250°C
Split ratio 1:50

Detector: FID, 250°C

Sample: 0.5 µL

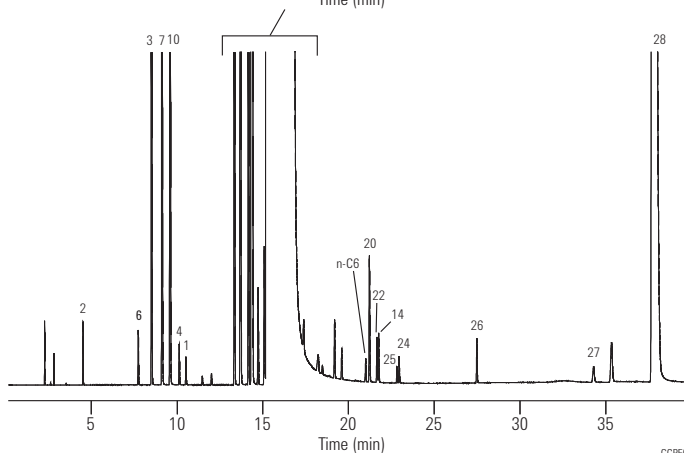


Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885



Refined Butadiene Standard Component

1. Acetylene	20.7
2. Propane	19.8
3. Propylene	296
4. Propadiene (allene)	21.1
5. Propyne (methylacetylene)	21
6. Cyclopropane	20
7. Isobutane	506
8. Butene-1	999
9. Isobutylene	495
10. n-Butane	494
11. 1,3-Butadiene	balance
12. trans-2-Butene	442
13. cis-2-Butene	1946
14. 1-Butyne (ethylacetylene)	20.2

Gravimetric concentration (PPM)

Refined Butadiene Standard Component

15. 1,2-Butadiene	28.9
16. 3-Methyl-1-butene	19.8
17. Isopentane	50.1
18. Pentene-1	29.8
19. n-Pentane	50.1
20. 2-Butyne (dimethylacetylene)	150
21. trans-2-Pentene	5.57
22. Isoprene	20
23. cis-2-Pentene	13.9
24. trans-1,3-Pentadiene	13.8
25. cis-1,3-Pentadiene	7.73
26. Benzene	20.3
27. Toluene	20.2
28. Dimer (4-vinylcyclohexene-1)	

Gravimetric concentration (PPM)

Extended Hydrocarbon Analysis I

Column: GS-Alumina
115-3532
30 m x 0.53 mm

Carrier: Helium at 52 cm/sec (6.7 mL/min),
measured at 100°C

Oven: 100°C for 1 min
100-140°C at 8°/min
140°C for 0.5 min
140-200°C at 30°/min

Injection: Split, 250°C
Split ratio 1:8

Detector: FID, 275°C
Nitrogen makeup gas at 29 mL/min

Sample: 300 µL injection of 100 ppm V
SUMMA canister mixture

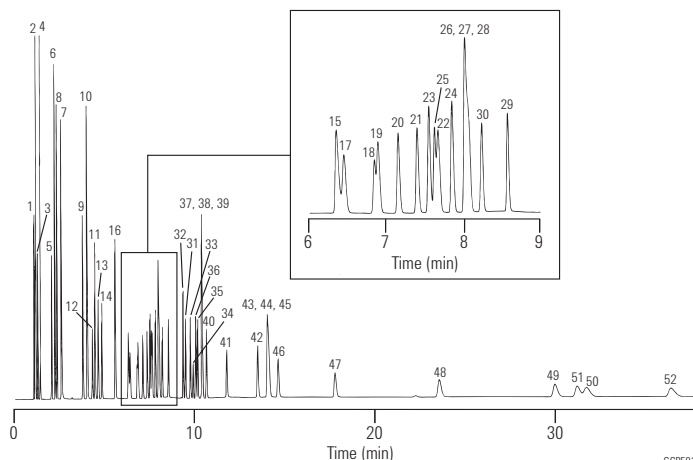
- | | | |
|-----------------------|-------------------------|--|
| 1. Methane | 20. 2-Methyl-2-butene | 39. 3-Methylhexane |
| 2. Ethane | 21. 1-Pentene | 40. n-Heptane |
| 3. Ethylene | 22. cis-2-Pentene | 41. Benzene |
| 4. Propane | 23. Methylcyclopentane | 42. Isooctane (2,2,4-Trimethylpentane) |
| 5. Propylene | 24. 2,2-Dimethylbutane | 43. 2,3,4-Trimethylpentane |
| 6. Isobutane | 25. Cyclohexane | 44. 3-Methylheptane |
| 7. Acetylene | 26. 2,3-Dimethylbutane | 45. 2-Methylheptane |
| 8. n-Butane | 27. 2-Methylpentane | 46. n-Octane |
| 9. trans-2-Butene | 28. 3-Methylpentane | 47. Toluene |
| 10. 1-Butene | 29. Isoprene | 48. n-Nonane |
| 11. cis-2-Butene | 30. n-Hexane | 49. Ethylbenzene |
| 12. Cyclopentane | 31. 4-Methyl-1-pentene | 50. m-Xylene |
| 13. Isopentane | 32. trans-2-Hexene | 51. p-Xylene |
| 14. n-Pentane | 33. 2-Methyl-1-pentene | 52. o-Xylene |
| 15. Propyne | 34. cis-2-Hexene | |
| 16. 1,3-Butadiene | 35. 2,4-Dimethylpentane | |
| 17. Cyclopentene | 36. Methylcyclohexane | |
| 18. 3-Methyl-1-butene | 37. 2,3-Dimethylpentane | |
| 19. trans-2-Pentene | 38. 2-Methylhexane | |

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885



GCPE012



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Extended Hydrocarbon Analysis II

Column: GS-GasPro
113-4362
60 m x 0.32 mm

Carrier: Helium at 40 cm/sec (3.3 mL/min),
measured at 80°C

Oven: 80°C for 0.5 min
80-175°C at 25°/min
175°C for 2 min
175-250°C at 25°/min

Injection: Split, 250°C
Split ratio 1:17

Detector: FID, 275°C
Nitrogen makeup gas at 32 mL/min

Sample: 500 µL injection of 100 ppmV
SUMMA canister mixture

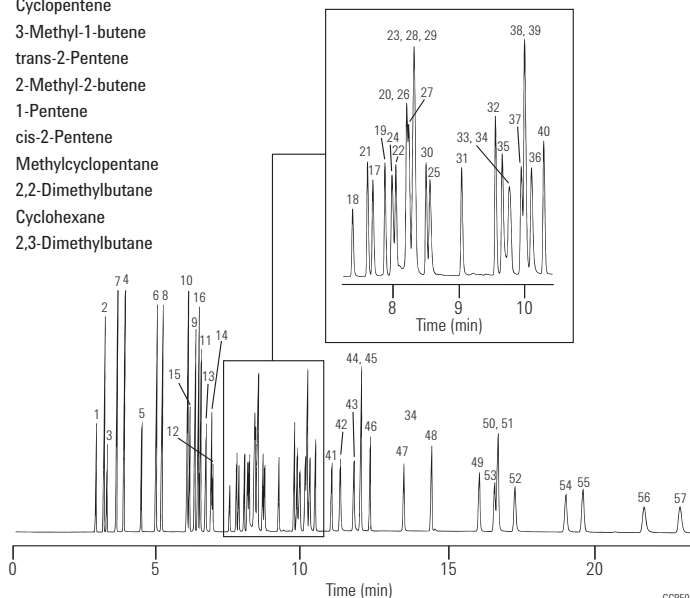
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885

- | | | |
|------------------------|--|-------------------------------|
| 1. Methane | 27. 2-Methylpentane | 43. 2,3,4-Trimethylpentane |
| 2. Ethane | 28. 3-Methylpentane | 44. 3-Methylheptane |
| 3. Ethylene | 29. Isoprene | 45. 2-Methylheptane |
| 4. Propane | 30. n-Hexane | 46. n-Octane |
| 5. Propylene | 31. 4-Methyl-1-pentene | 47. Toluene |
| 6. Isobutane | 32. trans-2-Hexene | 48. n-Nonane |
| 7. Acetylene | 33. 2-Methyl-1-pentene | 49. Ethylbenzene |
| 8. n-Butane | 34. cis-2-Hexene | 50. m-Xylene |
| 9. trans-2-Butene | 35. 2,4-Dimethylpentane | 51. p-Xylene |
| 10. 1-Butene | 36. Methylcyclohexane | 52. o-Xylene |
| 11. cis-2-Butene | 37. 2,3-Dimethylpentane | 53. Styrene |
| 12. Cyclopentane | 38. 2-Methylhexane | 54. Isopropylbenzene (Cumene) |
| 13. Isopentane | 39. 3-Methylhexane | 55. n-Propylbenzene |
| 14. n-Pentane | 40. n-Heptane | 56. 1,3,5-Trimethylbenzene |
| 15. Propyne | 41. Benzene | 57. 1,2,4-Trimethylbenzene |
| 16. 1,3-Butadiene | 42. Isooctane (2,2,4-Trimethylpentane) | |
| 17. Cyclopentene | | |
| 18. 3-Methyl-1-butene | | |
| 19. trans-2-Pentene | | |
| 20. 2-Methyl-2-butene | | |
| 21. 1-Pentene | | |
| 22. cis-2-Pentene | | |
| 23. Methylcyclopentane | | |
| 24. 2,2-Dimethylbutane | | |
| 25. Cyclohexane | | |
| 26. 2,3-Dimethylbutane | | |



GCPE013

Refinery Gas

Column: HP PLOT Al₂O₃ S
19095P-S25
50 m x 0.53 mm, 15 µm

Carrier: Helium 7 mL/min

Oven: 100°C Isothermal

Injection: Split, 250°C
Split ratio 100:1

Detector: FID, 250°C

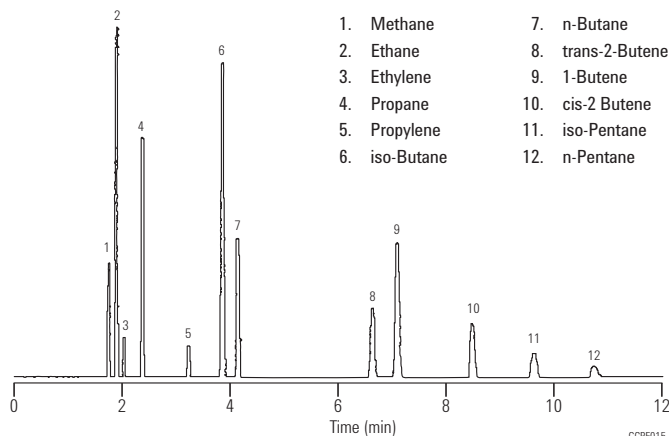
Sample: 5 µL

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885



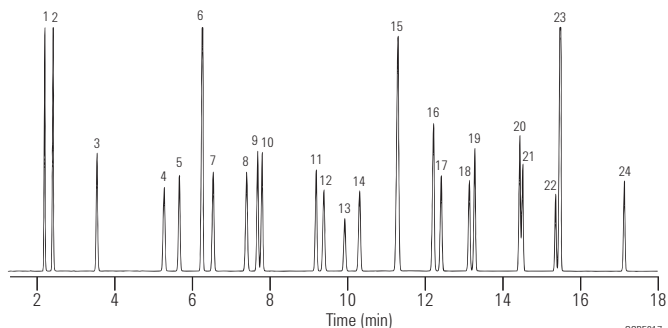
GCPE015

Volatile Sulfur Compounds

Column: DB-1
123-1035
30 m x 0.32 mm, 5.00 µm
Carrier: Helium at 23 cm/sec (H₂S at 50°C)
Oven: 50°C for 4 min, 50-120°C at 20°/min,
 120°C for 4 min, 120-220°C at
 25°/min, 220°C for 2.5 min
Injection: Split, 200°C
 Split ratio 1:10
Detector: PFPD (OI Analytical), 220°C
Sample: 600 µL of sulfur gas standard
 3 ppmV each component

- | | |
|-----------------------------|---------------------------|
| 1. Hydrogen sulfide | 13. Diethyl sulfide |
| 2. Carbonyl sulfide | 14. 1-Butanethiol |
| 3. Methyl mercaptan | 15. Methyl disulfide |
| 4. Ethyl mercaptan | 16. 2-Methylthiophene |
| 5. Dimethyl sulfide | 17. 3-Methylthiophene |
| 6. Carbon disulfide | 18. Tetrahydrothiophene |
| 7. 2-Propanethiol | 19. 1-Pentanethiol |
| 8. 2-Methyl-2-propanethiol | 20. 2-Ethylthiophene |
| 9. 1-Propanethiol | 21. 2,5-Dimethylthiophene |
| 10. Ethyl methyl sulfide | 22. 1-Hexanethiol |
| 11. Thiophene | 23. Ethyl disulfide |
| 12. 2-Methyl-1-propanethiol | 24. 1-Heptanethiol |

Agilent wishes to thank Air Toxics, Ltd. (Folsom, CA) for providing the standard mixture shown in this chromatogram.



GCPE017



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

**Sulfur Gas Analysis
in Light Hydrocarbon Streams I**

Column: GS-GasPro
113-4332
30 m x 0.32 mm

Carrier: Helium, 10 psig, 2.0 mL/min @ 60°C

Oven: 60°C for 2 min, 20°/min to 260°C and hold

Injection: Split, 200°C
Split ratio 1:20

Detector: Two separate analyses under identical conditions on FID and PFPD

Suggested Supplies

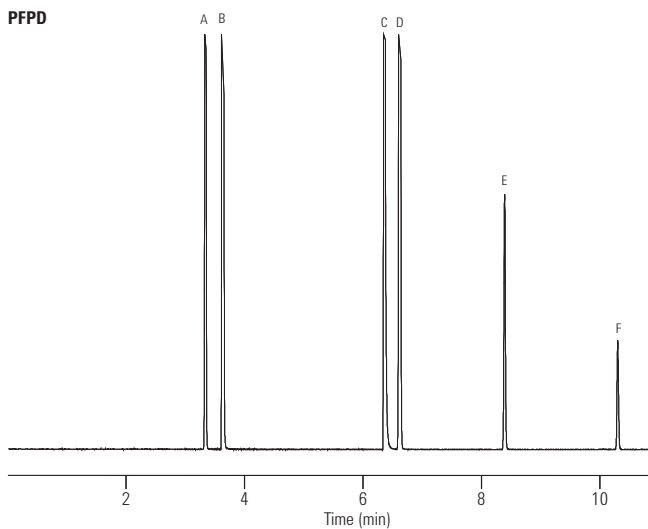
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

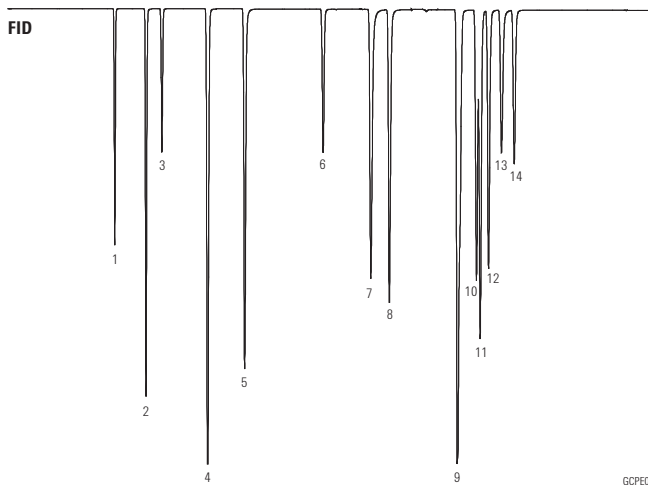
Seal: Gold plated seal, 18740-20885

Sulfur compounds (PFPD)

- A. Carbonyl sulfide
- B. Hydrogen sulfide
- C. Sulfur dioxide
- D. Carbon disulfide
- E. Methyl mercaptan
- F. Ethyl mercaptan



- 1. Methane
- 2. Ethane
- 3. Ethylene
- 4. Acetylene
- 5. Propane
- 6. Propylene
- 7. iso-Butane
- 8. n-Butane
- 9. 1-Butene/Methyl acetylene
- 10. trans-2-Butene
- 11. 1,3-Butadiene
- 12. cis-2-Butene
- 13. iso-Pentane
- 14. n-Pentane



GCPE018

**Sulfur Gas Analysis
in Light Hydrocarbon Streams II**

Column: GS-Q
113-3432
10 m x 0.32 mm, 0.2 µm

Carrier: Helium, 10 psig, 1.7 mL/min @ 100°C
Oven: 100°C for 2 min, 20°/min to 250°C and hold

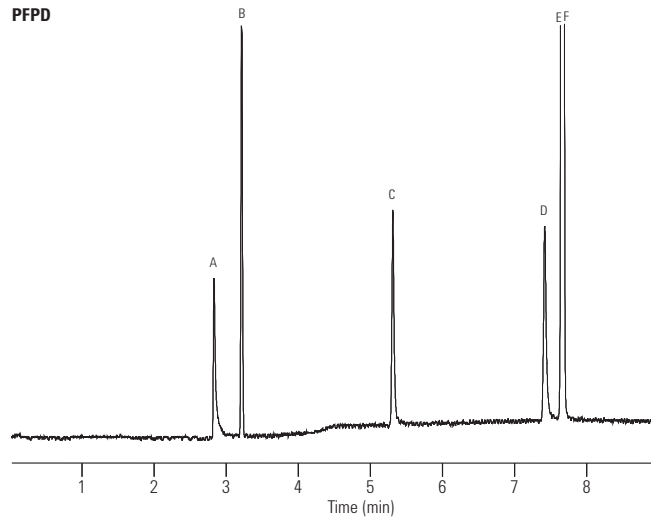
Injection: Split, 200°C
Split ratio 1:20

Detector: Two separate analyses under identical conditions on FID and PFPD

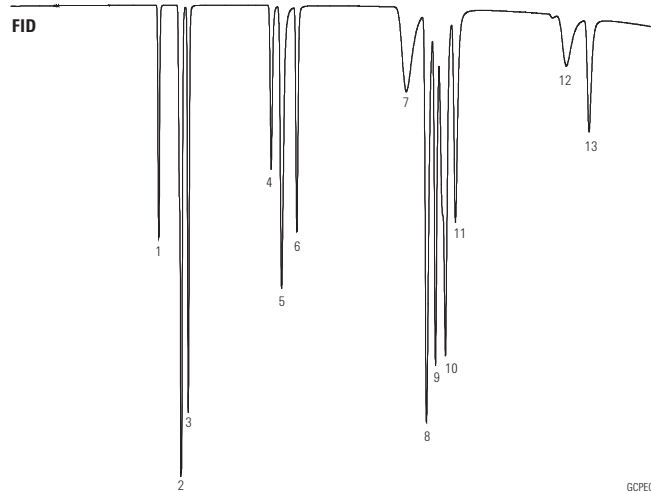
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885

Sulfur compounds (PFPD)
A. Hydrogen sulfide
B. Carbonyl sulfide
C. Methyl mercaptan
D. Ethyl mercaptan
E. Carbon disulfide



1. Methane
2. Ethylene/Acetylene
3. Ethane
4. Propylene
5. Propane
6. Methyl acetylene
7. iso-Butane
8. 1-Butene
9. 1,3-Butadiene
10. n-Butane/cis-2-Butene
11. trans-2-Butene
12. iso-Pentane
13. n-Pentane



GCPE019

Sulfur Compounds in Propylene (1 ppm)

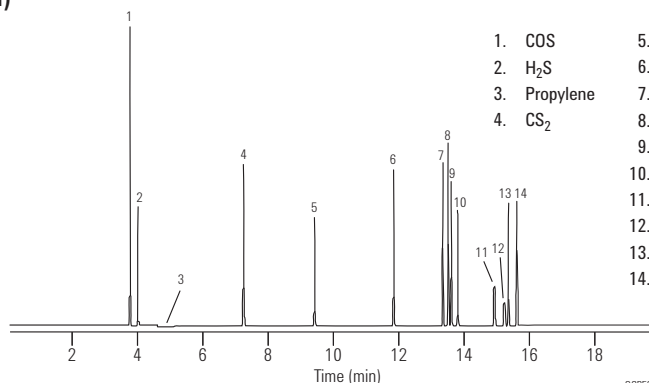
Column: GS-GasPro
113-4332
30 m x 0.32 mm

Oven: 60°C for 2.5 minutes
60-250°C at 10°C/min

Injection: OI Analytical Volatiles Inlet
Split ratio 5:1
200 µL gas sampling valve

Detector: OI Analytical Model 5380 PFPD

Sample: 1 ppm Sulfur compounds in Propylene



- | | |
|---------------------|-----------------------------|
| 1. COS | 5. Methyl mercaptan |
| 2. H ₂ S | 6. Ethyl mercaptan |
| 3. Propylene | 7. Thiophene |
| 4. CS ₂ | 8. Dimethyl sulfide |
| | 9. 2-Propanethiol |
| | 10. 1-Propanethiol |
| | 11. 2-Methyl-2-propanethiol |
| | 12. 2-Methyl-1-propanethiol |
| | 13. 1-Methyl-1-propanethiol |
| | 14. 1-Butanethiol |

Chromatogram courtesy of OI Analytical.

GCPE020

Mercaptans

Column: GS-GasPro
113-4332
30 m x 0.32 mm

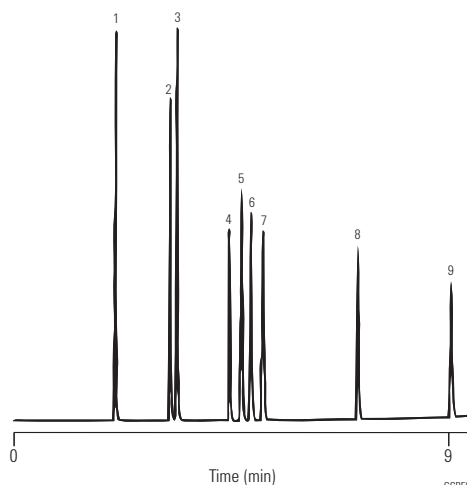
Carrier: Helium at 25 cm/sec

Oven: 175°C for 2 min
175-260°C at 10°/min

Injection: Split
Split flow 80 mL/min

Detector: FID

Sample: 0.2 mL



- | |
|--------------------------------|
| 1. Ethyl mercaptan |
| 2. 2-Propyl mercaptan |
| 3. 1-Propyl mercaptan |
| 4. 2-Methyl-2-propyl mercaptan |
| 5. 2-Methyl-1-propyl mercaptan |
| 6. 1-Methyl-1-propyl mercaptan |
| 7. 1-Butyl mercaptan |
| 8. 1-Pentyl mercaptan |
| 9. 1-Hexyl mercaptan |

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885

GCPE021



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

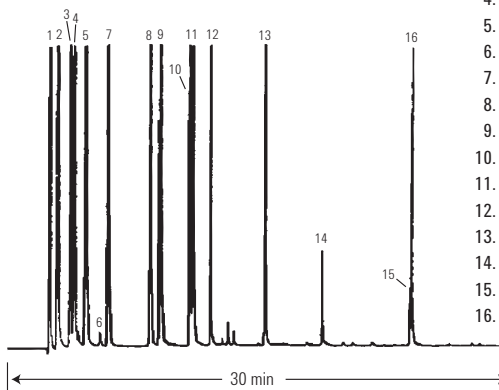
Sulfur Compounds in Natural Gas – Synthetic Mixture

Column: HP-1
19091Z-205
50 m x 0.20 mm, 0.50 µm

Carrier: Helium
Oven: 35°C for 10 min
35-300°C at 7°C/min
Injection: Split 100:1
Detector: FPD
Sample: 0.5 mL

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885



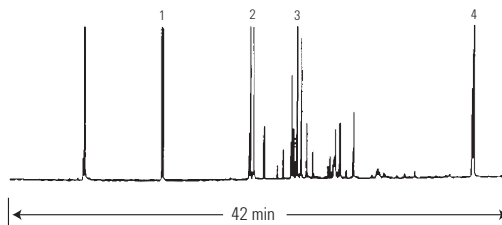
1. Hydrogen sulfide
2. Methyl mercaptan
3. Ethyl mercaptan
4. Dimethyl sulfide
5. Isopropyl mercaptan
6. tert-Butyl mercaptan
7. n-Propyl mercaptan
8. Thiophene and sec-Butyl mercaptan
9. Isobutyl mercaptan
10. n-Butyl mercaptan
11. tert-Amyl mercaptan
12. Isoamyl mercaptan
13. n-Amyl mercaptan
14. n-Hexyl mercaptan
15. tert-Dibutyl disulfide
16. n-Octyl mercaptan

GCPE022

Sulfur Compounds in Naphtha

Column: HP-PONA
19091S-001
50 m x 0.20 mm, 0.50 µm

Carrier: Helium, 26 cm/sec
Oven: 35°C for 15 min
35-70°C at 8°C/min
70-130°C at 15°C/min
Injection: Split ratio 400:1
Detector: FPD
Sample: 3 µL



1. Thiophene
2. Methyl thiophenes
3. Ethyl and dimethyl thiophenes
4. Benzothiophene

GCPE023



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

**Aromatics Analysis –
ASTM D16 Analytes**

Column: HP-INNOWax
19091N-216
60 m x 0.32 mm, 0.50 µm

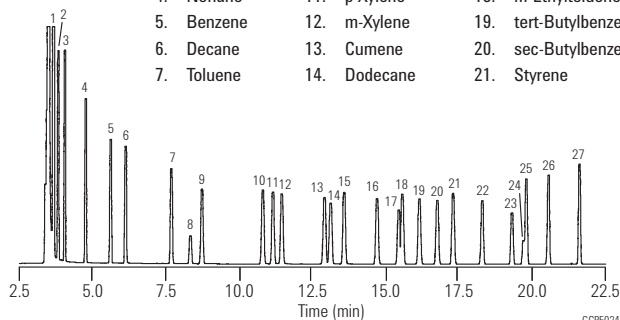
Carrier: Helium at 20 psi,
constant pressure mode

Oven: 75°C for 10 min
3°C/min to 100°C
10°C/min to 145°C

Injection: Split, 250°C
Split ratio 100:1 to 400:1

Detector: FID, 250°C
Data acquisition rate at 20 Hz

- | | | | |
|----------------|------------------|-----------------------|---------------------------|
| 1. Heptane | 8. 1-4-Dioxane | 15. o-Xylene | 22. Tridecane |
| 2. Cyclohexane | 9. Undecane | 16. Propylbenzene | 23. Diethylbenzene isomer |
| 3. Octane | 10. Ethylbenzene | 17. p-Ethyltoluene | 24. Diethylbenzene isomer |
| 4. Nonane | 11. p-Xylene | 18. m-Ethyltoluene | 25. n-Butylbenzene |
| 5. Benzene | 12. m-Xylene | 19. tert-Butylbenzene | 26. α-Methylstyrene |
| 6. Decane | 13. Cumene | 20. sec-Butylbenzene | 27. Phenylacetylene |
| 7. Toluene | 14. Dodecane | 21. Styrene | |



**Aromatics Analysis – Ethylbenzene
Impurities**

Column: HP-INNOWax
19091N-216
60 m x 0.32 mm, 0.50 µm

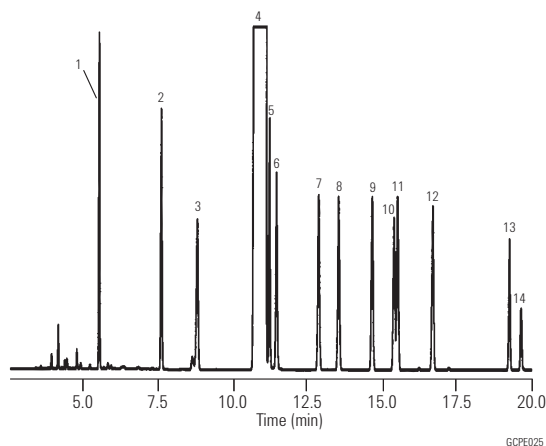
Carrier: Helium at 20 psi, constant pressure mode

Oven: 75°C for 10 min
3°C/min to 100°C
10°C/min to 145°C

Injection: Split, 250°C
Split ratio 100:1 to 400:1

Detector: FID, 250°C
Data acquisition rate at 20 Hz

- | |
|---------------------|
| 1. Benzene |
| 2. Toluene |
| 3. Undecane |
| 4. Ethylbenzene |
| 5. p-Xylene |
| 6. m-Xylene |
| 7. Isopropylbenzene |
| 8. o-Xylene |
| 9. n-Propylbenzene |
| 10. p-Ethyltoluene |
| 11. m-Ethyltoluene |
| 12. s-Butylbenzene |
| 13. Diethylbenzene |
| 14. Diethylbenzene |



Impurities in p-Xylene – ASTM D3798

Column: HP-INNOWax
19091N-216
60 m x 0.32 mm, 0.50 µm

Carrier: Helium, 32 cm/sec, 19.9 psi (60°C),
2.5 mL/min constant flow

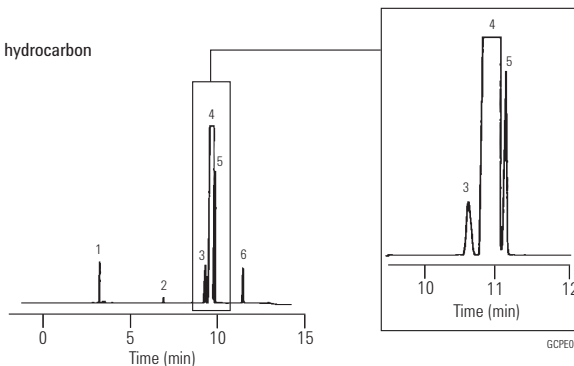
Oven: 60°C for 1 min
60-92°C at 4°C/min
92°C for 4.5 min
92-220°C at 20°C/min
220°C for 5 min

Injection: Split, 220°C
Split ratio 100:1

Detector: FID, 270°C

Sample: 0.5 µL
Neat, 99%+

1. Non aromatic hydrocarbon
2. Toluene
3. Ethylbenzene
4. p-Xylene
5. m-Xylene
6. o-Xylene



Ethylene Oxide Synthetic Standard

Column: HP PLOT Q
19095P-Q04
30 m x 0.53 mm, 40 µm

Carrier: Helium, 25 psi

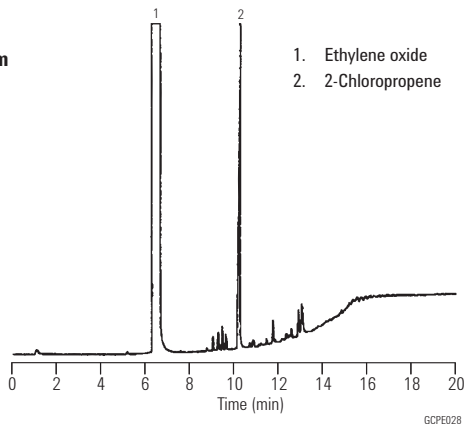
Oven: 50°C for 2 min
50-250°C at 15°C/min

Injection: Split ratio 40:1

Detector: FID

Sample: 1 µL liquid injection
sample 2000 ppm v/v

1. Ethylene oxide
2. 2-Chloropropene



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: General purpose split/splitless liner, taper, glass wool, 5183-4711

Seal: Gold plated seal, 18740-20885

Syringe: 10 µL tapered, FN 23-26s/42/HP, 5181-1267

Oxygenates

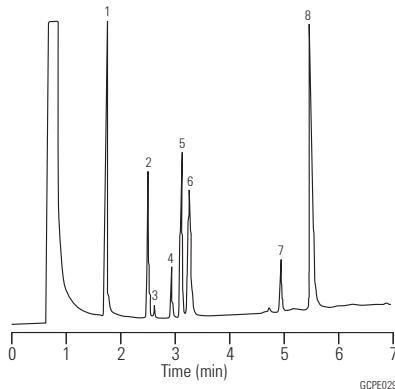
Column: HP PLOT Q
19095P-Q04
30 m x 0.53 mm, 40 µm

Carrier: Helium, 25 psig

Oven: 150°C for 2 min
150-250°C at 15°C/min

Detector: FID

1. Ethanol
2. 2-Propanone
3. Dichloromethane
4. Acetic acid, methyl ester
5. Diethyl ether
6. Pentane
7. Acetic acid, ethyl ester
8. Hexane



**Oxygenates in Gasoline
ASTM D5599 (GC-OFID)**

Column: HP-1
19091Z-236
60 m x 0.25 mm, 1.00 µm

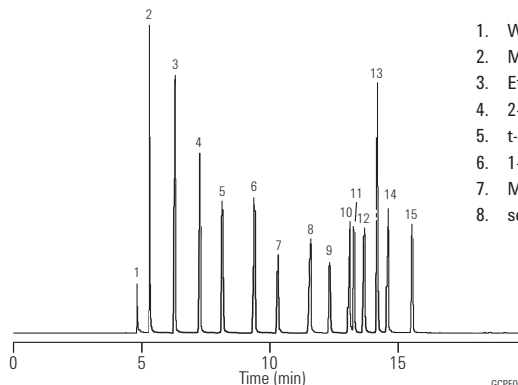
Carrier: Helium 30 cm/sec constant flow

Oven: 40°C for 6 min
40-50°C at 5°C/min
50°C for 4 min
50-175°C at 25°C/min
175°C for 5 min

Injection: Split ratio 150:1

Detector: Wasson ECE OFID

Sample: 0.5 µL



- | | |
|----------------|-------------------------|
| 1. Water | 9. DIPE |
| 2. Methanol | 10. Isobutanol |
| 3. Ethanol | 11. ETBE |
| 4. 2-Propanol | 12. TAA |
| 5. t-Butanol | 13. 1,2-Dimethoxyethane |
| 6. 1-Propanol | 14. 1-Butanol |
| 7. MTBE | 15. TAME |
| 8. sec-Butanol | |

Denatured Fuel Ethanol – ASTM D5501

Column: HP-1
19091Z-530
100 m x 0.25 mm, 0.50 µm

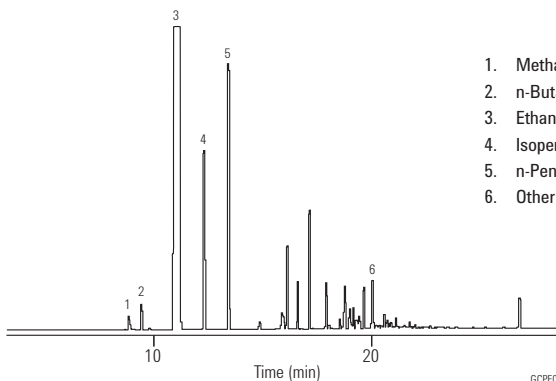
Carrier: Helium 24 cm/sec

Oven: 15°C for 12 min
15-250°C at 19°C/min
250°C for 20 min

Injection: Split ratio 200:1

Detector: FID 250°C
Nitrogen makeup gas at 30 mL/min

Sample: 0.5 µL



- | |
|-----------------------|
| 1. Methanol |
| 2. n-Butane |
| 3. Ethanol |
| 4. Isopentane |
| 5. n-Pentane |
| 6. Other hydrocarbons |

Unleaded Gasoline

Column: DB-Petro
122-10a6
100 m x 0.25 mm, 0.50 µm

Carrier: Helium at 25.6 cm/sec

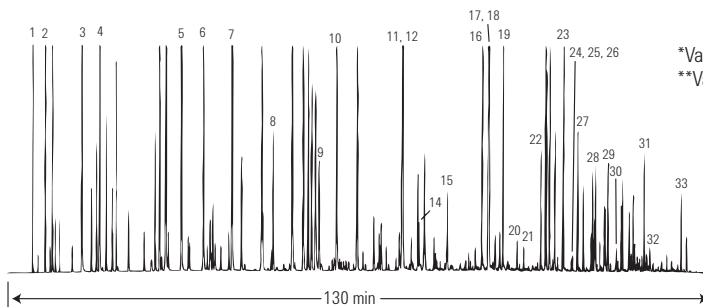
Oven: 0°C for 15 min
0-50°C at 1°/min
50-130°C at 2°/min
130-180°C at 4°/min
180°C for 20 min

Injection: Split, 200°C
Split ratio 1:300

Detector: FID, 250°C
Nitrogen makeup gas at 30 mL/min

Sample: 1 µL of neat sample

- | | | |
|-----------------------|----------------------------|--------------------------------|
| 1. Methane | 12. 2,3,3-Trimethylpentane | 23. 1,2,4-Trimethylbenzene |
| 2. n-Butane | 13. 2-Methylheptane | 24. Isobutylbenzene |
| 3. Isopentane | 14. 4-Methylheptane | 25. sec-Butylbenzene |
| 4. n-Pentane | 15. n-Octane | 26. n-Decane |
| 5. n-Hexane | 16. Ethylbenzene | 27. 1,2,3-Trimethylbenzene |
| 6. Methylcyclopentane | 17. m-Xylene ** | 28. Butylbenzene |
| 7. Benzene | 18. p-Xylene | 29. n-Undecane |
| 8. Cyclohexane | 19. o-Xylene | 30. 1,2,4,5-Tetramethylbenzene |
| 9. Isooctane | 20. n-Nonane | 31. Naphthalene |
| 10. n-Heptane | 21. Isopropylbenzene | 32. Dodecane |
| 11. Toluene * | 22. Propylbenzene | 33. Tridecane |



*Valley point with 12 = 78%
**Valley point with 18 = 87%

PONA Mix as Specified by AFNOR Method #2

Column: DB-Petro
122-10A6E
50 m x 0.20 mm, 0.5 µm

Carrier: Helium at 16.7 cm/sec,
measured at 35°C

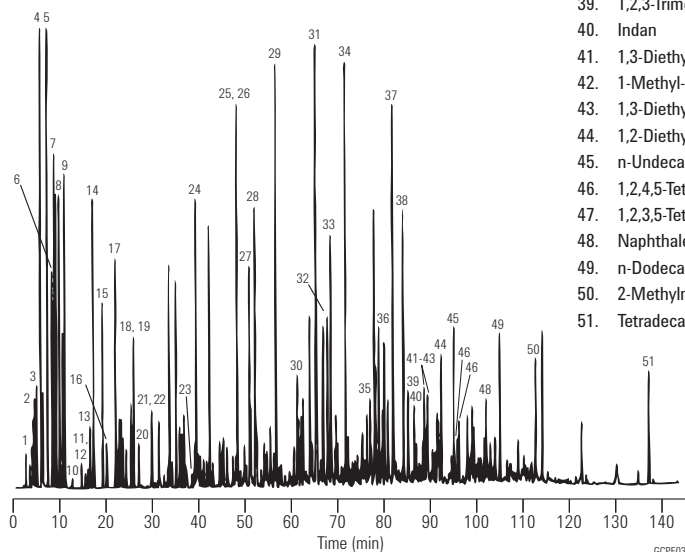
Oven: 10°C for 15 min
10-70°C at 1.3°/min
70-250°C at 1.7°/min

Injection: Split, 250°C
Split ratio 1:200

Detector: FID, 250°C
Nitrogen makeup gas
at 30 mL/min

Sample: 0.3 µL petroleum reformate

- | | | |
|------------------------|-----------------------------|--------------------------------|
| 1. Ethane | 13. 2,3-Dimethylbutane | 26. 2,3,3-Trimethylpentane |
| 2. Propane | 14. 2-Methylpentane | 27. 2-Methylheptane |
| 3. n-Butane | 15. 3-Methylpentane | 28. 3-Methylheptane |
| 4. Ethanol | 16. 2-Methyl-1-pentene | 29. n-Octane |
| 5. Isopentane | 17. n-Hexane | 30. Ethylbenzene |
| 6. 1-Pentene | 18. 2,2-Dimethylpentane | 31. m-Xylene |
| 7. 2-Methyl-1-butene | 19. Methylcyclopentane | 32. p-Xylene |
| 8. n-Pentane | 20. 2,4-Dimethylpentane | 33. o-Xylene |
| 9. 2-Methyl-2-butene | 21. Benzene | 34. n-Nonane |
| 10. 2,2-Dimethylbutane | 22. 1-Methyl-1-cyclopentene | 35. n-Propylbenzene |
| 11. 1-Cyclopentene | 23. Isooctane | 36. 1,3,5-Trimethylbenzene |
| 12. Cyclopentane | 24. n-Heptane | 37. 1,2,4-Trimethylbenzene |
| | 25. Toluene | 38. n-Decane |
| | | 39. 1,2,3-Trimethylbenzene |
| | | 40. Indan |
| | | 41. 1,3-Diethylbenzene |
| | | 42. 1-Methyl-3-propylbenzene |
| | | 43. 1,3-Diethyl-5-ethylbenzene |
| | | 44. 1,2-Diethyl-4-ethylbenzene |
| | | 45. n-Undecane |
| | | 46. 1,2,4,5-Tetramethylbenzene |
| | | 47. 1,2,3,5-Tetramethylbenzene |
| | | 48. Naphthalene |
| | | 49. n-Dodecane |
| | | 50. 2-Methylnaphthalene |
| | | 51. Tetradecane |



GCPE033

Aromatics in Finished Gasoline – ASTM Method 5769

Column: DB-1
122-1063
60 m x 0.25 mm, 1.00 µm

Carrier: Helium at 35 cm/sec,
measured at 50°C

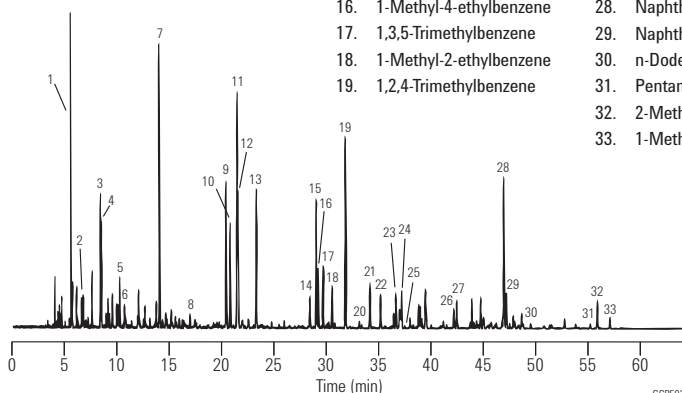
Oven: 50°C for 1 min
50-190°C at 2°/min
190°C for 1 min

Injection: Split, 250°C
Split ratio 1:100

Detector: MSD

Sample: 0.3 µL unleaded gasoline
Calib std: ASTM/EPA gasoline
refinery aromatics
(AccuStandard M-GRA-CAL/IS-SET)

- | | | |
|-----------------------------------|-----------------------------|--------------------------------|
| 1. Methyl-tert-butyl-ether (MTBE) | 8. n-Octane | 20. n-Decane |
| 2. n-Hexane | 9. Ethylbenzene-d10 (IS) | 21. 1,2,3-Trimethylbenzene |
| 3. Benzene-d6 (IS) | 10. Ethylbenzene | 22. Indan |
| 4. Benzene | 11. m-Xylene | 23. 1,4-Diethylbenzene |
| 5. Isooctane | 12. p-Xylene | 24. n-Butylbenzene (valley) |
| 6. n-Heptane | 13. o-Xylene | 25. 1,2-Diethylbenzene |
| 7. Toluene | 14. n-Propylbenzene | 26. 1,2,4,5-Tetramethylbenzene |
| | 15. 1-Methyl-3-ethylbenzene | 27. 1,2,3,5-Tetramethylbenzene |
| | 16. 1-Methyl-4-ethylbenzene | 28. Naphthalene-d8 (IS) |
| | 17. 1,3,5-Trimethylbenzene | 29. Naphthalene |
| | 18. 1-Methyl-2-ethylbenzene | 30. n-Dodecane |
| | 19. 1,2,4-Trimethylbenzene | 31. Pentamethylbenzene |
| | | 32. 2-Methylnaphthalene |
| | | 33. 1-Methylnaphthalene |



GCPE034

Simulated Distillation

Column: DB-2887
 125-2814
 10 m x 0.53 mm, 3.00 μ m

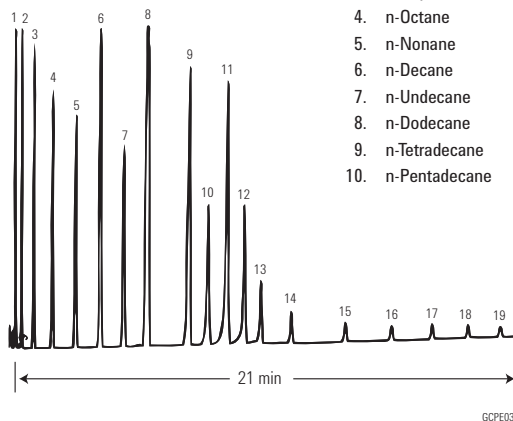
Carrier: Helium at 7 mL/min

Oven: 35-350°C at 15°/min

Injection: Direct

Detector: FID
 Nitrogen makeup gas
 at 30 mL/min

- | | |
|-------------------|-----------------------|
| 1. n-Pentane | 11. n-Hexadecane |
| 2. n-Hexane | 12. n-Heptadecane |
| 3. n-Heptane | 13. n-Octadecane |
| 4. n-Octane | 14. n-Eicosane |
| 5. n-Nonane | 15. n-Tetracosane |
| 6. n-Decane | 16. n-Octacosane |
| 7. n-Undecane | 17. n-Dotriacontane |
| 8. n-Dodecane | 18. n-Hexatriacontane |
| 9. n-Tetradecane | 19. n-Tetracontane |
| 10. n-Pentadecane | |



GCPE035

Suggested Supplies

Septum: 11 mm Certified BTO septa, 5183-4757

Liner: Direct connect, dual taper, deactivated,
 4 mm ID, G1544-80700

Seal: Gold plated seal, 18740-20885

Syringe: 10 μ L tapered, FN 23-26s/42/HP,
 5181-1267

Reference Gas Oil

Column: DB-2887
 125-2814
 10 m x 0.53 mm, 3.00 μ m

Carrier: Helium at 7 mL/min

Oven: 35-350°C at 15°/min

Injection: Direct

Detector: FID
 Nitrogen makeup gas
 at 30 mL/min

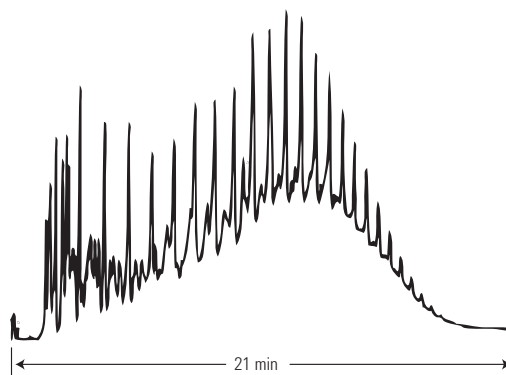
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, dual taper, deactivated,
 4 mm ID, G1544-80700

Seal: Gold plated seal, 18740-20885

Syringe: 10 μ L tapered, FN 23-26s/42/HP,
 5181-1267



GCPE036



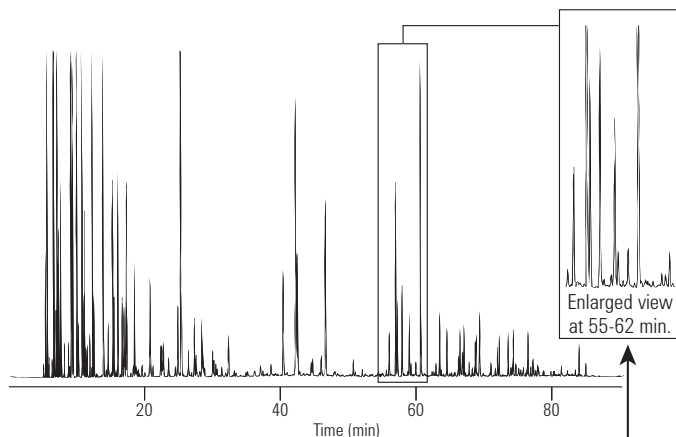
For a comprehensive listing of chromatograms searchable by compound name, visit our
 online Chromatogram Library at www.agilent.com/chem/library

**Regular Unleaded Gasoline
(California Phase 1) – "Normal" GC Run I**

Column: DB-Petro
122-10a6
100 m x 0.25 mm, 0.50 µm

Carrier: Hydrogen at 31 cm/sec
Oven: 35°C for 9.5 min
35-45°C at 13.3°/min
45°C for 11 min
45-60°C at 1.4°/min
60°C for 11 min
60-220°C at 2.7°/min
220°C for 3.6 min

Injection: Split ratio 1:200
Detector: FID, 300°C
Sample: 0.2 µL

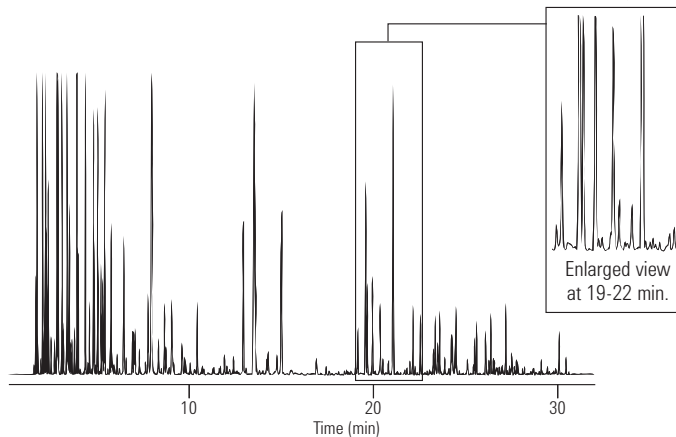


**Regular Unleaded Gasoline
(California Phase 1) – "Normal" GC Run II**

Column: DB-1
127-1046
40 m x 0.10 mm, 0.20 µm

Carrier: Hydrogen at 34.8 cm/sec
Oven: 35°C for 3.6 min
35-45°C at 36.1°/min
45°C for 4.2 min
45-60°C at 3.9°/min
60°C for 4.2 min
60-220°C at 6.9°/min
220°C for 1.4 min

Injection: Split ratio 1:400
Detector: FID, 300°C
Sample: 0.2 µL



**Compare
Resolution**

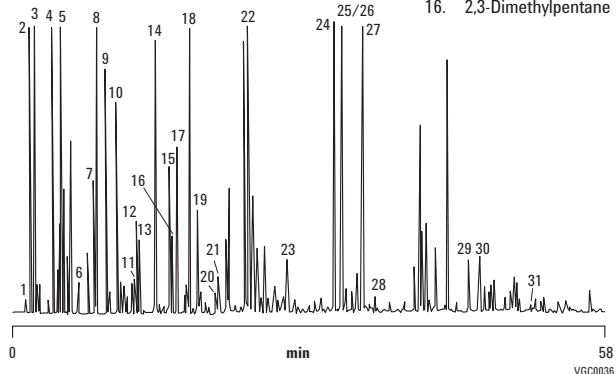
GCPE037

Gasoline unleaded ASTM D 5769

Column: CP-Sil PONA CB
CP7530
100 m x 0.25 mm, 0.50 µm

Sample: 0.1 µL
Carrier: Helium, 240 pKa (2.4 bar, 34 psi)
Oven: 35°C (7 min) to 250°C, 3°C/min
Injection: Split 80 mL/min
Detector: FID

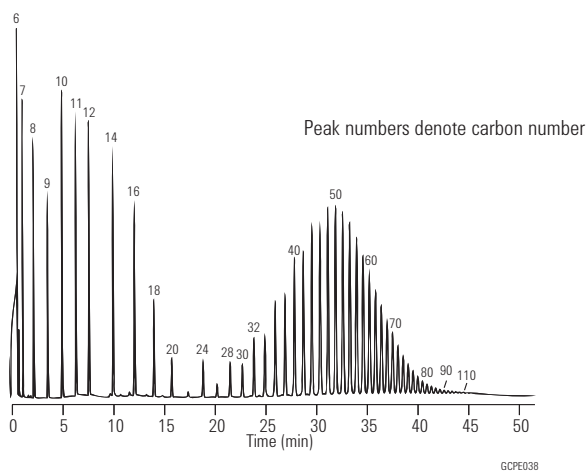
- | | | |
|-----------------------|-------------------------|------------------------------------|
| 1. Propane | 8. 2-Methylpentane | 17. 3-Methylhexane |
| 2. Isobutane | 9. 3-Methylpentane | 18. Tert. amyl methyl ether (TAME) |
| 3. Butane | 10. Hexane | 19. Unknown |
| 4. 2-Methylbutane | 11. 2,2-Dimethylpentane | 20. 2,2-Dimethylhexane |
| 5. Pentane | 12. Methylcyclopentane | 21. Methylcyclohexane |
| 6. 2,2-Dimethylbutane | 13. 2,4-Dimethylpentane | 22. Toluene |
| 7. 2,3-Dimethylbutane | 14. Benzene | 23. Octane |
| | 15. 2-Methylhexane | 24. Ethylbenzene |
| | 16. 2,3-Dimethylpentane | 25. p-Xylene |
| | | 26. m-Xylene |
| | | 27. o-Xylene |
| | | 28. Nonane |
| | | 29. Decane |
| | | 30. 1,2,3-Trimethylbenzene |
| | | 31. Undecane |



n-Paraffin Standard

Column: DB-HT SimDis
145-1001
5 m x 0.53 mm, 0.15 µm

Carrier: Helium at 18 mL/min, measured at 35°C
Oven: -30-430°C at 10°/min
Injection: OPTIC PTV
55-450°C at 2°/sec
Detector: FID, 450°C
Nitrogen makeup gas at 15 mL/min
Sample: 0.5 µL of about 2% n-paraffins in CS₂



Polyethylene

Column: DB-1
125-1011
15 m x 0.53 mm, 0.15 µm

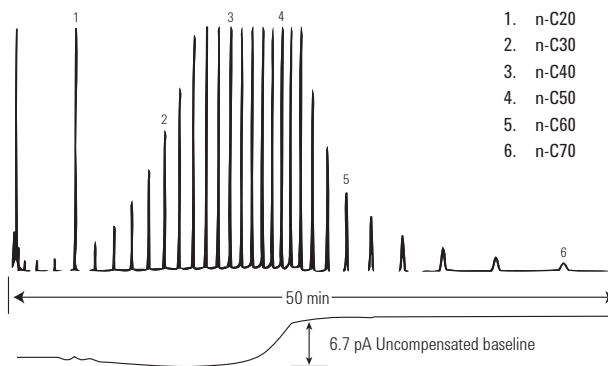
Carrier: Helium at 8 mL/min

Oven: 120-360°C at 10°/min

Injection: Split ratio 1:500

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Sample: 0.5 µL
3% Solution in CS₂



GCP6039

Direct Injection of Gasoline and Diesel Fuel in Methylene Chloride

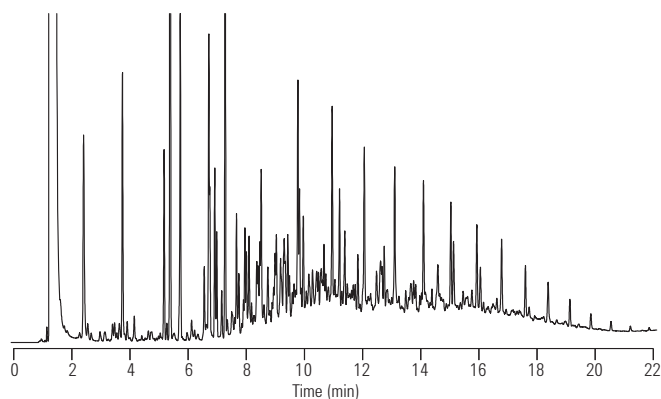
Column: DB-TPH
124-1632
30 m x 0.45 mm, 1.00 µm

Carrier: Helium at 67 cm/sec, measured at 40°C

Oven: 40°C for 2 min
40-280°C at 12°/min

Injection: Megabore Direct, 250°C

Detector: FID, 250°C
Nitrogen makeup gas at 30 mL/min



GCGAS001

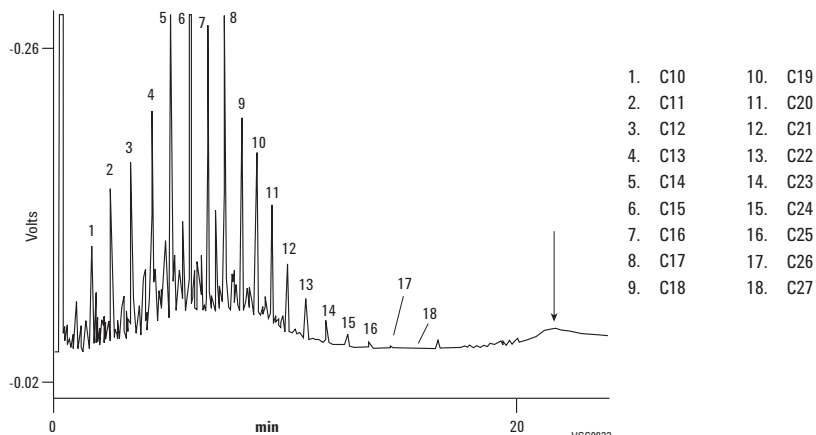
Diesel analysis

Column: VF-5ht Fused Silica
CP9047
15 m x 0.32 mm, 0.10 µm

Carrier: H₂, 60 kPa, 0.6 bar, 8.6 psi

Oven: 50°C (1 min), 15°C to 180°C,
7°C to 230°C, 30°C to 380°C

Detector: FID



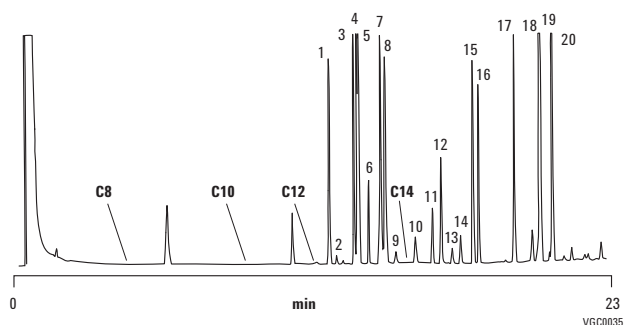
VGC0033

Analysis of oxygenates in a C1 to C5 hydrocarbon mix

Column: CP-Lowox
CP8587
10 m x 0.53 mm, 10.00 µm

Sample: 1 µL
Sample Conc: 0.01% per compound
Solvent: Cyclohexane
Carrier: He, 28.8 kPa (0.288 bar, 4.1 psi)
Oven: 50°C (5 min) to 240°C, 10°C/min
Injection: Split, T=250°C
Detector: FID, T=250°C

- | | |
|-------------------------------|--|
| 1. Acetaldehyde | 11. Methanol |
| 2. Diethyl ether | 12. Acetone |
| 3. Ethyl tert-butyl ether | 13. Isovaleraldehyde |
| 4. Methyl tert-butyl ether | 14. Valeraldehyde |
| 5. Diisopropyl ether | 15. 2-Butanone |
| 6. Propionaldehyde (propanol) | 16. Ethanol |
| 7. Tert-amyl methyl ether | 17. 1-Propanol |
| 8. Dipropyl ether | 18. 2-Methyl-1-propanol (isobutanol) |
| 9. Isobutyraldehyde | 19. 2-Methyl-2-propanol (tert-butanol) |
| 10. Butyraldehyde | 20. 1-Butanol |



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Fast Analysis of Aromatic Solvent

Column: HP-INNOWax
19091N-216
60 m x 0.32 mm, 0.50 µm

Carrier: Helium at 20 psi
constant pressure mode

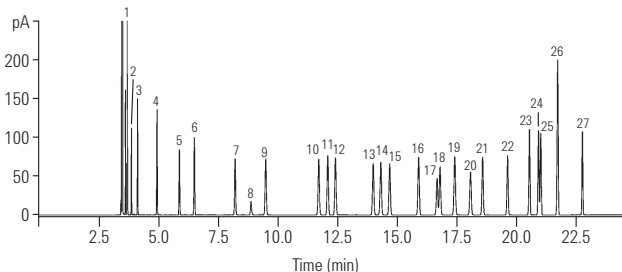
Oven: 75°C (10 min); 3°C/min
to 100°C (0 min)
10°C/min to 145°C (0 min)

Injection: Split/splitless at 250°C
100:1 split ratio

Detector: FID at 250°C

Sample: 1.0 µL

Unified aromatic solvent method



1. Heptane
2. Cyclohexane
3. Octane
4. Nonane
5. Benzene
6. Decane
7. Toluene
8. 1,4-Dioxan
9. Undecane
10. Ethylbenzene
11. p-Xylene
12. m-Xylene
13. Cumene
14. Dodecane
15. o-Xylene
16. Propylbenzene
17. p-Ethyltoluene
18. m-Ethyltoluene
19. t-Butylbenzene
20. s-Butylbenzene
21. Styrene
22. Tridecane
23. 1,3-Diethylbenzene
24. 1,2-Diethylbenzene
25. n-Butylbenzene
26. a-Methylstyrene
27. Phenylacetylene

Column: HP-INNOWax
19091N-577
20 m x 0.18 mm, 0.18 µm

Carrier: Helium at 33 psi
constant pressure mode

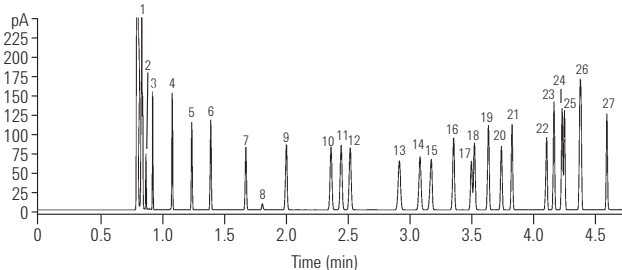
Oven: 70°C (3 min); 45°C/min
to 145°C (1 min)

Injection: Split/splitless at 250°C
100:1 to 600:1 split ratio

Detector: FID at 250°C

Sample: 0.2 to 1.0 µL

Optimized unified aromatic solvent method



GCHE003

This application showcases the practicality using high efficiency GC columns in daily aromatic solvent analysis. The result: a three-fold reduction in run time (compared to a 0.32 mm I.D. column) with no compromise in resolution.

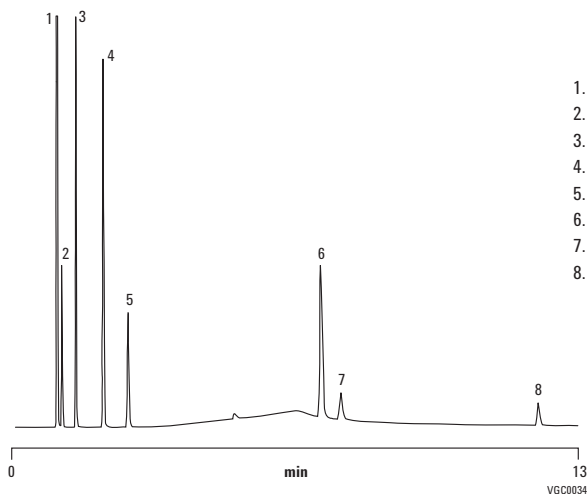


For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Analysis of gases C1 to C4

Column: CP-PoraPLOT Q
CP7554
25 m x 0.53 mm, 20.00 µm

Sample: 50 µL
Carrier: He, 65 kPa (0.65 bar, 8 psi)
Oven: 40°C (3 min) to 150°C, 10°C/min
Injection: Split, 1:50, T=225°C
Detector: TCD, T=250°C

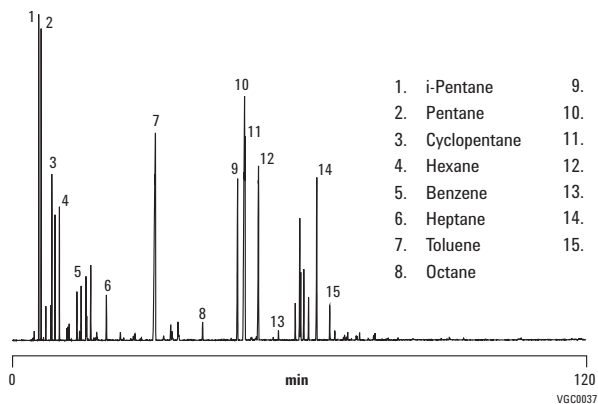


- 1. Carbon monoxide
- 2. Methane
- 3. Carbon dioxide
- 4. Ethylene
- 5. Ethane
- 6. Propylene
- 7. Propane
- 8. Butane

Detailed hydrocarbon analysis of petroleum naphthas through n-nonane using ASTM D 5134

Column: CP-Sil PONA for ASTM D 5134
CP7531
50 m x 0.21 mm, 0.50 µm

Sample: 0.2 µL
Carrier: Helium
Oven: 35°C (30 min) @ 2°C/min to 200°C (10 min)
Injection: Split/splitless 1177, full EFC control, 250°C, split 200 mL/min
Detector: FID, 250°C



- 1. i-Pentane
- 2. Pentane
- 3. Cyclopentane
- 4. Hexane
- 5. Benzene
- 6. Heptane
- 7. Toluene
- 8. Octane
- 9. Ethylbenzene
- 10. p-Xylene
- 11. m-Xylene
- 12. o-Xylene
- 13. Nonane
- 14. t-Butylbenzene
- 15. 1,2,3 Trimethylbenzene

LC AND LC/MS



In this Chapter

Parts and Supplies

- 712** Bio-inert Supplies
- 716** General Supplies
- 739** Pump Supplies
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NEW!

Agilent 1260 Infinity Bio-inert Quaternary LC Supplies



For your challenging bio-molecule analyses, the new 1260 Infinity Bio-inert Quaternary LC System sets new standards in performance, reliability, and robustness. Analysis of proteins and biotherapeutics usually presents the most challenging solvent conditions for any LC instrument. In addition, bio-molecules tend to bind unspecifically to surfaces, requiring tedious procedures. To address these needs, Agilent designed this application-specific LC instrument for bio-molecular analysis – without any compromise in performance – built on the proven Agilent 1200 Infinity platform technology.

100% Bio-inert

The Agilent 1260 Infinity Bio-inert Quaternary LC features bio-inertness for all components without exception. The sample flow path through autosampler, capillaries and a variety of detectors are completely metal-free, with only PEEK and ceramic components coming into contact with your bio-molecule. Thus, the uncertainty of secondary interaction for proteins and peptides with surfaces which can result in peak tailing, low recovery and decreased column lifetime is minimized – and your confidence maximized.

1260 Bio-inert Quaternary Pump Parts

Description	Part No.
Bio-inert purge valve	G5611-60061
Bio-inert active inlet valve	G5611-60025
Bio-inert cartridge for active inlet valve, 600 bar	G5611-60020
Bio-inert outlet ball valve	G5611-60067
Sapphire piston	5067-4695
Bio-inert piston seal	G5611-21503
Bio-inert wash seal	0905-1731
Bio-inert seal keeper	G5611-26210
Bio-inert support ring	G5611-63010

1260 Bio-inert High Performance Autosampler Parts

Description	Part No.
Bio-inert 2 position/6 port injection valve	5067-4131
Rotor seal, 3 grooves, max 600 bar	0101-1416
Bio-inert stator	5068-0060
Stator face, ceramic	0100-1851
Bio-inert needle assembly	G5667-87200
Tool for needle adjustment	G5667-40500
Bio-inert seat assembly, 0.17 mm ID, 100 mm	G5667-87017
Sapphire piston, 100 µL	5067-4695
Bio-inert piston seal	G5611-21503

1260 Bio-inert Valve Parts

Description	Use With	Part No.
Bio-inert rotor seal, PEEK	Bio-inert 2 position/6 port switching valve	0101-1409
Bio-inert stator	Bio-inert 2 position/6 port switching valve	5068-0060
Stator face, ceramic	Bio-inert 2 position/6 port switching valve	0100-1851
Bio-inert rotor seal, PEEK	Bio-inert 8 position/9 port switching valve	5068-0043
Bio-inert stator	Bio-inert 8 position/9 port switching valve	5068-0042
Bio-inert stator face	Bio-inert 8 position/9 port switching valve	5068-0091
Bio-inert rotor seal, PEEK	Bio-inert 4 column selection valve	5068-0045
Bio-inert stator	Bio-inert 4 column selection valve	5068-0044
Bio-inert stator face	Bio-inert 4 column selection valve	5068-0093

1260 Bio-inert 2 Position/6 Port Manual Injection Valve Parts

Description	Part No.
Bio-inert 2 position/6 port manual injection valve Includes needle port; does not include sample loop	5067-4158
Bio-inert rotor seal, PEEK	0101-1409
Stator face, ceramic	0100-1851
Bio-inert stator	5068-0060
PEEK sample loop, 5 µL	0101-1241
PEEK sample loop, 10 µL	0101-1240
PEEK sample loop, 20 µL	0101-1239
PEEK sample loop, 50 µL	0101-1238
PEEK sample loop, 100 µL	0101-1242
PEEK sample loop, 200 µL	0101-1237
PEEK sample loop, 500 µL	0101-1236
PEEK sample loop, 1 mL	0101-1235
PEEK sample loop, 2 mL	0101-1234
PEEK sample loop, 5 mL	0101-1230
PEEK sample loop, 10 mL	0101-1227
PEEK sample loop, 20 mL	0101-1226

1260 Bio-inert Detector Parts

Description	Use With	Part No.
Bio-inert standard flow cell, with RFID tag, 10 mm, 13 µL, 120 bar	G1315C/D and G1365C/D	G5615-60022
Bio-inert max light cartridge cell, 60 mm, 4.0 µL, 60 bar	G4212A/B	G5615-60017
Bio-inert max light cartridge cell, 10 mm, 1.0 µL, 60 bar	G4212A/B	G5615-60018
Bio-inert FLD flow cell	G1321B	G5615-60005
PEEK tubing, 0.18 mm ID, 1.5 m		0890-1763

1260 Bio-inert Fittings

Description	Part No.
Bio-inert union, 600 bar, 10-32 with PEEK insert	5067-4741

1260 Bio-inert Titan Capillaries

From	To	ID (mm)	Length (mm)	Material	Fittings/Connection	Part No.
Pump	Autosampler	0.17	400	Titan	Pre-swaged	G5611-60500
		0.17	700	Titan	Pre-swaged	G5611-60501
Pump	Manual injection valve	0.17	900	Titan	Pre-swaged	G5611-60502
Injection valve	Metering device	0.17	160	Titan	Pre-swaged	G5611-60503
Damper	Pump head Piston 1	0.6	234	Titan	Pre-swaged	G5611-67301
Outlet ball valve	Damper	0.6	248	Titan	Pre-swaged	G5611-67300

1260 Bio-inert PEEK/Stainless Steel Capillaries

ID (mm)	Length (mm)	Material	Fittings/Connection	Part No.
0.17	100	PEEK/stainless steel	Without fitting	5067-4777
0.17	150	PEEK/stainless steel	Without fitting	5067-4778
0.17	200	PEEK/stainless steel	Without fitting	5067-4779
0.17	300	PEEK/stainless steel	Without fitting	5067-4780
0.17	400	PEEK/stainless steel	Without fitting	5067-4781
0.17	500	PEEK/stainless steel	Without fitting	5067-4782
0.17	100	PEEK/stainless steel	Male to male, pre-swaged	G5667-60502
0.17	150	PEEK/stainless steel	Male to male, pre-swaged	G5667-60503
0.17	200	PEEK/stainless steel	Male to male, pre-swaged	G5667-60504
0.17	300	PEEK/stainless steel	Male to male, pre-swaged	G5667-60505
0.17	400	PEEK/stainless steel	Male to male, pre-swaged	G5667-60500
0.17	500	PEEK/stainless steel	Male to male, pre-swaged	G5667-60501

Tips & Tools

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GENERAL LC SUPPLIES



Agilent offers a wide range of supplies for operation and maintenance of LC systems. These products have been carefully designed or selected by Agilent to work with your Agilent instruments for maximum performance and uptime.

LC Capillaries and Tubing

Stainless Steel Capillaries

- Made of flexible stainless steel (0.6 mm OD) with 1/16 in. OD tubing at both ends to accept standard fittings
- Pre-swaged fittings are assembled according to Swagelok specifications

Stainless Steel Capillaries for 1100/1200 LC Systems

From	To	ID (mm)	Length (mm)	Material*	Color Code	Fittings/Connection	Part No.
Pump	Autosampler	0.17	600	SS	Green	Pre-swaged	G1312-67305
		0.25	130	SS	Blue	Pre-swaged	01090-87308
		0.25	320	SS	Blue	Pre-swaged	79835-87638
		0.17	500	SS	Green	Non-swaged	G1328-87600
	Manual valve	0.17	900	SS	Green	1 end pre-swaged	G1329-87300
	Universal	0.25	700	SS	Blue	1 end pre-swaged	01018-67305
	1 multi assembly	0.6	173	SS		Male to male	G1361-67300
	1 multi assembly	0.6	175	SS		Male to male	G1361-67301
	Restriction capillary			SS		A/A	G1312-67302
SSV/MCGV	AIV		Pre-swaged	PTFE		Pre-swaged	G1311-67304
OBV	Piston 2	0.6	230	SS		Pre-swaged	G1312-67300
Mixing capillary	Damper	0.17	495	SS	Green	Pre-swaged	G1312-67304
Damper	Mixer	0.25	130	SS	Blue	Pre-swaged	01090-87308
Damper	Purge valve			SS		A/A	G1312-67301
Filter	EMPV			SS		A/A	G1375-87400
Needle seat	Injection valve			SS		-C	G1329-87101
EMPV	Next module	0.6	400	SS		Male to male	G1361-67302
EMPV	Multi assembly	0.5	160	SS		Male to male	G1361-67303

*SS = stainless steel

(Continued)

Stainless Steel Capillaries for 1100/1200 LC Systems

From	To	ID (mm)	Length (mm)	Material*	Color Code	Fittings/Connection	Part No.
Union	EMPV2	0.6	111	SS		Male to female	G1361-87304
Union	Mixer	0.6	40	SS		Male to female	G1361-87305
EMPV1	Union	0.6	367	SS		Male to female	G1361-87306
Autosampler	Column	0.12	180	SS	Red	1 end pre-swaged	G1313-87304
		0.12	280	SS	Red	1 end pre-swaged	01090-87610
		0.12	105	SS	Red	1 end pre-swaged	01090-87611
		0.17	180	SS	Green	1 end pre-swaged	G1313-87305
		0.17	280	SS	Green	1 end pre-swaged	01090-87304
		0.17	800	SS	Green	1 end pre-swaged	01048-87302
		0.17	130	SS	Green	1 end pre-swaged	01090-87305
		0.5	600	SS			G2260-87300
Manual valve	Column	0.17	500	SS	Green	Non-swaged	G1328-87600
Column compartment	Column	0.12	70	SS	Red	1 end pre-swaged	G1316-87303
Detector	Waste	0.17	90	SS	Green	Non-swaged	G1316-87300
Column	DAD	0.12	150	SS	Red	Pre-swaged	G1315-87312
		0.17	380	SS	Green	Pre-swaged	G1315-87311
Column	VWD	0.18	40	PEEK		Inlet capillary, 0.17 mm ID, 600 mm long	5062-8522
		0.12	105	SS	Red	Without fittings	5021-1820
		0.12	150	SS	Red	Without fittings	5021-1821
		0.12	280	SS	Red	Without fittings	5021-1822
		0.12	400	SS	Red	Without fittings	5021-1823
		0.12	70	SS	Red	1 end pre-swaged	G1316-87303
		0.17	105	SS	Green	Without fittings	5021-1816
		0.17	150	SS	Green	Without fittings	5021-1817
		0.17	280	SS	Green	Without fittings	5021-1818
		0.17	400	SS	Green	Without fittings	5021-1819
		0.17	90	SS	Green	With fittings	G1316-87300
		VWD	Waste	0.25	48	PEEK	
Injector valve	Waste	0.25	120	SS	Blue		G1377-87301
Injector valve	Prep head	0.5	160	SS			G2258-87301
Description		ID (mm)	Length (mm)	Material*	Color Code	Fittings/Connection	Part No.
Stainless steel capillary		0.12	210	SS	Red	Pre-swaged	G1316-87328
Stainless steel capillary		0.17	250	SS	Green	Pre-swaged	G1367-87304
Stainless steel capillary		0.12	250	SS	Red	1 end pre-swaged	G1373-87300

*SS = stainless steel

Stainless Steel Capillaries for 1260 Infinity LC and 1200 Rapid Resolution LC Systems

From	To	ID (mm)	Length (mm)	Connection	Fittings	Part No.
Pump	Autosampler	0.17	400	Male to male	Pre-swaged	G1312-87303
	Cooled autosampler	0.17	700	Male to male	Pre-swaged	G1312-87304
Damper	Pressure sensor	0.17	150	Male to male	Pre-swaged	G1312-87305
Damper	Mixer	0.17	105	Male to male	Pre-swaged	G1312-87306
Mixer	Outlet valve					
Column	Flow cell	0.17	150	Male to female	Non-swaged	G1315-87303
Cell out	MS	0.12	500	Male to male	1 end pre-swaged	G1315-87307
DAD heat exchanger capillary		0.17	310	Male to male	1 end pre-swaged	G1315-87319
DAD heat exchanger capillary		0.12	310	Male to male	1 end pre-swaged	G1315-87339
Valve	Valve	0.12	100	Male to male	Non-swaged	G1316-27301*
Micro valve	Regeneration pump	0.12	130	Male to female	Non-swaged	G1316-87304*
WPS	Micro valve	0.12	340	Male to male	1 end pre-swaged	G1316-87305*
Micro valve	Heat exchanger	0.12	75	Male to male	Non-swaged	G1316-87306*
TCC	MS	0.12	500	Male to male	1 end pre-swaged	G1316-87309
VWD						
Column	DAD cell	0.12	50	Male to female	Non-swaged	G1316-87312
		0.12	70	Male to female	Non-swaged	G1316-87313
		0.12	90	Male to female	Non-swaged	G1316-87314
		0.12	130	Male to female	Non-swaged	G1316-87315
		0.17	150	Male to female	Non-swaged	G1315-87303
WPS	TCC	0.12	170	Male to male	Non-swaged	G1316-87316
		0.12	210	Male to male	Non-swaged	G1316-87317

*0.8 mm OD stainless steel capillaries – use 0.8 mm ID fittings

(Continued)

Stainless Steel Capillaries for 1260 Infinity LC and 1200 Rapid Resolution LC Systems

From	To	ID (mm)	Length (mm)	Connection	Fittings	Part No.
Cooled WPS	TCC	0.12	300	Male to male	Non-swaged	G1316-87318
		0.12	340	Male to male	Non-swaged	G1316-87319
Column	Cooler (50-150 mm column)	0.17	105	Male to male	Non-swaged	G1316-87321
	Cooler (20-30 mm column)	0.17	170	Male to male	Non-swaged	G1316-87323
Micro valve	Detector	0.12	75	Male to female	Non-swaged	G1316-87326*
Column	DAD cell	0.12	170	Male to female	Non-swaged	G1316-87327
WPS	10 port valve	0.12	210	Male to male	Pre-swaged	G1316-87328*
10 port valve	Column	0.12	100	Male to male	Non-swaged	G1367-87303*
WPS	TCC	0.17	250	Male to male	Pre-swaged	G1367-87304
Description		ID (mm)	Length (mm)	Connection	Fittings	Part No.
DAD heat exchanger capillary		0.17	310	Male to male	1 end pre-swaged	G1315-87319
DAD heat exchanger capillary		0.12	310	Male to male	1 end pre-swaged	G1315-87339
Absorber capillary, 500 µL		0.17	1770	Male to male	Pre-swaged	G1312-87300
Calibration capillary assembly						G1312-67500
Stainless steel restriction capillary, T-piece to pressure sensor		0.17				G1312-87301
Column connecting capillary with fittings		0.17	90	Male to male	Non-swaged	G1316-87300
Flexible capillary		0.17	280		Without fittings	5021-1818
Stainless steel capillary		0.17	230	Male to male	Pre-swaged	5067-1570
Stainless steel capillary		0.17	320	Male to male	Pre-swaged	5067-1571
Stainless steel capillary		0.17	150	Male to female	Pre-swaged	5067-1572

*0.8 mm OD stainless steel capillaries – use 0.8 mm ID fittings

Tips & Tools

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Stainless Steel Connection Capillaries for 1290 Infinity LC

From	To	ID (mm)	Length (mm)	Fittings	Part No.
Pump	Autosampler	0.17	300	Pre-swaged	5067-4657
Pump	Thermostatted Autosampler	0.17	450	Pre-swaged	5067-4658
Autosampler	TCC	0.12	340	Non-swaged	5067-4659
TCC	DAD	0.12	220	Non-swaged	5067-4660
1290 LC System	CTC Autosampler	0.17	600	Pre-swaged	5067-4670
CTC Autosampler	Column	0.12	600	Non-swaged	5067-4669
Autosampler	Valve	0.12	340	Pre-swaged	5067-4647
Autosampler	Valve	0.12	340	1200 bar removable fitting	5067-4744
Autosampler	Valve (dual stack)	0.12	500	1200 bar removable fitting	5067-4745
Second pump	Valve	0.17	700	Pre-swaged	5067-4648
Valve	HX1-HX2	0.12	90	Pre-swaged	5067-4649
Valve	Heat exchanger	0.12	150	Pre-swaged	5067-4735
Column	Valve (short)	0.12	150	Non-swaged	5067-4650
Column	Valve (short)	0.12	170	Non-swaged	5067-4736
Column	Valve (long)	0.12	280	Non-swaged	5067-4651
Valve	Valve	0.12	120	Pre-swaged	5067-4652
Valve	Valve	0.12	150	Pre-swaged	5067-4737
Valve	Detector	0.12	200	Pre-swaged	5067-4653
Valve	Detector	0.12	200	1200 bar removable fitting	5067-4746
Filter	Purge valve	0.25	250	Pre-swaged	5067-4655
Pressure sensor	Purge valve	0.25	80	Pre-swaged	5067-4656
Mixer	Purge valve	0.17	140	Pre-swaged	G4220-87000
Valve	Metering device	0.17	160	Pre-swaged	G4226-60301

Flexible Stainless Steel Capillaries Without Fittings

ID (mm)	Length (mm)	Color Code	Volume (µL)	Part No.
0.12	105	Red	1.2	5021-1820
	150	Red	1.7	5021-1821
	200	Red	2.3	5065-9935
	280	Red	3.2	5021-1822
	400	Red	4.5	5021-1823
	500	Red	5.6	5065-9964
0.17	105	Green	2.4	5021-1816
	150	Green	3.4	5021-1817
	200	Green	4.6	5065-9931
	280	Green	6.4	5021-1818
	400	Green	9.1	5021-1819
	600	Green	13.6	5065-9933
	700	Green	15.9	5065-9932
	900	Green	20.5	5065-9963
0.25	250	Blue	12.3	5065-9979
	280	Blue	13.8	5022-6508
	320	Blue	15.8	5065-9980
	800	Blue	39.3	5065-9930
0.50	105	None	20.6	5065-9927
	150	None	29.5	5022-6509
	280	None	55	5022-6510
	800	None	157	5065-9926

Peek Coated Fused Silica Capillaries

PEEK Coated Fused Silica Capillaries for use with 20 μ L/min Flow Range

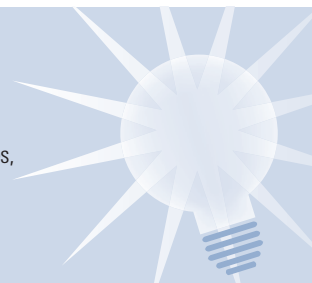
From	To	ID (μ m)	Length (mm)	Fitting Type	Part No.
EMPV	Flow sensor	50	220	B/B	G1375-87301
Flow sensor	Injection valve	50	550	B/C	G1375-87310
Injection valve	Metering device	50	200	B/C	G1375-87302
Metering device	Needle	100	110	B/B	G1375-87303
Injection valve	Column	50	500	C/D	G1375-87304
Column	Detector	50	400	D/E	G1315-68703
Detector	Waste	75	700	E/-	G1315-68708
μ -switching valve	Column	50	280	C/D	G1375-87309

PEEK Coated Fused Silica Capillaries for use with 100 μ L/min Flow Range

From	To	ID (μ m)	Length (mm)	Fitting Type	Part No.
EMPV	Flow sensor	100	220	B/B	G1375-87305
Flow sensor	Injection valve	100	550	B/C	G1375-87306
Injection valve	Metering device	100	200	B/C	G1375-87312
Metering device	Needle	100	110	B/B	G1375-87303
Injection valve	Column	75	500	C/D	G1375-87311
Column	Waste	75	400	D/E	G1375-87308
Detector	Detector	75	700	E/-	G1315-68708
μ -switching valve	Waste	50	280	C/D	G1375-87309

Tips & Tools

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PEEK Coated Fused Silica Capillaries for Nano LC

From	To	ID (µm)	Length (mm)	Fitting Type	Part No.
Switching valve	Column	25	100	C/D	G1375-87320
EMPV	Flow sensor	25	220	B/B	G1375-87321
Flow sensor	Injection valve	25	350	B/C	G1375-87322
Injection valve	Flow sensor	25	550	C/D	G1375-87323
Switching valve	Column				
Switching valve	Column	25	700	C/D	G1375-87324
Switching valve	Column	50	100	C/D	G1375-87325
Injection valve	Injector seat or 2nd pump	75	650	C/D	G1375-87327

Generic Connecting Capillaries for Capillary LC System

From	To	Fitting Type	Part No.
SSV	AIV		G1311-67304
OBV	Piston 2	A/A	G1312-67300
Pump	Restriction capillary	A/A	G1312-67302
Mixing capillary	Damper	A/A	G1312-67304
Damper	Mixer	A/A	01090-87308
Mixer	Filter	A/A	01090-87308
Filter	EMPV	A/A	G1375-87400
Needle seat	Injection valve	-C	G1329-87101



Tubing

PEEK Tubing

- Flexible and easy to cut to desired lengths
- Color coded for easy tracking
- Accepts both stainless steel and PEEK fittings
- 1/16 in. OD

PEEK Tubing

ID (mm)	Length (m)	Color Code	Part No.
0.50	1.5	Orange	0890-1761
0.25	1.5	Blue	0890-1762
0.25	5	Blue	5042-6463
0.18	1.5	Yellow	0890-1763
0.18	5	Yellow	5042-6462
0.13	1.5	Red	0890-1915
0.13	5	Red	5042-6461

Other Tubing

Description	Length (m)	ID (mm)	OD (mm)	Part No.
PTFE tubing, FEP, primary use for valve solutions	5	0.7	1.6	5062-2462
PTFE solvent tubing, primary use for flow path from solvent bottle to degasser, to pump	5	1.5	3.1	5062-2483
Corrugated tubing, polypropylene	5	6.5		5062-2463
Silicone tubing	5	1	3	5065-9978
Clamps and micro clamps, 10/pk				5065-9976
Barbed Y-Connector PP for 3/16 in. ID tube, 10/pk				5065-9971
For G2258A 1100/1200 Series Dual Loop Autosampler				
Front seat tube, SS	0.1	0.5		G2258-87316
Back seat tube, SS	0.12	0.5		G2258-87315
Front seat tube, PTFE	0.1	0.2		G2258-87312
Back seat tube, PTFE	0.12	0.25		G2258-87313
Waste tube	0.15	0.8		G2258-87310
Waste tube	0.1	0.8		G2258-87311
Drawing tube assembly for flush solvent with filter and bottle cap				G2258-87307
Tubing assembly, solvent flush				G2258-87314
For G1313/27/29A 1100/1200 Series Autosampler				
Waste tube				G1313-87300
Waste tubing, 5 m, 6.5 mm ID, corrugated polypropylene	5	6.5		5062-2463
For G1387A 1100/1200 Series Micro Autosampler				
Waste tube, FEP		0.8	1.6	G1375-87326



Plastic tubing cutter, 8710-1930

Accessories

Description	Part No.
Plastic tubing cutter	8710-1930
Blades for plastic tubing cutter, 5/pk	8710-1931
Fitting screws, stainless steel, 10-32, 4 mm, 5/pk	5065-9948
PEEK ferrule and stainless steel ring for 2 mm tube, 5/pk	5065-9950
Union, PEEK for 1/8 in. OD tubing	0100-2410
Waste adapter, 1200 Series autosamplers, gray	G1313-43216



Fitting screws, 5065-9948

Rigid Capillary Tubing

- Squarely cut, pre-cleaned and ready to use
- Use with stainless steel fittings and ferrules (P/N 5062-2418) or PEEK fittings (P/N 0100-1516)



PEEK ferrules and SS rings, 5065-9950

Rigid Capillary Tubing

Length (mm)	ID (mm)	Unit	Part No.
100	0.17	10/pk	5061-3361
200	0.17	10/pk	5061-3362



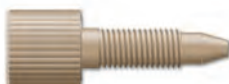
Stainless steel fittings, 5062-2418



Stainless steel long fittings, 5065-4454



PEEK fittings, 5063-6591



PEEK long fittings, 5062-8541



Finger-tight PEEK fittings, 5065-4426



Double winged fitting, 5042-6500



PEEK RheFlex fittings, 0100-1631

LC Fittings, Ferrules and Unions

To ensure leak-free connections – and to prevent the loss of peak shape and resolution – always use the manufacturer’s recommended fitting style with columns, valves, and unions. For example:

- Different columns have different fitting requirements (ZORBAX columns use standard Swagelok fittings)
- Agilent 1100/1200 modules use standard Swagelok fittings
- Rheodyne injection valves require Rheodyne fittings

Fittings for 1/16 in. OD Capillaries

Description	Contents	Unit	Part No.
1/16 in. stainless steel fitting	Includes nut, front and back ferrules	10/pk	5062-2418
1/16 in. stainless steel long fitting	Includes nut, front and back ferrules	10/pk	5065-4454
1/16 in. stainless steel extra long fitting	Includes nut, front and back ferrules	10/pk	5065-9967
1/16 in. stainless steel fitting		10/pk	5061-3303
1/16 in. stainless steel front ferrule		10/pk	5180-4108
1/16 in. stainless steel back ferrule		10/pk	5180-4114
1/16 in. finger-tight PEEK fitting	1 piece, beige	10/pk	5063-6591
1/16 in. finger-tight PEEK fitting	1 piece, beige	2/pk	0100-1516
1/16 in. finger-tight PEEK long fitting	1 piece, beige	10/pk	5062-8541
1/16 in. finger-tight PEEK fitting	1 each: yellow, blue, black, green, red	10/pk	5065-4426
1/16 in. double winged PEEK fittings	Includes nut and ferrule	10/pk	5042-6500
1/16 in. PEEK RheFlex fittings	Includes nut and ferrule	5/pk	0100-1631
1/16 in. PEEK RheFlex fittings	Includes nut and ferrule, colored	10/pk	0100-2175

(Continued)



ChromTrac identifiers, 0350-1402








1200 bar removable fitting, 5067-4733

Fittings for 1/16 in. OD Capillaries

Description	Contents	Unit	Part No.
ChromTrac identifiers	2 each: black, green, white; 4 each: yellow, blue, red	20/pk	0350-1402
1/16 in. stainless steel blanking nut			01080-83202
1/16 in. stainless steel nut, PEEK ferrule	Includes stainless steel nut and PEEK ferrule	6/pk	5067-1540
1/16 in. PEEK ferrule		6/pk	5067-1547
For use with 5067-1540 fitting			
1/16 in. plastic fitting			0100-1259
1/16 in. finger-tight polyketone fittings		10/pk	5042-8957
1/16 in. 0.8 mm ID stainless steel ferrule		6/pk	5067-1557
1/16 in. 0.8 mm ID stainless steel fitting, M4/4 mm		6/pk	5067-1558
1/16 in. 1200 bar removable fitting			5067-4733
1/16 in. 1200 bar removable long fitting			5067-4738
1/16 in. 1200 bar removable extra long fitting			5067-4739

Replacement Fittings and Ferrules for Capillary and Nano Flow System

Graphic	Description	Fitting Type	Part No.
	1/16 in. stainless steel fittings, front and back ferrules, 10/pk	A	5062-2418
	1/16 in. stainless steel fittings, male, 4 mm, 10/pk	B	5063-6593
	1/32 in. ferrule and stainless steel lock ring, 10/pk	B	5065-4423
	6 fittings, 2 plugs, PEEK for μ-valves	C	5065-4410
	Double winged PEEK nuts and 1/32 in. ferrules, 10/pk	D	5065-4422
	PEEK fitting, long for 1/32 in. OD capillary	D	5022-6536



ZDV union with fittings, 0100-0900



High flow union, 5022-2133



Micro T-connector, PEEK, 5042-8519

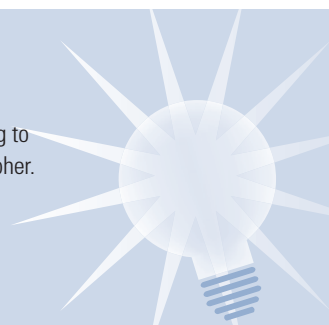
Unions

Description	Use With	Part No.
True ZDV union, no fittings	Nano LC	5022-2145
Universal ZDV union, stainless steel, no fittings	Capillary/Nano/Standard LC	5022-2184
ZDV union, with fittings	Standard LC	0100-0900
ZDV union, PEEK with fittings	Bio-applications	0100-2441
High flow union, no fittings	Prep LC	5022-2133
PEEK adapter 1/4-28 to 10-32		0100-1847
Adapter, PEEK int. 1/4-28 to ext. 10-32		0100-2298
Barbed Y-Connector PP for 3/16 in. ID tube, 10/pk		5065-9971
Adapter, female to female 1/4-28		5042-8517
Adapter, male luer to female 1/4-28		5042-8518
Adapter, female to male 10-32 to 1/4-28 stainless steel		5023-1803
T-connector, PEEK, swept volume 0.57 µL	For 1/16 in. OD tubing	5022-2144
Micro T-connector, PEEK, swept volume 29 nL, with 1/32 in. ID fittings		5042-8519

Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatographer.

For more information, visit
www.agilent.com/chem/education





Capillary and Fittings Kits

Agilent starter kits contain the most often used capillaries and fittings. We included our genuine flexible stainless steel capillaries to make the best connection in your LC system, no matter the brand. The kits are for use with 3-4 or 1-2 mm ID columns, as well as for Micro LC columns. The free Cybertool, which contains over 30 tools, is useful in every laboratory.

Capillary and Fittings Kits

Description	Contents	Part No.
Capillary/fitting starter kit, 0.12 mm ID	Kit includes: Qty 1 – PEEK capillary, 0.13 mm ID, 1.5 m Qty 4 – Stainless steel capillary, 105 x 0.12 mm Qty 4 – Stainless steel capillary, 150 x 0.12 mm Qty 2 – Stainless steel capillary, 170 x 0.12 mm Qty 2 – Stainless steel capillary, 200 x 0.12 mm Qty 2 – Stainless steel capillary, 220 x 0.12 mm Qty 2 – Stainless steel capillary, 280 x 0.12 mm Qty 1 – Stainless steel capillary, 400 x 0.12 mm Qty 3 – Stainless steel ZDV union Tubing cutter for PEEK capillaries 1/16 in. stainless steel fittings, 10/pk 1/16 in. PEEK fittings, color, 10/pk 1/16 in. PEEK fittings, 10/pk Rheotool Cybertool	5065-9937
Capillary/fitting starter kit, 0.17 mm ID	Kit includes: Qty 1 – PEEK capillary, 0.18 mm ID, 1.5 m Qty 4 – Stainless steel capillary, 105 x 0.17 mm Qty 4 – Stainless steel capillary, 150 x 0.17 mm Qty 2 – Stainless steel capillary, 200 x 0.17 mm Qty 2 – Stainless steel capillary, 280 x 0.17 mm Qty 1 – Stainless steel capillary, 400 x 0.17 mm Qty 3 – Stainless steel ZDV union Tubing cutter for PEEK capillaries 1/16 in. stainless steel fittings, 10/pk 1/16 in. PEEK fittings, color, 10/pk 1/16 in. PEEK fittings, 10/pk Rheotool Cybertool	5065-9939

(Continued)

Capillary and Fittings Kits

Description	Contents	Part No.
Capillary/fitting starter kit for 1100 Capillary LC System	Kit includes: Qty 2 – Fused silica/PEEK capillary, 50 µm, 55 cm Qty 1 – Fused silica/PEEK capillary, 50 µm, 20 cm Qty 1 – Fused silica/PEEK capillary, 100 µm, 110 cm Qty 2 – Fused silica/PEEK capillary, 50 µm, 50 cm Qty 2 – Fused silica/PEEK capillary, 50 µm, 40 cm Qty 4 – 4 mm stainless steel fitting, male 10-32 Qty 4 – 1/32 in. PEEK ferrule and stainless steel lock ring Qty 4 – PEEK fittings for µ-valves Qty 4 – Double winged PEEK nuts and 1/32 in. ferrules Cybertool	5065-9938
Rapid Resolution High Throughput capillary kit	Kit includes: Qty 1 – PEEK fitting long for 1/32 in. OD capillaries Qty 1 – Stainless steel capillary, 280 x 0.12 mm Qty 1 – Stainless steel capillary, 150 x 0.12 mm Qty 1 – Stainless steel capillary, 70 x 0.12 mm Qty 1 – Needle seat capillary, 12 µL x 0.12 mm Qty 1 – PEEK capillary, 550 x 0.125 mm	5065-9947
1200 capillary kit for 0.12 mm ID	Kit includes: Qty 1 – Stainless steel capillary, 130 x 0.12 mm Qty 2 – Stainless steel capillary, 170 x 0.12 mm Qty 1 – Stainless steel capillary, 210 x 0.12 mm Qty 1 – Stainless steel capillary, 300 x 0.12 mm Qty 3 – Stainless steel capillary, 500 x 0.12 mm Qty 1 – Stainless steel capillary, 500 x 0.12 mm Qty 1 – Stainless steel capillary, 700 x 0.12 mm Qty 1 – Stainless steel capillary, 340 x 0.12 mm Qty 1 – Low carry over seat Qty 1 – DAD heat exchanger capillary, 310 x 0.12 mm	G1316-68716
Stainless steel flexible capillary tubing kit	Kit includes: Qty 10 – 1/16 in. stainless steel back ferrules Qty 10 – 1/16 in. stainless steel front ferrules Qty 10 – Stainless steel fittings Qty 3 – Stainless steel capillary, 105 x 0.12 mm Qty 1 – Stainless steel capillary, 150 x 0.12 mm Qty 1 – Stainless steel capillary, 280 x 0.12 mm	5061-3304
Stainless steel flexible capillary tubing kit	Kit includes: Qty 2 – Stainless steel capillary, 35 x 0.12 mm Qty 3 – Stainless steel capillary, 105 x 0.12 mm Qty 1 – Stainless steel capillary, 280 x 0.12 mm	5061-3315
Low dispersion capillary kit	Kit includes: Qty 1 – Stainless steel capillary, 200 x 0.12 mm, with removable fitting Qty 1 – Stainless steel capillary, 340 x 0.12 mm, with removable fitting Qty 1 – Stainless steel capillary, 500 x 0.12 mm, with removable fitting Qty 4 – Stainless steel capillary, 150 x 0.12 mm, with 1 long/1 short pre-swaged fittings Qty 1 – Stainless steel capillary, 150 x 0.12 mm, with 2 long pre-swaged fittings Qty 4 – Stainless steel capillary, 170 x 0.12 mm	5067-4729

LC Tools

Your Agilent LC system arrives with a full complement of tools needed to perform general maintenance and operation procedures. Should you need additional or replacement tools, Agilent offers a selection of high-precision, high-quality, stainless steel tools, to avoid any deformation of the screws or nuts.



Mounting tool, 0100-1710



Capillary mounting tool, G1377-44900



HPLC system tool kit, G4203-68708

LC Tools

Description	Part No.
Tool kit hex keys, Rheotool Includes 3 hex keys, 4 mm, 1.5 mm, and 9/64 in., with straight or T-handle plus Rheotool	5064-8211
Torque wrench adapter Used with nanoliter flow cell for Diode Array Detector to mount capillaries of cell (P/N G1315-68714)	G1315-45003
Insert tool (seal wash option)	01018-23702
Mounting tool for flangeless nut	0100-1710
Tool for micro seat capillary mounting Simplifies the connection of micro seats with capillary	G1377-44900
Mounting clamp	5021-1866
Velocity regulator	5062-2486
USB memory stick	G4208-68700
Compact flash card	01100-68700
HPLC system tool kit	G4203-68708
Compact tool kit	G4296-68715



Semi-prep filter, 5064-8273

HPLC In-Line Filters

Column inlet frit contamination can increase column back pressure and reduce efficiency. Microbore column blockages are a particular problem, due to the small diameter of the inlet frit. To prevent blockages, always use the appropriate filters in your LC system. Agilent offers two types of high pressure in-line filter kits for use with any HPLC system.



High pressure semi-prep filter, 5022-2165

Universal Solvent Filter

Ideal for microbore, narrow-bore, high-speed or standard analytical columns

Universal solvent filters are installed between the LC pump and injector, so particles from the solvent can be removed before they reach the injector. The filter assembly consists of a 4.8 mm frit, two inserts and a two-piece holder. The frit is placed between the tapered edges of the inserts in such a way that the solvent is evenly distributed over the whole surface of the frit. This provides efficient filtration and extends the life of the frit.

Low-volume Column Inlet Filter

A high-capacity filter with built-in efficiency

The low-volume column inlet filter is positioned immediately before the LC column, so it can remove particles from both the injection system and the sample. With a frit diameter of only 2.1 mm – plus tapered inserts – this filter minimizes external band spreading while maximizing filtration capacity.



RRLC in-line filter, 5067-1551



Low dispersion in-line filter, 01090-68702



1290 Infinity in-line filter, 5067-4638

In-Line Filters

Low dispersion in-line filter

- Positioned immediately before the LC column
- Removes particles from the sample and injection system
- Minimizes external band spreading due to frit diameter of only 2.1 mm and tapered inserts
- Can be used with any microbore, high speed, or standard analytical columns

Universal in-line filter

- Installed between the LC pump and injector to remove particles from the solvent
- Uses a high capacity filter
- Frit is placed between the tapered edges of the inserts so the solvent is evenly distributed over the filtering frit

HPLC In-Line Filters

Description	Frit Porosity (µm)	Frit Inlet ID (mm)	Comments	Part No.	Replacement Frits
RRLC in-line filter 4.6 mm, 0.2 µm pore size filter, connecting capillary, max 600 bar	0.2	4.6	max 600 bar	5067-1553	5067-1562, 10/pk
RRLC in-line filter 2.1 mm, 0.2 µm pore size filter, connecting capillary, max 600 bar	0.2	2.1	max 600 bar	5067-1551	5067-1555, 10/pk
Low dispersion in-line filter Includes two frits, 2.1 mm, 2 µm pore size filter holder with inserts, 60 x 0.12 mm connecting capillary	2 0.5	2.1	< 1 mL/min	01090-68702	280959-904, 10/pk 280959-907, 10/pk
Universal in-line filter Includes two frits, 4.8 mm, 2 µm pore size filter holder with inserts, 130 x 0.25 mm connecting capillary	2	4.8	1-5 mL/min	01090-68703	01090-27609, 2/pk
Semi-prep filter	0.5	12.7	1-5 mL/min	5064-8273	5022-2185
High pressure semi-prep filter	10	19	5-10 mL/min	5022-2165	5022-2166, 10/pk
Prep filter	10		10-100 mL/min	5065-4500	5065-9901 Replacement Glass Cartridge
In-line filter for G1311A	Recommended when high salt concentrations are used			G1311-60006	
1290 Infinity in-line filter (0.3 µm)	0.3	2.0	1200 bar	5067-4638	5023-0271, 5/pk

Solvent Filters

Description	Recommended Use	Part No.	Frit Adapter	Part No.	Frit Inlet ID (mm)	Tube OD (mm)
Glass filter, solvent inlet, 20 µm pore size	Analytical scale, micro scale	5041-2168	Frit adapter, PTFE, 3 mm, 4/pk	5062-8517	5	3.2
Glass filter, solvent inlet, 40 µm pore size	Preparative LC	3150-0944	Frit adapter, PTFE, 4 mm	G1361-23204	7	4
Glass filter, solvent inlet, 40 µm pore size	For G2258A Dual Loop Autosampler	3150-0944	Frit adapter, PTFE for 1/8 in. OD tubing	G2258-23201	7	3.2
Solvent inlet filter, stainless steel	For use in capillary and nano systems	01018-60025				

Frits and Adapters

Description	Part No.
Solvent mixer, 1100 Series	G1312-87330
Solvent mixer, short, 200 µL	5067-1565
Frit adapter, PTFE, for 4.7 mm OD tubing	G1361-23205
Frit adapter, PTFE, for 1/8 in. OD tubing For G2258A Dual Loop Autosampler	G2258-23201
O-ring, Viton, 30 mm	0905-1516
Stainless steel filter assembly with PEEK ring, 2 µm pore size	5022-2192



Glass filter, 5041-2168



Solvent inlet filter, 01018-60025



Glass solvent filter degasser, 3150-0577

Solvent Filters/Degassers

An added benefit of filtering solvents is that degassing occurs at the same time. This is particularly beneficial if you do not have an on-line degasser in your system. The benefits of solvent filtration:

- Degasses eluents as particulates are removed
- Prevents the formation of spurious peaks within the detector due to solvent outgassing at the low-pressure end of the chromatograph
- Increases solvent inlet lifetime
- Eliminates pump downtime caused by air locks and particulates in check valves
- Decreases piston wear, while increasing column life

Solvent Filters/Degassers

Description	Part No.
HPLC solvent filter/degasser assembly	3150-0577
Replacement Parts for 3150-0577	
Glass funnel, 250 mL	5188-2743
PTFE coated sieve	5188-2744
PTFE seal	5188-2745
Funnel base, glass	5188-2746
Filter Membranes	
Regenerated cellulose filter membranes Diameter 47 mm, pore size 0.45 μm , 100/pk	3150-0576
Nylon filter membranes Diameter 47 mm, pore size 0.45 μm , 100/pk	9301-0895
PTFE filter membranes Diameter 47 mm, pore size 0.45 μm , 10/pk	3150-0509

Biocompatibility Kit

Biocompatibility Kit



PEEK RheFlex fittings, 0100-1631



PEEK fittings, 5063-6591

Description	Part No.
Biocompatibility kit	5065-9972
Needle seat PEEK without capillary, G1313A	G1313-87104
Needle assembly, for use with PEEK seat	G1313-87203
PEEK seat tubing, 0.17 mm ID, 100 mm, 2.3 µL	G1313-87302
PEEK capillary, 0.25 mm ID, 160 mm connecting valve with metering device of G1313 autosampler	G1313-87306
PEEK loop capillary for 100 µL sample	G1313-87309
Rotor seal, PEEK, 2-groove for G1367B, 400 bar	0100-2231
ZDV union, PEEK with fittings	0100-2441
1/16 in. PEEK RheFlex fittings	0100-1631
PEEK tubing, 0.25 mm ID, 1.5 m	0890-1762
PEEK tubing, 0.18 mm ID, 1.5 m	0890-1763
Solvent inlet filter, PTFE, 10 µm pore stepped tubing connector, metal free	3150-0958
1/16 in. finger-tight PEEK fitting	5063-6591

Tips & Tools

Don't forget, we have special offers throughout the year.

To learn more, visit www.agilent.com/chem/specialoffers



LC Standards

LC Standards

Description	Part No.
Caffeine standards kit for LC OQ/PV Includes one 10 mL ampoule: 125.0 µg/mL; four 5 mL ampoules: 5.0, 25.0, 250.0 and 500.0 µg/mL caffeine in water	8500-6762
Caffeine standards kit for capillary OQ/PV Includes 5 ampoules, 5 mL: 2.0, 4.0, 20.0, 100.0, 200.0 µg/mL caffeine in water	5065-4420
Caffeine OQ/PV sample for dissolution test, 150 mg/L caffeine in water, 500 mL	5042-6476
Caffeine standard, 250 µg/mL	G4218-85000
Enterprise Edition caffeine standard kit	5190-0488
Fluorescence detector calibration sample, 1 g glycogen	5063-6597
RI detector OQ/PV test sample Includes 5 ampoules, 5 mL: 5, 10, 15, 25, and 50 mg/mL glycerin in water	5064-8220
Isocratic and gradient standards Contains 0.15% diethylphthalate, 0.01% biphenyl, and 0.03% terphenyl in MeOH (w/w). Gradient standard includes 0.32% dioctyl phthalate as well. Two 0.5 mL ampoules of each.	01080-68702
Isocratic standard, 0.5 mL ampoule	01080-68704
RRLC Check out sample, 1 mL ampoule	5188-6529
Chip cube high mass reference (HP-1221), 0.5 mL	G1982-85001
Chip cube high mass solvent (FC-70), 25 mL Fluorinert	G1982-85002
Chip cube low mass reference sample, 1 g Methyl stearate	G1982-85003
ESI+APCI LC demo sample Contains 5 x 1 mL ampoules with 033 ng/µL crystal violet, 77 ng/µL carbazole, 300 ng/µL 9-phenanthrol, 1 ng/µL 1-hexanesulfonic acid sodium salt in water/methanol 60:40	G1978-85000
ES-TOF biopolymer reference standard kit Contains 7 x 2 mL ampoules with 5 mM purine, 1 M ammonium forate, 0.5 mM HP-0285, 0.1 mM HP-0321, 0.2 mM HP-1221, 0.2 mM HP-1821, 0.5 mM HP-2421	G1969-85003
HSA peptide standard mix kit 2 vials with 6 lyophilized peptides	G2455-85001

Agilent Rack for LC Systems

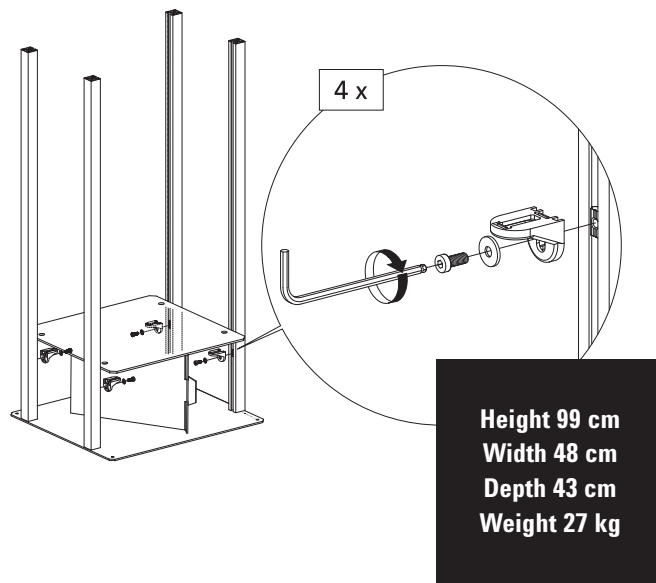


Agilent rack for LC systems, 5001-3726

Reclaim critical bench space with the stable, robust rack for LC systems. The sturdy and open design offers complete protection for your sensitive LC system and easy maintenance for fast, safe access to instruments and cables. It is designed for all Agilent LC modules stacks and features:

- Easy assembly saves time and expense (see diagram)
- Adjustable shelves allow full customization for all Agilent LC modules
- Open design ensures proper airflow management and distribution of equipment and cabling

Description	Part No.
Agilent rack for LC systems	5001-3726



Height 99 cm
Width 48 cm
Depth 43 cm
Weight 27 kg



Pump Supplies

Regular pump maintenance helps lower operating costs and generate precise results that make you feel confident.

You can count on Agilent isocratic, binary, quaternary, capillary, and preparative pumps for superior flow and composition stability. And by following a regular maintenance routine, you can also count on maximum uptime and a steady, accurate solvent flow for the life of the pump.

Pump Routine Maintenance Procedures

- Replace the seals and pistons
- Replace the PTFE frit
- Replace the cartridge in the Active Inlet Valve
- Clean the outlet ball valve
- Clean or replace the solvent inlet frits

Routine pump maintenance should be done on a regular basis to keep your Agilent LC system performing at its optimum. You can perform all maintenance procedures at once or as needed. Some parts may need to be replaced more than others depending upon your application and solvent preparation procedures.

Pump Routine Maintenance Procedures

Symptom	Cause	Solution
Solvent dripping out of waste outlet when valve closed	Leak on pump head	Exchange the purge valve frit or the purge valve
Pressure ripple unstable	Dirty active inlet valve cartridge	Run leak test for verification and exchange the active inlet valve cartridge
	Leak on pump head	Run leak test for verification and exchange the outlet ball valve sieve or the complete valve
Gradient performance problems, intermittent pressure fluctuations	Solvent filter is blocked	Change the solvent filter
A pressure drop of >10 bar across the frit (5 mL/min H ₂ O with purge valve open) indicates blockage	Dirty frit	Exchange the purge valve frit or the purge valve
Leaks at lower pump head side	High seal wear	Run leak test for verification and exchange the pump seals
Unstable retention time		
Pressure ripple unstable		
Seal lifetime shorter than normally expected	Scratch on plunger	Check plungers while changing the seals
Loss of wash solvent	Leaky wash seals	Exchange the wash seals

Purge Valves

Purge Valves

Description	Comments	Part No.
Purge valve assembly	For 1260 Infinity LC Iso/Quat/Bin/SFC pumps, includes PTFE frit	G1312-60061
Purge valve assembly	For 1220 Infinity LC pumps, includes PTFE frit	G4280-60061
Purge valve assembly	For 1120 pump, includes PTFE frit	G4280-60031
Purge valve assembly, 400 bar	For 1100/1200 pumps, 1260 Cap and Nano pumps, includes PTFE frit	G1311-60009
Purge valve assembly, 600 bar	For 1200 RRLC pump, includes PTFE frit	G1312-60023
5 position/7 port rotor seal	For 1290 Infinity LC purge valve	5068-0005
5 position/7 port stator	For 1290 Infinity LC purge valve	5068-0004
Purge valve actuator	For 1120 pump	G4280-60033
PTFE frits, 5/pk	For 1100/1120/1200/1200 RRLC and 1220/1260/1290 Infinity LC Pumps*	01018-22707
Seal for purge valve	For 1120 pump	0905-1192

*Please note: the 1220 is not an Infinity LC pump



Purge valve assembly, G1311-60009



PTFE frits, 01018-22707

Inlet and Outlet Valves



Active inlet valve, G1312-60025



Cartridge, 400 bar, 5062-8562



Outlet ball valve, G1311-60012

Inlet and Outlet Valves

Description	Comments	Part No.
Active Inlet Valve (AIV)		
Active inlet valve, without cartridge	For 1100/1200/1200 RRLC, 1260 Infinity LC Binary/Cap/Nano pumps	G1312-60025
Cartridge for active inlet valve, 400 bar	For 1100/1200, 1260 Infinity LC Cap/Nano pumps	5062-8562
Cartridge for active inlet valve, 600 bar	For 1200 RRLC, 1260 Infinity LC Binary pumps	G1312-60020
Passive Inlet Valve (PIV)		
Passive inlet valve	For 1260 Infinity LC SFC pumps	G1312-60066
Passive inlet valve	For 1260 Infinity LC Iso/Quat pumps, 1120 and 1220 Infinity LC pumps	G4280-60036
Inlet valve	For 1290 Infinity LC	G4220-60022
Valve		
Valve assembly, inlet/outlet	For 1200/1260 Infinity prep pumps	G1361-60012
Outlet Ball Valve		
Outlet valve	For 1260 Infinity LC Cap/Nano/SFC pump*	G1312-60067
Outlet ball valve	For quaternary, isocratic 1100/1200 and 1120 pumps	G1311-60012
	For 1100/1200 binary pumps, 1120 pumps, 400 bar	G1312-60012
	For binary SL pumps, 1260 Infinity LC Iso/Quat/Bin/1220 pumps, 600 bar	G1312-60022
	For 1290 Infinity LC	G4220-60028
Gold seal, outlet	For 1100/1200/1200 RRLC and 1120 pumps	5001-3707
Outlet caps, 4/pk	For 1100/1200/1200 RRLC and 1120 pumps	5062-2485
Sieves for outlet ball valve, 10pk	For G1312-60012 valve	5063-6505
Seal cap	For outlet ball valve 1290 Infinity LC, P/N G4220-60028, Compatible with P/N G1311-60012, G1312-60012 and G1312-60022	5067-4728

*Does not require an extra gold seal



Sapphire piston and seals

Pistons and Seals

Agilent pistons are made from a high purity, monocrystalline sapphire for maximum durability. Although ceramic pistons can be manufactured at a lower cost, ceramic is a sintered, polycrystalline material, which can cause undesirable variations during the production process. Agilent sapphire pistons are:

- Meticulously cut at just the right angle, making them the most durable – and longest lasting – pistons in the world
- Precisely aligned in their stainless steel holder to minimize wear on the piston and seal

Agilent seals are designed to fit snugly around our pistons, and are capable of adapting to a wide range of flow rates and pressures. Agilent piston seals are:

- Spring-loaded and engineered to deliver optimal performance over highly dynamic flow and pressure ranges
- Manufactured from a proprietary polymer blend, and feature a spring made from the same high-quality stainless steel that is used in our pump's flow path

The combination of our piston and seal has undergone extensive testing under temperature stress, with all common HPLC solvents, and in many instruments. More importantly, they yield consistent, reproducible results.

Pistons and Seals

Piston Description	Comments	Part No.	Seal Description	Part No.
Sapphire piston	For 1260 Infinity SFC pump	5067-4695	Piston seals, graphite filled PTFE (reversed phase), 2/pk	5063-6589
			Piston seals, polyethylene (normal phase)	0905-1420
Sapphire piston	For 1100/1200/1260 and 1120/1220 pumps	5063-6586	Piston seals, graphite filled PTFE (reversed phase), 2/pk	5063-6589
			Piston seals, polyethylene (normal phase)	0905-1420
Piston SSiC	For 1290 Infinity LC	5067-4603	Pump seal PE for 1290 Infinity Binary Pump	0905-1719
Sapphire plunger	For 1200 Prep Pump	G1361-22402	Piston seal for G1361A Preparative Pump	5022-2188

Tips & Tools

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Seal Wash

The routine use of highly concentrated buffer solutions (100 mM) will reduce the life of seals and pistons in your pump. Counteract the problem with one of Agilent's seal wash kits, which flush the backside of the seal with a wash solvent. Note: Water/isopropanol (90/10) is recommended as the wash solvent.



Peristaltic pump, 5042-8507

Seal Wash

Description	Comments	Part No.
Peristaltic pump cassette with silicone tubing	For 1100/1200/1200 RRLC and 1260 Infinity LC pumps	5042-8507
Silicone tubing, 1 mm ID, 3 mm OD, 5 m		5065-9978
Peristaltic pump with ChemSure tubing	For 1100/1200/1200 RRLC and 1260 Infinity LC pumps	5065-9952
ChemSure tubing for peristaltic pump		5042-8954
Wash Seal and Wash Keeper		
Wash seal	For 1100/1200/1200 RRLC, 1120 and 1260/1220 Infinity LC pumps	0905-1175
Seal keeper	For 1100/1200/1200 RRLC and 1120 pumps	5001-3743
Wash seal gasket, 6/pk	For 1100/1200/1200 RRLC, 1120 and 1260/1220 Infinity LC pumps	5062-2484
Wash seal PE	For 1290/1260/1220 Infinity LC pump	0905-1718
Support ring	For 1290/1260/1220 Infinity LC pump	G4220-63010
Backup ring for seal holder	For 1290/1260/1220 Infinity LC pump	G4220-24013
Seal keeper	For 1290/1260/1220 Infinity LC pump	G4220-26210

Solvent Reservoir and Supplies



Solvent reservoirs



Prep bottle, 5065-4421

Solvent Reservoir and Supplies

Description	Part No.
Solvent Reservoir	
Solvent reservoir, 1 L	9301-1420
Solvent reservoir, 1 L, with cap	9301-1421
Solvent reservoir, 1 L, F29/32	9301-0656
Solvent reservoir, amber, 1 L	9301-1450
Solvent bottle, clear, 2 L, 2 inlets	5065-4421
Solvent bottle, amber, 2 L	9301-6341
Solvent bottle, clear, 2 L	9301-6342
Bottle Head Assembly	
Bottle head assembly for screw bottle	G1311-60003
Bottle head assembly for F29/32 tapered solvent bottle	G1312-68716
Bottle head assembly with tubing and filter For capillary and nano systems (with stainless steel solvent filter)	G1376-60003
Bottle head assembly for prep system	G1361-60022
Bottle head assembly	G4220-60007
Bottle cap with 3-hole insert	5063-6531



Safety Caps

Open or partially covered solvent bottles can lead to the evaporation of solvents and harmful solvent vapors. Prevent solvent evaporation and possible chemical spills with solvent safety caps from Agilent. These safety caps have been designed for optimal sealing with an integrated exhaust valve providing pressurization during solvent extraction and allowing proper solvent flow to your HPLC system. The exhaust valve contains a PTFE membrane to prevent contamination of your solvents from dirt and dust particles.

- Designed to fit all solvent bottles
- Constructed of PTFE and PFA for high chemical resistance
- Caps rotate freely, preventing tube twisting during bottle exchange
- Available in GL40, GL45, S60 and NS29/32 thread sizes



Safety Cap I, 5043-0223

Safety Caps

Description	Kit Contents	Part No.
Safety Cap II with 2 ports For NS29/32 ground neck bottles	Includes 2 fittings, PFA, 3.2 mm (1 blue, 1 red); 1 venting valve for SCAT safety caps, including air filter, 1 µm, PTFE membrane	5043-0221
Safety Cap II with 2 ports For GL45 threaded bottles	Includes 1 basic cap with 2 ports, polypropylene, blue, GL45, with PTFE cone; 2 fittings, PFA, 3.2 mm (1 blue, 1 red); 1 venting valve for SCAT safety caps, including air filter, 1 µm, PTFE membrane	5043-0222
Safety Cap I with 1 port For GL45 threaded bottles	Includes 1 basic cap with 1 port, polypropylene, blue, GL45, with PTFE cone; 1 fitting, PFA, 3.2 mm, black; 1 venting valve for SCAT safety caps, including air filter, 1 µm, PTFE membrane	5043-0223

(Continued)



Safety Cap II, 5043-0224



Safety Cap IV, 5043-0226



Safety Cap IV, 5043-0227



5 L waste can assembly, GL45, 5043-0242

Safety Caps

Description	Kit Contents	Part No.
Safety Cap II with 2 shut-off valves For GL45 threaded bottles	Includes 1 basic cap with 2 ports and 2 shut-off valves, polypropylene, blue, GL45, with PTFE cone; 2 fittings, PFA, 3.2 mm (1 blue, 1 red); 2 fittings, PTFE, 3.2 mm, white; 1 venting valve for SCAT safety caps, including air filter, 1 µm, PTFE membrane	5043-0224
Safety Cap I with 1 shut-off valve For GL45 threaded bottles	Includes 1 basic cap with 1 port and 1 shut-off valve, polypropylene, blue, GL45, with PTFE cone; 1 fitting, PFA, 3.2 mm, black; 1 fitting, PTFE, 3.2 mm, white; 1 venting valve for SCAT safety caps, including air filter, 1 µm, PTFE membrane	5043-0225
Safety Cap IV with 4 ports and 1 leak port For GL45 threaded waste bottles	Includes 1 basic cap with 4 ports and 1 port for leak hose, polypropylene, blue, GL45, with PTFE cone; 4 fittings, PFA (4 violet, 3.2 mm; 4 green, 1.6 mm); 1 leak hose, polypropylene Must be used with charcoal filter (P/N 5043-0230). Can be used with 2 port collector for leak connector, sidewise (spare part).	5043-0226
Safety Cap IV with 4 ports and 1 leak port For S60 threaded waste bottles	Includes 1 basic cap with 4 ports and 1 port for leak hose, polypropylene, black, S60, with PTFE cone; 4 fittings, PFA (4 violet, 3.2 mm; 4 green, 1.6 mm); 1 leak hose, polypropylene Must be used with charcoal filter (P/N 5043-0230). Can be used with 2 port collector for leak connector, sidewise (spare part).	5043-0227
5 L waste can assembly, GL45	Includes safety cap IV with 4 ports and 1 leak port, GL45 (P/N 5043-0226) and 2 ports collector, PTFE (P/N 5043-0235)	5043-0242
10 L waste can assembly, S60	Includes safety cap IV with 4 ports and 1 leak port, S60 (P/N 5043-0227) and 2 ports collector, PTFE (P/N 5043-0235)	5043-0243



Charcoal filter, 48 g, 5043-0230



Screw plug, 1/8 in., PTFE, 5043-0231



Venting valve with 1 μ m PTFE membrane, 5043-0232



Screw plug, 1/4 in., PTFE, 5043-0233

Replacement Parts for Safety Caps

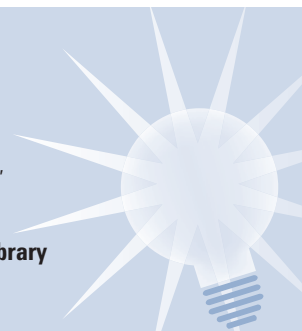
Description	Unit	Part No.
Fitting for 3.2 mm tube, PFA	6/pk	5043-0255
Fitting for 2.3 mm tube, PFA	5/pk	5043-0228
Fitting for 1.6 mm tube, PFA	5/pk	5043-0229
Charcoal filter, 48 g		5043-0230
Screw plug, 1/8 in., PTFE		5043-0231
Venting valve with 1 μ m PTFE membrane*		5043-0232
Screw plug, 1/4 in., PTFE	5/pk	5043-0233
Thread adapter GL45-GL40, PTFE		5043-0234
2 ports collector, PTFE		5043-0235
5 L waste can, GL45		5043-0236
10 L waste can, S60		5043-0237
3 port collector		5043-0238
Adapter for two 3.2 mm tubes		5043-0239

*Valve change is recommended every 6 months

Tips & Tools

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1200 Series Vacuum Degasser

Vacuum Degassers

A vacuum degasser is recommended for:

- Maximum sensitivity in the low UV wavelength range
- High injection precision
- High retention time reproducibility
- Flow rates below 0.5 mL/min

Vacuum Degasser Care

- To generally clean the vacuum degasser tubing, flush the system with isopropanol
- Flush the degasser with water after using buffers
- Speed solvent changes by drawing solvent through the degasser and tubing with syringe adapter kit



Plastic tubing cutter, 8710-1930



Ferrules and rings, 5063-6598



PPS nuts, 5063-6599

Vacuum Degassers

Description	Comments	Part No.
Tubing kit, degasser to pump, 4/pk, 30 cm pieces of tubing with screws and bushings	For G1322A, G1379A/B	G1322-67300
Mounting tool for flangeless nut	For G1322A, G1379A/B	0100-1710
Plastic tubing cutter	For G1322A, G1379A/B	8710-1930
Tefzel ferrules and SS lock rings, 1/8 in., 10/pk	For G1322A, G1379A/B	5063-6598
PPS nuts, 1/8 in., 1/4-28 thread, 10/pk	For G1322A, G1379A/B	5063-6599
Union, 1/4-28 thread, polypropylene	For G1322A, G1379A/B	5022-2155
PTFE solvent tubing, 5 m, 1.5 mm ID, 3 mm OD	For G1322A, G1379A/B	5062-2483
Disposable syringes, 20 mL, 10/pk	For G1322A	5062-8534
Syringe adapter, 1/16 in. OD, 2 in. long	For G1322A	9301-1337
Dual channel micro degasser vacuum chamber	For G1379A	G1379-60010
Micro vacuum degasser tubing kit	For G1379A	G1379-67310
Micro vacuum degasser tubing kit	For G1379B	5042-8922
Online degasser accessory kit	For G1322A, G1379A/B	G1322-68705
Includes 8 screws, 8 bushings, 4 markers, tubing, syringe and syringe adapter		

Pump Kits

Pump Kits

Description	Kit Contents	Part No.
Start-up Kits		
Pump start-up kit For 1100/1200/1220 RRLC pumps	Includes 1 outlet cap, 5 PTFE frits, 4 piston seals, 1 outlet gold seal, 2 glass solvent inlet filters, 20 µm, and 1 cartridge for active inlet valve	G1311-68710
Nanoflow LC start-up kit	Includes PEEK coated fused silica capillaries, column and fittings to start up a Nanoflow LC System	G2228-68700
Seal Wash Kits		
Active seal wash kit	Includes 2 wash seal gaskets, 2 pump seals, peristaltic pump (includes pump cassette and motor), 2 seal keepers, 2 support ring assemblies, seal insert tool and silicone tubing	G1311-68711
Active seal wash kit	Includes 4 wash seal gaskets, 4 pump seals, 2 peristaltic pumps (includes pump cassette and motor), 4 seal keepers, 4 support ring assemblies, seal insert tool and silicone tubing	G1312-68711
Continuous seal wash kit For 1100/1200/1200 RRLC pumps	Includes 2 wash seal gaskets, 4 m flex tubing, 2 pump seals, 1 flow regulator, 2 seal keepers, 2 support ring assemblies, 20 mL luer lock syringe, seal insert tool and abrasive paper	01018-68722
Seal wash PM kit For 1260 Infinity LC pumps	Includes 2 PTFE wash seals (P/N 0905-1175), 2 gasket wash seals (P/N 01018-07102)	G1310-68742
PM kit for seal wash option	Includes 2 wash seals and 1 pack of 6 wash seal gaskets	G1310-68731
Preventive Maintenance Kits		
For 1260 Infinity LC isocratic or quaternary and 1220 pumps	Includes 1 PTFE pump seal (P/N 0905-1503), PTFE frits, 5/pk (P/N 01018-22707), 1 seal cap (P/N 5067-4728)	G1310-68741
For 1260 Infinity LC binary pump	Includes 1 PTFE pump seals (0905-1503), PTFE frits, 5/pk (01018-22707), 1 seal cap (5067-4728), sieves for outlet valve, 10/pk (5063-6505)	G1312-68741
For 1100/1200 isocratic or quaternary pumps	Includes piston seal, PTFE frits, 2 gold seals and 2 outlet caps	G1310-68730

(Continued)



Pump start-up kit, G1311-68710

Maintenance Kits

Description	Kit Contents	Part No.
Preventive Maintenance Kits		
For 1200 Isocratic and Quaternary pump	Includes 4 piston seals, PTFE frits, 3 gold seals, 2 sieves and 3 outlet caps	G1312-68730
For G1376A Capillary Pump	Includes 4 pump seals, 4 stainless steel sieves, 4 gold seals, 1 stainless steel frit and 4 outlet caps	G1376-68710
For 1100/1200 and 1260 Infinity LC prep pump	Includes 1 filter cup (P/N 3150-0942), 4 seal prep flange (P/N 5022-2188), 1 filter assembly (P/N 5022-2192), 1 peristaltic pump	G1361-68710
For 1120 manual injector systems	Includes 1 piston seal, 5 PTFE frits, 2 gold seals, 4 outlet caps and 1 PEEK rotor seal	G4280-68710
For 1220 manual injector systems	Includes piston seals, PTFE frits, gold seals and rotor seal	G4280-68750
For 1220 automated injector systems	Includes piston seals, PTFE frits, gold seals, rotor seal, needle and needle seat	G4280-68770
For 1120 automated injector systems	Includes 1 piston seal, 5 PTFE frits, 2 gold seals, 4 outlet caps, 1 Vespel rotor seal, 1 needle and 1 needle seat	G4280-68730
Extended PM kit For 1100/1050/1200 pumps	Includes 2 piston seals (P/N 5063-6589), PTFE frits, 5/pk (P/N 01018-22707), cartridge active inlet valve (P/N 5062-8562), outlet ball valve (P/N G1311-60012) and 2 pistons (P/N 5063-6586)	5065-4499
Accessory Kits		
1260 Infinity LC binary pump accessory kit	Includes 1 tubing assembly (P/N 5063-6527), 1 CAN cable (P/N 5181-1519), 1 RRLC system configurator, 1 stainless steel capillary, 400 x 0.17 mm (P/N G1312-87303), 1 stainless steel capillary, 700 x 0.17 mm (P/N G1312-87304)	G1312-68755
1100/1200 pump accessory kit	Includes 3 wrenches, 5 PTFE frits, tubing, capillary and wrist strap	G1311-68705
Pump configuration kit for G1312B with G1158B 2 position/6 port valve	Includes side cover with fixed rail, top and right cover for pump housing, and 6 connecting capillaries. Allows automatic switching between different delay volumes to optimize the system for 2.1 mm ID or 4.6 mm ID columns.	G1312-68726
Capillary pump accessory kit	Includes purge valve and holder, hex keys 2.5 and 3 mm, 2 wrenches 1/2 in. x 1/16 in., wrenches 1/4 in. x 5/16 in. and 14 mm, wrist strap, torque adaptor and stainless steel frit, 0.5 µm	G1376-68705
Accessory kit prep pump/gradient G1361A	Includes stainless steel connecting capillaries, solvent mixer, 2 L solvent bottle, bottle head assembly, filter, glass stop valve, stainless steel union, tubing and other parts	G1361-68707
Online degasser accessory kit	Includes 8 screws, 8 bushings, 4 markers, tubing, syringe and syringe adapter	G1322-68705
Extended flow range kit, 100 µL/min	Includes all parts to go from 20 µL/min to 100 µL/min flow rate in a capillary LC system	G1376-68707
Manual prep injection valve kit, stainless steel	Includes position sensing, 10 mL loop, 25 mL syringe, ring mounting bracket, start cable and SS connecting capillaries, 0.5 mm ID, 40 cm and 60 cm	5065-9922



Autosampler Supplies

Your Agilent autosampler is designed to deliver accurate measurements, precise injection volumes, and high-quality data. And by following a regular schedule of preventive maintenance, you can ensure a lifetime of defensible results.

Autosampler Maintenance Schedule

Procedure	Typical Procedure	Time Required
Exchanging the needle assembly	When needle shows indication of damage or blockage	15 minutes
Exchanging the seat assembly	When the seat shows indication of damage or blockage	10 minutes
Exchanging the metering seal	When autosampler reproducibility indicates seal wear	30 minutes



Needles and Needle Seats

The needle should be replaced when it becomes bent, burred or blunt, or when it is leaking or plugged. You should suspect a leak if you notice a trail of buffer crystals on the needle seat. The needle seat can become blocked if the sample contains particulates, as this is the first restriction that the sample experiences. If this occurs, try backflushing the needle seat capillary.

Needles and Needle Seats

Agilent Autosampler	Needle Assembly Description	Part No.	Compatible with Needle Seat	Part No.
G1313A, G1329A/B, 1120, 1220 Infinity LC (automated sampler only)	Needle assembly, standard autosampler	G1313-87201	Standard needle seat 0.17 mm ID capillary, 2.3 µL	G1313-87101
			Standard needle seat 0.12 mm ID capillary, 1.2 µL	G1313-87103
G1313A, G1329A, 1120, 1220 Infinity LC (automated sampler only)	Needle assembly, for use with PEEK seat	G1313-87203	Standard needle seat, PEEK 0.17 mm ID capillary, 2.3 µL	G1313-87102
G1313A, G1329A/B, 1120, 1220 Infinity LC (automated sampler only)	Needle assembly, 900 µL upgrade	G1313-87202	Standard needle seat 0.17 mm ID capillary, 2.3 µL	G1313-87101
G1389A	Needle assembly, micro LC autosampler	G1329-80001	Micro LC Needle seat 100 µm ID capillary, 1.2 µL	G1329-87101
			Micro LC Needle seat 50 µm ID capillary, 0.3 µL	G1329-87103
G1367A/B	Needle assembly, well plate autosampler (green)	G1367-87200	Needle seat, well plate autosampler 0.17 mm ID capillary, 2.3 µL	G1367-87101
	Needle assembly, well plate autosampler (blue)	G1367-87201	Needle seat, well plate autosampler 0.12 mm ID capillary, 1.2 µL	G1367-87102

(Continued)

Needles and Needle Seats

Agilent Autosampler	Needle Assembly Description	Part No.	Compatible with Needle Seat	Part No.
G1367C SL and G1367D SL Plus	Needle assembly, well plate autosampler (black)	G1367-87202	Needle seat, 600 bar, with seat capillary 0.17 mm ID x 100 mm, 0.8 mm OD	G1367-87017
			Needle seat, 600 bar, with seat capillary 0.12 mm ID x 100 mm, 0.8 mm OD	G1367-87012
G1367E	Needle assembly, 1290/1260 Infinity LC autosampler	G4226-87201	Needle seat, 600 bar, with seat capillary 0.12 mm ID x 100 mm, 0.8 mm OD	G1367-87012
G1377A	Needle assembly, micro well plate sampler	G1377-87201	Micro needle seat with seat capillary, 100 µm	G1377-87000
			Micro needle seat with seat capillary, 75 µm	G1377-87001
			Micro needle seat with seat capillary, 50 µm	G1377-87002
G2258A	Needle assembly, dual loop autosampler	G2258-68710	Twin needle seat, dual loop autosampler	G2258-87102
G2260A	Needle assembly, prep autosampler	G2260-87201	Needle seat, prep autosampler 0.5 mm ID, 20 µL	G2260-87101
G4226A	Needle assembly, 1290/1260 Infinity LC autosampler	G4226-87201	Seat assembly, 0.12 mm, 1290 Infinity LC autosampler	G4226-87012

Accessories for Needle Assemblies

Description	Use With	Part No.
Seat adapter	G1313A, G1329A, G1389A, G2260A, 1120 and 1220 Infinity LC	G1313-43204
Finger caps, 15/pk	G1313A, G1329A, G1389A, G2260A, 1120 and 1220 Infinity LC	5063-6506
Tool for micro seal capillary mounting	G1377A	G1377-44900



Seat assembly for 1290/1260 Infinity LC,
G4226-87012



Needle Assembly for 1290/1260 Infinity LC,
G4226-87201

Metering Device Supplies

Infrequently, the metering device seal and piston may need replacement if you see loss in injection volume precision or metering device leaking.

Metering Device Supplies

Piston Description	Use With	Part No.	Seal Description	Part No.
Sapphire piston, 40 μ L	G1367D, G1389A, G1377A, G4226A	5064-8293	Piston seal, 2 mm, for G1367D, G1389A, G1377A	5022-2175
			Piston seal for G4226A	0905-1717
Sapphire piston, 100 μ L	G1313A, G1329A/B, G1367A/B/C, G1367E	5063-6586	Piston seals, graphite filled PTFE (reversed phase), 2/pk	5063-6589
Sapphire piston, 900 μ L	G1313A, G1329A/B, G1367E	5062-8587	Metering valve seal	0905-1294
Piston, 5 mL	G2258A	G2258-60003	Piston seal	0905-1599

Loop Capillaries

Description	Agilent Autosampler	Part No.
Stainless steel loop capillary, 100 μ L	G1313A	01078-87302
	G1329A/B	
	1120	
	1220 Infinity LC	G1367-87300
	G1367A/B/C	
	G4226A	
Stainless steel loop capillary, 900 μ L	G1367E	5067-4710
	G1329A/B	G1313-87303
Loop capillary, 40 μ L	G2260A	G1377-87310
	G1367D	
	G4226A	
	G1367E	
	G1377A	
	G1389A	
Loop capillary, 20 μ L	G1377A	G1377-87300
	G1389A	G1329-87302
Loop capillary, 8 μ L	G4226A	G4226-60310
	G1367E	
Loop capillary, 5 mL	G1389A	G1375-87303
	G2260A	G2260-68711
	G1377A	G1375-87315



Sample loop, 01078-87302



Loop capillary, 20 μ L, G4226-60310

Autosampler Trays



Vial plate, G2255-68700



Vial plate, 5022-6539



Plate for safe lock tubes, 5022-6538

Autosampler Trays

Description	Part No.
For G1313A, G1329A/B, 1120, 1220 Infinity LC samplers	
100 position tray for 2 mL vials	G1313-44510
100 position tray for 2 mL vials, thermostatable	G1329-60011
40 position tray for 2 mL vials	G1313-44512
15 position tray for 6 mL vials	G1313-44513
External vial tray for 17 vials (disposal position)	G1313-60004
Disposal tube for external vial tray	G1313-27302
For G1367A/B/C/D/E, G2258A, G4226A	
Well plate tray, 2 well plates, 10 vials (supports 50 mm plates)	G2258-60011
Vial plate for 54 x 2 mL vials, 6/pk	G2255-68700
Vial plate for 15 x 6 mL vials	5022-6539
For G1367A/B/C/D/E	
100 position tray for micro vials	G4226-60021
Also for G4226A	
Plate for 27 Eppendorf safe lock tubes, 0.5/1.5/2 mL	5022-6538
For G2257A	
8.5 in. well plate rack, 2/pk	G2255-68709
For 16 shallow well plates, 4 deep well plates (max 48 mm height) or 6 vial racks	
10 in. well plate rack, 2/pk	G2255-68710
For 20 shallow well plates (max height 16 mm), not compatible with deep well plates	
8.5 in. well plate rack extension	G2255-68720
Includes 3 racks for 3 x 16 shallow well plates, 2 x 4 deep well plates (max 48 mm height) or 3 x 6 vial racks	
10 in. well plate rack extension	G2255-68730
Includes 3 racks for 3 x 20 shallow well plates (max height 16 mm), not compatible with deep well plates	
For G2250A	
205H rack, two 96-deep well plates	G2250-04504
200 rack, 13 x 100 mm tubes (9 mL), 96	G2250-04503
207 rack, 16 x 100 mm tubes (12 mL), 75	G2250-04502
209 rack, 12 x 32 mm tubes (12 mL), 96	G2250-04501
94A special holding 1100 tray	G2250-04500

Autosampler Kits

Autosampler Kits

Description	Kit Contents	Part No.
Preventive Maintenance Kits		
For G1329B autosamplers	Includes 1 PEEK rotor seal, 1 needle seat, 1 needle	G1313-68719
For G1313A, G1329A autosamplers	Includes 1 Vespel rotor seal, 1 needle seat, 1 needle, 2 metering seals and 15 finger caps	G1313-68709
For G1313A, G1329A samplers	Includes 1 Vespel rotor seal, 1 needle seat, 1 needle	G1313-68730
For G1367A/B autosamplers	Includes 1 Vespel rotor seal, 1 needle seat, 1 needle, 1 peristaltic pump cartridge, 1 seal tight nut	G1367-68730
For G1367E autosampler	Includes 1 PEEK rotor seal, 1 needle seat, 1 needle, 1 peristaltic pump cartridge, 1 metering seal	G1367-68741
For 1220 manual injector systems	Includes piston seals, PTFE frits, gold seals and rotor seal	G4280-68750
For 1220 automated injector systems	Includes piston seals, PTFE frits, gold seals, rotor seal, needle and needle seat	G4280-68770
For 1120 manual injector systems	Includes 1 piston seal, 5 PTFE frits, 2 gold seals, 4 outlet caps and 1 PEEK rotor seal	G4280-68710
For 1120 automated injector systems	Includes 1 piston seal, 5 PTFE frits, 2 gold seals, 4 outlet caps, 1 Vespel rotor seal, 1 needle and 1 needle seat	G4280-68730
Extended PM kit For G1313A, G1329A autosamplers	Includes 1 Vespel rotor seal, 1 needle seat, 1 needle, 1 metering seal, 1 stator face	5065-4498
Door Replacement Kits		
Cabinet upgrade kit for 1260 Infinity LC sampler	Includes side panel, top cover and front door	G1329-68736
Door replacement kit for 1260 Infinity LC sampler	Includes front and side doors	G1329-68737
Light protection kit for G1329A	Includes opaque front and side doors and front cover	G1329-68718
Door replacement kit for G1329A	Includes transparent front and side doors	G1329-68727
Upgrade Kits		
Multidraw upgrade kit for G1313A/G1327A/G1329A autosamplers	Includes 500 µL capillary, 1500 µL capillary and ZDV union	G1313-68711



Maintenance kit, G1313-68709



Fraction Collector Supplies

Agilent fraction collectors are designed to process data in real-time for instantaneous and precise fraction collection, while increasing throughput on your purification system. So you can be certain that you are getting the highest degree of recovery and purity for your fractions – even with low flow rates.

Fraction Collector Maintenance Schedule

Procedure	When to Perform
Analytical and Preparative Fraction Collector Maintenance	
Replace the inlet/waste tubing	Once per year – or when you notice signs of damage or wear
Replace the valve-to-needle tubing	Once per year – or when you notice signs of damage or wear
Exchange the preparative needle assembly	When the needle shows signs of damage or blockage
Exchange the analytical needle assembly	When the needle shows signs of damage or blockage, or when using the short needle assembly with tall test tubes (>45 mm)
Exchange the diverter valve	When the valve is leaking or not switching properly
Exchange the internal tray	When the flow delay sensor no longer works
Repair or exchange a funnel within the internal tray or funnel tray	When defective, leaky, blocked or contaminated
Micro Fraction Collector/Spotter Maintenance	
Replace fraction collector capillary	At least every six months or when worn, blocked or damaged
Exchange the capillary guiding assembly	When bent or damaged
Exchange the internal tray	When the flow delay sensor no longer works properly
Exchange the flap septum and waste tubing	At least every six months or when defective or contaminated



Funnel tray for G1364C fraction collector, G1364-84532

Collecting Tubes and Trays

Tray Part No.	Hole Diameter (mm)	No. of Tubes	Tube Dimensions	Tube Part No.	Unit
G1364-84523	30	40	30 x 100 mm	5042-6458	100/pk
			30 x 48 mm	5042-6470	100/pk
G1364-84524	25	60	25 x 100 mm	5042-6459	100/pk
G1364-84525	16	126	16 x 100 mm	5022-6532	250/pk
			16 x 48 mm	5022-6533	100/pk
G1364-84516	12	215	12 x 100 mm	5022-6531	250/pk
			12 x 48 mm	5022-6534	100/pk
G1364-84532	Funnel tray	40	Any size		



Collection plate, showing 96-position closing mat, 5042-1389

Well Plate Trays

Tray Part No.	Description	Well Plate Part No.	Description	Unit
G1364-84521	Tray for 4 well plates, cooled	5042-1385	96-well plates, 0.5 mL, polypropylene	120/pk
		5042-1386	96-well plates, 0.5 mL, polypropylene	10/pk
G1364-84531	Tray for 4 well plates, adjustable, cooled	5042-6454	96-deep well plates, 1 mL, polypropylene	50/pk
		5042-1389	Closing mats for 96-well plates, silicone, pre-slit, fits 96-well plates P/N 5042-1385 and 5042-1386 only	50/pk
G1364-84522	Tray for 2 well plates, 10 funnels, cooled	5042-1388	384-well plates, 90 µL, polypropylene	30/pk
		5065-4402	96-deep well collection plates with glass inserts, caps, and septa, pre-assembled, 0.35 mL	
G1367-60001	Tray for 2 well plates, 10 vials, 2 mL	5188-5321	Glass inserts, 350 µL	1000/pk
		5042-8502	96-well plates, 150 µL, conical, polypropylene	25/pk
		G2255-68700	Vial plate for 54 x 2 mL vials	6/pk
		5022-6538	Plate for 27 Eppendorf safe lock tubes, 0.5/1.5/2 mL	
		5022-6539	Vial plate for 15 x 6 mL vials	



Vial plate, G2255-68700



Plate for safe lock tubes, 5022-6538

Fraction Collector Capillary Kits and Needles

Module	Max Flow Rate	Tube Size	Tubing Kit	Needle Length	Needle	Typical Use
G1364B	100 mL/min	0.8 mm ID	G1364-68711		G1364-87201	Tubes (max 100 mm)
G1364C	1 mL/min	0.15 mm ID	G1364-68723	50 mm	G1367-87200	Tubes (max 48 mm), well plates, vials
	10 mL/min	0.25 mm ID	G1364-68712	50 mm	G1367-87200	
	10 mL/min	0.25 mm ID	G1364-68712	20 mm	G1364-87202	Funnel tray (tubes max 75 mm)
	100 mL/min	0.8 mm ID	G1364-68711	20 mm	G1364-87202	
G1364D	4 µL/min	25 µm ID	G1364-87304			MALDI targets, well plates
	4-30 µL/min	50 µm ID	G1364-87305			
	30-100 µL/min	100 µm ID	G1364-87306			



G1364D Micro Fraction Collector Supplies

MALDI spotting adapter, G1364-83205



Well plate adapter assembly, G1364-60021



MALDI plate carrier Bruker, 5022-6541



Calibration plate Bruker, 5023-0208

Description	Part No.
MALDI spotting adapter for G1364D	G1364-83205
Well plate adapter assembly for G1364C/D	G1364-60021
Flap septum, PEEK, for internal tray	G1364-27107
Fused silica/PEEK capillary, 25 μ m, 50 cm	G1364-87304
Fused silica/PEEK capillary, 50 μ m, 50 cm	G1364-87305
Fused silica/PEEK capillary, 100 μ m, 50 cm	G1364-87306
Waste tube, PTFE, 20 cm, 1.4 mm ID, 2.0 mm OD	G1364-86711
MALDI plate carrier Bruker	5022-6541
MALDI plate carrier Bruker PAC	5022-6546
MALDI plate carrier ABI	5022-6542
MALDI plate carrier ABI Opti-TOF	5023-0238
MALDI plate carrier Agilent	5022-6543
MALDI plate carrier Micromass	5022-6544
Target plate for AP-MALDI LC/MS	G1972-60025
Calibration plate Bruker	5023-0208
Calibration plate ABI 192	5023-0209
Calibration plate ABI 10x10 & 20x20	5023-0213
Calibration plate Agilent	5023-0214
Calibration plate Micromass	5023-0215
On-line matrix kit for MALDI spotting Includes BCD board/cable, syringe, needles, adapters, connector and capillary	G1364-68706
Adapter, female to female 1/4-28	5042-8517
Adapter, male luer to female 1/4-28	5042-8518
Syringe, glass, 1 mL, 1/4-28 connector	5181-1541
Micro T-connector, PEEK, swept volume 29 nL, with 1/32 in. ID fittings	5042-8519
MALDI spotting tips, PTFE, 10/pk	G1364-81701



Valve Supplies

Agilent's industry-leading Manual Injection Valves are designed to ensure trouble-free operation with your HPLC System.

Our valves also feature patented "Make-Before-Break" architecture that allows you to switch between LOAD and INJECT positions without interrupting the flow. So you can analyze more samples in less time.

Valve Maintenance Notes

- Vespel is a polyimide with low wear and high chemical resistance. Vespel tolerates a pH range of 0 to 10. More basic solutions dissolve Vespel, which damages the rotor seal.
- PEEK offers a high chemical resistance and versatility, and will tolerate the entire pH range from 0 to 14.
- Tefzel is recommended for use in applications where PEEK cannot be used, such as methylene chloride or DMSO in higher concentrations.

pH Range	0-7	7-10	10-14
Vespel			
PEEK			
Tefzel			

Injection Valves

Injection Valves

Valve	Use With	Part No.	RheBuild Kit	Rotor Seal Material	Rotor Seal	Stator	Stator Face
2 position/6 port injection valve, 400 bar	G1313A, G1329A, G1367A/B, 1120	0101-0921	0101-1257	Vespel	0100-1853	0100-1850	0100-1851
				Tefzel	0100-1849		
				PEEK	0100-2231		
2 position/6 port micro injection valve, 400 bar	G1377A, G1389A	0101-1050		Vespel	0100-2088	0100-2089	
2 position/6 port injection valve, 600 bar	G1329B, G1367C SL, G1367D SL Plus, G1367E, 1220 Infinity LC	0101-1422		PEEK	0101-1416	0101-1417	
10 port, dual loop valve, 400 bar	G2258A	0101-1385		Vespel	0101-2415	0101-1390	
2 position/6 port MBB injection valve, 400 bar	G2260A	0101-1267	0101-1268	PEEK	0101-1268*	0100-2195	
2 position/6 port ultra high pressure valve, 1200 bar	G4226A	5067-4117		Vespel	5068-0007	5068-0006	

*Includes seal and stator face



2 position/6 port ultra high pressure valve,
5067-4117



2 position /6 port ultra high pressure valve,
5068-0006



Switching valve

Switching Valve Supplies

A set of valve types specially designed for Agilent HPLC systems allows you to extend your HPLC applications. New valve offerings give you:

- More flexibility in solvent selection and column selection
- New automation capabilities in sample preparation
- Increased sample throughput through alternating column regeneration
- Increased separation performance with multidimensional chromatography

External Switching Valve Replacement Parts

Description	Use With	RheBuild Kit	Rotor Seal Material	Rotor Seal	Stator
12 position/13 port preparative solvent selection valve	G1160A	0101-1288			0101-1365
6 position/14 port column selection valve (six column selector)	G1159A	0101-1290			0101-1364
2 position/10 port valve dual-sided MBB	G1157A	0101-1359 0101-1289			0101-1362
2 position/6 port switching valve	G1158A	0101-1358 (with PEEK rotor seal)	Vespel	0100-1855	0100-1850
			Tefzel	0100-1854	
			PEEK	0100-2233	
2 position/6 port switching valve, 600 bar	G1158B		HP PEEK blend	0101-1409	0101-1417
2 position/6 port micro switching valve	G1162A			0100-2087	0100-2089
2 position/10 port micro switching valve	G1163A			0101-1361	0101-1363
6 position/7 port selection valve	G1156A			0101-1361	0101-1410

Internal Switching Valves

Description	Use With	Complete Valve	Valve Head	Rotor Seal Material	Rotor Seal	Stator Face	Stator Head	Bearing Ring Isolation Seal	RheBuild Kit*
2 position/6 port, 400 bar	G1316A/B	0101-0920		Tefzel	0100-1854	0100-1851	0100-1850	0100-1852	0101-1258
				Vespel	0100-1855				
				PEEK	0100-2233				
2 position/6 port ultra high pressure, 1200 bar	G1316C		5067-4117		5068-0008		5068-0006	1535-4045	
2 position/6 port micro, 400 bar	G1316A/B	0101-1051			0100-2087	0100-2089			
2 position/6 port, 600 bar	G1316B	0101-1420	5067-4137		0101-1409		0101-1417		
2 position/10 port ultra high pressure, 1200 bar	G1316C		5067-4118		5068-0012		5068-0011	1535-4045	
2 position/10 port, 400 bar	G1316A/B	0101-1343		PEEK	0101-1361		0101-1362		0101-1360
2 position/10 port, 600 bar	G1316B	0101-1419	5067-4144		0101-1415		0101-1421		
8 position/9 port low pressure, 400 bar	G1316C		5067-4108		5067-4113		5067-4112	1535-4045	5067-4113
8 position/9 port high pressure, 600 bar	G1316C		5067-4107		5067-4111		5068-0001	0100-1852	
8 position/9 port ultra high pressure, 1200 bar	G1316C		5067-4121		5068-0002		5068-0001	1535-4045	

*Includes rotor and stator



Manual Injection Valves

Agilent provides the latest developments in LC injection technology from Rheodyne.

- Continuous flow path with "Make-Before-Break" design
- Sample capacity
- Choice of stainless or PEEK flow path
- Easy access to fittings due to wide 30° port angles

Series 7725i and 9725i Analytical Injection Valves

Stainless steel (SS) 7725i and PEEK 9725i valves are the most popular injection valves for analytical HPLC. Features include:

- A 20 μ L loop (installed). Loops are also available in stainless steel or PEEK from 5 μ L to 5 mL (10 mL for PEEK)
- Make-Before-Break (MBB) technology allows switching without flow interruption
- Wide 30° port angles offer easier access to fittings
- Built-in position sensing switch provides the chromatograph with a reproducible start signal

Series 3725i-038 and 3725i Preparative Injection Valves

The series 3725i-038 (stainless steel) and 3725i (PEEK) are the most suitable manual valves for large sample volumes, high flow rates, and preparative columns sized 1.0-10 cm in diameter.

- Versatile ports accommodate 1/8 in. (3.2 mm) and 1/16 in. (1.6 mm) OD tubing.
Note: 1/16 in. OD tubing requires an adapter, P/N 5067-1503
- 1.0 mm diameter passages allow flow rates up to 800 mL/min with virtually no pressure drop
- Make-Before-Break technology allows switching without flow interruption
- High reproducibility for both partial-filling and complete-filling methods
- Sample range is 100 μ L to 20 mL (10 mL loop is installed)
- Flow range is 10 to 800 mL/min
- Built-in position sensing switch gives the chromatograph a reproducible start signal

Manual Injection Valves with Position Sensing Switches

Description	Comments	Part No.	Rotor Seal Material	Rotor Seal	Stator	Stator Face	RheBuild Kit
7125		N/A	Vespel	0101-0623		0101-0624	
			Tefzel	0101-0620			
			PEEK	0101-1255			
7725i, stainless steel	Analytical scale	5063-6502	Vespel	0101-0623	0100-1860	0100-1859	0101-1254
9725i, PEEK	Analytical scale	0101-1253	Tefzel	0101-0620			
3725i, stainless steel prep valve	Preparative scale	0101-1232	PEEK	0101-1233			
3725i, PEEK prep valve	Preparative scale	0101-1231	PEEK	0101-1233			
7010/7000/7040		N/A	PEEK	0101-1256			
Manual prep injection valve kit, stainless steel	Includes position sensing, 10 mL loop, 25 mL syringe, ring mounting bracket, start cable and SS connecting capillaries, 0.5 mm ID, 40 cm and 60 cm	5065-9922					
2 position/6 port manual injection valve for 1120	Does not include 20 μ L loop and needle port	5067-4104	PEEK	5067-4105	0100-1850		



7725i manual injection valve



Ring stand mounting bracket, 1400-3166

Manual Injection Valve Replacement Parts

- Rotor seals wear with use and need routine replacement
- Stators only need replacement if the ports are damaged
- PEEK rotor seals are incompatible with concentrated nitric and sulfuric acids

Manual Injection Valve Replacement Parts

Description	Comments	Part No.
Isolation seal	For Rheodyne Series 7725, 9725, 3725	1535-4046
Ring stand mounting bracket		1400-3166
PEEK adapter, 1/8 in. to 1/16 in.	For 3725i	5067-1503
Position sensor switch for manual valves		0490-1849

Tips & Tools

Don't forget, we have special offers throughout the year.

To learn more, visit www.agilent.com/chem/specialoffers



Manual Injection Valve Sample Loops

The right mix of injection valve sample loops are available for your application needs. Agilent offers factory-cut and finished loops of the highest quality.

- Stainless steel loops are square cut and free of burrs for a flush connection
- Flexible PEEK loops have a clean, straight cut for low dead volume connections



Stainless Steel Sample Loops

- Sample loops for Rheodyne 7725 Series and 7125 Series valves are not interchangeable due to the change in port angle
- Actual volumes can differ due to tolerance of metal tubing bore
- Accuracy of large metal loops is $\pm 5\%$, intermediate loops $\pm 10\%$, small loops $\pm 30\%$



PEEK Sample Loops

- Inert to most organic solvents
- Wall thickness, temperature, exposure time and concentration of organic solvents affect the durability of PEEK tubing
- Concentrated nitric acid and sulfuric acid weaken PEEK tubing
- THF, methylene chloride and DMSO cause PEEK to swell
- Actual volumes can differ because of tolerance of tubing bore
- Accuracy of large PEEK loops is $\pm 14\%$, intermediate loops $\pm 21\%$, small loops $\pm 65\%$



Manual Injection Valve Sample Loops

Volume	ID (mm)	Material	Use With	Part No.
5 μ L	0.18	SS	7125 and 7010	1535-4860
	0.18	SS	7725	0101-1248
	0.18	PEEK	9725	0101-1241
10 μ L	0.30	SS	7125 and 7010	0101-0376
	0.30	SS	7725	0100-1923
	0.25	PEEK	9725	0101-1240
20 μ L	0.51	SS	7125 and 7010	0101-0377
	0.30	SS	7725	0100-1922
	0.25	PEEK	9725	0101-1239
50 μ L	0.51	SS	7125 and 7010	0101-0378
	0.51	SS	7725	0100-1924
	0.51	PEEK	9725	0101-1238
100 μ L	0.51	SS	7125 and 7010	0101-0379
	0.51	SS	7725	0100-1921
	0.51	PEEK	9725	0101-1242
200 μ L	0.76	SS	7125 and 7010	0101-1252
	0.76	SS	7725	0101-1247
	0.51	PEEK	9725	0101-1237
500 μ L	0.76	SS	7125 and 7010	0101-1251
	0.76	SS	7725	0101-1246
	0.76	PEEK	9725	0101-1236
1 mL	0.76	SS	7125 and 7010	0101-1219
	0.76	SS	7725	0101-1245
	0.76	PEEK	9725	0101-1235
2 mL	1.00	SS	7125 and 7010	0101-1250
	1.00	SS	7725	0101-1244
	0.76	PEEK	9725	0101-1234
	1.6	PEEK	3725	0101-1229
5 mL	1.00	SS	7125 and 7010	0101-1249
	1.00	SS	7725	0101-1243
	0.76	PEEK	9725	0101-1230
	1.6	PEEK	3725	0101-1228
10 mL	2.0	PEEK	3725	0101-1227
20 mL	2.0	PEEK	3725	0101-1226



Syringes for Manual Injection

Agilent syringes for manual injection valves have a blunt-tip point style needle to prevent damaging the valve's internal parts. They can be used with any type/brand of manual injection valve.

LC Manual Syringes with Fitted Plungers

Volume (μL)	Description	Unit	Needle	Part No.
5	Fixed		22 gauge/2 in./LC	5190-1480
10	Fixed		22 gauge/2 in./LC	5190-1484
	Removable		22 gauge/2 in./LC	5190-1485
	Replacement needle for 10 μL syringe	3/pk		5190-1486
25	Fixed		22 gauge/2 in./LC	5190-1494
50	Fixed		22 gauge/2 in./LC	5190-1501
100	Fixed		22 gauge/2 in./LC	5190-1508
250	Fixed		22 gauge/2 in./LC	5190-1515
500	Fixed		22 gauge/2 in./LC	5190-1522

LC Manual Syringes with PTFE-Tipped Plungers

Volume (μL)	Description	Unit	Needle	Part No.
10	Removable		22 gauge/2 in./LC tip	5190-1492
	Replacement needle for 10 μL syringe	3/pk		5190-1486
	Replacement plunger with PTFE tip for 10 μL syringe			5190-1558
25	Removable		22 gauge/2 in./LC tip	5190-1499
	Replacement needle	3/pk		5190-1571
	Replacement plunger with PTFE tip for 25 μL syringe			5190-1560
50	Removable		22 gauge/2 in./LC tip	5190-1505
	Replacement needle	3/pk		5190-1571
	Replacement plunger with PTFE tip for 50 μL syringe			5190-1561
100	Removable		22 gauge/2 in./LC tip	5190-1512
	Replacement needle	3/pk		5190-1571
	Replacement plunger with PTFE tip for 100 μL syringe			5190-1562
250	Removable		22 gauge/2 in./LC tip	5190-1520
	Replacement needle	3/pk		5190-1571
500	Removable		22 gauge/2 in./LC tip	5190-1526
	Replacement needle	3/pk		5190-1571
	Replacement plunger with PTFE tip for 500 μL syringe			5190-1564



High temperature heat exchanger, G1316-80002



Heat exchanger/cooler, G1316-80004



Column Identification Module, 5062-8588

Thermostatted Column Compartment Supplies

Thermostatted Column Compartment Supplies

Description	Part No.
Capillary system for 0.12 mm ID use	G1316-68744
Rapid Resolution High Throughput capillary kit	5065-9947
1200 capillary kit for 0.12 mm ID	G1316-68716
High temperature heat exchanger, 1.6 μ L, 0.12 mm ID, "R"	G1316-80002
High temperature heat exchanger, 1.6 μ L, 0.12 mm ID, "L"	G1316-80003
Heat exchanger/cooler, 1.5 μ L, 0.12 mm ID	G1316-80004
Carrier for heat exchanger 1290 Infinity TCC and 1200 Series TCC SL	G1316-83200
Column Identification Module (CIM), 3/pk	5062-8588
Column clamp, 6/pk	5063-6526
Column holder for micro LC columns	5001-3702
Column connecting capillary with fittings, 7 cm, 0.12 mm ID, 1/16 in. male/male	G1316-87303
Column connecting capillary with fittings, 9 cm, 0.17 mm ID, 1/16 in. male/male	G1316-87300
Column connecting capillary with fittings, 18 cm, 0.12 mm ID, 1/16 in. male/male	G1313-87304
Column connecting capillary with fittings, 18 cm, 0.17 mm ID, 1/16 in. male/male	G1313-87305
PEEK tubing, 1/32 in. OD, 0.4 mm ID, 450 mm, Micro valve to waste	5022-6503

Capillary Tubing Kits

Capillary kits are available for easy ordering and setup of the switching valves. They include all capillaries and fittings for specific applications, as well as bulk PEEK capillaries and a capillary cutter to add maximum flexibility.

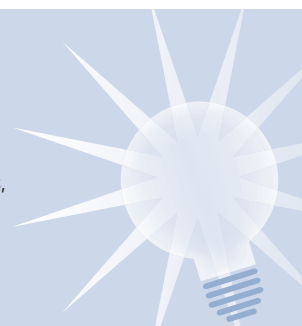
Capillary Tubing Kits

Application	Valve Kit	Part No.
Column regeneration Capillaries: 0.17 mm ID	G1157A	G1156-68711
Column regeneration Capillaries: 0.25 mm ID	G1157A	G1156-68713
Column regeneration Capillaries: 0.17 mm ID	G1316A #057	G1316-68711
Column selection Capillaries: 0.17 mm ID	G1159A	G1156-68712
Sample enrichment Capillaries: 0.17 mm ID	G1316A #055	G1316-68710
Sample enrichment Capillaries: 0.17 mm ID	G1158A	G1156-68714
Solvent selection Flow rate up to 10 mL/min	G1160A	G1160-68706 5067-4601*

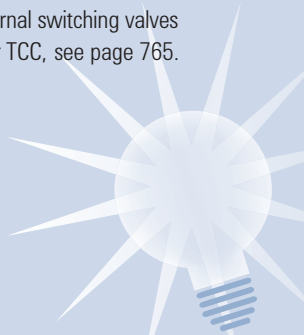
*Use for method development applications. Kit contains longer tubing.

Tips & Tools

To learn more about Agilent's complete portfolio of services, please visit www.agilent.com/chem/services



For internal switching valves
for your TCC, see page 765.



Capillary Kits for Column Selection

Description	Use With	Part No.
Capillary kit Contains capillaries (0.12 mm ID) and low dispersion heat exchangers	1290 Infinity TCC 2 pos/ 6 port QuickChange valve	5067-4646
Capillary kit Contains capillaries (0.12 mm ID) and low dispersion heat exchangers	1290 Infinity TCC 2 pos/ 10 port QuickChange valve	5067-4682
Capillary kit Contains capillaries (0.17 mm ID)	1290 Infinity TCC 2 pos/ 10 port QuickChange valve	5067-4730
Low dispersion capillary kit	1290 Infinity TCC 6 pos/ 14 port QuickChange valve	5067-4729
Method development capillary kit, low dispersion, short columns Contains capillaries (0.12 mm ID), fittings and low dispersion heat exchanger for up to 8 columns of up to 100 mm length	1290 Infinity TCC 8 pos/ 9 port QuickChange valve	5067-1595
Method development capillary kit, general purpose Contains capillaries (0.17 mm ID) and fittings for up to 6 columns of up to 250 mm length	1290 Infinity TCC 8 pos/ 9 port QuickChange valve	5067-1596
Method development capillary kit, low dispersion, long columns Contains capillaries (0.12 mm ID), fittings and low dispersion heat exchanger for up to 6 columns of up to 250 mm length	1290 Infinity TCC 8 pos/ 9 port QuickChange valve	5067-1597



Detector Supplies

Agilent wavelength detectors combine exceptional flexibility with superior instrument control, data communication, and analytical capabilities. This section shows you how to maintain your detector's high level of selectivity and sensitivity.

Detector Maintenance Tips

Symptom	What To Do	Additional Information
Lamp does not ignite	Exchange the lamp	Perform a wavelength calibration test and an intensity test after lamp replacement
Noise exceeds application limit	Exchange the flow cell	Perform a wavelength calibration test after flow cell replacement
Drift exceeds application limit	Exchange the lamp	Perform a wavelength calibration test and a pressure tightness test after flow cell replacement
Leaky flow cell (For G4212 only)	Exchange the flow cell	Perform a wavelength calibration test after flow cell replacement
Leaky flow cell (For all G1314/G1315/G1365 detectors)	Clean or exchange the flow cell	Perform a wavelength calibration test and a pressure tightness test after flow cell replacement
Lower intensity (For G4212 only)	Exchange the flow cell	Perform a wavelength calibration test after flow cell replacement
Lower intensity (For all G1314/G1315/G1365 detectors)	Clean or exchange the flow cell	Perform a wavelength calibration test and a pressure tightness test after flow cell replacement



Deuterium lamp, 1100DAD/MWD longlife – C

Certified Lamps

- All lamps are tested for noise and drift specifications, correct operating voltage, light intensity and proper alignment
- Improved coating process increases Agilent lamp lifetimes up to 50%
- Agilent deuterium lamps are designed with a much narrower aperture providing increased light intensity and decreased noise – translating into an appreciably higher signal-to-noise ratio
- By providing higher sensitivity, Agilent lamps can extend detection capabilities and improve qualification at trace levels – for more than 2,000 hours of use

Agilent's lamps are manufactured in an ISO 9001 certified environment and are fully traceable throughout every step of the production process. Each lamp is then tested to ensure it meets Agilent's performance specifications. Test equipment is regularly calibrated using optical standards certified by NIST (National Institute of Standards and Technology) or PTB (Physikalisch-Technische Bundesanstalt).



Deuterium lamp, G1314-60100



Long life HiS Deuterium lamp, 5190-0917

Detector Lamps

Description	Comments	Part No.
Variable Wavelength Detector (VWD)		
Long life Deuterium lamp with RFID tag	For G1314D/E/F	G1314-60101
Long life Deuterium lamp	For G1314A/B/C, 1120 and 1220 Infinity LC	G1314-60100
Diode Array Detector (DAD)/Multiple Wavelength Detector (MWD)		
Long life HiS Deuterium lamp (8-pin) with RFID tag	For G4212A/B	5190-0917
Long life Deuterium lamp with RFID tag	For G1315C/D and G1365C/D	2140-0820
Long life Deuterium lamp	For G1315A/B and G1365A/B	2140-0813
Long life Deuterium lamp	For G1315A/B and G1365A/B	5181-1530
Deuterium lamp	For G1315A/B and G1365A/B	2140-0590
Tungsten lamp	For G1315A/B/C/D and G1365A/B/C/D	G1103-60001



Variable Wavelength Detector (VWD)

VWD Flow Cell Selection

Typical Column Length (cm)	Typical Peak Width	Recommended Flow Cell				
< = 5	0.025	Micro Flow Cell				High Pressure Flow Cell For Pressure Above 100 bar
10	0.05	0.05-0.2 mL/min	Semi-micro Flow Cell			
20	0.1	Standard Flow Cell				
> = 40	0.2					
Typical Flow Rate		0.05-0.2 mL/min	0.2-0.4 mL/min	0.4-0.8 mL/min	1-2 mL/min	0.05-5 mL/min
Internal Column Diameter		1.0 mm	2.1 mm	3.0 mm	4.6 mm	

Flow Cell and Repair Kits for VWD

Description	Use With	Specifications	Part No.	Repair Kit Part No.
Standard flow cell, RFID	G1314D/E/F	10 mm, 14 µL, 40 bar	G1314-60186	G1314-65061
Standard "D" type flow cell	G1314A/B/C	10 mm, 14 µL, 40 bar	G1314-60086	G1314-65061
Semi-micro flow cell, RFID	G1314D/E/F	6 mm, 5 µL, 40 bar	G1314-60183	G1315-68713
Semi-micro flow cell	G1314A/B/C	6 mm, 5 µL, 40 bar	G1314-60083	G1315-68713
Micro flow cell, 3 mm, RFID	G1314D/E/F	2 µL, 120 bar	G1314-60187	G1315-68713
Micro flow cell, 3 mm	G1314A/B/C	2 µL, 120 bar	G1314-60087	G1315-68713
Micro flow cell, 5 mm	G1314A/B/C	1 µL, 40 bar	G1314-60081	G1314-65052
High pressure flow cell, RFID	G1314D/E/F	10 mm, 14 µL, 400 bar	G1314-60182	G1314-65054
High pressure flow cell	G1314A/B/C	10 mm, 14 µL, 400 bar	G1314-60082	G1315-68713

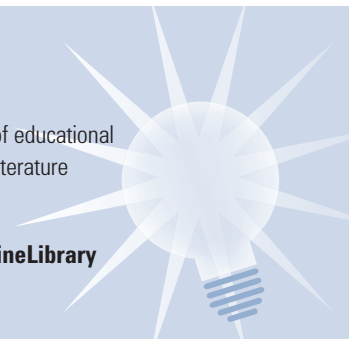
Capillaries for VWD Flow Cell

Flow Cell Description	Part No.	Inlet Capillary	Part No.	Outlet Capillary	Part No.
Standard flow cell, RFID	G1314-60186	Inlet capillary, 0.17 mm ID, 600 mm long	5062-8522	Waste capillary, PEEK, 0.25 mm ID	5062-8535
Standard "D" type flow cell	G1314-60086			1/16 in. finger-tight PEEK fitting, 2/pk	0100-1516
Semi-micro flow cell, RFID	G1314-60183	Inlet capillary, 0.12 mm ID, 400 mm long	5021-1823	Waste capillary, PEEK, 0.25 mm ID	5062-8535
Semi-micro flow cell	G1314-60083			1/16 in. finger-tight PEEK fitting, 2/pk	0100-1516
Micro flow cell, 3 mm, RFID	G1314-60187	Inlet capillary, 0.12 mm ID, 310 mm long	G1314-87301	Outlet capillary, 0.17 mm ID, 120 mm long	G1314-87302
Micro flow cell, 3 mm	G1314-60087				
Micro flow cell, 5 mm	G1314-60081	Inlet capillary, 0.12 mm ID, 400 mm long	5021-1823	Outlet capillary, 0.17 mm ID, 120 mm long	G1314-87302
High pressure flow cell, RFID	G1314-60182	Inlet capillary, 0.17 mm ID, 380 mm long	G1315-87311	Outlet capillary, 0.17 mm ID, 120 mm long	G1314-87302
High pressure flow cell	G1314-60082				

Tips & Tools

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Diode Array Detector (DAD)/ Multiple Wavelength Detector (MWD)

Cleaning or Replacing DAD/MWD Flow Cells

- A decrease in detector performance or unusual noise levels may mean you have dirty flow cell windows
- Clean and reassemble one side of the flow cell before beginning the other side to prevent mixing the front and rear gaskets, which have different hole diameters
- While cleaning or replacing flow cell windows, if the washers fall out of the window assembly, they must be inserted in the correct order with a PTFE ring to prevent any leaks from the flow cell window
- Clean the cell body with water or isopropanol
- After opening the cell you should always use a new gasket

DAD/MWD Flow Cell Selection						
Typical Column Length (cm)	Typical Peak Width	Recommended Flow Cell				
< = 5	0.025	80/500 nL Flow Cell				High Pressure Flow Cell
10	0.05	Semimicro Flow Cell				
20	0.1	Standard Flow Cell				
> = 40	0.2					
Typical Flow Rate		0.05-0.2 mL/min	0.2-0.4 mL/min	0.4-0.8 mL/min	1-2 mL/min	0.05-5 mL/min
Internal Column Diameter		0.3-1 mm	2.1 mm	3.0 mm	4.6 mm	

Flow Cell and Repair Kits for DAD/MWD

Description	Use With	Specifications	Part No.	Repair Kit Part No.
Standard flow cell with RFID tag	G1315C/D, G1365C/D	10 mm, 13 μ L, 120 bar	G1315-60022	G1315-68712
Standard flow cell	G1315A/B, G1365A/B	10 mm, 13 μ L, 120 bar	G1315-60012	
Semi-micro flow cell, RFID	G1315C/D, G1365C/D	6 mm, 5 μ L, 120 bar	G1315-60025	G1315-68713
Semi-micro flow cell	G1315A/B, G1365A/B	6 mm, 5 μ L, 120 bar	G1315-60011	
Micro flow cell, RFID	G1315C/D, G1365C/D	3 mm, 2 μ L, 120 bar	G1315-60024	G1315-68713
Micro high-pressure flow cell	G1315A/B, G1365A/B	6 mm, 1.7 μ L, 400 bar	G1315-60015	
500 nL flow cell		10 mm, 50 bar	G1315-68724	
80 nL flow cell		6 mm, 50 bar	G1315-68716	
Preparative flow cell	G1315A/B, G1365A/B	3 mm, 120 bar, stainless steel	G1315-60016	G1315-68712
Preparative flow cell		0.3 mm, 20 bar, quartz	G1315-60017	
Preparative flow cell		0.06 mm, 20 bar, quartz	G1315-60018	
Max-light cartridge cell	G4212A/B Infinity LC DAD	10 mm, 1.0 μ L, 60 bar	G4212-60008	
Max-light cartridge cell	G4212A/B Infinity LC DAD	60 mm, 4.0 μ L, 60 bar	G4212-60007	
Max-light cartridge test cell	Must be used to perform detector build-in tests		G4212-60011	

Capillaries for DAD/MWD Flow Cell

Flow Cell Description	Part No.	Inlet Capillary	Part No.	Outlet Capillary	Part No.
Standard flow cell with RFID tag	G1315-60022	Inlet capillary with heat exchanger, 0.17 mm ID, 590 mm long	G1315-87321	Outlet capillary, 0.17 mm ID, 200 mm long	G1315-87302
Standard flow cell	G1315-60012				
Semi-micro flow cell with RFID tag	G1315-60025	DAD heat exchanger capillary, 0.17 mm ID, 310 mm long	G1315-87319	Outlet capillary, 0.12 mm ID, 200 mm long	G1315-87306
Semi-micro flow cell	G1315-60011			Outlet capillary, 0.17 mm ID, 200 mm long	G1315-87302
				Outlet capillary, 0.12 mm ID, 200 mm long	G1315-87306
				Outlet capillary, 0.17 mm ID, 200 mm long	G1315-87302
Micro flow cell with RFID tag	G1315-60024	DAD heat exchanger capillary, 0.12 mm ID, 310 mm long	G1315-87339	Outlet capillary, 0.12 mm ID, 200 mm long	G1315-87306
				Outlet capillary, 0.17 mm ID, 200 mm long	G1315-87302
Micro high-pressure flow cell	G1315-60015	Inlet capillary with heat exchanger, 0.12 mm ID, 290 mm long	G1315-87325	Outlet capillary, 0.12 mm ID, 200 mm long	G1315-87306



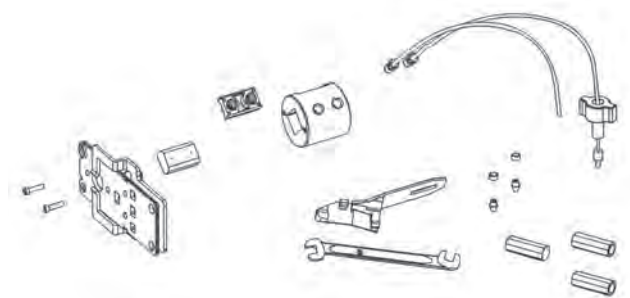
Max-light cartridge cell, G4212-60008

80 nL and 500 nL Flow Cell Supplies

Description	Unit	Part No.
Fitting screw	10/pk	5063-6593
Double winged nuts and 1/32 in. ferrules	10/pk	5065-4422
1/32 in. ferrule and stainless steel lock ring, lite touch	10/pk	5063-6592
Union adjustment tool	2/pk	5022-2146
Universal ZDV union, stainless steel, no fittings	2/pk	5022-2184
Torque wrench adapter		G1315-45003
Open end wrench, 4 mm		8710-1534

500 nL Flow Cell and Replacement Parts

Description	Comments	Part No.
500 nL flow cell	Contains quartz flow cell with 10 mm path length and 500 nL volume and connecting capillaries, max 50 bar pressure	G1315-68724
Sealing kit	Includes torque adapter, 2 cell seal assemblies, 5 lite touch front and back ferrules	G1315-68715
Quartz cell body, 10 mm		G1315-80001
Cell seal assembly, 500 nL		G1315-87101
Fused silica/PEEK capillary, 100 µm ID, 30 cm long	Inlet	G1315-87333
Fused silica/PEEK capillary, 50 µm ID, 40 cm long	Inlet	G1315-87323
Fused silica/PEEK capillary, 100 µm ID, 12 cm long	Outlet	G1315-87338
Fused silica/PEEK capillary, 50 µm ID, 12 cm long	Outlet	G1315-87328



500 nL flow cell and replacement parts

80 nL Flow Cell and Replacement Parts

Description	Comments	Part No.
80 nL flow cell	Contains quartz flow cell with 6 mm path length and 80 nL volume and connecting capillaries, max 50 bar pressure	G1315-68716
Sealing kit for 80 nL flow cell	Includes torque adapter, 2 cell seal assemblies, 5 lite touch front and back ferrules and 5 sleeves for 360 µm OD capillaries	G1315-68725
Quartz cell body, 80 nL, 6 mm path length		G1315-80002
Fused silica/PEEK capillary, 50 µm ID, 40 cm long	Inlet	G1315-87323
Fused silica/PEEK capillary, 50 µm ID, 12 cm long	Outlet	G1315-87328
Fused silica/PEEK capillary, 25 µm ID, 20 cm long	Inlet	G1315-87313
Fused silica/PEEK capillary, 25 µm ID, 60 cm long	Outlet	G1315-87318

Preparative Flow Cells and Replacement Parts

Description	Part No.
Preparative flow cell, 0.3 mm, 20 bar, quartz	G1315-60017
Preparative flow cell, 0.06 mm, 20 bar, quartz	G1315-60018
PTFE tubing, 0.8 mm ID, 2 m	G1315-67301
PTFE tubing, 0.5 mm ID, 0.8 m	G1315-67302
Cell housing	G1315-27705
1/16 in. finger-tight PEEK fitting, 2/pk	0100-1516
Quartz body, 0.3 mm	G1315-80004
Quartz body, 0.06 mm	G1315-80003
Prep flow cell, stainless steel, 3 mm, 120 bar	G1315-60016
Stainless steel connecting capillary, 0.5 mm, 250 mm	G1315-87305

Detector Maintenance Kits

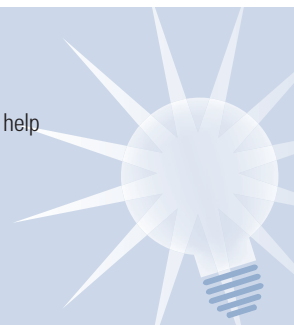
Detector Maintenance Kits

Description	Kit Contents	Part No.
Variable Wavelength Detector (VWD)		
Standard "D" type flow cell kit	Includes 2 windows, 2 gaskets #1, 2 gaskets #2	G1314-65061
Semi-micro flow cell kit	Includes 2 windows, 4 gaskets: 2 standard #1, 1 semi-micro #1, 1 semi-micro #2	G1314-65056
Micro flow cell kit	Includes 2 windows, 2 gaskets #1, 2 gaskets #2	G1314-65052
Cell repair kit, semi-micro	Includes window screw kit, 4 mm hexagonal wrench and seal kits	G1315-68713
High-pressure flow cell kit	Includes 2 windows, 2 Kapton gaskets and 2 PEEK rings	G1314-65054
Diode Array Detector (DAD)/Multiple Wavelength Detector (MWD)		
Cell repair kit	Includes window screw kit, 4 mm hexagonal wrench and seal kit	G1315-68712
Cell repair kit, semi-micro	Includes window screw kit, 4 mm hexagonal wrench and seal kits	G1315-68713
Sealing kit for 500 nL flow cell	Includes torque adapter, 2 cell seal assemblies, 5 lite touch front and back ferrules	G1315-68715
Sealing kit for 80 nL flow cell	Includes torque adapter, 2 cell seal assemblies, 5 lite touch front and back ferrules and 5 sleeves for 360 µm OD capillaries	G1315-68725

Tips & Tools

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Other Detectors



1200 Series Evaporating Light Scattering Detector



Standard flow nebulizer, G4218-20000



Cartridge for gas regulator, G4218-40150

G4218A 1200 Series Evaporating Light Scattering Detector Supplies

Description	Part No.
Standard flow nebulizer	G4218-20000
Semi-micro flow nebulizer	G4218-20001
Large flow nebulizer	G4218-20002
Micro flow nebulizer	G4218-20003
RRLC nebulizer	G4218-20004
Nebulization chamber, glass	G4218-40000
Black plastic nut, 13 mm diameter, glassware	G4218-40010
Black plastic nut, 22 mm diameter, glassware	G4218-40011
Black exhaust tube, 2.5 m	G4218-40110
Bulkhead	G4218-40130
Cartridge, 0.01 µm for gas regulator	G4218-40150
Pneumatic tube with stainless steel fitting	G4218-40220
Drain tube with stainless steel fitting	G4218-40100
Gas regulator with 0.01 µm filter and manometer	G4218-60100
Seal kit for nebulization chamber	G4218-68010
Caffeine standard, 250 µg/mL	G4218-85000

G1362A 1100/1200 Series Refractive Index Detector (RID) Supplies

Description	Part No.
Tubing kit Includes 300 mm recycle valve to recycle port, 200 mm recycle valve to waste port, 120 mm purge valve to recycle valve, 270 mm purge valve to sample cell, 170 mm purge valve to reference cell	G1362-68709
Interface tubing kit Includes 1/8 in. ferrule, 1/3 in. nut, PTFE tubing	G1362-68706
Interface capillary, 400 mm, 0.17 mm ID	G1362-87300
Restriction capillary, 0.17 mm ID	G1362-87301



Flow cell for G1321A fluorescence detector, G1321-60005



Stainless steel front ferrules, 5180-4108



Back ferrules 1/16 in., 5180-4114

G1321A 1100/1200 Series Fluorescence Detector (FLD) Supplies

Description	Part No.
Xenon flash detector lamp	2140-0600
Flow cell, 8 μ L, 20 bar	G1321-60005
Cuvette kit, 8 μ L, 20 bar	G1321-60007
Includes tubing, stainless steel fitting, front and back ferrule, PEEK fitting, syringe needle and syringe	
Cut-off filter kit:	
389, 408, 450, 500, 550 nm	5061-3327
380, 399, 418, 470, 520 nm	5061-3328
280, 295, 305, 335, 345 nm	5061-3329
Corrugated tubing, polypropylene, 6.5 mm ID, 5 m	5062-2463
PTFE tubing, FEP, 0.7 mm ID, 5 m	5062-2462
1/16 in. finger-tight PEEK fitting, 2/pk	0100-1516
Column connecting capillary with fittings, 380 x 0.17 mm	G1315-87311
1/16 in. stainless steel front ferrule, 10/pk	5180-4108
1/16 in. stainless steel back ferrule, 10/pk	5180-4114
1/16 in. stainless steel fitting, 10/pk	5061-3303
Fluorescence detector calibration sample, 1 g glycogen	5063-6597
Open end wrench, 1/4 and 5/16 in.	8710-0510
Glass syringe	9301-1446
Syringe needle	9301-0407

1100/1200 Series Chip LC Supplies

1100/1200 Series Chip LC Supplies

Description	Part No.
Rotor, inner valve, 3 grooves, chip LC	G4240-23705
Rotor, outer valve, 5 grooves, chip LC	G4240-25206
PEEK fitting, special for chip LC	G4240-43200
Fused silica/PEEK capillary, 15 µm, 90 cm	G4240-87300
Nano pump to chip cube	
Fused silica/PEEK capillary, 25 µm, 105 cm	G4240-87301
Micro well plate sampler to chip cube	
Fused silica/PEEK capillary, 100 µm, 100 cm	G4240-87302
Chip cube to waste	
Fused silica/PEEK capillary, 75 µm, 100 cm	G4240-87303
Syringe pump to chip cube	
Fused Silica/PEEK capillary, 50 µm, 50 cm	G4240-87304
Inline micro filter kit, 0.5 µm, PEEK	5067-1582
Use with chip cube LC system	
Fitting with 0.5 µm PEEK frit, 10/pk	5067-1584
PEEK fitting for use with 1/32 in. OD, 10/pk	5067-1585
PEEK sample transfer capillary, 25 µm, 100 cm	G4240-87309
Micro inline filter to chip cube (Phospho-Chip application)	
PEEK capillary, 25 µm, 10 cm	G4240-87310
Micro well plate sampler to micro inline filter (Phospho-Chip application)	

Tips & Tools

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LC/MS Supplies

Combined with Agilent's industry-leading LC systems, our single quadrupole, ion trap, triple quadrupole, TOF and Q-TOF LC/MS solutions combine world-class performance with legendary reliability and ease-of-use.

This section contains all of the mass spectrometry supplies you need to keep your LC mass spectrometer running at peak performance.

LC/MS Maintenance Schedule

Procedure	When to Perform
Flush the nebulizer	Daily or at the end of each shift to flush traces of samples and buffers out of the tubing, valves, and nebulizer.
Clean the electrospray spray chamber	Daily or anytime you suspect carryover contamination from one sample or analysis to another.
Replace the electrospray nebulizer needle	When the needle is plugged. Common symptoms of a plugged needle are increased LC back pressure, off-axis spraying, or dripping from the nebulizer.
Clean the APCI spray chamber	Daily or anytime you suspect carryover contamination from one sample or analysis to another.
Replace the APCI nebulizer needle	When the needle is plugged. Common symptoms of a plugged needle are increased LC back pressure or off-axis spray from the nebulizer.
Clean the multimode source	Daily or anytime you suspect carryover contamination from one sample or analysis to another, or when you must access the end cap and capillary cap for cleaning and inspection.
Check calibrant levels	Monthly or weekly if you tune the LC/MS frequently.





LC/MS Preventive Maintenance Kit

For your convenience, the LC/MS Preventive Maintenance Kit has the recommended common supplies needed for most Agilent LC/MS systems. Unique source parts should be ordered separately.

LC/MS Preventive Maintenance kit

Description	Part No.
LC/MS Preventive Maintenance kit	5190-1443
Foreline pump oil, Inland 45, 1 L, for E1M18/E2M28	6040-0834
Oil mist filter element for E1M18/E2M28	1535-4970
Filter element, 5 μ m, 5/pk	0100-2051
Spring, canted coil, 4/pk	1460-2571
Big hydrocarbon trap, 1/4 in. fittings	BHT-4
Rotor seal, Vespel, pH 0 to 10	0100-1855

Tips & Tools

Save ordering time and money with the LC/MS PM Kit! It contains the common supplies specified in Agilent service engineer preventive maintenance procedure for LC/MS platforms.



LC/MS Supplies

Description	6100 Series Single Quadrupole LC/MS	6200 Series TOF LC/MS	6300 Series Ion Trap LC/MS	6400 Series Triple Quadrupole LC/MS	6500 Series Accurate- Mass Q-TOF LC/MS	Part No.
ES nebulizer assembly, original	◆	◆	◆	◆	◆	G1946-60098
ES nebulizer needle (original) replacement kit	◆	◆	◆	◆	◆	G2427A
ES nebulizer assembly, new	◆	◆	◆	◆	◆	G1958-60098
ES nebulizer needle (new) replacement kit	◆	◆	◆	◆	◆	G1958-60136
APCI nebulizer assembly	◆	◆	◆	◆	◆	G1946-60037
APCI nebulizer needle replacement kit	◆	◆	◆	◆	◆	G2428A
Needle assembly APCI/Multimode	◆	◆	◆		◆	G1947-60103
Corona needle APCI/Multimode	◆	◆	◆	◆	◆	G1947-20029
Capillary cap, high temperature, 3.0 mm	◆	◆	◆	◆	◆	G1946-20301
Capillary, 0.5 mm ID, dielectric*	◆		◆			G1946-80009
Capillary, 0.6 mm ID, dielectric*	◆	◆	◆	◆	◆	59987-20040
Capillary, 0.6 mm ID, resistive, fast polarity switching*				◆		G1960-80060
Spring, canted coil, 0.25 in. ID, 0.53 mm	◆	◆	◆	◆	◆	1460-2571
1/6 in. tee, low dead volume, stainless steel		◆			◆	0100-0969

*Dielectric capillary supports standard polarity switching only. Resistive capillary supports fast polarity switching

(Continued)

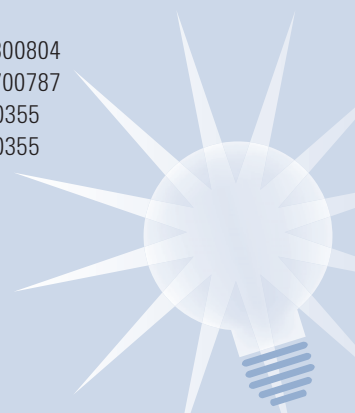


Corona needle APCI, G1947-20029

Tips & Tools

ES nebulizer (original) is compatible with the following ion sources:

- ESI G1948A with Serial Number < US91801994
- ESI G1948B with Serial Number < US91201787
- Multimode G1978A with Serial Number < US90800804
- Multimode G1978B with Serial Number < US90700787
- Dual ESI G3251A with Serial Number < US91200355
- Dual ESI G3251B with Serial Number < US91200355



LC/MS Supplies

Description	6100 Series Single Quadrupole LC/MS	6200 Series TOF LC/MS	6300 Series Ion Trap LC/MS	6400 Series Triple Quadrupole LC/MS	6500 Series Accurate- Mass Q-TOF LC/MS	Part No.
Syringe adapter			◆			9301-1291
Syringe pump			◆			3162-0178
1/16 in. finger-tight PEEK fitting		◆	◆		◆	0100-1516
Female luer to female 10/32 adapter		◆	◆		◆	0100-2304
PEEK tubing		◆	◆		◆	0890-1915
Gas-tight syringe, PTFE luer lock		◆	◆		◆	5182-9710
High-throughput skimmer, 2 mm		◆		◆	◆	G1969-20302
Skimmer 1 (G1956A/B)	◆					G1956-20302
HED assembly	◆					G1946-80019
HED assembly (G6140A, G6460A, G6530A)				◆		G2571-80103
HED assembly		◆				G1956-80000
Electron multiplier replacement horn	◆	◆		◆		05971-80103
Replacement horn and dynode	◆		◆	◆		G2441-80010

*Dielectric capillary supports standard polarity switching only. Resistive capillary supports fast polarity switching



05971-80103



LC/MS Foreline Pump Supplies

Description	Part No.
Oil mist filter kit for E1M18/E2M28	3162-1056
Oil mist cartridge filter for MS40+	G1960-80039
Oil return kit	3162-1057
Foreline pump oil, Inland 45, 1 L, for E1M18/E2M28	6040-0834
Rotary pump oil, 4 L, for E1M18/E2M28	6040-0798
Foreline exhaust adapter	59980-20134
Hose clamp	1400-0563
Oil mist filter element for E1M18/E2M28	1535-4970
KF25 clamp, stainless steel	0100-0549
KF25 coseal (inside clamp)	0100-1597
Exhaust tubing	0890-1727
Pump oil drip pan	G1946-00034

LC/MS Chemicals

Description	6100 Series		6300 Series		6400 Series	6500 Series	Part No.
	Single Quadrupole LC/MS	6200 Series TOF LC/MS	Ion Trap LC/MS	Triple Quadrupole LC/MS	Accurate- Mass Q-TOF LC/MS		
ES/APCI positive ion performance standard, 5 x 1 mL ampoules	◆	◆			◆	◆	G2423A
Electrospray LC demo sample (Sulfamix)	◆				◆*		59987-20033
ESI+APCI LC demo sample	◆						G1978-85000
ES negative ion performance standard, 5 x 1 mL ampoules	◆				◆		G2424A
APCI negative ion performance standard, 5 x 1 mL ampoules	◆						G2425A
ES/APCI positive ion performance standard	◆						G1946-85004
Multiple-charge compound performance evaluation sample (horse heart myoglobin)	◆						G2426A
Caffeine standards kit for LC/MS OQ/PV	◆						8500-6917
ES/APCI positive ion performance standard, 5 x 1 mL ampoules	◆						G2423A
ES-TOF reference mix, 6 x 2 mL ampoules		◆				◆	G1969-85001
ES-TOF biopolymer reference standard kit		◆					G1969-85003
Flushing solvent	◆	◆	◆	◆	◆	◆	G1969-85026
High purity water, 4 L	◆	◆	◆	◆	◆	◆	8500-2236
Methyl alcohol, 1 L	◆	◆	◆	◆	◆	◆	8500-1867
Ammonium formate	◆	◆	◆	◆	◆	◆	G1946-85021
Formic acid, 5 mL	◆	◆	◆	◆	◆	◆	G2453-85060
Acetonitrile, 1 L	◆	◆	◆	◆	◆	◆	G2453-85050

*Recommended item for familiarization

LC/MS Common Supplies*

Description	Part No.
Common Parts	
Filter element, 5 µm, 5/pk	0100-2051
Rotor seal, Tefzel, pH 0 to 14	0100-1854
Rotor seal, Vespel, pH 0 to 10	0100-1855
Inlet filter assembly	G1946-60180
SSV long drain tubing assembly	G1969-60086
Spring, canted coil	1460-2571
Cleaning Supplies	
Abrasive mesh, 4000 grit	8660-0827
Capillary cleaning wire for dip tube	G1946-80054
Cleaning powder, dielectric capillary, Alconox	5190-1401
Cloths, lint-free	05980-60051
Cotton swabs, 100/pk	5080-5400
Gas Purifiers	
Big hydrocarbon trap, 1/4 in. fittings	BHT-4
Big moisture trap, 1/4 in. fittings	BMT-4
Big universal trap, 1/4 in. fittings	RMSN-4
Big universal trap, 1/8 in. fittings, Nitrogen	RMSN-2
Tools	
LC/MS tool kit	G1946-60157
Nebulizer adjustment fixture	G1946-20215
Nebulizer 25X magnifier	G1946-80049
Plastic tubing cutter	8710-1930
Screwdriver, Torx T15	8710-1622
Screwdriver, Torx T20	8710-1615
Open end wrench, 1/4 and 5/16 in.	8710-0510
Wrench, 1/2 and 7/16 in.	8710-0806
Needle nose pliers, pointed serrated jaws	8710-0004
3 mm wrench for nebulizer needle adjustment	8710-2699

*These parts are common to all LC/MS systems

Tips & Tools

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Quiet Cover

Quiet Cover

Agilent has a solution to the frequent maintenance and inherent noise of LC/MS rough pumps. The Quiet Cover II was designed for easy movement, maintenance, and better living with rough pumps used with Agilent and other LC/MS systems.

- Locking castors to move heavy pump for maintenance
- No tools necessary to remove sectioned cover for easy access to pump
- Built in lift-and-tilt lever raises end of pump to drain oil
- Removable drip pan with well and hand holds to collect and transport oil
- Sound absorbing cabinet with resistant foam insulation to reduce pump noise
- Pump mounted on cushioned grommets to minimize vibration
- 2 Integrated fans maintain temperature inside cover
- LEDs and audible alarm if temperature exceeds 35°C limit
- Maximum ambient temperature of 35°C when airflow is neither restricted nor recycled
- Standard one-year warranty; installation and familiarization included with new LC/MS orders

The Quiet Cover II is compatible with these Agilent LC/MS Systems that use Edwards pumps:

- 6300 Traps: G2440DA, G2451AA, G4533AA, G2474SS
- 6410 QQQ: G6410AA
- 6210 TOF: G3250AA, G3252A
- 6510AA Q-TOF: G6510AA
- Any analytical system using BOC Edwards pumps (lbs/kg): E2M28, E2M18, E1M18

Please confirm rough pump used in your Agilent LC/MS system to ensure compatibility.

Quiet Cover II for Agilent LC/MS Systems

Description	Part No.
Quiet Cover II for Agilent LC/MS Systems 12.5 W x 17.3 H x 33.5 L	G3199B

LC/MS Standards Kits

LC/MS Standards Kits

Description	Part No.
Caffeine standards kit for LC/MS OQ/PV Includes 5 ampoules, 5 mL each: 0.5, 1.0, 5.0, 25.0, and 50.0 µg/mL in water	8500-6917
Caffeine standards kit for LC/MS-Trap OQ/PV Includes 5 ampoules, 5 mL each: 0.1, 0.5, 1.0, 5.0, 10.0, µg/mL caffeine in water	5065-9908
Sulfa drug standards kit for LC/MS OQ/PV 5 x 2 mL ampoules with 4 sulfa drugs in water/methanol 70:30	5188-6523

LC/MS Analyzer Kit Standards

Description	Part No.
LC/MS toxicology calibration mixture, 3 x 1 mL ampoules	5190-0470
Method EN12916/IP391 LC standard calibration kit, 4 x 1 mL ampoules	5190-0484
Method EN12916/IP391 system calibration standard kit, 2 x 1 mL ampoules	5190-0485
LC TOF/QTOF/QQQ pesticide test mixture, 2 solutions, 3 x 1 mL ampoules of each	5190-0469

LC/MS Calibrant Mixes

Description	Part No.
ESI tuning mix, 100 mL	G2421A
APCI/APPI calibrant solution, 100 mL	G2432A
ESI tuning mix for ion trap, 100 mL	G2431A
ES-TOF tuning mix, 100 mL	G1969-85000
APCI-L low concentration tuning mix, 100 mL	G1969-85010
MMI-L low concentration tuning mix, 100 mL	G1969-85020

Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatographer.

For more information, visit www.agilent.com/chem/education



LC/MS Calibrant Mix and Source Compatibility Matrix

Source	6100 Series Single Quadropole LC/MS*	6140A/6150B Single Quadropole LC/MS	6200 Series TOF LC/MS	6300 Series Ion Trap LC/MS	6400 Series Triple Quadropole LC/MS	6500 Series Accurate-Mass Q-TOF LC/MS
ESI	G2421A	G1969-85000	G1969-85000	G2431A	G1969-85000	G1969-85000
APCI	G2432A	G1969-85010	G1969-85010	G2432A	G1969-85010 ²	G1969-85010 ²
APPI	G2432A	G2432A	G1969-85010	G2432A	G2432A ²	G1969-85010 ²
MMI	G2432A	G1969-85000	G1969-85020	G2432A	G1969-85020	G1969-85020
NanoESI			G1969-85000 ⁴	G2431A		G1969-85000 ⁴
HPLC chip cube		G1969-85000 ²	G1969-85000 ⁴	G2431A ¹	G1969-85000 ³	G1969-85000 ⁴

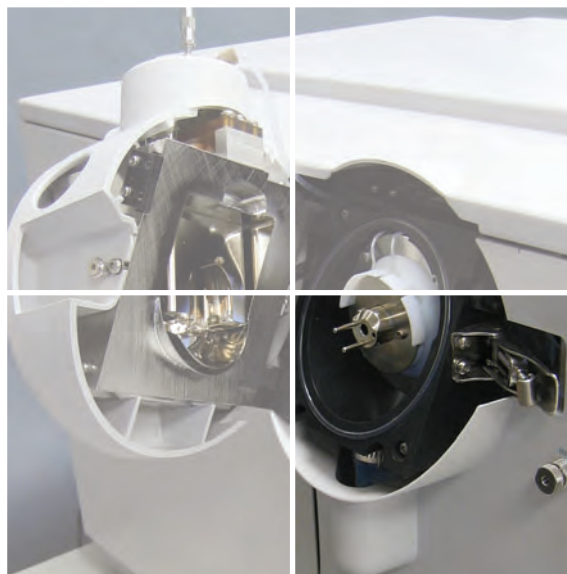
*G6110A, G6120A/B, G6130A/B

¹5X dilution suggested

²No autotune

³ESI positive tune only

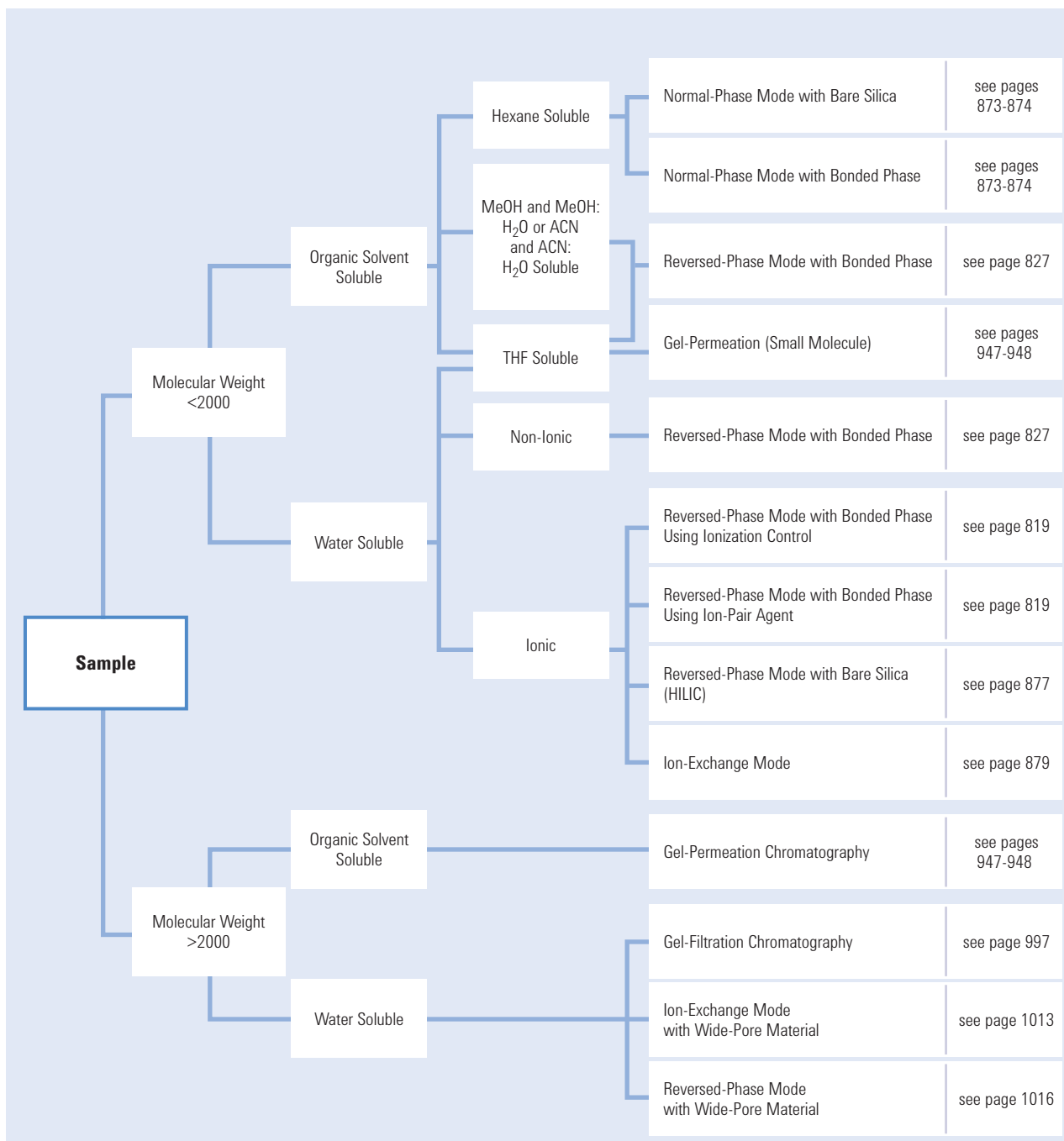
⁴Calibration only



LC and LC/MS Columns

HPLC Column Selection

To use the column selection guide diagram below, simply follow the path for your analyte and mobile phase. At the far right, follow your final column selection to the pages indicated.



Adapted with permission from "Practical HPLC Methodology and Applications," Brian A. Bidlingmeyer, John Wiley & Sons, Inc., New York, p. 109

Column and Mobile Phase Guidelines: Reversed Phase

HPLC columns consist of two parts: the column chemistry and hardware. For the proper column chemistry, consult the catalog section for each type of bonded phase. For choosing column hardware and particle sizes, consult the section on column sizes and rapid separations, including Agilent ZORBAX Rapid Resolution HT, Solvent Saver, Capillary and PrepHT columns.

Pore Size Selection

Choose a column packing with small pore (60-120Å) if the solute molecular weight is less than about 5000. Otherwise, use column packing with the 300Å pore size.

Particle Size Selection

The typical particle size for HPLC columns is 5 µm with 3.5 µm and smaller now common in method development. If high-speed analyses or higher resolution analyses are required, packing with 1.8 µm and 2-3 µm particles can be used. Shorter columns with these particles can produce faster high-resolution separations, with the 1.8 µm particle size providing the highest efficiency and 2.7 µm superficially porous providing similar results. With 1.8, 2.7, 3.5 and 5 µm particle sizes to choose from, start with the smallest particle size for your HPLC or UHPLC – 400 bar, 600 bar, or 1200 bar – to achieve the best results.

Column Configuration

Choosing the best column size for method development has changed dramatically in the past few years. Smaller 3.0 mm ID or 2.1 mm ID columns are now used more than 4.6 mm ID to lower solvent use and achieve compatibility with MS detectors. And shorter 50, 75 and 100 mm long columns can be a great starting choice, with longer columns used only when more resolution is needed or when 3.5 and 5 µm particle sizes are used.

Silica Type and Bonded Phase

Base Material

The base material for an LC column is most often high purity silica material with totally porous particles such as that used in most Agilent ZORBAX columns. However, more choices are available, including polymer material with high pH stability used in PLRP-S columns and superficially porous silica particles such as those used in Poroshell 120 columns. The high purity Type B silicas, including the ZORBAX Rx-Sil used in ZORBAX Eclipse Plus, and superficially porous Poroshell 120, are an excellent first choice for most methods. Type A silicas, such as ZORBAX SIL, used in Original ZORBAX columns, are still manufactured and used in many methods.

Bonded Phase

A good first choice for bonded phase is C18 or C8, and the recommended starting column choices are Eclipse Plus C18 or Poroshell 120 EC-C18. These two choices provide excellent peak shape and can be used over the pH range 2-9, accommodating most typical LC and LC/MS mobile phases. If the sample solutes of interest are not adequately separated on these columns, CN and Phenyl columns – including Phenyl, Phenyl-Hexyl and Diphenyl – may offer significant differences in selectivity from straight-chain alkyl phases to effect the separation.

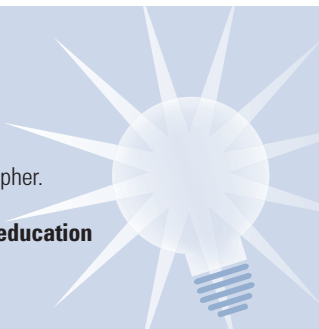
pH and Mobile Phase

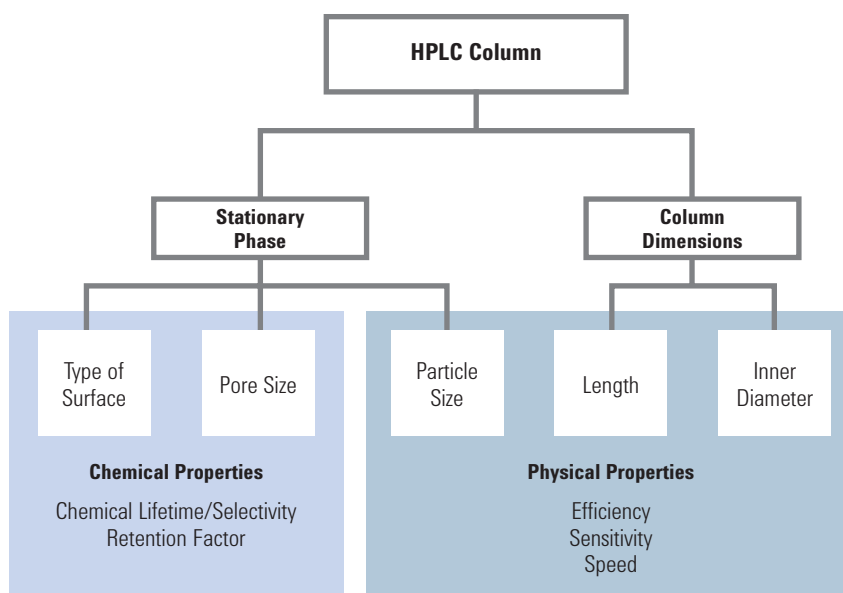
The choice of mobile phase for a reversed-phase system starts with selecting the organic modifier. Acetonitrile is the most commonly used organic modifier. However, selectivity differences and sample retention will vary significantly among mobile phases containing acetonitrile, methanol, and tetrahydrofuran (THF). Sample solubility is likely to differ in such solvents and dictate use of a specific solvent or solvents. UV detection at certain wavelengths is not possible with certain modifiers (e.g., methanol at 200 nm).

Tips & Tools

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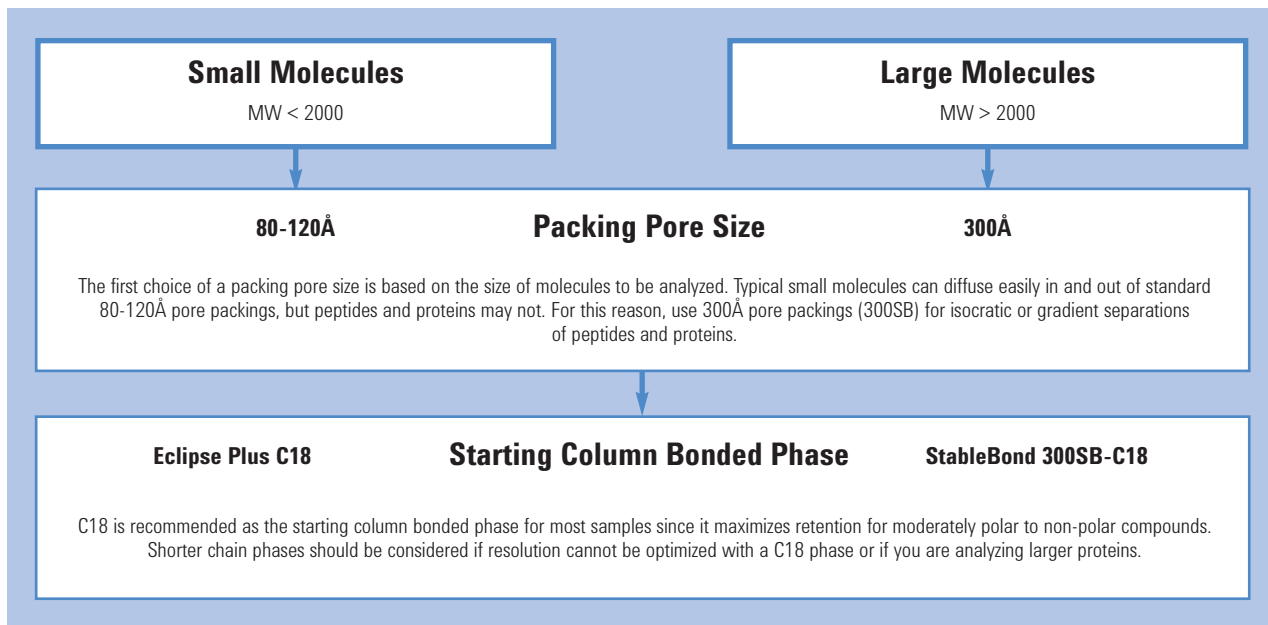


Column Choice Relative to Application Objective

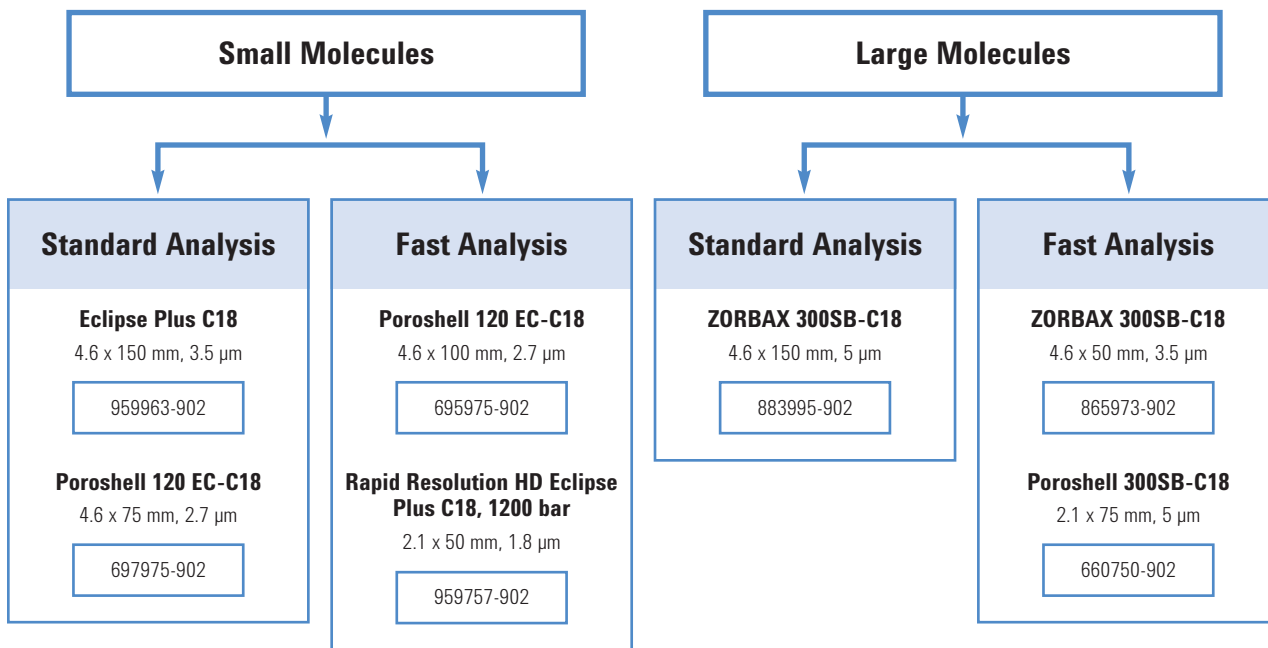
Application	Objective Column Diameter (mm)
Very high sensitivity, LC/MS, peptides and proteins	0.1, 0.075
Very high sensitivity, limited sample, LC/MS, peptides and proteins	0.3, 0.5
High sensitivity, limited sample, LC/MS	1.0
Save solvent; special low-volume instrumentation is available	2.1
Special detectors, e.g., mass spec	2.1
High sensitivity, limited sample	2.1
Save solvent; standard HPLC equipment available, LC/MS	3.0
Standard separations	4.6
Small-scale (mg) preparative separations	9.4
Large-scale preparative separations (100 mg-gram)	21.2
Large-scale preparative separations (up to 100 mg-gram)	30, 50

Consult the Column Hardware section for guard column configurations

Recommended Column Choices for Method Development



Starting Column Choices



USP Designations

The US Pharmacopeia (USP) is a standard source for many pharmaceutical methods that specifies columns by packing materials rather than by manufacturer. Listed below are the recommended Agilent Technologies HPLC columns suitable for most LC methods listed with the USP.

USP Method	USP Packing Materials	Column	Particle Size (µm)	Page No.
L1	Octadecyl silane chemically bonded to porous silica or ceramic micro-particles, 1.5 to 10 µm in diameter	Poroshell 120 EC-C18	2.7	822
		Poroshell 120 SB-C18	2.7	822
		ZORBAX Eclipse Plus C18	1.8, 3.5, 5	827
		ZORBAX Eclipse XDB-C18	1.8, 3.5, 5, 7	831
		ZORBAX SB-C18	1.8, 3.5, 5, 7	838
		ZORBAX Rx-C18	3.5, 5	854
		ZORBAX Extend-C18	1.8, 3.5, 5, 7	850
		ZORBAX ODS	3.5, 5, 7	870
		ZORBAX ODS classic	5	870
		Pursuit XRs C18	3, 5, 10	862
		Pursuit C18	3, 5, 10	860
		Polaris C18-A	3, 5, 10	867
		Polaris C18-Ether	3, 5	867
		SepTech ST60 C18	10	928
SepTech ST150 C18	10	928		
L2	Octadecyl silane chemically bonded to porous silica gel of a controlled surface porosity that has been bonded to a solid spherical core, 30 to 50 µm in diameter	N/A		
L3	Porous silica particles, 5 to 10 µm in diameter	ZORBAX SIL	5	873
		ZORBAX Rx-Sil	3.5, 5	873
		Pursuit XRs Si	3, 5, 10	862
		Polaris Si-A	5, 10	867
		MicroSpher Si	5	
		Microsorb 100 Si	5	
L4	Silica gel of controlled surface porosity bonded to a solid spherical core, 30 to 50 µm in diameter			
L5	Alumina of controlled surface porosity bonded to a solid spherical core, 30 to 50 µm in diameter	N/A		
L6	Strong cation-exchange packing: sulfonated fluorocarbon polymer coated on a solid spherical core, 30 to 50 µm in diameter	N/A		

(Continued)

USP Method	USP Packing Materials	Column	Particle Size (µm)	Page No.
L7	Octyl silane chemically bonded to totally porous microsilica particles, 1.5 to 10 µm in diameter	Poroshell 120 EC-C8	2.7	822
		ZORBAX Eclipse Plus C8	1.8, 3.5, 5	827
		ZORBAX Eclipse XDB-C8	1.8, 3.5, 5, 7	831
		ZORBAX SB-C8	1.8, 3.5, 5, 7	838
		ZORBAX Rx-C8	1.8, 3.5, 5, 7	854
		ZORBAX C8	5	870
		Pursuit XRs C8	3, 5, 10	856
		Pursuit C8	3, 5, 10	856
		Polaris C8-A	3, 5	865
		Polaris C8-Ether	3, 5	865
		Microsorb 100 C8	5	
L8	An essentially monomolecular layer of aminopropylsilane chemically bonded to totally porous silica gel support, 10 µm in diameter	ZORBAX NH2	5	873
		Polaris NH2	5	865
		Microsorb 100 Amino	5	
L9	10 µm irregular, totally porous silica gel having a chemically bonded, strongly acidic cation exchange coating	ZORBAX SCX	5 spherical	879
L10	Nitrile groups chemically bonded to porous silica particles, 3 to 10 µm in diameter	ZORBAX CN	5	873
		ZORBAX SB-CN	3.5, 5	838
		ZORBAX Eclipse XDB-CN	3.5, 5	831
		Microsorb 100 Cyano	5	
L13	Trimethylsilane chemically bonded to porous silica particles, 3 to 10 µm in diameter	ZORBAX TMS	5	
L14	Silica gel 10 µm in diameter with a chemically bonded, strongly basic quaternary ammonium anion exchange coating	ZORBAX SAX	5	879
		IonoSpher A		
L15	Hexyl silane chemically bonded to totally porous silica particles, 3 to 10 µm in diameter	MetaSil C6		
L16	Dimethyl silane chemically bonded to totally porous silica particles, 3 to 10 µm in diameter	N/A		
L17	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 7 to 11 µm in diameter	Hi-Plex H	8	881
L18	Amino and cyano groups chemically bonded to porous silica particles, 5 to 10 µm in diameter	N/A		
L19	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the calcium form, 9 µm in diameter	Hi-Plex Ca	8	881
		Hi-Plex Ca (Duo)	8	881
L20	Dihydroxypropane groups chemically bonded to porous silica particles, 3 to 10 µm in diameter	LiChrospher Diol	5	

(Continued)

USP Method	USP Packing Materials	Column	Particle Size (µm)	Page No.
L21	A rigid, spherical styrene-divinylbenzene copolymer, 5 to 10 µm in diameter	PLgel	3, 5, 10, 20	947
		PLRP-S 100Å	3, 5, 8	1027
		PLRP-S 300Å	3, 5, 8	1027
		PLRP-S 1000Å	5, 8	1027
L22	A cation exchange resin made of porous polystyrene gel with sulfonic acid groups, about 10 µm in size	Hi-Plex H	8	881
L23	An ion exchange resin made of porous polymethacrylate or polyacrylate gel with quaternary ammonium groups, about 10 µm in size	N/A		
L24	A semi-rigid hydrophilic gel consisting of vinyl polymers with numerous hydroxyl groups on the matrix surface, 32 to 63 µm in diameter	N/A		
L25	Packing having the capacity to separate compounds with a MW range from 1,000 to 5,000 da (as determined by the polyethylene oxide), applied to neutral, ionic and cationic water-soluble polymers	PL aquagel-OH	5, 8	974
L26	Butyl silane chemically bonded to totally porous silica particles, 5 to 10 µm in diameter	MicroSorb C4	5	
L27	Porous silica particles, 30 to 50 µm in diameter	Bondesil Silica		204
L28	A multifunctional support, which consists of a high purity, 100Å, spherical silica substrate that has been bonded with anionic (amine) functionality in addition to conventional reversed-phase C8 functionality	N/A		
L29	Gamma alumina, reversed phase, low carbon percentage by weight, alumina-based polybutadiene spherical particles, 5 µm diameter with a pore diameter of 80Å	N/A		
L30	Ethyl silane chemically bonded to a totally porous silica particle, 3 to 10 µm in diameter	N/A		
L31	A strong anion-exchange resin-quaternary amine bonded on latex particles attached to a core of 8.5 µm macroporous particles having a pore size of 2000Å and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene	N/A		
L32	A chiral ligand-exchange packing L-proline copper complex covalently bonded to irregularly shaped silica particles, 5 to 10 µm in diameter	N/A		
L33	Packing having the capacity to separate proteins by molecular size over a range of 4,000 to 400,000 da. It is spherical, silica-based, and processed to provide pH stability	ZORBAX GF-250	4	1001
		Bio SEC-3	3	997
		Bio SEC-5	5	999







(Continued)

USP Method	USP Packing Materials	Column	Particle Size (µm)	Page No.
L34	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the lead form, 9 µm in diameter	Hi-Plex Pb	8	881
L35	A zirconium-stabilized spherical silica packing with a hydrophilic (diol-type) molecular monolayer bonded phase	ZORBAX GF-250	4	1001
		ZORBAX GF-450	6	1001
L36	L-Phenylglycine-3,5-dinitrobenzoyl on 5 µm amino propyl silica	N/A		
L37	Polymethacrylate gel packing having the capacity to separate proteins by molecular size over a range of 2,000 to 4,000 da MW	N/A		
L38	Methacrylate-based size exclusion packing for water solubles	N/A		
L39	Hydrophilic polyhydroxymethacrylate gel of totally porous spherical resin	N/A		
L40	Cellulose tris-3,5-dimethylphenylcarbamate coated porous silica particles, 5 to 20 µm in diameter	N/A		
L41	Immobilized alpha-acid glyco-protein on spherical silica particles, 5 µm in diameter	N/A		
L42	Octylsilane and octadecylsilane groups chemically bonded to porous silica particles	N/A		
L43	Pentafluorophenyl groups chemically bonded to silica particles 5 to 10 µm in diameter	Pursuit PFP	3, 5	856
L44	A multifunctional support, which consists of a high purity, 60Å spherical silica substrate, that has been bonded with a cationic exchanger, sulfonic acid functionality in addition to a conventional reversed phase C8 functionality	N/A		
L45	Beta cyclodextrin bonded to porous silica particles, 5 to 10 µm in diameter	ChiraDex Chiral	5	915
L46	Polystyrene/divinylbenzene substrate agglomerated with quaternary amine functionalized latex beads, 10 µm in diameter	N/A		
L47	High capacity anion exchange microporous substrate, fully functionalized with a trimethyl-amine group, 8 µm in diameter	N/A		
L48	Sulfonated, cross-linked polystyrene with an outer layer of submicron, porous, anion-exchange microbeads, 15 µm in diameter	N/A		
L49	Amylose tris-3,5-dimethylphenyl-carbamate-coated, porous, spherical, silica particles, 5 to 10 µm in diameter	N/A		

(Continued)














USP Method	USP Packing Materials	Column	Particle Size (µm)	Page No.
L50	A strong cation exchange resin made of porous silica with sulfopropyl groups, 5 to 10 µm in diameter	ZORBAX 300SCX	5	879
L51	A reversed-phase packing made by coating a thin layer of polybutadiene on to spherical porous zirconia particles, 3 to 10 µm in diameter	N/A		
L52	Multifunction resin with reversed-phase retention and strong anion-exchange functionalities. The resin consists of ethylvinyl-benzene, 55% cross-linked with divinylbenzene copolymer, 3 to 15 µm in diameter, and a surface area of not less than 350m ² /g, substrate is coated with quaternary ammonium functionalized latex particles consisting of styrene cross-linked with divinylbenzene.	N/A		
L53	An anion-exchange resin consisting of rigid, spherical styrene-divinylbenzene copolymer with trimethylammonium groups at a loading of about 2 meq per g, 3 to 29 µm in diameter	Bio SAX	3, 5, 10	1006
L54	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the sodium form, about 7 to 11 µm diameter	N/A		
L55	Weak cation-exchange resin consisting of ethylvinylbenzene, 55% cross-linked with divinylbenzene copolymer, 3 to 15 µm diameter. Substrate is surface grafted with carboxylic acid and/or phosphoric acid functionalized monomers. Capacity not less than 500 µeq/column	N/A		
L56	Propyl silane chemically bonded to totally porous silica particles, 3 to 10 µm in diameter	SB-C3	3, 5	838
L57	A chiral-recognition protein, ovomucoid, chemically bonded to silica particles, about 5 µm in diameter, with a pore size of 120 angstroms	Ultron ES-OVM	5	913
L58	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the sodium form, about 6 to 30 µm in diameter	Hi-Plex Na Hi-Plex Na (Octo)	10 8	881 881
L59	Packing having the capacity to separate proteins by molecular weight over the range of 5 to 7000 kDa. It is spherical (5-10 µm), silica-based, and processed to provide hydrophilic characteristics and pH stability	N/A		
L60	Spherical, porous silica gel, 10 µm or less in diameter, the surface of which has been covalently modified with alkyl amide groups and endcapped	Bonus-RP Polaris Amide-C18	1.8, 3.5, 5 3, 5	846 865

CARTRIDGE COLUMN SYSTEMS

Cartridge Selection Guide			
Icon*	Type of Cartridge	Features	Benefits
	Agilent HPLC Cartridge	Can reverse collets in the end fitting to add guard cartridges	Inexpensive Extends column lifetime Permits rapid column changes Can use 2, 3, 4 and 4.6 mm cartridges
		Cartridges have a unique filter and sieve at each end	Helps prevent blockage
	ZORBAX Guard Cartridge: Standalone system	High efficiency, standalone, low dead volume cartridge	Seals up to 400 bar
		Polymeric cartridge designed for leak-tight seals against metal surfaces	No gaskets required More solvent-resistant than PEEK
		Reusable fittings	Adapt for connections to 1/16 in. LC fittings
	ZORBAX Rapid Resolution and Rapid Resolution HT Cartridge Columns: 3.5 µm and 1.8 µm packings, standalone system	For high throughput LC/MS, LC/MS/MS and combinatorial separations	
		Packed with Eclipse XDB for pH use from 2-9	For all analyte types
		Packed with StableBond for low pH use Sold individually or as three-packs	Low bleed
	ZORBAX Semi-Preparative Guard HPLC Hardware Kit: Standalone system	Easy, low-dead-volume assembly	Seals up to 2000 psi (135 bar, 13.5 MPa)
		Tubing (polyphenylene sulfone) designed for leak-tight seals against metal surfaces	No gaskets required
		Reusable fittings	Adapt for connections to 1/16 in. LC fittings
	ZORBAX and Agilent Prep Preparative Cartridge Column and Guard HPLC System: Standalone and integral hardware options	Easy, low-dead-volume assembly	Extends column lifetime
		Reusable fittings	Permits rapid column changes
		Hardware options for integral and external guards	Can use with 21.2 and 30 mm ID columns
	ChromSep Column Hardware: Complete systems and replacement cartridges	Easy, no-dead-volume assembly	Economical format No tools required Modular flexibility

*Look for these icons on subsequent pages to help you select the proper guard cartridges and columns.

Cartridge/Guard Cartridge Systems Compatibility Guide*

Icon	Column Type	Guard Cartridge Holder	ID (mm)	Phases
	Cartridge column cartridge holder 5021-1845	Guard cartridge (internal system) cartridge holder 5021-1845	2.0 3.0 4.0 4.6	Asahipak LiChrospher Nucleosil Purospher Superspher ZORBAX
				
	Standard fitting	Column guard cartridge (standalone) cartridge holder 820999-901	2.1 3.0 4.6	ZORBAX
				
	Rapid Resolution cartridge holder 820555-901	No guard cartridge holder	4.6	ZORBAX
				
	Semi-preparative column	Semi-prep guard cartridge (standalone) cartridge holder 840140-901	9.4	ZORBAX
				
	PrepHT	Guard cartridge 820444-901	21.2	ZORBAX Agilent Prep
				

*Standalone guard cartridges fit all cartridge and standard fitting columns available from Agilent. All columns without icons are standard fitting columns.



Look for this icon identifying Agilent cartridge columns in column ordering tables

Cartridge Column Systems

Agilent offers a variety of popular HPLC packing materials in economical, easy-to-use cartridge configurations.

Agilent Cartridge System

Agilent's flexible cartridge system has been thoroughly tested to ensure that the design and hardware meet Agilent's quality standards. Finger-tight connections allow rapid column changes without removing capillaries from end fittings. The same convenient, easy-to-use cartridge holder accommodates 2, 3, 4 and 4.6 mm diameter cartridges of varying lengths. The cartridge columns have a unique filter and sieve at each end that help prevent blockage.

By reversing the collets in the end fitting, an inexpensive guard cartridge can be added to further extend column lifetime.



Guard cartridge installed



No guard cartridge installed

Hardware

Description	Unit	Part No.
Cartridge holder for 2, 3, 4 and 4.6 mm ID cartridges	2/pk	5021-1845
Replacement filters for 4 and 4.6 mm ID cartridges	10/pk	5063-6574
Replacement filters for 2 and 3 mm ID cartridges	10/pk	5063-6519
Mounting tool for replacement filters		5021-1846
Replacement collets	2/pk	5021-1849

Tips & Tools

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This icon identifies standalone guard cartridges for ZORBAX analytical columns



ZORBAX High Performance Guard Cartridge

The ZORBAX High Performance Guard Cartridge series has been developed to provide convenient, cost-effective protection for high performance analytical columns. The cartridge components assemble quickly and easily to provide a high efficiency, low dead volume column that seals, with hand tightening, up to 5000 psi (340 bar) or 3000 psi with a PEEK fitting.

The reusable guard column end fitting with integrated 1/16 in. OD tubing adapts the cartridge guard column for direct connection to standard 1/16 in. LC fittings and provides a standalone guard column system for 2.1 to 4.6 mm ID columns. There are two different end fitting options to allow the use of other connecting tubing.

The polymeric guard cartridges used in this holder are specifically designed to make leak-tight seals against metal surfaces without requiring gaskets. This polymeric material (polyphenylenesulfone) is also more solvent resistant than PEEK.

Guard cartridges are available for almost every ZORBAX bonded phase and can be found in the ordering information for each type of column.

Hardware

Description	Part No.
Guard fittings kit Includes low-volume guard holder, inlet end fitting (2), outlet end fitting with integrated column connector, and PEEK fingertight fitting	820999-901
Inlet end fitting, also used as alternate outlet end fitting	820340-001
Exit end fitting with integrated column connector	820345-001
1/16 in. finger-tight PEEK fitting, 2/pk	0100-1516
Perfluoro-Elastomer Seals, 2/pk	820370-901



Rapid Resolution and Rapid Resolution HT Cartridge Columns are marked with this icon



Rapid Resolution and Rapid Resolution HT Cartridge Column System (400 bar)

For fast, clean high throughput LC/MS, LC/MS/MS and combinatorial separations, we recommend ZORBAX Rapid Resolution (3.5 μm) and Rapid Resolution HT (1.8 μm) Cartridge Columns. These cartridges are packed with ZORBAX Eclipse and StableBond bonded phases that provide excellent separations.

Cartridge dimensions are 4.6 x 15 mm, 4.6 x 30 mm or 4.6 x 50 mm and 2.1 x 15 mm, 2.1 x 30 mm or 2.1 x 50 mm. All 15 and 30 mm cartridges are available in both Eclipse and StableBond phases in both the 3.5 μm and the very high efficiency 1.8 μm particles. The 1.8 μm particles are available as 50 mm cartridges and as 50 mm columns with fixed endfittings. Choose the Eclipse XDB bonded phases for most methods and when using LC/MS mobile phase additives such as formic acid or acetic acid. The StableBond phases are ideal for different selectivity and for long lifetime with TFA-containing mobile phases. Additional bonded phases can be packed upon request.

These economical and easy-to-use cartridge columns are offered individually and in convenient three-packs.

One cartridge holder kit includes all components for use with Rapid Resolution or Rapid Resolution HT columns.

Hardware

Description	Part No.
Hardware Kit for RR and RRHT Cartridges Includes cartridge holder 15 mm, cartridge holder 30 mm, cartridge holder 50 mm (1 ea), and end fitting assemblies (2)	820555-901
Cartridge holder, 15 mm	820315-015
Cartridge holder, 30 mm	820330-030
Cartridge holder, 50 mm	820320-050
Perfluoro-Elastomer Seals, 2/pk	820370-901
End fitting assembly, two required for one system	820311-001

P

This icon identifies preparative guard columns



Preparative guard system

ZORBAX Semi-Preparative Guard Column Hardware Kit

The ZORBAX Semi-Preparative Guard Column has been developed to provide convenient, cost-effective protection for high-performance lab-scale semi-preparative columns. The cartridge components assemble quickly and easily to provide a high-efficiency, low-dead-volume column that seals at pressures up to 2000 psi (135 bar, 13.5 MPa).

The guard column housing made from polyphenylene sulfone is specifically engineered to make leak-tight seals against metal surfaces, without requiring gaskets. The reusable guard-column end fittings adapt the cartridge guard column for connection to standard 1/16 in. LC fittings and provide a standalone guard column system. The ZORBAX materials used in preparative cartridges are matched with chemistry chosen for compatibility with a wide range of applications.

Hardware

Description	Part No.
Preparative guard column hardware kit*	840140-901
Includes inlet fitting, outlet end fitting, column connector	

*The semi-preparative guard column hardware is available only as a kit.



This icon identifies prep preparative cartridge and guard columns



Guard Cartridge, 820444-901



Prep external guard hardware kit, assembled, 420420-901

ZORBAX PrepHT and Agilent Prep Preparative Cartridge and Guard Column Hardware

The ZORBAX PrepHT and Agilent Prep Preparative Cartridge and Guard Column hardware kits have been developed to provide a convenient preparative 21.2 mm ID cartridge design. The 21.2 mm ID preparative cartridge columns (actual ID 17 mm to fit into holder) are reusable and allow rapid change of column lengths from 50 to 250 mm for optimizing sample loadability. This easy-to-use cartridge hardware design is used for both ZORBAX PrepHT and Agilent Prep materials and can be finger-tightened up to 5000 psi (350 bar).

The cartridge hardware can be used standalone or with an integral guard column. The integral guard column holder is a stainless steel body and is used with a PTFE sealing gasket to ensure a tight, leak-free and extremely low-dead-volume seal against the 21.2 mm ID cartridge body. The external guard system seals finger-tight up to 2000 psi (135 bar). The reusable guard holder is ready-to-use with standard 1/16 in. LC fittings. Both ZORBAX and Agilent Prep guard cartridges are available to use with this holder and are selected to match the preparative column used in the application.

The 21.2 mm ID guard columns can be used with 30 mm ID Agilent Prep columns. For this application, select the external preparative guard column hardware kit.

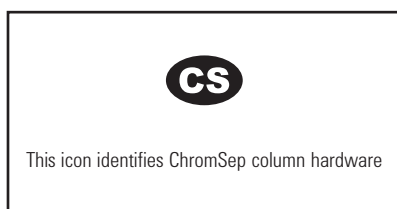
PrepHT Columns are easy to use



PrepHT cartridge columns have a unique design that makes them easy to install and seal finger-tight up to 5000 psi. The cartridge design allows for an integral guard column to be used, which prolongs the life of the purification column. This cartridge configuration is economical to use since the column cartridge and/or the guard cartridges are replaced independently. The end fittings are used many times.

Hardware

Description	Part No.
PrepHT cartridge column hardware Includes cartridge column end fittings (2), polymeric seals (2)	820400-901
PrepHT guard column hardware kit Includes guard column end fitting, polymeric seal, and seal insertion tool (seal holder and seal pusher)	820444-901
Agilent Prep external guard hardware kit, Includes guard holder, guard column end fitting, polymeric seal (2), seal insertion tool, and connector tubing	420420-901
Replacement polymeric seals, 2/pk	820385-901

**ChromSep HPLC Column Hardware**

The ChromSep system combines simplicity with extraordinary flexibility and considerable savings on column and operating costs. The ChromSep 316 stainless steel column-housing hardware is a durable one-time investment. Once you have purchased the complete basic system of a holder, analytical cartridge and guard column, you will only need to replace the cartridges or replacement guard columns, both of which are available in economical packages: 3-pack analytical column replacements and 5-pack guard column replacements for added value.

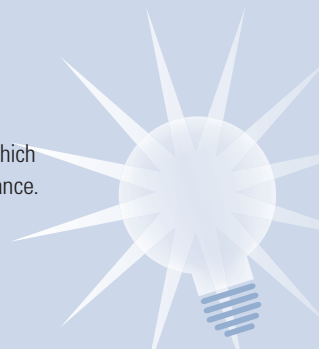
Unlike other modular column systems, ChromSep is extremely flexible. Column housings are available in lengths of 10, 30, 50, 100, 150 and 250 mm, and cartridges are available in various IDs ranging from 2 to 4.6 mm. You can use any combination of cartridge columns to match the column length with the separation you need and minimize your analysis time.

Tips & Tools

Guard columns and filters help protect your column and instrument from particulates that can cause blockages, which increase system pressure and negatively impact performance.

Learn more about this common problem at

www.agilent.com/chem/lctroubleshooting



HPLC Column Protection

Column Protection

Guard columns and in-line filters are inexpensive and easy-to-use tools for column protection. They can improve the accuracy of your results and improve analytical column lifetime while enhancing reliability. Column protection is available for all sizes of columns with any particle size packed into the column.

Guard Columns

Guard columns provide protection against contamination with minimal impact on column efficiency. Prepacked ZORBAX cartridge columns are available for most types of ZORBAX material. Guard cartridges are available in different internal diameters to provide high efficiency protection to all types of columns. Guard columns are also available for many non-Zorbax columns. See the respective column listings for available guard columns.

Low Volume In-line Filters

Low volume in-line filters are recommended for every column and provide column protection from particulate materials. An in-line filter will increase analytical column lifetime by preventing particulates (from unfiltered samples and/or eluents) from plugging the analytical column frit. Using guard columns can compromise the efficiency of very low volume columns and/or columns with very small particle sizes. For these columns, low volume in-line filters are strongly recommended. A small, 0.5 μm frit should be used to maximize column efficiency.

Replacement Column Inlet Frits

If HPLC columns are used without a guard column on in-line precolumn filters, the analytical column may become plugged. Due to the high efficiency packing processes used today, replacing the column inlet frit is discouraged. Column efficiency may be compromised if the frit is replaced. PEEK-encapsulated replacement frits are available for ZORBAX columns packing in 2.1, 3.0, 4.6, and 9.4 mm standard column hardware.

Replacement Inlet Frits (PEEK Encapsulated) for Standard Hardware Columns

Description	Diameter (mm)	Unit	Part No.
Narrow Bore	2.1	10/pk	280959-904
Solvent Saver	3.0	1/ea	280959-006
Analytical	4.6	10/pk	280959-905
Semi-Preparative	9.4	1/ea	280959-001

Agilent ZORBAX Silica

ZORBAX Silica Manufacturing Process – the Making of a Rugged, High-Purity Silica

All Agilent ZORBAX columns are built from porous silica microspheres (PSM) based on silica sols. The silica particle is made of tiny, solid sol microparticles agglutinated in a patented polymerization process, then fused together at very high temperatures to form the final particle (Figure 1). These strong, durable silica particles are called ZORBAX Rx-SIL or ZORBAX SIL and are the base silicas for ZORBAX columns.

The ZORBAX Rx-SIL process produces ultra-pure (99.995%) particles, with very low metal content. The final silica particle is fully hydroxylated and of low acidity. The Rx-SIL process also allows careful and reproducible control of pore size and particle size. These key features – purity (low acidity), strength, and careful control of pore and particle size – are critical to excellent chromatographic results and are the building blocks of superior ZORBAX bonded phases.

The table compares the processes used to make the ZORBAX Rx-SIL particles to a second process – the Xerogel process – commonly used to make silica particles for HPLC columns. To produce silica with the key features that maximizes chromatographic performance – purity, strength, controlled pore and particle size, plus higher pH resistance – the Agilent ZORBAX process is an excellent choice.

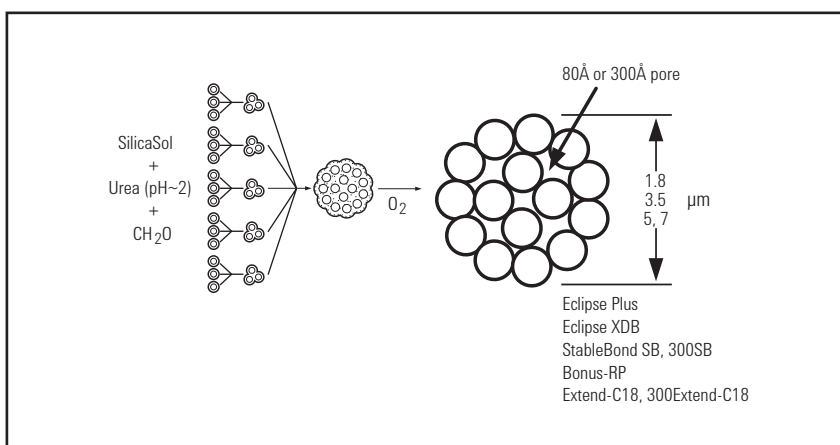
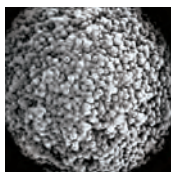
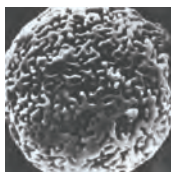


Figure 1. Formation of ZORBAX porous silica particles



ZORBAX Rx-SIL uniform sub particles



Xerogel "sponge-like" polymeric network

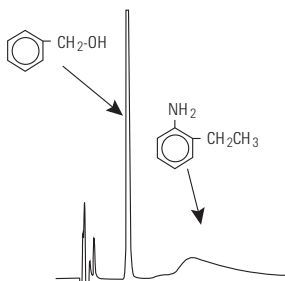
Characteristics of ZORBAX Rx-SIL and a Contrasting Type of Silica

Structure	ZORBAX Rx-SIL (Sol-type)	Xerogel (SIL-type)
Purity	High (99.995%)	Low to High
Strength	High	Moderate
Pore Size, Particle Size Distribution	Narrow	Broad
Pore Size/Surface Area	80Å/180 m ² /g	100Å/300 m ² /g
Porosity (%)	60	70
High pH Resistance	Good	Poor

The Benefit of Silica Purity – Reduced Peak Tailing

Peak tailing of basic compounds can be a major chromatographic problem. Peak tailing reduces chromatographic efficiency and the accuracy and precision of results. The major cause of peak tailing is interactions between analytes and the silica surface (Figure 2). Typically the presence of acidic silanol sites on the silica surface cause this type of peak tailing. Trace metals in silica increase silanol acidity and peak asymmetry. These silanol interactions are reduced or eliminated by choosing a less acidic, ultra pure (99.995%) silica, such as ZORBAX Rx-SIL. The improvement in chromatography is dramatic. Figure 3 shows the reduction in peak tailing for a basic analyte using ZORBAX Rx-SIL versus a more acidic silica.

Original ZORBAX SIL (1973)



Highly Purified ZORBAX Rx-SIL

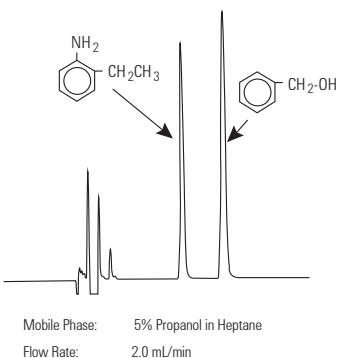


Figure 3. Chromatographic improvement using highly purified ZORBAX Rx-SIL

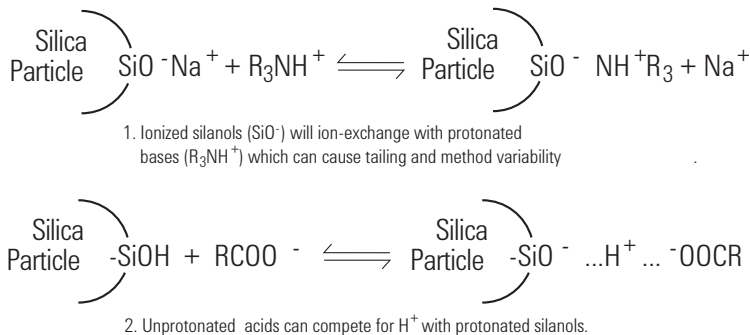


Figure 2. Potential secondary interactions with silica silanols and ionizable compounds

The Benefits of Strong Particles – Greater Efficiency and Durability

During the silica manufacturing process, the agglutinated sol particles are sintered for increased strength. This improved mechanical stability allows ZORBAX columns to be packed at high pressures when needed – up to 14,000-15,000 psi. This results in a packed column with an exceptionally stable column bed that will not compress under normal or even high operating pressures – up to 18,000 psi (1200 bar). This packed bed stability increases column lifetime using ZORBAX 1.8, 3.5, 5 or 7 μm particles. When ZORBAX Rapid Resolution HD or HT 1.8 μm and Rapid Resolution 3.5 μm silica particles are used as the underlying support, high speed, high efficiency chromatography is possible without compromising column lifetime.

The Benefits of Careful Pore Size and Particle Size Control – High Efficiency and Better Reproducibility with More Column Choices

Accurate and closely monitored particle and pore size control for ZORBAX Rx-SIL produces reproducible retention behavior from column-to-column and lot-to-lot. The narrow, consistent particle size distribution of ZORBAX Rx-SIL particles maximizes efficiency and column bed stability. Column pressure is never unusually high due to "fines" – smaller particles at the low end of the particle size distribution. Accurate and precise control of particle size allows specific 1.8, 3.5, 5 and 7 μm particles to be produced. The small 3.5 μm and 1.8 μm particle sizes are the basis for the Rapid Resolution and Rapid Resolution HD and HT, high-speed analysis columns designed to maximize resolution in shorter column lengths – ideal for LC/MS or any application demanding shorter analysis times. The 5 μm particles are an industry standard and provide high resolution in a wide variety of column dimensions. This particle size also provides high efficiency in a short preparative configuration – the PrepHT column – because careful particle size control means consistent pressure expectations within normal operating limits. The 7 μm particle size provides the ideal balance between efficiency and operating pressure for longer preparative columns.

ZORBAX Rx-SIL – The Foundation for Many Bonded Phases

With such strong performance characteristics, ZORBAX Rx-SIL particles have been developed into many effective bonded phases for solving key analytical problems. These include columns that can be used at extremes of pH, unmatched by any other silica-based columns. Because silica-based columns have different limitations at low and high pH, specific bonded-phase chemistries are required to provide longer column life over different pH ranges. As a result, Agilent ZORBAX RP-HPLC bonded phases are designed to give extended column lifetime and reproducibility in the pH ranges that provide optimum and long-lasting resolution, all starting with high performance ZORBAX Rx-SIL.

■ AGILENT COLUMNS FOR ANALYTICAL HPLC

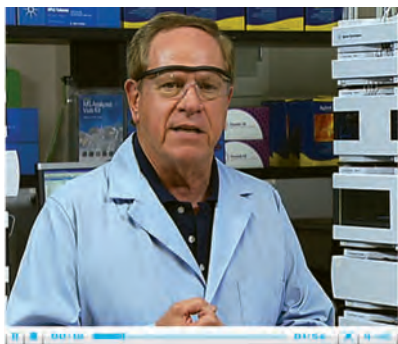
Achieve excellent peak shape and resolution – and eliminate "false starts"

Good news for analysts who do not have time to "make columns work" for a particular application: Agilent columns let you choose the right column based on your sample and mobile phase – eliminating any guesswork.

Additionally, Agilent's ZORBAX silica is manufactured by Agilent – not purchased from outside suppliers. And that means we control every step of the manufacturing process, ensuring lot-to-lot consistency, superior performance, and long-term, reliable results.

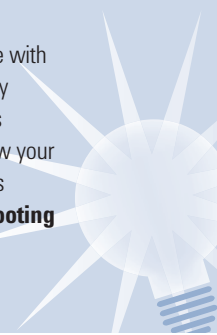
In this section, you will find a diverse range of columns designed for optimum resolution over a wide pH range, including:

- Poroshell 120 HPLC Columns
- ZORBAX Reversed-Phase HPLC Columns
- Pursuit HPLC Columns
- Polaris HPLC Columns
- ZORBAX Normal-Phase HPLC Columns
- ZORBAX and Hi-Plex Ion Exchange HPLC Columns
- ZORBAX Method Development and Validation Kits



Tips & Tools

All ZORBAX and Poroshell conventional columns (non-cartridge) come with a QC chromatogram. Run a standard sample of QC components or key analytes from your lab on each new column before use, and keep this chromatogram in your log book. Periodically re-run this test to see how your column has aged. Learn how this can help with troubleshooting issues by watching the videos at www.agilent.com/chem/lctroubleshooting



Agilent Reversed-Phase Columns

The following table summarizes the unique bonding chemistry of ZORBAX RP-HPLC columns. Each is designed for long column lifetime and resolution that lasts.

Agilent RP-HPLC Column Chemistry

Modern Columns*	Silica Type	Particle Type	Endcapping	Side Group Structure on Silane	Polar Group	Page No.
Poroshell 120 EC	B	Superficially porous	Double	Dimethyl	None	822
Poroshell 120 SB	B	Superficially porous	None	Diisobutyl	None	822
Eclipse Plus	B	Totally porous	Double	Dimethyl	None	827
Eclipse XDB	B	Totally porous	Double	Dimethyl	None	831
StableBond	B	Totally porous	None	Diisopropyl (C8, C3, CN, phenyl), diisobutyl (C18)	None	838
Bonus-RP	B	Totally porous	Triple	Diisopropyl	Amide	846
Extend-C18	B	Totally porous	Double	Unique bidentate structure	None	850
Rx-C18	B	Totally porous	None	Dimethyl	None	854
Pursuit	B	Totally porous	Single	Dimethyl	None	856
Pursuit XRs	B	Totally porous	Single	Dimethyl	None	862
Polaris A	B	Totally porous	Single	Dimethyl	Yes	865
Polaris Ether	B	Totally porous	Single	Dimethyl	Ether	865
Polaris Amide	B	Totally porous	Single	Dimethyl	Amide	925
Original ZORBAX Columns**						
ZORBAX	A	Totally porous	Single	Dimethyl	None	870
ZORBAX ODS Classic	A	Totally porous	None	Dimethyl	None	870

*Type B silica: low acidity, low metal content; these bonded phases use ZORBAX Rx-SIL

**Type A silica: more acidic, higher metal content

Quick Guide to Agilent Reversed-Phase Bonded Phases

Modern RP-HPLC Columns	Recommended Uses and Applications	Page No.
Poroshell 120	<ul style="list-style-type: none"> • Superficially porous particles for high efficiency at low pressure • Sub-2 μm efficiency with a 2.7 μm particle • Endcapped and non-endcapped C18 and C8 phases for selectivity optimization • Compatible with 400 bar and 600 bar LC's 	822
Eclipse Plus	<ul style="list-style-type: none"> • Excellent first choice for method development • Long life from pH 2-9 for reliable separations of basic, acidic and neutral compounds • Superior peak shape with basic compounds • High resolution and efficiency with 1.8, 3.5 and 5 μm columns • Rigorous QA/QC testing for greater long-term reproducibility 	827
Eclipse XDB	<ul style="list-style-type: none"> • Four selectivity choices for flexible method development • High performance over a wide pH range (2-9) • Good peak shape for acids, bases and neutrals • Long lifetime with extra dense bonding and double endcapping • Fast, ultra-fast, and high resolution separations using 1.8 and 3.5 μm columns • Choices from capillary to prep 	831
StableBond (SB)	<ul style="list-style-type: none"> • Basic, acidic, neutral compounds • Exceptional stability at low pH (1-2) • Use of high temperature (up to 90°C for C18, 80°C for C8, C3, Phenyl, CN, and Aq) and low pH as an added selectivity tool • Widest selection of bonded phases for different selectivity (C18, C8, C3, CN, Phenyl, Aq) • Uses mobile phases for LC/MS with formic acid, acetic acid, or TFA • Uses mobile phases with TFA for peptide and protein separation • Rapid separations using 1.8 and 3.5 μm columns 	838
Bonus-RP	<ul style="list-style-type: none"> • Separating basic compounds in higher aqueous mobile phases • General separation of basic, neutral, acidic compounds at mid-range pH or low pH; especially stable at low pH • Separating peptides for different selectivity • Rapid separations using 3.5 μm columns 	846

(Continued)

Quick Guide to Agilent Reversed-Phase Bonded Phases

Modern RP-HPLC

Columns	Recommended Uses and Applications	Page No.
Extend-C18	<ul style="list-style-type: none"> Separating basic compounds above their pKa in free base form; separation of basic, acidic, neutral compounds at high pH; up to pH 11.5 Uses ammonium hydroxide as mobile phase additive with LC/MS with small molecules or peptides Separating at high, mid-range and low pH for selectivity changes Rapid separations using 3.5 μm columns 	850
ZORBAX Rx	<ul style="list-style-type: none"> General separation of basic, acidic and neutral compounds at low pH with different selectivity than SB columns Rx-C8 is the same as SB-C8 	854
Pursuit	<ul style="list-style-type: none"> Good separations of a wide range of analytes Diphenyl and Pentafluorophenyl bonded phases for unique selectivity 200Å pore size for separations of larger molecules 	856
Pursuit XRs	<ul style="list-style-type: none"> High carbon load for excellent retention and resolution Basic, acidic, and neutral compounds Unique diphenyl bonded phase for separations based on pi-pi selectivity 	862
Polaris A	<ul style="list-style-type: none"> Good for polar acids, polar bases and non-polar compounds High aqueous compatibility 	865
Polaris Ether	<ul style="list-style-type: none"> Additional selectivity for H-bond donors High aqueous compatibility No "phase collapse" 	865

Original ZORBAX

Columns	Recommended Uses and Applications	Page No.
ZORBAX	<ul style="list-style-type: none"> General separation of basic, acidic, neutral compounds at low pH with different selectivity than SB columns; higher number of active silanols than SB "Mixed mode" separation at more neutral pH values 	870
ZORBAX ODS Classic (non-encapped)	<ul style="list-style-type: none"> General separation of basic, acidic, neutral compounds at mid-range to low pH with different selectivity than SB or XDB columns 	870



Poroshell 120

- Up to 90% of the efficiency of sub-2 μm
- 2X the efficiency of 3.5 μm
- Up to 50% less pressure than sub-2 μm columns
- Ideal for use up to 600 bar for HPLC and UHPLC
- Three bonded phases with excellent selectivity and peak shape

Agilent Poroshell 120 columns are a 2.7 μm particle with a 1.7 μm solid core and 0.5 μm porous outer layer. This small particle size provides high efficiency, similar to sub-2 μm columns, but with 40-50% less pressure. These high efficiency, high resolution columns can be used on any type of LC. The porous outer layer and solid core limit diffusion distance and improve separation speed while the narrow particle size distribution improves efficiency and resolution. The solid core limits diffusion distance and improves separation speed. The columns can support high pressure and multiple columns can be used for the highest resolution and efficiency possible. The same principles are used in Poroshell 300 columns, ideal for fast, high resolution separations of biomolecules.

Column Specifications

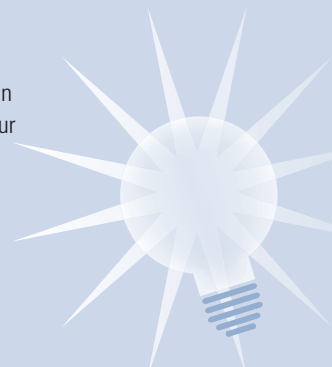
Bonded Phase	Pore Size	Temp. Limits	pH Range	Endcapped	Carbon Load
SB-C18	120Å	90°C	1.0-8.0	No	8%
EC-C18	120Å	60°C	2.0-8.0	Double	10%
EC-C8	120Å	60°C	2.0-8.0	Double	5%

Specifications represent typical values only.



Tips & Tools

Method transfer from a conventional 3.5 or 5 μm column is easy, and often requires only minor adjustments to your method and no revalidation. Learn more at www.agilent.com/chem/poroshell120video



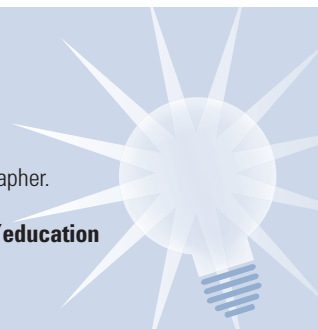
Poroshell 120

Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1	EC-C18 USP L1	EC-C8 USP L7
Analytical	4.6 x 150	2.7	683975-902	693975-902	693975-906
Analytical	4.6 x 100	2.7	685975-902	695975-902	695975-906
Analytical	4.6 x 75	2.7	687975-902	697975-902	697975-906
Analytical	4.6 x 50	2.7	689975-902	699975-902	699975-906
Analytical	4.6 x 30	2.7	681975-902	691975-902	691975-906
Solvent Saver	3.0 x 150	2.7	683975-302	693975-302	693975-306
Solvent Saver	3.0 x 100	2.7	685975-302	695975-302	695975-306
Solvent Saver	3.0 x 75	2.7	687975-302	697975-302	697975-306
Solvent Saver	3.0 x 50	2.7	689975-302	699975-302	699975-306
Solvent Saver	3.0 x 30	2.7	681975-302	691975-302	691975-306
Narrow Bore	2.1 x 150	2.7	683775-902	693775-902	693775-906
Narrow Bore	2.1 x 100	2.7	685775-902	695775-902	695775-906
Narrow Bore	2.1 x 75	2.7	687775-902	697775-902	697775-906
Narrow Bore	2.1 x 50	2.7	689775-902	699775-902	699775-906
Narrow Bore	2.1 x 30	2.7	681775-902	691775-902	691775-906

Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatographer.

For more information, visit www.agilent.com/chem/education



Superficially porous particles provide similar performance to sub-2 µm particles

This Van Deemter curve shows that Poroshell 120 – a superficially porous, 2.7 µm particle column – can deliver reduced plate heights similar to a 1.8 µm column for similar efficiency.

✕ **Agilent Poroshell 120 EC-C18**

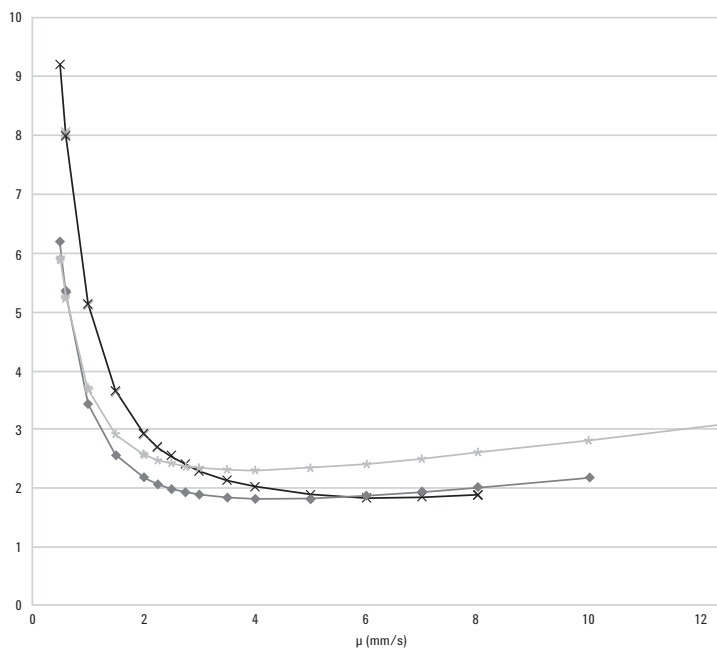
3.0 x 100 mm, 2.7 µm
(USCFX01009)
P/N 695975-302

◆ **Agilent ZORBAX Eclipse Plus C18**

3.0 x 100 mm, 1.8 µm
(USUYB01455)
P/N 959964-302

* **Agilent ZORBAX Eclipse Plus C18**

3.0 x 100 mm, 3.5 µm
(USUXV01435)
P/N 959961-302



UHPLC efficiency at HPLC pressures

Column A: Poroshell 120 EC-C18
695975-302
3 x 100 mm, 2.7 µm

Column B: Eclipse Plus C18
959964-302
3.0 x 100 mm, 1.8 µm

Mobile Phase: 60% Acetonitrile:40% Water

Flow Rate: 0.58 mL/min

Temperature: 60°C

Injection Volume: 4 µL

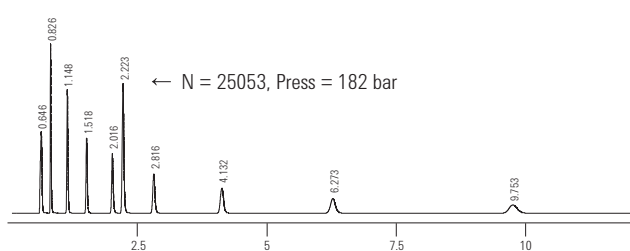
Detector: DAD Sig = 254,4 nm

Ref = 360,100 nm

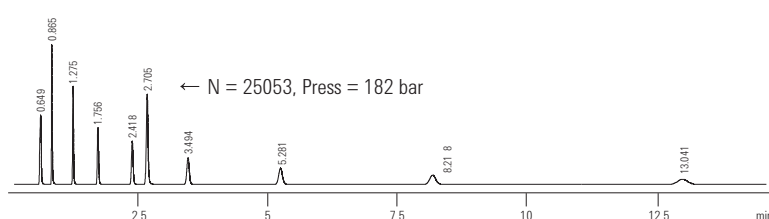
Sample: (PN 5188-6529) spiked w/50 µL

2 mg/mL Thiourea in
water/acetonitrile (65:35)

A Agilent Poroshell 120 EC-C18, 3.0 x 100 mm, 2.7 µm
PN 695975-302



B Agilent Eclipse Plus C18, 3.0 x 100 mm, 1.8 µm
PN 959964-302

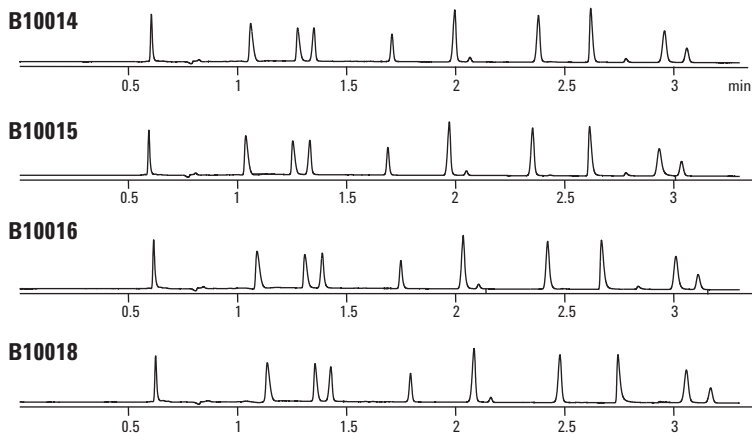


For this sample of neutral alkylphenones, the Poroshell 120 column delivered >90% of the efficiency attained by the 1.8 µm column. Also note that the pressure on the Poroshell 120 column is about 50% of the pressure on the 1.8 µm column.

The simpler the manufacturing process, the more consistent the column

A single-step shell process creates a highly reproducible column, as you can see in this lot-to-lot comparison.

Agilent Poroshell 120 EC-C18
4.6 x 100 mm, 2.7 μ m
P/N 695975-902 – from 4 Different Lots

**Poroshell 120 EC-C8 is less retentive for faster analysis of non-polar compounds**

Column A: Poroshell 120 EC-C18
699975-302
3 x 50 mm, 2.7 μ m

Column B: Poroshell 120 EC-C8
699975-306
3.0 x 50 mm, 2.7 μ m

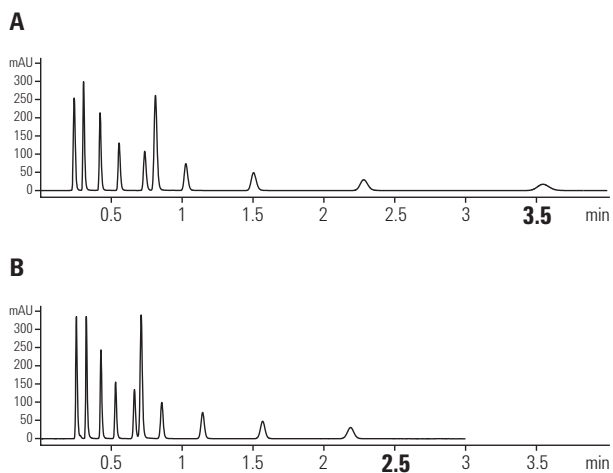
Mobile Phase: 60% CH₃CN:40% H₂O

Flow Rate: 0.85 mL/min

Temperature: 26°C

Detector: 254 nm

Sample: 2 μ L of RRLLC Checkout Sample
(PN 5188-6529), alkylphenones

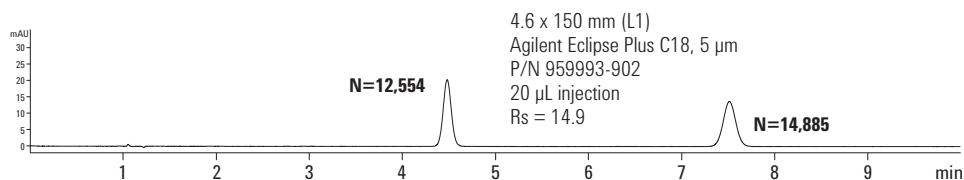


USP method for Naproxen tablets – 4.5X faster analysis on Agilent Poroshell 120 at HPLC pressures

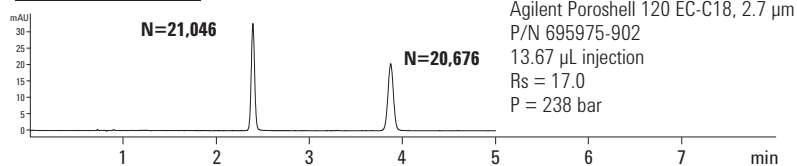
Mobile Phase: 50:49:1 MeCN:H₂O
Acetic Acid
Flow Rate: 1.2 mL/min

1. Naproxen
2. Butyrophenone

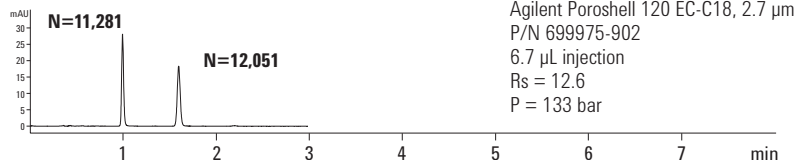
This Naproxen separation demonstrates how easy it can be to convert a method to Poroshell 120 columns without changing the flow rate or mobile phase.



2X Faster



4.5X Faster

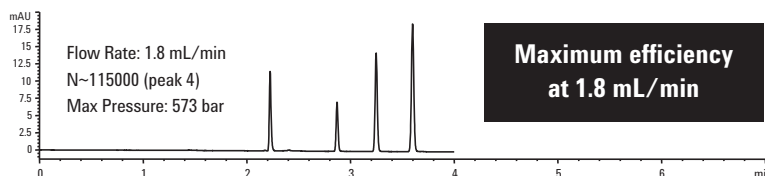
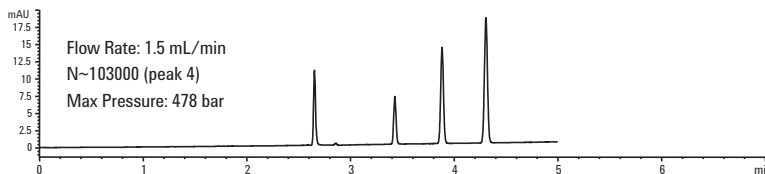
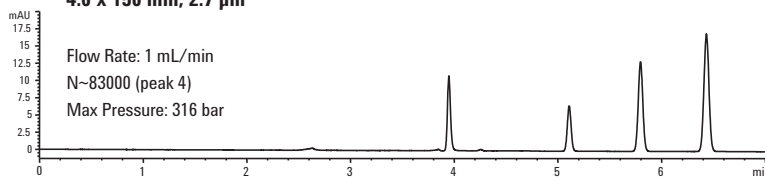


Agilent Poroshell 120 columns in series deliver the highest efficiency at HPLC and UHPLC pressures

Because low backpressure is one of the advantages of Poroshell 120 columns, you can couple several columns in series to achieve the highest separation power per unit time. This enables better separation of complex samples.

Peak #	Compound	Plates	k'
2	Acetophenone	114120	0.29
3	Benzene	109931	0.46
4	Touene	114800	0.65

3 Agilent Poroshell 120 EC-C18 columns in series 693975-902 4.6 x 150 mm, 2.7 μm



**Maximum efficiency
at 1.8 mL/min**

LC2011_120



ZORBAX Eclipse Plus

- Excellent peak shape for basic compounds
- High level of performance – peak shape, efficiency, resolution, and lifetime – with all sample types: acids, bases and neutrals
- Superior reproducibility with more rigorous QA/QC testing
- Improved, patented silica manufacturing with start-to-finish product control
- Available in 1.8, 3.5 and 5 μm particle sizes for all analytical, high resolution, and fast LC analyses

Agilent ZORBAX Eclipse Plus columns provide the ultimate in performance for silica-based columns. Peak shape is excellent for the most challenging basic compounds, improving efficiency and resolution with these sample types. These results are achieved by improvements in the silica manufacturing and bonding technology, which is completely controlled by Agilent.

Because of their high level of performance, Eclipse Plus columns are the ideal first choice for method development of all samples. If you need to achieve fast method development and superior productivity, then choose a column with high-resolution 1.8 μm particles. For standard methods, conventional 5 μm and Rapid Resolution 3.5 μm columns are your best choice. With all particle sizes, easy method transfer is possible.

With more rigorous QA and QC testing, column lot-to-lot reproducibility is also improved, resulting in long-term reliable results for all analyses.

Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits	pH Range*	Endcapped	Carbon Load
ZORBAX Eclipse Plus C18	95Å	160 m ² /g	60°C	2.0-9.0	Double	9%
ZORBAX Eclipse Plus C8	95Å	160 m ² /g	60°C	2.0-9.0	Double	7%
ZORBAX Eclipse PAH	95Å	160 m ² /g	60°C	2.0-8.0	No	14%
ZORBAX Eclipse Plus Phenyl-Hexyl	95Å	160 m ² /g	60°C	2.0-8.0	Double	9%

Specifications represent typical values only.

*Column lifetime will be reduced significantly at pH >7 and temperature >40°C. At pH 6-9, highest column stability for all silica based columns is obtained by operating at temperatures <40°C and using lower buffer concentrations in range of 0.01-0.02 M, especially with phosphate and carbonate buffers.

ZORBAX Eclipse Plus: Best Peak Shape in the Industry Without Tailing

Column: Eclipse Plus C18
959996-902
4.6 x 100 mm, 5 µm

Mobile Phase: A: 60% Water
B: 40% Acetonitrile

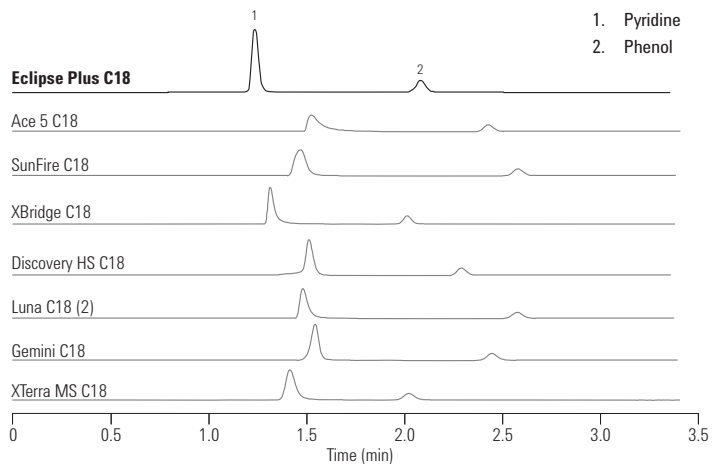
Flow Rate: 1.0 mL/min

Temperature: Ambient

Detector: UV 254 nm

Publication: 5989-4934EN

Sample: Pyridine, Phenol



LCEC001

Peak Shape and Efficiency are Better with ZORBAX Eclipse Plus

Column A: XBridge C18, 4.6 x 150 mm, 5 µm

Column B: Eclipse Plus C18
959993-902
4.6 x 150 mm, 5 µm

Mobile Phase: A: 0.1% formic acid
B: 0.1% formic acid in ACN

Flow Rate: 1.0 mL/min

Gradient: 0.0 min 10% B

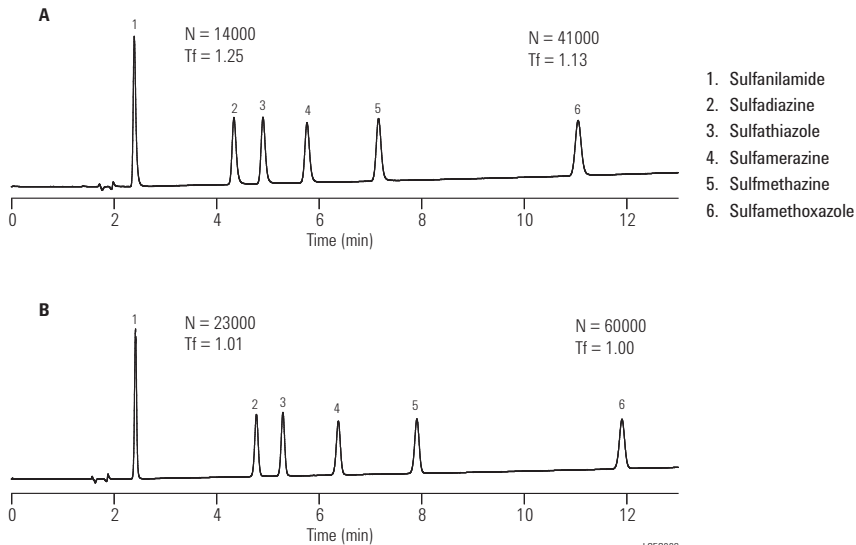
15 min 30% B

Temperature: 40°C

Detector: UV 254 nm

Publication: 5989-4934EN

Sample: Sulfonamides

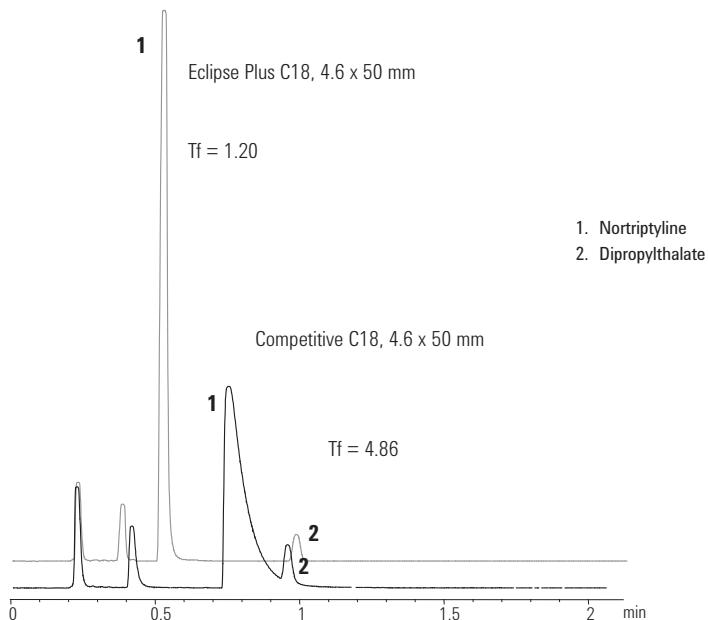


LCEC003




Eliminate Tailing and Maximize Resolution with Eclipse Plus Columns**Column A:** Eclipse Plus C18, 4.6 x 50 mm**Column B:** Competitive C18, 4.6 x 50 mm

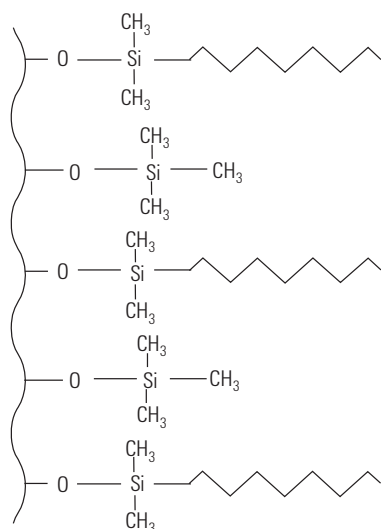
Mobile Phase: 65% ACN:35% 25 mM phosphate buffer (pH 7.4)

Superior peak shape and better selectivity with Eclipse Plus means more resolution, easier quantitation and better results in your separations.

**Tips & Tools**To learn more about Agilent's complete portfolio of services, please visit www.agilent.com/chem/services

ZORBAX Eclipse Plus

Hardware Description	Size (mm)	Particle Size (µm)	Eclipse Plus C18 USP L1	Eclipse Plus C8 USP L7	Eclipse Plus Phenyl-Hexyl USP L11	Eclipse Plus PAH USP L1
Analytical	4.6 x 250	5	959990-902	959990-906	959990-912	959990-918
Analytical	4.6 x 150	5	959993-902	959993-906	959993-912	959993-918
Analytical	4.6 x 100	5	959996-902	959996-906	959996-912	959996-918
Analytical	4.6 x 50	5	959946-902	959946-906		
Rapid Resolution	4.6 x 150	3.5	959963-902	959963-906	959963-912	959963-918
Rapid Resolution	4.6 x 100	3.5	959961-902	959961-906	959961-912	959961-918
Rapid Resolution	4.6 x 75	3.5	959933-902	959933-906	959933-912	
Rapid Resolution	4.6 x 50	3.5	959943-902	959943-906	959943-912	959943-918
Rapid Resolution	4.6 x 30	3.5	959936-902	959936-906	959936-912	
Rapid Resolution HT, 600 bar	4.6 x 100	1.8	959964-902	959964-906	959964-912	959964-918
Rapid Resolution HT, 600 bar	4.6 x 75	1.8	959951-902			
Rapid Resolution HT, 600 bar	4.6 x 50	1.8	959941-902	959941-906	959941-912	959941-918
Rapid Resolution HT, 600 bar	4.6 x 30	1.8	959931-902	959931-906	959931-912	959931-918
Solvent Saver	3.0 x 250	5				959990-318
Solvent Saver	3.0 x 150	5	959993-302	959993-306		
Solvent Saver Plus	3.0 x 150	3.5	959963-302	959963-306	959963-312	
Solvent Saver Plus	3.0 x 100	3.5	959961-302	959961-306	959961-312	
Solvent Saver RRHD, 1200 bar	3.0 x 150	1.8	959759-302	959759-306		
Solvent Saver RRHD, 1200 bar	3.0 x 100	1.8	959758-302	959758-306		
Solvent Saver RRHD, 1200 bar	3.0 x 50	1.8	959757-302	959757-306		
Solvent Saver HT, 600 bar	3.0 x 100	1.8	959964-302	959964-306	959964-312	
Solvent Saver HT, 600 bar	3.0 x 50	1.8	959941-302	959941-306	959941-312	
Narrow Bore	2.1 x 250	5				959790-918
Narrow Bore	2.1 x 150	5	959701-902	959701-906	959701-912	959701-918
Narrow Bore	2.1 x 50	5	959746-902	959746-906		
Narrow Bore RR	2.1 x 150	3.5	959763-902	959763-906	959763-912	
Narrow Bore RR	2.1 x 100	3.5	959793-902	959793-906	959793-912	959793-918
Narrow Bore RR	2.1 x 50	3.5	959743-902	959743-906	959743-912	
Narrow Bore RR	2.1 x 30	3.5	959733-902	959733-906	959733-912	
Narrow Bore RRHD, 1200 bar	2.1 x 150	1.8	959759-902	959759-906		
Narrow Bore RRHD, 1200 bar	2.1 x 100	1.8	959758-902	959758-906		
Narrow Bore RRHD, 1200 bar	2.1 x 50	1.8	959757-902	959757-906		
Narrow Bore RRHT, 600 bar	2.1 x 100	1.8	959764-902	959764-906	959764-912	959764-918
Narrow Bore RRHT, 600 bar	2.1 x 50	1.8	959741-902	959741-906	959741-912	959741-918
Narrow Bore RRHT, 600 bar	2.1 x 30	1.8	959731-902	959731-906	959731-912	
 Guard Cartridges, 4/pk	4.6 x 12.5	5	820950-936	820950-937	820950-938	820950-939
 Guard Cartridges, 4/pk	2.1 x 12.5	5	821125-936	821125-937	821125-938	821125-939
 Guard Hardware Kit			820999-901	820999-901	820999-901	820999-901



eXtra Densely Bonded and Double Endcapped
Eclipse XDB Bonded Phase

ZORBAX Eclipse XDB

- Four selectivity choices for method development optimization
- Good peak shape for basic, acidic and neutral compounds
- High performance over a wide pH range – pH 2-9
- Particle sizes from 1.8 μm to 7 μm
- Long lifetime with extra dense bonding and double endcapping

Agilent ZORBAX Eclipse XDB columns – C18, C8, Phenyl and CN – provide four bonded phase choices for method development optimization. These columns provide good peak shape over a wide pH range (2-9) for additional method development flexibility with one family of columns. Eclipse XDB columns can be used for method development at low pH (2-3) and the same column can be used for method development in the mid pH (6-8) region. In the mid pH region residual silanols are more active and tailing interactions are more likely. To overcome these interactions, Eclipse XDB columns are eXtra Densely Bonded and double endcapped through a proprietary process to cover as many active silanols as possible. The result is superior peak shape of basic compounds from pH 2-9. Eclipse XDB columns are available in 1.8, 3.5, 5 and 7 μm particle sizes for high speed, high resolution, analytical and prep scale separations.

Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits	pH Range*	Endcapped	Carbon Load
ZORBAX Eclipse XDB-C18	80Å	180 m ² /g	60°C	2.0-9.0	Double	10%
ZORBAX Eclipse XDB-C8	80Å	180 m ² /g	60°C	2.0-9.0	Double	7.6%
ZORBAX Eclipse XDB-Phenyl	80Å	180 m ² /g	60°C	2.0-9.0	Double	7.2%
ZORBAX Eclipse XDB-CN	80Å	180 m ² /g	60°C	2.0-8.0	Double	4.3%

Specifications represent typical values only.

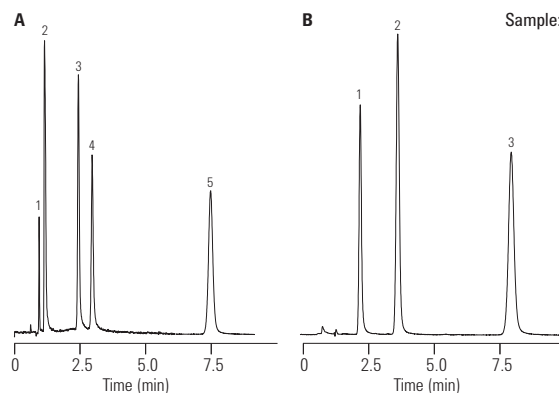
*Eclipse XDB columns are designed for operation over a wide pH range. At pH 6-9, highest column stability for all silica based columns is achieved by operating at temperatures <40°C and using low buffer concentrations in the range of 0.01-0.02 M.

Good Peak Shape Over a Wide pH Range with ZORBAX Eclipse XDB

Column: Eclipse XDB-C8
993967-906
4.6 x 150 mm, 5 μm

Mobile Phase: A: pH 3.0 75% 25 mM phosphate buffer
25% ACN
B: pH 7.0 90% 20 mM phosphate
10% ACN

Flow Rate: 1.5 mL/min
Temperature: 40°C



Sample:

A:

1. Maleate
2. Doxylamine
3. Chlorpheniramine
4. Triprolidine
5. Diphenhydramine

B:

1. Procainamide
2. N-acetylprocainamide
3. N-propionylprocainamide

ZORBAX Eclipse XDB columns provide good peak shape over a wide pH range and are an excellent choice for method development from pH 2-9.

LCEC004

Column Stability Testing at pH 3 and 60°C

Column: ZORBAX SB-C8
883975-906
4.6 x 150 mm, 5 μm

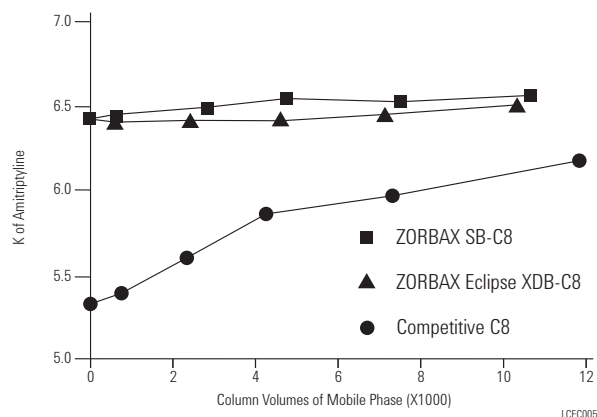
Column: Eclipse XDB-C8
993967-906
4.6 x 150 mm, 5 μm

Mobile Phase: Purge Conditions:
70% 50 mM NaAc-HCl, pH 3.0
30% ACN

Retention Test Conditions:
65% Methanol
35% Water

Flow Rate: 1.0 mL/min
Temperature: 60°C

Sample: Tricyclic Antidepressants



LCEC005

Eclipse XDB columns are stable over a wide pH range. At low pH an Eclipse endcapped column is extremely stable and shows equivalent stability to a non-endcapped column, SB-C8, at pH 3. The columns were purged with a pH 3 mobile phase at 60°C. Then they were tested with a strongly basic compound to determine if the endcapping or bonded phase had been hydrolyzed from the silica surface. The Eclipse XDB column was very stable, as shown by the consistency of the retention of amitriptyline over the 12,000 column volumes of the test. Another endcapped column shows less stability under these same conditions.

Column Stability Testing at pH 7.0

Column A: Competitive C8
SIL-type
After 1826 Column Volumes

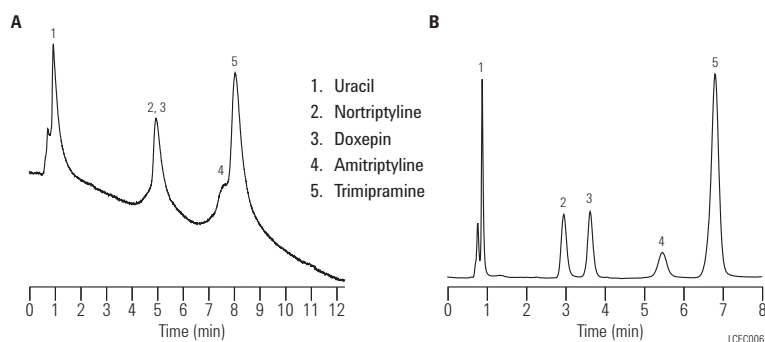
Column B: Eclipse XDB-C8
993967-906
4.6 x 150 mm, 5 µm
Sol-type
After 1843 Column Volumes

Mobile Phase: 60% ACN
40% 250 mM Phosphate Buffer, pH 7.0

Flow Rate: 1.5 mL/min

Temperature: 60°C

Sample: Tricyclic Antidepressants



Double endcapping, dense bonding and the durable Rx-Sil particles (sol-type) combine to provide long lifetime at pH 7 when compared to single endcapped sil-gel columns used here. The conditions used for this test – high temperature (60°C) and high salt concentration (250 mM), accelerate the dissolution of silica, causing premature failure of the sil-gel type column.

Selectivity Changes for Basic Compounds with Eclipse XDB and StableBond

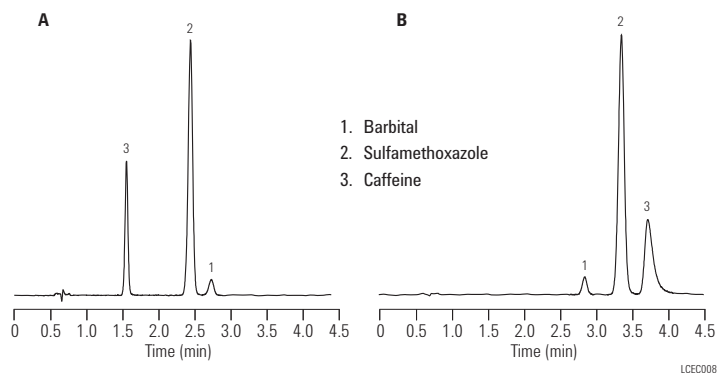
Column A: Eclipse XDB-C8
966967-906
4.6 x 75 mm, 3.5 µm

Column B: ZORBAX Rx/SB-C8
866953-906
4.6 x 75 mm, 3.5 µm

Mobile Phase: 70% 25 mM NaH₂PO₄, pH 3.0
30% Methanol

Flow Rate: 1.0 mL/min

Temperature: 35°C



Eclipse XDB and StableBond columns are based on the same silica but have different bonding and endcapping. Therefore, they can have very different selectivity for the same sample under the same conditions, as this example shows.

Optimize Separations with Eclipse XDB Selectivity Options: Analysis of Sunscreens

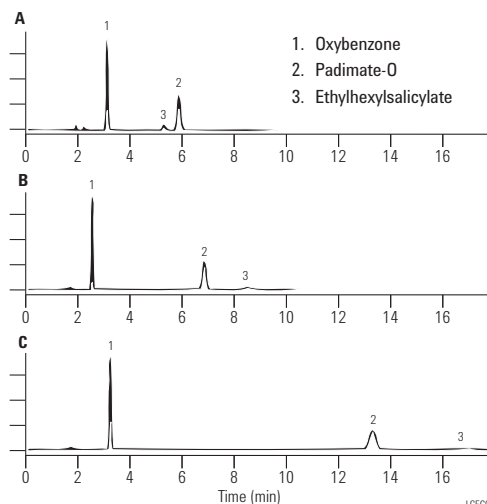
Column A: Eclipse XDB-Phenyl
963967-912
4.6 x 150 mm, 3.5 μ m

Column B: Eclipse XDB-C8
963967-906
4.6 x 150 mm, 3.5 μ m

Column C: Eclipse XDB-C18
963967-902
4.6 x 150 mm, 3.5 μ m

Mobile Phase: 15% H₂O:85% MeOH
Flow Rate: 1.0 mL/min
Temperature: 35°C
Sample: Sunscreens

This separation of sunscreens on all three Eclipse XDB bonded phases – C18, C8 and Phenyl – shows that different bonded phases can be used to optimize a separation. While all three bonded phases provide an adequate separation, the Eclipse XDB-Phenyl provides a different peak elution order and a much shorter overall analysis time. All three bonded phases also provide excellent peak shape with no mobile phase additives.



Selectivity for Urea Pesticides

Column A: Eclipse XDB-C18
993967-902
4.6 x 150 mm, 5 μ m

Column B: Eclipse XDB-CN
993967-905
4.6 x 150 mm, 5 μ m

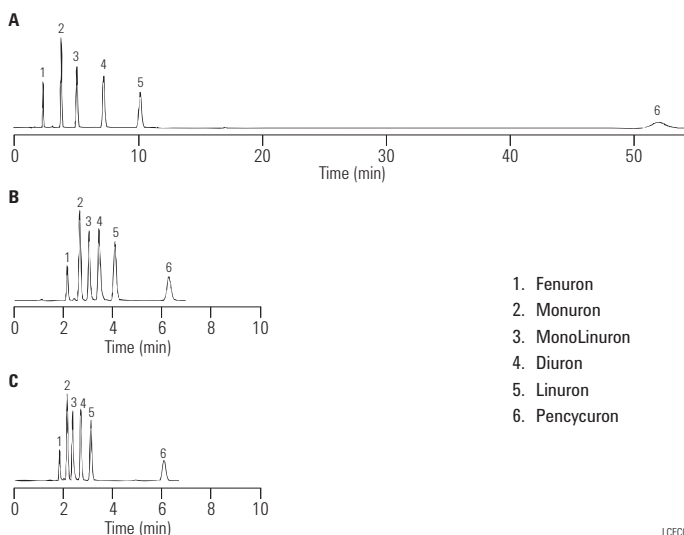
Column C: Eclipse XDB-C18
993967-902
4.6 x 150 mm, 5 μ m

Mobile Phase: A. 60:40 MeOH:Water
B. 60:40 MeOH:Water
C. 77:23 MeOH:Water

Flow Rate: 1.0 mL/min

Temperature: 25°C

Sample: Urea pesticides














The Eclipse XDB-CN column reduces retention time and provides good selectivity for Urea pesticides when compared to an Eclipse XDB-C18 column.

ZORBAX Eclipse XDB

Hardware Description	Size (mm)	Particle Size (µm)	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7	Eclipse XDB-Phenyl USP L11	Eclipse XDB-CN USP L10
Standard Columns (no special hardware required)						
Semi-Preparative	9.4 x 250	5	990967-202	990967-206		
Analytical	4.6 x 250	5	990967-902	990967-906	990967-912	990967-905
Analytical	4.6 x 150	5	993967-902	993967-906	993967-912	993967-905
Analytical	4.6 x 50	5	946975-902	946975-906		
Rapid Resolution	4.6 x 150	3.5	963967-902	963967-906	963967-912	963967-905
Rapid Resolution	4.6 x 100	3.5	961967-902	961967-906		961967-905
Rapid Resolution	4.6 x 75	3.5	966967-902	966967-906	966967-912	966967-905
Rapid Resolution	4.6 x 50	3.5	935967-902	935967-906	935967-912	
Rapid Resolution	4.6 x 30	3.5	934967-902	934967-906		
Rapid Resolution	4.6 x 20	3.5	932967-902	932967-906		
Rapid Resolution HT, 600 bar	4.6 x 100	1.8	928975-902	928975-906		
Rapid Resolution HT, 600 bar	4.6 x 50	1.8	927975-902	927975-906		
Rapid Resolution HT, 600 bar	4.6 x 30	1.8	924975-902	924975-906		
Rapid Resolution HT, 600 bar	4.6 x 20	1.8	926975-902	926975-906		
Solvent Saver	3.0 x 250	5	990967-302	990967-306	990967-312	990967-305
Solvent Saver	3.0 x 150	5	993967-302	993967-306	993967-312	993967-305
Solvent Saver Plus	3.0 x 150	3.5	963954-302	963954-306	963954-312	963954-305
Solvent Saver Plus	3.0 x 100	3.5	961967-302	961967-306	961967-312	
Solvent Saver Plus	3.0 x 75	3.5	966954-302			
Solvent Saver RRHD, 1200 bar	3.0 x 150	1.8	981759-302			
Solvent Saver RRHD, 1200 bar	3.0 x 100	1.8	981758-302			
Solvent Saver RRHD, 1200 bar	3.0 x 50	1.8	981757-302			
Solvent Saver HT, 600 bar	3.0 x 100	1.8	928975-302	928975-306		
Solvent Saver HT, 600 bar	3.0 x 50	1.8	927975-302	927975-306		
Solvent Saver HT, 600 bar	3.0 x 30	1.8	924975-302	924975-306		
Solvent Saver HT, 600 bar	3.0 x 20	1.8	926975-302	926975-306		
Narrow Bore	2.1 x 150	5	993700-902	993700-906	993700-912	993700-905
Narrow Bore	2.1 x 50	5	960967-902	960967-906	960967-912	960967-905
Narrow Bore RR	2.1 x 150	3.5	930990-902	930990-906		
Narrow Bore RR	2.1 x 100	3.5	961753-902	961753-906		961753-905
Narrow Bore RR	2.1 x 75	3.5	966735-902			
Narrow Bore RR	2.1 x 50	3.5	971700-902	971700-906		
Narrow Bore RR	2.1 x 30	3.5	974700-902	974700-906		
Narrow Bore RR	2.1 x 20	3.5	972700-902	972700-906		
Narrow Bore RRHD, 1200 bar	2.1 x 150	1.8	981759-902			
Narrow Bore RRHD, 1200 bar	2.1 x 100	1.8	981758-902			
Narrow Bore RRHD, 1200 bar	2.1 x 50	1.8	981757-902			





(Continued)

ZORBAX Eclipse XDB

Hardware Description	Size (mm)	Particle Size (µm)	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7	Eclipse XDB-Phenyl USP L11	Eclipse XDB-CN USP L10
Standard Columns (no special hardware required)						
Narrow Bore RRHT, 600 bar	2.1 x 100	1.8	928700-902	928700-906		
Narrow Bore RRHT, 600 bar	2.1 x 50	1.8	927700-902	927700-906		
Narrow Bore RRHT, 600 bar	2.1 x 30	1.8	924700-902	924700-906		
Narrow Bore RRHT, 600 bar	2.1 x 20	1.8	926700-902	926700-906		
MicroBore RR	1.0 x 150	3.5	963600-902	963600-906		
MicroBore RR	1.0 x 50	3.5	965600-902	965600-906		
MicroBore RR	1.0 x 30	3.5	961600-902	961600-906		
MicroBore Guard, 3/pk	1.0 x 17	5	5185-5921	5185-5921		
 Guard Cartridges, 4/pk	4.6 x 12.5	5	820950-925	820950-926	820950-927	820950-935
 Guard Cartridges, 4/pk	2.1 x 12.5	5	821125-926	821125-926	821125-926	821125-935
 Guard Hardware Kit			820999-901	820999-901	820999-901	820999-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)						
 PrepHT Cartridge	21.2 x 250	7	977250-102	977250-106		
 PrepHT Cartridge	21.2 x 150	7	977150-102	977150-106		
 PrepHT Cartridge	21.2 x 150	5	970150-902	970150-906		
 PrepHT Cartridge	21.2 x 100	5	970100-902	970100-906		
 PrepHT Cartridge	21.2 x 50	5	970050-902	970050-906		
 PrepHT Guard Cartridge	17 x 7.5	5	820212-925	820212-926		
 Guard Cartridge Hardware			820444-901	820444-901		
 PrepHT endfittings, 2/pk			820400-901	820400-901		

Unless indicated, column pressure limit is 400 bar.

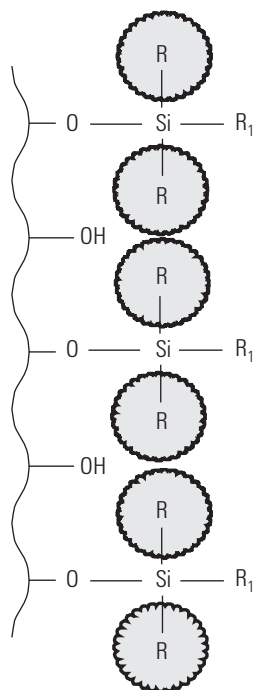
ZORBAX Eclipse XDB

Hardware Description	Size (mm)	Particle Size (µm)	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7
Agilent Cartridge Columns (require hardware kit 5021-1845)				
 Analytical	4.6 x 250	5	7995118-585	7995108-585
 Analytical	4.6 x 150	5	7995118-595	7995108-595
 Rapid Resolution	4.6 x 75	3.5	7995118-344	7995108-344
 Solvent Saver Plus	3.0 x 75	3.5	7995230-344	
Guard Cartridges, 10/pk	4.0 x 4	5	7995118-504	7995118-504
Cartridge Holder, 5021-1845			5021-1845	5021-1845

(Continued)

ZORBAX Eclipse XDB

Hardware	Description	Size (mm)	Particle Size (µm)	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7
Standard Columns (no special hardware required)					
	Rapid Resolution HT	4.6 x 50	1.8	922975-902	922975-906
	Rapid Resolution HT, 3/pk	4.6 x 50	1.8	922975-932	
	Narrow Bore RRHT	2.1 x 50	1.8	922700-902	
	Narrow Bore RRHT, 3/pk	2.1 x 50	1.8	922700-932	
Rapid Resolution HT Cartridges (require hardware kit 820555-901)					
RR	Rapid Resolution Cartridge	4.6 x 30	3.5	933975-902	933975-906
RR	Rapid Resolution Cartridge, 3/pk	4.6 x 30	3.5	933975-932	933975-936
RR	Rapid Resolution Cartridge	4.6 x 15	3.5	931975-902	931975-906
RR	Rapid Resolution Cartridge, 3/pk	4.6 x 15	3.5	931975-932	931975-936
RR	Rapid Resolution Cartridge	2.1 x 30	3.5	973700-902	973700-906
RR	Rapid Resolution Cartridge, 3/pk	2.1 x 30	3.5	973700-932	973700-936
RR	Rapid Resolution Cartridge	2.1 x 15	3.5	975700-902	975700-906
RR	Rapid Resolution Cartridge, 3/pk	2.1 x 15	3.5	975700-932	975700-936
RR	Rapid Resolution HT Cartridge	4.6 x 50	1.8	925975-902	
RR	Rapid Resolution HT Cartridge, 3/pk	4.6 x 50	1.8	925975-932	
RR	Rapid Resolution HT Cartridge	4.6 x 30	1.8	923975-902	
RR	Rapid Resolution HT Cartridge, 3/pk	4.6 x 30	1.8	923975-932	
RR	Rapid Resolution HT Cartridge	4.6 x 15	1.8	921975-902	
RR	Rapid Resolution HT Cartridge, 3/pk	4.6 x 15	1.8	921975-932	
RR	Rapid Resolution HT Cartridge	2.1 x 50	1.8	925700-902	
RR	Rapid Resolution HT Cartridge, 3/pk	2.1 x 50	1.8	925700-932	
RR	Rapid Resolution HT Cartridge	2.1 x 30	1.8	923700-902	
RR	Rapid Resolution HT Cartridge, 3/pk	2.1 x 30	1.8	923700-932	
RR	Rapid Resolution HT Cartridge	2.1 x 15	1.8	921700-902	
RR	Rapid Resolution HT Cartridge, 3/pk	2.1 x 15	1.8	921700-932	
RR	Hardware Kit for RR and RRHT Cartridges			820555-901	
Capillary Glass-lined Columns					
	Capillary	0.5 x 250	5	5064-8286	
	Capillary	0.5 x 150	5	5064-8287	
	Capillary RR	0.5 x 150	3.5	5064-8288	
	Capillary RR	0.5 x 35	3.5	5064-8298	
	Capillary	0.3 x 250	5	5064-8269	
	Capillary	0.3 x 150	5	5064-8291	
	Capillary RR	0.3 x 150	3.5	5064-8271	
	Capillary	0.5 x 35	5	5064-8296	
	Capillary	0.3 x 35	5	5064-8297	



Sterically Protected StableBond Bonded Phase

ZORBAX 80Å StableBond

- Longest column lifetime and best reproducibility for low pH separations – down to pH 1
- Patented stable column chemistry allows use at high temperature and low pH without degradation
- Six different bonded phases provide broad selectivity – SB-C18, SB-C8, SB-CN, SB-Phenyl, SB-C3, and SB-Aq
- High purity (Type B) silica for good peak shape

Agilent ZORBAX StableBond columns use patented, unique, nonfunctional silanes with bulky diisobutyl (SB-C18) or diisopropyl (SB-C8, SB-C3, SB-Phenyl, SB-CN, and SB-Aq) side chain groups that sterically protect the key siloxane bond to the silica surface from hydrolytic attack at low pH. StableBond packing materials are not endcapped in order to provide exceptional stability and to maximize lifetime and reproducibility under acidic mobile phase conditions. The high purity, low acidity silica provides excellent peak shape with acidic, basic and neutral compounds making StableBond columns an excellent choice for low pH method development. ZORBAX StableBond columns are compatible with all common mobile phases, including very high aqueous mobile phases.

Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits*	pH Range*	Endcapped	Carbon Load
ZORBAX SB-C18	80Å	180 m ² /g	90°C	0.8-8.0	No	10%
ZORBAX SB-C8	80Å	180 m ² /g	80°C	1.0-8.0	No	5.5%
ZORBAX SB-C3	80Å	180 m ² /g	80°C	1.0-8.0	No	4%
ZORBAX SB-Phenyl	80Å	180 m ² /g	80°C	1.0-8.0	No	5.5%
ZORBAX SB-CN	80Å	180 m ² /g	80°C	1.0-8.0	No	4%
ZORBAX SB-Aq	80Å	180 m ² /g	80°C	1.0-8.0	No	proprietary

Specifications represent typical values only.

*StableBond columns are designed for optimal use at low pH. At pH 6-8, highest column stability for all silica-based columns is obtained by operating at temperatures <40°C and using lower buffer concentrations in the range of 0.01-0.02 M. At mid-range pH, Eclipse Plus, Eclipse XDB and Bonus-RP are recommended.

StableBond SB-C18 Shows Excellent Stability at Low pH and High Temperature (pH 0.8, 90°C)

Column: **ZORBAX SB-C18**
883975-902
4.6 x 150 mm, 5 µm

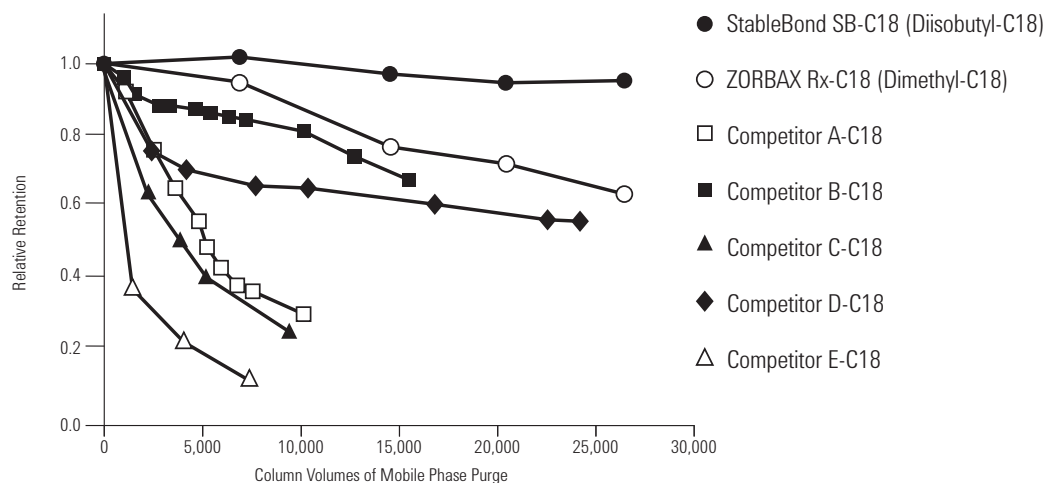
Column: **ZORBAX Rx-C18**
883967-902
4.6 x 150 mm, 5 µm

Mobile Phase: 50% Methanol/50% Water
with 1.0% TFA

Test Solute: Toluene

Temperature: 90°C

As an indicator of column breakdown, retention time of toluene was measured after purging the column with mobile phase. Only the StableBond SB-C18 is unchanged after three working months of use under these very low pH (0.8) and high temperature (90°C) conditions. ZORBAX Rx-C18 also provides a stable matrix, and can be used as an alternative selectivity to StableBond SB-C18.



LCSB001

Shorter Chain ZORBAX SB-CN is also Stable at Low pH (pH 2.0, 50°C)

Column: **ZORBAX SB-CN**
883975-905
4.6 x 150 mm, 5 µm

Mobile Phase: 0.1% TFA, pH 2:ACN

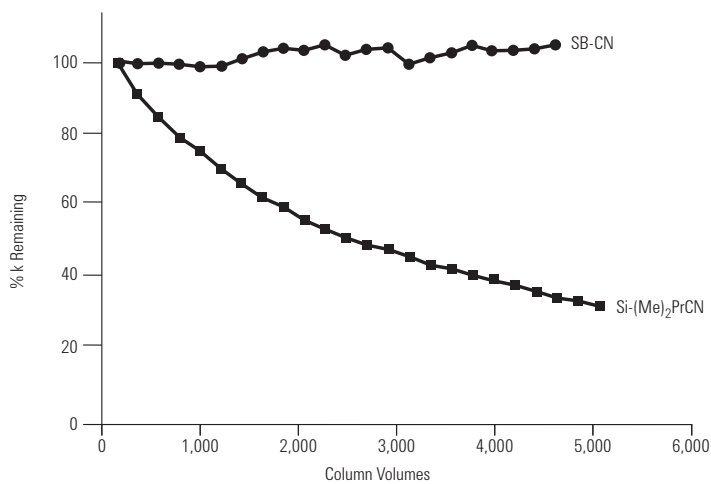
Flow Rate: 1 mL/min

Gradient: 0-100% ACN

Temperature: 50°C

Sample: 1-phenylheptane @ 50% AC/50% Water
with 0.1% TFA

ZORBAX StableBond SB-CN and other short chain StableBond bonded phases are also exceptionally stable at low pH. Conventional dimethyl CN and similar bonded phases lack this stability.



LCSB002

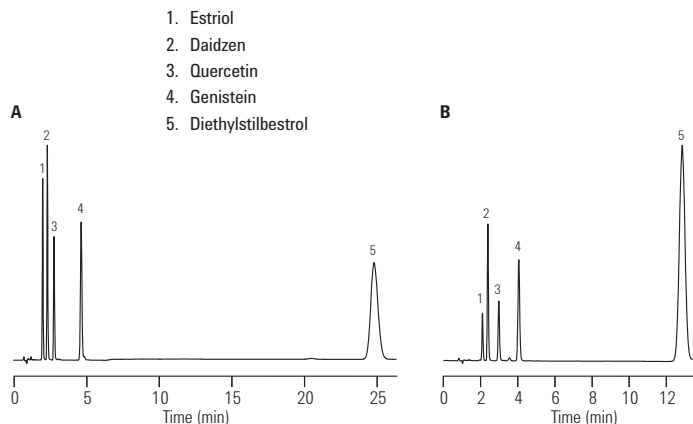
SB-CN Optimizes Retention and Resolution

Column A: ZORBAX SB-C18
866953-902
4.6 x 75 mm, 3.5 µm

Column B: ZORBAX SB-CN
866953-905
4.6 x 75 mm, 3.5 µm

Mobile Phase: 30% ACN
70% 25mM NaH₂PO₄, pH 2.5
Flow Rate: 1.0 mL/min
Temperature: 35°C

The SB-CN column is used here to reduce analysis time by 50%. The retention of the most hydrophobic analyte is cut in half. At the same time retention of the more polar, early eluting peaks increases slightly.



LCSB003

Five Different Bonded Phases Provide Selectivity Options

Column A: ZORBAX SB-C18
883975-902
4.6 x 150 mm, 5 µm

Column B: ZORBAX SB-C8
883975-906
4.6 x 150 mm, 5 µm

Column C: ZORBAX SB-C3
883975-909
4.6 x 150 mm, 5 µm

Column D: ZORBAX SB-Phenyl
883975-912
4.6 x 150 mm, 5 µm

Column E: ZORBAX SB-CN
883975-905
4.6 x 150 mm, 5 µm

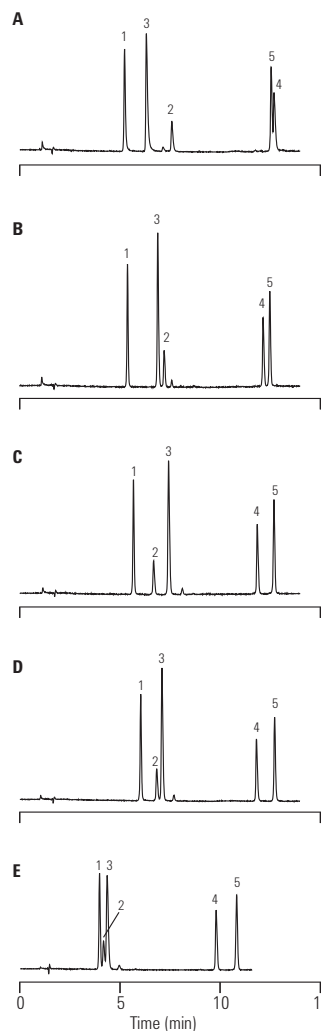
Mobile Phase: 0-100% B in 18.8 min
A: 50 mM NaH₂PO₄,
pH 2.5 in 95% H₂O / 5% ACN
B: 50 mM NaH₂PO₄,
pH 2.5 in 47% H₂O / 53% ACN

Flow Rate: 1.0 mL/min
Temperature: 26°C

Detector: 254 nm

Sample:
1. Procaine
2. Lidocaine
3. d-Cinchonine
4. Butacaine
5. Tetracaine

SB-C3 is just one of the five different StableBond selectivity choices. In this example, optimum resolution is obtained with SB-C3. All are based on the same high purity Rx-SIL. Selectivity changes are therefore dependent only on the bonded phases, making method development more reliable.



LCSB004

ZORBAX 80Å StableBond

Hardware Description	Size (mm)	Particle Size (µm)	SB-C18	SB-C8	SB-CN	SB-C3	SB-Phenyl	SB-Aq
			USP L1	USP L7	USP L10	USP L56	USP L11	
Standard Columns (no special hardware required)								
Semi-Preparative	9.4 x 250	5	880975-202	880967-201	880975-205	880975-209	880975-212	
Semi-Preparative	9.4 x 150	5	883975-202					
Semi-Preparative	9.4 x 100	5	884975-202					
Semi-Preparative	9.4 x 50	5	846975-202					
Analytical	4.6 x 250	5	880975-902	880975-906	880975-905	880975-909	880975-912	880975-914
Analytical	4.6 x 150	5	883975-902	883975-906	883975-905	883975-909	883975-912	883975-914
Analytical	4.6 x 50	5	846975-902	846975-906				846975-914
Rapid Resolution	4.6 x 250	3.5	884950-567					
Rapid Resolution	4.6 x 150	3.5	863953-902	863953-906	863953-905		863953-912	863953-914
Rapid Resolution	4.6 x 100	3.5	861953-902	861953-906	861953-905		861953-912	861953-914
Rapid Resolution	4.6 x 75	3.5	866953-902	866953-906	866953-905		866953-912	866953-914
Rapid Resolution	4.6 x 50	3.5	835975-902	835975-906	835975-905		835975-912	835975-914
Rapid Resolution	4.6 x 30	3.5	834975-902	834975-906				
Rapid Resolution	4.6 x 20	3.5	832975-902	832975-906				
Rapid Resolution HT, 600 bar	4.6 x 150	1.8	829975-902	829975-906	829975-905		829975-912	829975-914
Rapid Resolution HT, 600 bar	4.6 x 100	1.8	828975-902	828975-906	828975-905		828975-912	828975-914
Rapid Resolution HT, 600 bar	4.6 x 50	1.8	827975-901	827975-906	827975-905		827975-912	827975-914
Rapid Resolution HT, 600 bar	4.6 x 30	1.8	824975-902	824975-906	824975-905		824975-912	824975-914
Rapid Resolution HT, 600 bar	4.6 x 20	1.8	826975-902	826975-906				
Solvent Saver	3.0 x 250	5	880975-302	880975-306	880975-305	880975-309	880975-312	880975-314
Solvent Saver	3.0 x 150	5	883975-302	883975-306	883975-305	883975-309	883975-312	883975-314
Solvent Saver Plus	3.0 x 150	3.5	863954-302	863954-306	863954-305		863954-312	863954-314
Solvent Saver Plus	3.0 x 100	3.5	861954-302	861954-306	861954-305	861954-309	861954-312	861954-314
Solvent Saver Plus	3.0 x 75	3.5	866953-302					

Unless indicated, column pressure limit is 400 bar.

(Continued)












ZORBAX 80Å StableBond

Hardware Description	Size (mm)	Particle Size (µm)	SB-C18	SB-C8	SB-CN	SB-C3	SB-Phenyl	SB-Aq
			USP L1	USP L7	USP L10	USP L56	USP L11	
Standard Columns (no special hardware required)								
Solvent Saver RRHD, 1200 bar	3.0 x 150	1.8	859700-302	859700-306				
Solvent Saver RRHD, 1200 bar	3.0 x 100	1.8	858700-302	858700-306	858700-305		858700-312	
Solvent Saver RRHD, 1200 bar	3.0 x 50	1.8	857700-302	857700-306	857700-305		857700-312	
Solvent Saver HT, 600 bar	3.0 x 150	1.8	829975-302	829975-306	829975-305		829975-312	
Solvent Saver HT, 600 bar	3.0 x 100	1.8	828975-302	828975-306	828975-305	828975-309	828975-312	828975-314
Solvent Saver HT, 600 bar	3.0 x 50	1.8	827975-302	827975-306	827975-305			
Solvent Saver HT, 600 bar	3.0 x 30	1.8	824975-302	824975-306	824975-305		827975-312	827975-314
Solvent Saver HT, 600 bar	3.0 x 20	1.8	826975-302	826975-306				
Narrow Bore	2.1 x 150	5	883700-922	883700-906	883700-905	883700-909	883700-912	
Narrow Bore	2.1 x 50	5	860975-902	860975-906	860975-905	860975-909	860975-912	860975-914
Narrow Bore RR	2.1 x 150	3.5	830990-902	830990-906				830990-914
Narrow Bore RR	2.1 x 100	3.5	861753-902	861753-906	861753-905		861753-912	861753-914
Narrow Bore RR	2.1 x 75	3.5	866735-902					
Narrow Bore RR	2.1 x 50	3.5	871700-902	871700-906				871700-914
Narrow Bore RR	2.1 x 30	3.5	874700-902	874700-906				
Narrow Bore RR	2.1 x 20	3.5	872700-902	872700-906				
Narrow Bore RRHD, 1200 bar	2.1 x 150	1.8	859700-902	859700-906	859700-905		859700-912	
Narrow Bore RRHD, 1200 bar	2.1 x 100	1.8	858700-902	858700-906	858700-905		858700-912	
Narrow Bore RRHD, 1200 bar	2.1 x 50	1.8	857700-902	857700-906	857700-905		857700-912	

Unless indicated, column pressure limit is 400 bar.


















(Continued)

ZORBAX 80Å StableBond

Hardware Description	Size (mm)	Particle Size (µm)	SB-C18	SB-C8	SB-CN	SB-C3	SB-Phenyl	SB-Aq
			USP L1	USP L7	USP L10	USP L56	USP L11	
Standard Columns (no special hardware required)								
Narrow Bore RRHT, 600 bar	2.1 x 150	1.8	820700-902	820700-906	820700-905		820700-912	
Narrow Bore RRHT, 600 bar	2.1 x 100	1.8	828700-902	828700-906	828700-905		828700-912	828700-914
Narrow Bore RRHT, 600 bar	2.1 x 50	1.8	827700-902	827700-906	827700-905		827700-912	827700-914
Narrow Bore RRHT, 600 bar	2.1 x 30	1.8	824700-902	824700-906	824700-905		824700-912	824700-914
Narrow Bore RRHT, 600 bar	2.1 x 20	1.8	826700-902	826700-906				
MicroBore RR	1.0 x 150	3.5	863600-902	863600-906	863600-905			
MicroBore RR	1.0 x 50	3.5	865600-902	865600-906				
MicroBore RR	1.0 x 30	3.5	861600-902	861600-906				
MicroBore Guard, 3/pk	1.0 x 17	5	5185-5920	5185-5920				
 Guard Cartridge, 2/pk	9.4 x 15	7	820675-115	820675-115	820675-124	820675-124	820675-115	
 Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-920	820950-915	820950-916	820950-922	820950-917	820950-933
 Guard Cartridge, 4/pk	2.1 x 12.5	5	821125-915	821125-915	821125-924	821125-924	821125-915	821125-933
 Guard Hardware Kit	9.4 x 15	0	840140-901	840140-901	840140-901	840140-901	840140-901	
 Guard Hardware Kit			820999-901	820999-901	820999-901	820999-901	820999-901	820999-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)								
 PrepHT Cartridge	21.2 x 250	7	877250-102	877250-106	877250-105		877250-112	877250-114
 PrepHT Cartridge	21.2 x 150	7	877150-102	877150-106				877150-114
 PrepHT Cartridge	21.2 x 150	5	870150-902	870150-906				870150-914
 PrepHT Cartridge	21.2 x 100	5	870100-902	870100-906				870100-914
 PrepHT Cartridge	21.2 x 50	5	870050-902	870050-906				870050-914
 PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-920	820212-915	820212-915		820212-915	820212-933
Guard Cartridge Hardware			820444-901	820444-901	820444-901	820444-901	820444-901	820444-901
PrepHT endfittings, 2/pk			820400-901	820400-901	820400-901	820400-901	820400-901	820400-901

Unless indicated, column pressure limit is 400 bar.

ZORBAX 80Å StableBond

Hardware Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1	SB-C8 USP L7	SB-Phenyl USP L11
Agilent Cartridge Columns (require hardware kit 5021-1845)					
 Analytical	4.6 x 250	5	7995218-585	7995208-585	
 Analytical	4.6 x 150	5	7995218-595	7995208-595	
 Rapid Resolution	4.6 x 75	3.5	7995218-344	7995208-344	
 Guard Cartridges, 10/pk	4.0 x 4	5	7995118-504	7995118-504	
 Cartridge Holder, 5021-1845			5021-1845	5021-1845	
Standard Columns (no special hardware required)					
 Rapid Resolution HT	4.6 x 50	1.8	822975-902	822975-906	
 Rapid Resolution HT, 3/pk	4.6 x 50	1.8	822975-932		
 Narrow Bore RRHT	2.1 x 50	1.8	822700-902		
 Narrow Bore RRHT, 3/pk	2.1 x 50	1.8	822700-932		
Rapid Resolution Cartridges (require hardware kit 820555-901)					
 Rapid Resolution Cartridge	4.6 x 30	3.5	833975-902	833975-906	833975-912
 Rapid Resolution Cartridge, 3/pk	4.6 x 30	3.5	833975-932	833975-936	
 Rapid Resolution Cartridge	4.6 x 15	3.5	831975-902	831975-906	
 Rapid Resolution Cartridge, 3/pk	4.6 x 15	3.5	831975-932	831975-936	
 Rapid Resolution Cartridge	2.1 x 30	3.5	873700-902	873700-906	
 Rapid Resolution Cartridge, 3/pk	2.1 x 30	3.5	873700-932	873700-936	
 Rapid Resolution Cartridge	2.1 x 15	3.5	875700-902	875700-906	
 Rapid Resolution Cartridge, 3/pk	2.1 x 15	3.5	875700-932	875700-936	

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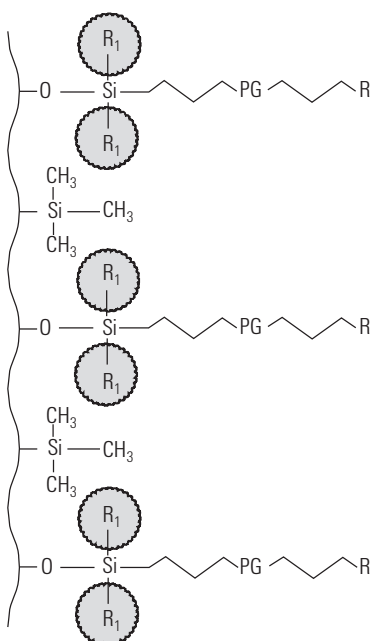


ZORBAX 80Å StableBond

Hardware Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1	SB-C8 USP L7	SB-Phenyl USP L11
Rapid Resolution HT Cartridges (require hardware kit 820555-901)					
 Rapid Resolution HT Cartridge	4.6 x 50	1.8	825975-902		
 Rapid Resolution HT Cartridge, 3/pk	4.6 x 50	1.8	825975-932		
 Rapid Resolution HT Cartridge	4.6 x 30	1.8	823975-902		
 Rapid Resolution HT Cartridge, 3/pk	4.6 x 30	1.8	823975-932		
 Rapid Resolution HT Cartridge	4.6 x 15	1.8	821975-902		
 Rapid Resolution HT Cartridge, 3/pk	4.6 x 15	1.8	821975-932		
 Rapid Resolution HT Cartridge	2.1 x 50	1.8	825700-902		
 Rapid Resolution HT Cartridge, 3/pk	2.1 x 50	1.8	825700-932		
 Rapid Resolution HT Cartridge	2.1 x 30	1.8	823700-902		
 Rapid Resolution HT Cartridge, 3/pk	2.1 x 30	1.8	823700-932		
 Rapid Resolution HT Cartridge	2.1 x 15	1.8	821700-902		
 Rapid Resolution HT Cartridge, 3/pk	2.1 x 15	1.8	821700-932		
 Hardware Kit for RR and RRHT Cartridges			820555-901		

ZORBAX 80Å StableBond

Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1
Capillary Glass-lined Columns			
Capillary	0.5 x 250	5	5064-8258
Capillary	0.5 x 150	5	5064-8256
Capillary	0.5 x 35	5	5064-8254
Capillary RR	0.5 x 150	3.5	5064-8262
Capillary RR	0.5 x 35	3.5	5064-8260
Capillary	0.3 x 250	5	5064-8257
Capillary	0.3 x 150	5	5064-8255
Capillary	0.3 x 35	5	5064-8253
Capillary RR	0.3 x 150	3.5	5064-8261



Unique, Polar Alkyl Bonus-RP Bonded Phase

ZORBAX Bonus-RP

- Excellent peak shape for challenging basic compounds at low and mid pH
- Unique reversed-phase selectivity
- Novel bonding technology with embedded polar group and steric protection
- Usable in 100% aqueous mobile phases

The Agilent ZORBAX Bonus-RP column has a polar amide group embedded in a long alkyl chain. This novel bonding reduces interactions between basic compounds and the silica support, improving peak shape for the most difficult basic compounds. Peak shape and column lifetime are further improved by triple endcapping. In addition, diisopropyl side groups provide steric protection against acid hydrolysis for good lifetime at low pH. The Bonus-RP column provides an alternate selectivity to C18 and C8 alkyl bonded phases.

Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits*	pH Range	Endcapped	Carbon Load
ZORBAX Bonus-RP	80Å	180 m ² /g	60°C	2.0-9.0	Triple	9.5%

Specifications represent typical values only.

*Temperature limits are 60°C up to pH 8, 40°C from pH 8-9.

Improved Peak Shape of Basic Compounds Using Bonus-RP

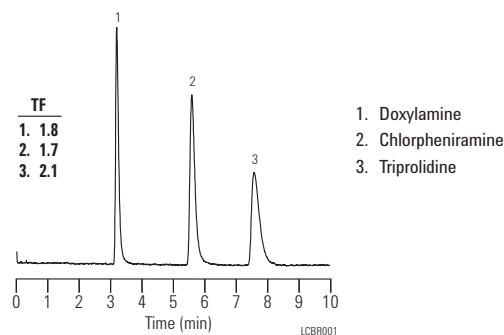
Column: Alkyl-C8
4.6 x 150 mm, 5 µm

Mobile Phase: 75% 25 mM NH₄OAc, pH 5.5
25% ACN

Flow Rate: 1.5 mL/min

Temperature: 40°C

Detector: 254 nm



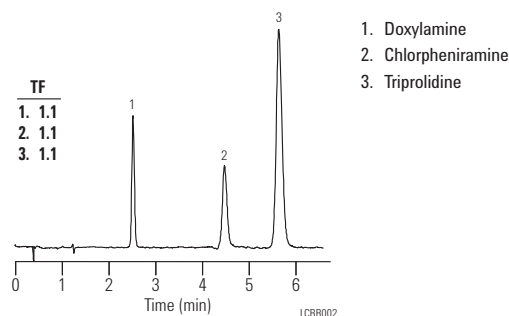
Column: ZORBAX Bonus-RP
883668-901
4.6 x 150 mm, 5 µm

Mobile Phase: 80% 25 mM NH₄OAc, pH 5.5
20% ACN

Flow Rate: 1.5 mL/min

Temperature: 40°C

Detector: 254 nm



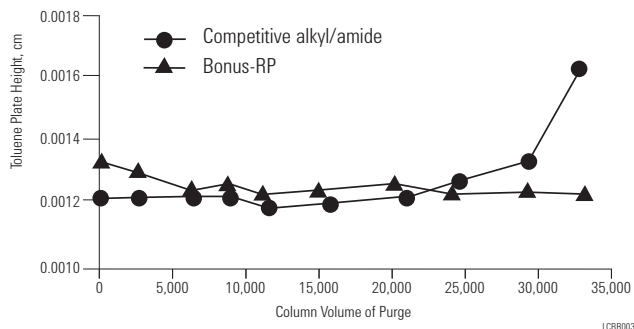
Bonus-RP eliminates peak tailing of these basic compounds in comparison to a typical alkyl C8 bonded phase. In the mid-pH region, residual silanols can interact more strongly with basic compounds to cause peak tailing. The polar group in the Bonus-RP bonded phase eliminates peak tailing of these basic compounds by reducing interactions with residual silanols.

ZORBAX Bonus-RP is Stable at Low and Mid pH

Column: ZORBAX Bonus-RP
883668-901
4.6 x 150 mm, 5 µm

Mobile Phase: 60% 25 mM
Phosphate Buffer,
pH 7.0:40% ACN

Flow Rate: 1.5 mL/min
Temperature: 23°C



Triple endcapping of Bonus-RP enhances stability at pH 7. Each 10,000 column volume is equivalent to approximately one working month.

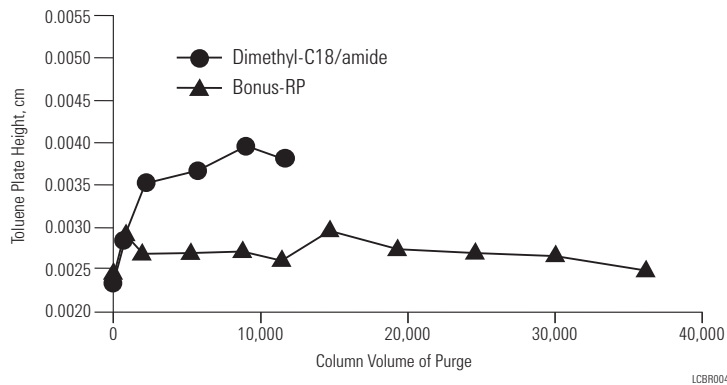
Dimethyl-C18/amide, Bonus-RP

Column: ZORBAX Bonus-RP
883668-901
4.6 x 150 mm, 5 µm

Mobile Phase: Aging:
50% MeOH
50% 0.1% TFA

Test:
80% MeOH
20% H₂O

Flow Rate: 1.0 mL/min
Temperature: Aging:
60°C
Test:
23°C



Sterically protecting side groups provide good low pH stability and longer column lifetime than similar polar alkyl bonded phases.

Tips & Tools

Don't forget, we have special offers throughout the year.

To learn more, visit www.agilent.com/chem/specialoffers

ZORBAX Bonus-RP Provides Unique Selectivity

Column A: ZORBAX Bonus-RP
883668-901
4.6 x 150 mm, 5 µm

Column B: Eclipse XDB-C8
993967-906
4.6 x 150 mm, 5 µm

Mobile Phase: 75% 25 mM Na Citrate, pH 6
25% MeOH

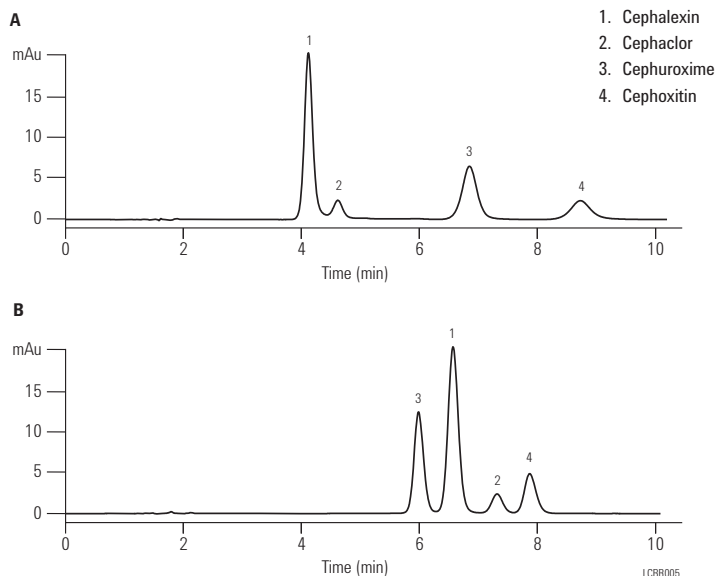
Flow Rate: 1.0 mL/min

Temperature: Ambient

Detector: 254 nm

Sample: 3 µL
Cephalosporins

Peak elution order can change dramatically when using Bonus-RP. In this example, the elution order of the first three peaks changes.














ZORBAX Bonus-RP

Hardware Description	Size (mm)	Particle Size (µm)	Bonus-RP USP L60
Standard Columns (no special hardware required)			
Analytical	4.6 x 250	5	880668-901
Analytical	4.6 x 150	5	883668-901
Rapid Resolution	4.6 x 250	3.5	884950-577
Rapid Resolution	4.6 x 150	3.5	863668-901
Rapid Resolution	4.6 x 100	3.5	864668-901
Rapid Resolution	4.6 x 75	3.5	866668-901
Rapid Resolution	4.6 x 50	3.5	835668-901
Rapid Resolution HT, 600 bar	4.6 x 100	1.8	828668-901
Rapid Resolution HT, 600 bar	4.6 x 75	1.8	830668-901
Rapid Resolution HT, 600 bar	4.6 x 50	1.8	827668-901

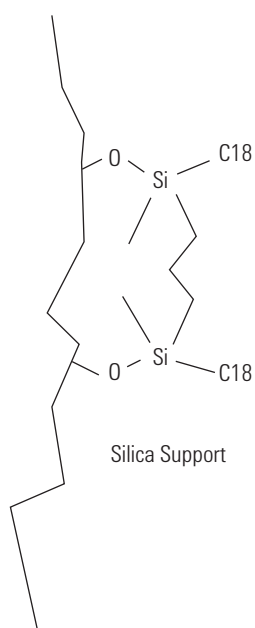
Unless indicated, column pressure limit is 400 bar.

(Continued)

ZORBAX Bonus-RP

Hardware Description	Size (mm)	Particle Size (µm)	Bonus-RP USP L60
Standard Columns (no special hardware required)			
Solvent Saver	3.0 x 250	5	880668-301
Solvent Saver	3.0 x 150	5	883668-301
Solvent Saver Plus	3.0 x 150	3.5	863668-301
Solvent Saver Plus	3.0 x 100	3.5	864668-301
Solvent Saver HT, 600 bar	3.0 x 100	1.8	828668-301
Solvent Saver HT, 600 bar	3.0 x 50	1.8	827668-301
Narrow Bore	2.1 x 150	5	883725-901
Narrow Bore	2.1 x 50	5	861971-901
Narrow Bore RR	2.1 x 150	3.5	863700-901
Narrow Bore RR	2.1 x 100	3.5	861768-901
Narrow Bore RR	2.1 x 50	3.5	861700-901
Narrow Bore RRHT, 600 bar	2.1 x 100	1.8	828768-901
Narrow Bore RRHT, 600 bar	2.1 x 50	1.8	827768-901
MicroBore RR	1.0 x 150	3.5	863608-901
MicroBore RR	1.0 x 50	3.5	865608-901
MicroBore RR	1.0 x 30	3.5	861608-901
MicroBore Guard, 3/pk	1.0 x 17	5	5185-5922
 Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-928
 Guard Cartridge, 4/pk	2.1 x 12.5	5	821125-928
 Guard Hardware Kit			820999-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)			
 PrepHT Cartridge	21.2 x 250	7	878250-101
 PrepHT Cartridge	21.2 x 150	7	878150-101
 PrepHT Cartridge	21.2 x 150	5	868150-901
 PrepHT Cartridge	21.2 x 100	5	868100-901
 PrepHT Cartridge	21.2 x 50	5	868050-901
 PrepHT endfittings, 2/pk			820400-901
 PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-928
 Guard Cartridge Hardware			820444-901

Unless indicated, column pressure limit is 400 bar.



Novel Bidentate C18-C18 Bonding for Extend C-18 Bonded Phase

ZORBAX 80Å Extend-C18

- High efficiency and long life at high pH – up to pH 11.5
- Unique bidentate bonding and double endcapping provides high pH stability
- More efficiency and better peak shape than polymer-based columns
- Improve retention, resolution and peak shape of basic compounds
- High sensitivity for LC/MS separations of peptides

The Agilent ZORBAX Extend-C18 column uses a novel bidentate C18-C18 bonding technology to make it possible to develop high-resolution separations at high pH with a silica-based column. At high pH, non-charged basic compounds will not interact with the underlying silica. The result is high efficiency separations with superior peak shape and improved resolution. High pH separations are also the best choice for compounds that are more stable or more soluble in high pH solutions. Some of the mobile phase buffer options for high pH include triethylamine, pyrrolidine, glycine, borate and ammonium hydroxide. Ammonium hydroxide at pH 10.5 is an excellent mobile phase modifier for the LC/MS of peptides and small molecules with improved sensitivity compared with TFA containing mobile phase at low pH. The Extend-C18 column is stable from pH 2-11.5 with good peak shape for all types of compounds. Extend-C18 columns also provide an additional selectivity choice at low pH.

Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits*	pH Range**	Endcapped	Carbon Load
ZORBAX Extend-C18	80Å	180 m ² /g	60°C	2.0-11.5	Double	12.5%

Specifications represent typical values only.

*Temperature limits are 60°C up to pH 8, 40°C from pH 8-11.5.

**Above pH 6 highest column stability for all silica based columns is obtained by reducing the operating temperature to 40°C or below and using lower buffer concentrations (0.01-0.02 M) or organic buffers.

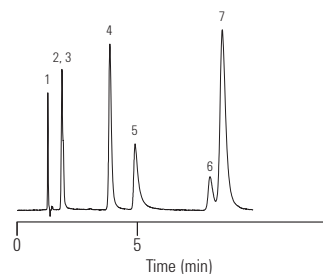
Basic Antihistamines on Extend-C18 at High pH

Column: ZORBAX Extend-C18
773450-902
4.6 x 150 mm, 5 μ m

Mobile Phase: pH 7:
30% 20 mM Na_2HPO_4 70% MeOH
pH 11:
30% 20 mM TEA 70% MeOH

Flow Rate: 1.0 mL/min
Temperature: Ambient
Detector: 254 nm
Sample: Antihistamines

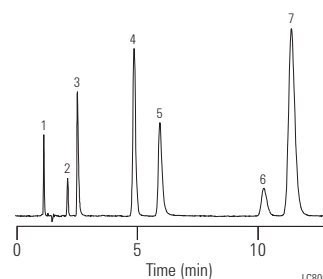
pH 7



1. Maleate
2. Scopolamine
3. Pseudoephedrine
4. Doxylamine
5. Chlorpheniramine
6. Triprolidine
7. Diphenhydramine

Pseudoephedrine and scopolamine are difficult to retain at low and mid pH. Pseudoephedrine is often analyzed by ion exchange methods. The Extend-C18 column retains these compounds in a noncharged form at high pH and improves resolution.

pH 11

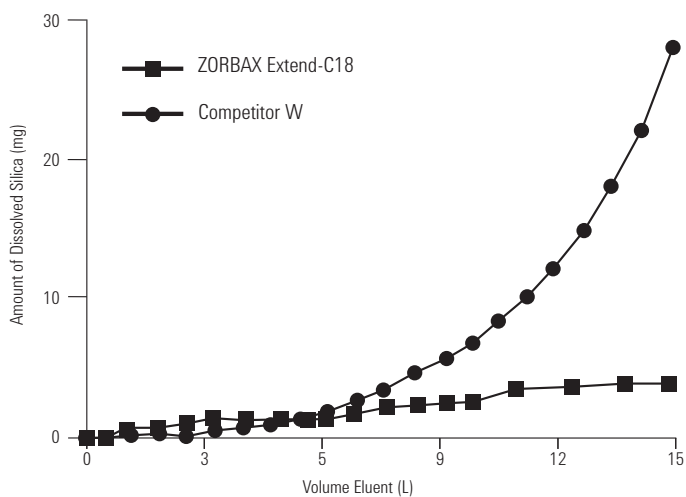


Long Life at High pH with Extend-C18

Column: ZORBAX Extend-C18
773450-902
4.6 x 150 mm, 5 μ m

Mobile Phase: 20% Methanol
80% 0.1 M Carbonate Buffer, pH 10.0

Flow Rate: 1.0 mL/min
Temperature: Ambient



At high pH, columns will fail due to silica dissolution. The example here shows extended lifetime of ZORBAX Extend-C18 at high pH in comparison to competitor W. This was measured by the amount of dissolved silica.

Extend-C18 Provides Good Peak Shape at Low pH

Column: ZORBAX Extend-C18
773450-902
4.6 x 150 mm, 5 µm

Mobile Phase: 80% 25 mM NaH₂PO₄, pH 3.0
20% Methanol

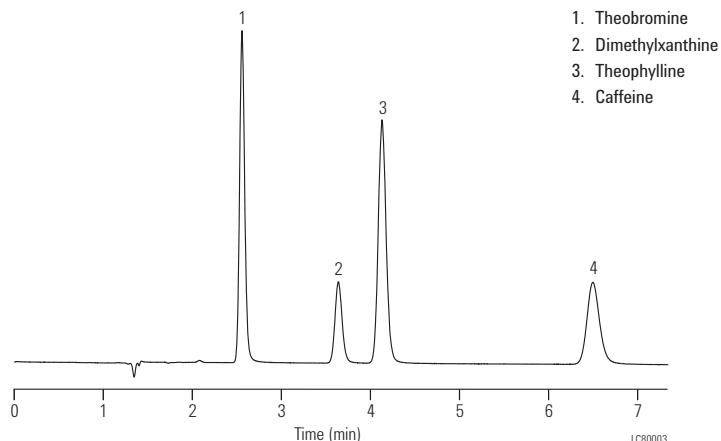
Flow Rate: 1.0 mL/min

Temperature: 35°C

Detector: 254 nm

Sample: Basic Compounds

These basic compounds are separated on the Extend-C18 at low pH with excellent peak shape. The Extend-C18 column can be used at high and low pH.












ZORBAX 80Å Extend-C18

Hardware Description	Size (mm)	Particle Size (µm)	Extend-C18 USP L1
Standard Columns (no special hardware required)			
Analytical	4.6 x 250	5	770450-902
Analytical	4.6 x 150	5	773450-902
Analytical	4.6 x 50	5	746450-902
Rapid Resolution	4.6 x 150	3.5	763953-902
Rapid Resolution	4.6 x 100	3.5	764953-902
Rapid Resolution	4.6 x 75	3.5	766953-902
Rapid Resolution	4.6 x 50	3.5	735953-902
Rapid Resolution HT, 600 bar	4.6 x 100	1.8	728975-902
Rapid Resolution HT, 600 bar	4.6 x 50	1.8	727975-902
Rapid Resolution HT, 600 bar	4.6 x 30	1.8	724975-902
Rapid Resolution HT, 600 bar	4.6 x 20	1.8	726975-902
Solvent Saver	3.0 x 250	5	770450-302
Solvent Saver	3.0 x 150	5	773450-302
Solvent Saver Plus	3.0 x 150	3.5	763954-302
Solvent Saver Plus	3.0 x 100	3.5	764953-302
Solvent Saver Plus	3.0 x 50	3.5	735954-302

Unless indicated, column pressure limit is 400 bar.

(Continued)

ZORBAX 80Å Extend-C18

Hardware Description	Size (mm)	Particle Size (µm)	Extend-C18 USP L1
Standard Columns (no special hardware required)			
Solvent Saver RRHD, 1200 bar	3.0 x 100	1.8	758700-302
Solvent Saver RRHD, 1200 bar	3.0 x 50	1.8	757700-302
Solvent Saver HT, 600 bar	3.0 x 100	1.8	728975-302
Solvent Saver HT, 600 bar	3.0 x 50	1.8	727975-302
Solvent Saver HT, 600 bar	3.0 x 30	1.8	724975-302
Solvent Saver HT, 600 bar	3.0 x 20	1.8	726975-302
Narrow Bore	2.1 x 150	5	773700-902
Narrow Bore	2.1 x 50	5	760450-902
Narrow Bore RR	2.1 x 100	3.5	761753-902
Narrow Bore RR	2.1 x 50	3.5	735700-902
Narrow Bore RRHD, 1200 bar	2.1 x 150	1.8	759700-902
Narrow Bore RRHD, 1200 bar	2.1 x 100	1.8	758700-902
Narrow Bore RRHD, 1200 bar	2.1 x 50	1.8	757700-902
Narrow Bore RRHT, 600 bar	2.1 x 100	1.8	728700-902
Narrow Bore RRHT, 600 bar	2.1 x 50	1.8	727700-902
Narrow Bore RRHT, 600 bar	2.1 x 30	1.8	724700-902
Narrow Bore RRHT, 600 bar	2.1 x 20	1.8	726700-902
MicroBore RR	1.0 x 150	3.5	763600-902
MicroBore RR	1.0 x 50	3.5	765600-902
MicroBore RR	1.0 x 30	3.5	761600-902
MicroBore Guard, 3/pk	1.0 x 17	5	5185-5923
 Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-930
 Guard Cartridge, 4/pk	2.1 x 12.5	5	821125-930
 Guard Hardware Kit			820999-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)			
 PrepHT Cartridge	21.2 x 150	5	770150-902
 PrepHT	21.2 x 100	5	770100-902
 PrepHT	21.2 x 50	5	770050-902
 PrepHT endfittings, 2/pk			820400-901
 PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-930
 Guard Cartridge Hardware			820444-901

Unless indicated, column pressure limit is 400 bar.

ZORBAX Rx

- Recommended for alternate selectivity at low pH relative to Eclipse XDB-C18 and StableBond SB-C18; for higher temperature applications, StableBond is recommended
- Higher carbon load than SB-C18 columns (12% vs. 10%).
- High stability and good peak shape for low pH applications (up to pH 8)
- Manufactured using dimethyloctadecylsilane and non-encapped
- Same product as SB-C8

Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits	pH Range*	Encapped	Carbon Load
ZORBAX Rx-C18	80Å	180 m ² /g	60°C	2.0-8.0	No	12%
ZORBAX Rx-C8	80Å	180 m ² /g	80°C	1.0-8.0	No	5.5%

Specifications represent typical values only.

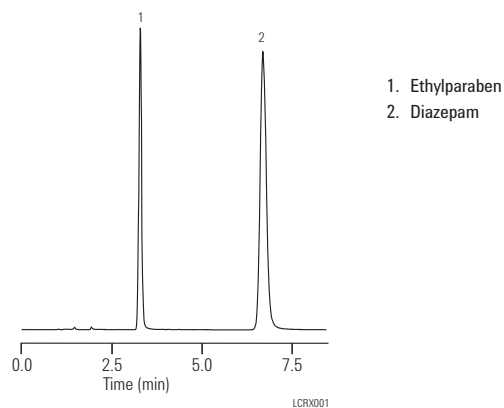
*At pH 6-9 highest column stability for all silica based columns is obtained by operating at temperatures <40°C and using lower buffer concentrations in the range of 0.01-0.02 M.

Analysis of Diazepam on Rx-C18














Column: ZORBAX Rx-C18
880967-302
3.0 x 250 mm, 5 µm

Mobile Phase: 35% H₂O:65% MeOH
Flow Rate: 0.5 mL/min

An Rx-C18 column is used for this USP analysis of diazepam and the internal standard ethylparaben. The Solvent Saver 3.0 mm ID Rx-C18 column reduces solvent usage by 60% over what would be used if the analysis was done on a 4.6 x 250 mm column.



ZORBAX Rx

Hardware Description	Size (mm)	Particle Size (µm)	Rx-C18 USP L1	Rx-C8 USP L7*
Semi-Preparative	9.4 x 250	5	880967-202	880967-201
Analytical	4.6 x 250	5	880967-902	880967-901
Analytical	4.6 x 150	5	883967-902	883967-901
Rapid Resolution	4.6 x 150	3.5	863967-902	
Rapid Resolution	4.6 x 100	3.5	861967-902	
Rapid Resolution	4.6 x 75	3.5	866967-902	
Solvent Saver	3.0 x 250	5	880967-302	
Solvent Saver	3.0 x 150	5	883967-302	
Solvent Saver Plus	3.0 x 150	3.5	863967-302	
Solvent Saver Plus	3.0 x 100	3.5	861967-302	
Narrow Bore	2.1 x 150	5	883700-902	
Narrow Bore RR	2.1 x 100	3.5	861767-902	
 Guard Cartridge, 2/pk	9.4 x 15	7	820675-115	820675-115
 Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-914	820950-913
 Guard Cartridge, 4/pk	2.1 x 12.5	5	821125-915	821125-915
 Guard Hardware Kit	9.4 x 15		840140-901	840140-901
 Guard Hardware Kit			820999-901	820999-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)				
 PrepHT Cartridge	21.2 x 250	7	877967-102	877250-106
 PrepHT Cartridge	21.2 x 150	7		877150-106
 PrepHT Cartridge	21.2 x 150	5		870150-906
 PrepHT Cartridge	21.2 x 100	5		870100-906
 PrepHT Cartridge	21.2 x 50	5		870050-906
 PrepHT Guard Cartridge, 2/pk		5	820212-914	820212-915
 Guard Cartridge Hardware			820444-901	820444-901
 PrepHT endfittings, 2/pk			820400-901	820400-901

*Rx-C8 is the same product as SB-C8. For other sizes and configurations, see the ZORBAX StableBond section. Turn to pages 841–848.

Pursuit HPLC Columns

Beginning in drug discovery and drug metabolism, Pursuit columns are ideal for analyzing lead compounds and biological samples. The column's performance is due to the unique combination of advanced bonding chemistry and ultra-high purity silica. These factors combine to provide rapid separations with excellent first time resolution and symmetrical peaks for polar compounds, whether at pH 1.5 or 10. Additionally, the need for ion pairing agents such as TFA is often eliminated, thus maximizing the performance of single and parallel multi-channel LC/MS systems.

Culminating in QC, Pursuit is ideal for implementing dependable trouble-free analysis of raw materials and approved drugs. Rigorous control and validation of each step in the manufacturing process ensures column reproducibility. With Pursuit your laboratory can spend its energy on producing results.

Special selectivities such as Pursuit PFP (for very polar compounds) and Pursuit PAH (environmental) give you the extra selectivities you need for your most challenging applications.

Pursuit

For LC/MS and high throughput applications. Built on the larger 200Å pore size silica, high ligand density delivers up to 40% faster separations without sacrificing resolution. This is accomplished by optimizing mass transfer with the larger pore size.

Pursuit XRs

For performance in analytical R&D, QC and preparative applications. Combining high ligand density with a 100Å pore size, high surface area silica, Pursuit XRs columns are designed to increase productivity, as they offer maximum loadability, excellent stability and easy scalability while maintaining superior resolution.

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Pursuit XR^sUltra 2.8

For the ultimate in speed and good resolution on any instrument, we designed the Pursuit XR^sUltra 2.8 around an optimized 2.8 μm particle and an advanced packing procedure.

Now you can decrease your run time while maintaining resolution. Lower backpressure allows high flow rates to be used, and the 2.8 μm particles of ultra-pure silica delivers 10-15% higher efficiency than 3 μm columns.

Pursuit UPS^{2.4}

For maximum efficiency, particularly in high viscosity solvent separations. With an optimized 2.4 μm particle, Pursuit UPS columns offer approximately 50% lower backpressure compared to sub-2 μm columns, delivering higher speed and resolution without the need for ultra-high pressure equipment.

Pursuit UPS^{1.9}

Pursuit UPS^{1.9} columns deliver sub-2 μm efficiencies when sensitivity, resolution, and throughput are critical. These columns excel under the high pressures and fast gradients demanded by today's pharmaceutical industry, up to a pressure limit of 1000 bar.

Column Specifications

Bonded Phase	Pore Size	Surface Area	pH Range	Endcapped	Carbon Load	Pore Volume	Ligand Coverage
Pursuit C18	200Å	200 m ² /g	1.5-10	Yes	12.9%	1.1 mL/g	3.5 $\mu\text{mol}/\text{m}^2$
Pursuit C8	200Å	200 m ² /g	1.5-10	Yes	7.4%	1.1 mL/g	3.8 $\mu\text{mol}/\text{m}^2$
Pursuit Diphenyl	200Å	200 m ² /g	1.5-8.0	Yes	7.3%	1.1 mL/g	2.8 $\mu\text{mol}/\text{m}^2$
Pursuit PFP	200Å	200 m ² /g	1.5-10	Yes	6.3%	1.1 mL/g	3.4 $\mu\text{mol}/\text{m}^2$
Pursuit PAH	200Å	200 m ² /g	1.5-10	Yes		1.1 mL/g	
Pursuit XR ^s C18	100Å	440 m ² /g	1.5-10	Yes	22%	1.1 mL/g	2.9 $\mu\text{mol}/\text{m}^2$
Pursuit XR ^s C8	100Å	440 m ² /g	1.5-10	Yes	15%	1.1 mL/g	3.7 $\mu\text{mol}/\text{m}^2$
Pursuit XR ^s Diphenyl	100Å	440 m ² /g	1.5-8.0	Yes	14.6%	1.1 mL/g	2.6 $\mu\text{mol}/\text{m}^2$
Pursuit XR ^s Si	100Å	440 m ² /g	1.5-10	Yes		1.1 mL/g	
Pursuit XR ^s Ultra 2.8 C18	100Å	440 m ² /g	1.5-10	Yes	23.2%	1.1 mL/g	3.2 $\mu\text{mol}/\text{m}^2$
Pursuit XR ^s Ultra 2.8 C8	100Å	440 m ² /g	1.5-10	Yes	15%	1.1 mL/g	3.7 $\mu\text{mol}/\text{m}^2$
Pursuit XR ^s Ultra 2.8 Diphenyl	100Å	440 m ² /g	1.5-8.0	Yes	14.6%	1.1 mL/g	2.6 $\mu\text{mol}/\text{m}^2$
Pursuit UPS ^{2.4} C18	100Å	350 m ² /g	1.5-10	Yes	21%	0.9 mL/g	2.5 $\mu\text{mol}/\text{m}^2$
Pursuit UPS ^{1.9} C18	100Å	350 m ² /g	1.5-10	Yes	21%	0.9 mL/g	3.0 $\mu\text{mol}/\text{m}^2$

Specifications represent typical values only.

Tricyclic antidepressants and benzodiazepines

Column: Pursuit XRs C18
A6000150X046
4.6 x 150 mm, 5 µm

Mobile Phase: A: Water+0.1% HCOOH
 B: MeCN+0.1% HCOOH

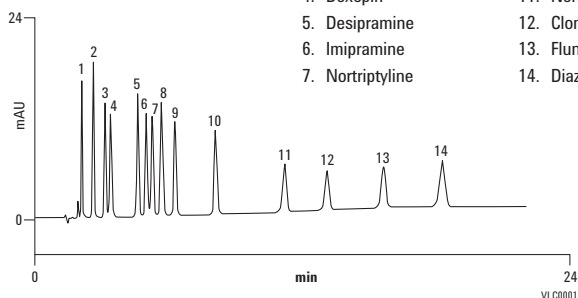
Gradient: 30-40% B in 15 min, hold at 40% B for 15 min

Flow Rate: 1.0 mL/min

Temperature: Ambient

Detector: UV, 254 nm

- | | |
|-------------------------|-------------------|
| 1. 7-Aminoclonazepam | 8. Amitriptyline |
| 2. 7-Aminoflunitrazepam | 9. Trimipramine |
| 3. Nordoxepin | 10. Clomipramine |
| 4. Doxepin | 11. Nordiazepam |
| 5. Desipramine | 12. Clonazepam |
| 6. Imipramine | 13. Flunitrazepam |
| 7. Nortriptyline | 14. Diazepam |



Mechanical stability of Pursuit XRs

Column: Pursuit XRs C18
A6000050X020
2.0 x 50 mm, 5 µm

Sample: DMSO mix

Mobile Phase: A: MeOH:water, 10:90 + 0.1% HCOOH
 B: MeOH:water, 90:10 + 0.1% HCOOH

Gradient: 0-100% B in 3 min, back to 0% B
 in 0.5 min, hold at 0% B for 3.5 min

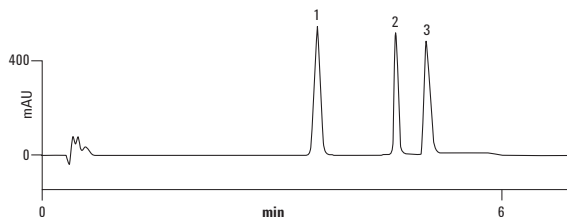
Flow Rate: 0.4 mL/min

Temperature: Ambient

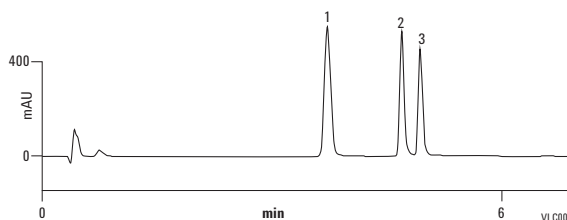
Detector: UV, 254 nm

1. 4-Methoxybenzenesulfonamide
2. Methyl 3-aminothiophene-2-carboxylate
3. Trimipramine

Injection 1



Injection 5000



Antifungals

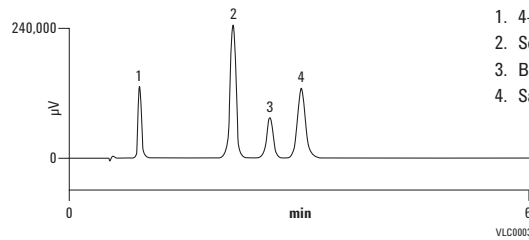
Column: Pursuit XR^{Ultra} 2.8 Diphenyl
A7521050X020
2 x 50 mm, 2.8 µm

Mobile Phase: Water+0.1% HCOOH:MeCN+0.1%
HCOOH, 80:20

Flow Rate: 0.4 mL/min

Temperature: Ambient

Detector: UV, 254 nm



1. 4-Aminobenzoic acid
2. Sorbic acid
3. Benzoic acid
4. Salicylic acid

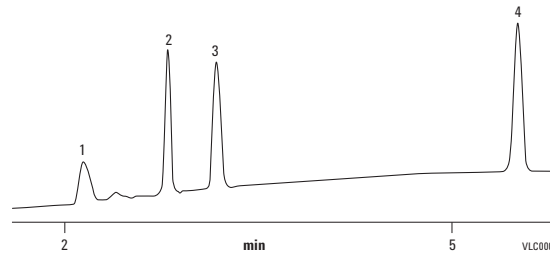
Liquid chromatography phase test mixture (LPTM) on Pursuit C8

Column: Pursuit C8
A3031050X020
2.0 x 50 mm, 3 µm

Mobile Phase: A: 0.05% HCOOH in water
B: 0.05% HCOOH in MeCN

Flow Rate: 0.6 mL/min

Detector: UV, 220 nm



1. Aspartame
2. Cortisone
3. Reserpine
4. Dioctyl phthalate

Adrenocorticosteroids on Pursuit PFP and C18

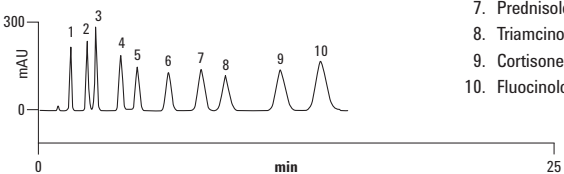
Mobile Phase: MeCN:water, 22.5:77.5

Flow Rate: 1.5 mL/min

Temperature: Ambient

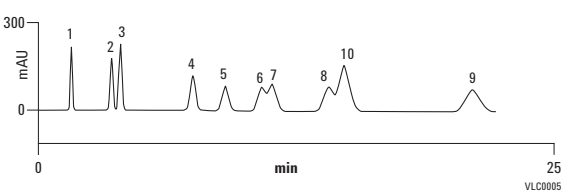
Detector: UV, 240 nm

Pursuit PFP



1. Triamcinolone
2. Prednisolone
3. Cortisone
4. Methylprednisolone
5. Corticosterone
6. Beclomethasone
7. Prednisolone acetate
8. Triamcinolone acetonide
9. Cortisone acetate
10. Fluciclonolone acetonide

Pursuit C18



Pursuit HPLC Columns

Size (mm)	Particle Size (µm)	Pursuit C18 USP L1	Pursuit C8 USP L7	Pursuit Diphenyl	Pursuit PFP	Pursuit PAH USP L1
50 x 250	10	A3002250X500	A3032250X500			
21.2 x 250	10	A3002250X212	A3032250X212			
21.2 x 150	10	A3002150X212				
21.2 x 250	5	A3000250X212			A3050250X212	
21.2 x 150	5	A3000150X212			A3050150X212	
21.2 x 100	5			A3040100X212		
10 x 250	10	A3002250X100	A3032250X100			
10 x 150	5	A3000150X100			A3050150X100	
10 x 250	5	A3000250X100	A3030250X100		A3050250X100	
4.6 x 250	10	A3002250X046	A3032250X046			
4.6 x 150	10	A3002150X046	A3032150X046			
4.6 x 100	10					
4.6 x 250	5	A3000250X046	A3030250X046	A3040250X046	A3050250X046	A7000250X046
4.6 x 150	5	A3000150X046	A3030150X046	A3040150X046	A3050150X046	A7000150X046
4.6 x 100	5	A3000100X046	A3030100X046	A3040100X046	A3050100X046	
4.6 x 50	5	A3000050X046	A3030150X046	A3040050X046	A3050050X046	
4.6 x 250	3	A3001250X046	A3031250X046	A3041250X046	A3051250X046	
4.6 x 150	3	A3001150X046	A3031150X046	A3041150X046	A3051150X046	
4.6 x 100	3	A3001100X046	A3031100X046	A3041100X046	A3051100X046	A7001100X046
4.6 x 50	3	A3001050X046		A3041050X046	A3051050X046	
4.6 x 30	3	A3001030X046				
4.0 x 250	5	A3000250X040				
4.0 x 125	5	A3000125X040				
3.9 x 300	10	A3002300X039				
3.9 x 300	5	A3000300X039				
3.9 x 150	5	A3000150X039				
3.0 x 250	5	A3000250X030		A3040250X030		
3.0 x 150	5	A3000150X030		A3040150X030	A3050150X030	
3.0 x 100	5	A3000100X030			A3050100X030	
3.0 x 250	3	A3001250X030				
3.0 x 150	3	A3001150X030		A3041150X030	A3051150X030	
3.0 x 100	3	A3001100X030		A3041100X030	A3051100X030	A7001100X030
3.0 x 50	3	A3001050X030		A3041050X030	A3051050X030	
2.0 x 250	5	A3000250X020				
2.0 x 150	5	A3000150X020	A3030150X020	A3040150X020		

(Continued)

Pursuit HPLC Columns

Size (mm)	Particle Size (µm)	Pursuit C18 USP L1	Pursuit C8 USP L7	Pursuit Diphenyl	Pursuit PFP	Pursuit PAH USP L1
2.0 x 100	5	A3000100X020	A3030100X020	A3040100X020	A3050100X020	
2.0 x 50	5	A3000050X020	A3030050X020	A3040050X020	A3050050X020	
2.0 x 30	5	A3000030X020		A3040030X020	A3050030X020	
2.0 x 20	5	A3000020X020			A3050020X020	
2.0 x 250	3	A3001250X020		A3041250X020		
2.0 x 200	3			A3041200X020		
2.0 x 150	3	A3001150X020	A3031150X020	A3041150X020	A3051150X020	
2.0 x 100	3	A3001100X020	A3031100X020	A3041100X020	A3051100X020	A7001100X020
2.0 x 50	3	A3001050X020	A3031050X020	A3041050X020	A3051050X020	
2.0 x 30	3	A3001030X020	A3031030X020	A3041030X020	A3051030X020	
2.0 x 20	3	A3001020X020		A3041020X020	A3051020X020	

Pursuit ChromSep Complete Cartridge Systems

Hardware	Size (mm)	Particle Size (µm)	Pursuit C18 USP L1	Pursuit C8 USP L7	Pursuit PAH USP L1
CS	4.6 x 250	5	A3000250C046	A3030250C046	A7000250C046
CS	4.6 x 250	3		A3031250C046	
CS	4.6 x 150	5	A3000150C046	A3030150C046	A7000150C046
CS	4.6 x 100	5	A3000100C046	A3030100C046	
CS	4.6 x 150	3	A3001150C046	A3031150C046	A7001150C046
CS	4.6 x 100	3	A3001100C046	A3031100C046	A7001100C046
CS	4.6 x 50	3	A3001050C046		
CS	3.0 x 250	5	A3000250C030		
CS	3.0 x 150	5	A3000150C030		
CS	3.0 x 100	5	A3000100C030		A7000100C030
CS	3.0 x 150	3	A3001150C030		
CS	3.0 x 100	3	A3001100C030		
CS	2.0 x 250	5	A3000250C020		
CS	2.0 x 150	5	A3000150C020	A3030150C020	
CS	2.0 x 100	5	A3000100C020		
CS	2.0 x 150	3	A3001150C020		
CS	2.0 x 100	3	A3001100C020		
CS	2.0 x 50	3	A3001050C020		

Pursuit ChromSep Replacement Cartridges

Hardware	Size (mm)	Particle Size (µm)	Unit	Pursuit C18 USP L1	Pursuit C8 USP L7	Pursuit PAH USP L1
CS	4.6 x 250	5				A7000250R046
			3/pk			A7000250T046
CS	4.6 x 150	5		A3000150R046	A3030150R046	A7000150R046
			3/pk	A3000150T046	A3030150T046	A7000150T046
CS	4.6 x 150	3			A3031150R046	A7001150R046
			3/pk		A3031150T046	A7001150T046
CS	4.6 x 100	3				A7001100R046
			3/pk			A7001100T046
CS	4.6 x 50	3		A3001050R046		
			3/pk	A3001050T046		
CS	3.0 x 150	5		A3000150R030		
			3/pk	A3000150T030		
CS	3.0 x 100	5		A3000100R030		A7000100R030
			3/pk	A3000100T030		A7000100T030
CS	3.0 x 150	3		A3001150R030		
			3/pk	A3001150T030		
CS	3.0 x 100	3		A3001100R030		A7001100R030
			3/pk	A3001100T030		A7001100T030
CS	2.0 x 50	3			A3031050R020	
			3/pk		A3031050T020	

Pursuit XRs HPLC Columns

Size (mm)	Particle Size (µm)	Pursuit XRs C18 USP L1	Pursuit XRs C8 USP L7	Pursuit XRs Diphenyl	Pursuit XRs Si USP L3
50.0 x 250	10	A6002250X500		A6002250X500	A6004250X500
30.0 x 250	5	A6000250X300			A6004250X300
30.0 x 150	5	A6000150X300		A6020150X300	
30.0 x 100	5	A6000100X300			
30.0 x 50	5	A6000050X300			
21.2 x 250	10	A6002250X212	A6012250X212		A6004250X212
21.2 x 250	5	A6000250X212		A6020250X212	
21.2 x 150	5	A6000150X212			
21.2 x 100	5	A6000100X212		A6020100X212	
21.2 x 50	5	A6000050X212			
21.2 x 30	5	A6000030X212			

(Continued)

Pursuit XRs HPLC Columns

Size (mm)	Particle Size (µm)	Pursuit XRs C18 USP L1	Pursuit XRs C8 USP L7	Pursuit XRs Diphenyl	Pursuit XRs Si USP L3
10.0 x 250	10	A6002250X100			A6004250X100
10.0 x 250	5	A6000250X100		A6020250X100	
10.0 x 150	5	A6000150X100			
10.0 x 50	5	A6000050X100			
10.0 x 150	3			A6021150X100	
4.6 x 250	10	A6002250X046			A6004250X046
4.6 x 50	10	A6002050X046S			
4.6 x 250	5	A6000250X046	A6010250X046	A6020250X046	
4.6 x 150	5	A6000150X046	A6010150X046	A6020150X046	
4.6 x 100	5	A6000100X046	A6010100X046	A6020100X046	A6006100X046
4.6 x 50	5	A6000050X046		A6020050X046	A6006050X046
4.6 x 250	3	A6001250X046		A6021250X046	
4.6 x 150	3	A6001150X046	A6010150X046	A6021150X046	
4.6 x 100	3	A6001100X046	A6011100X046	A6021100X046	A6005100X046
4.6 x 50	3	A6001050X046	A6011050X046	A6021050X046	A6005050X046
4.6 x 30	3	A6001030X046		A6021030X046	
4.0 x 250	5	A6000250X040	A6010250X040		
4.0 x 150	5	A6000150X040	A6010150X040		
3.0 x 250	5	A6000250X030			
3.0 x 150	5	A6000150X030			
3.0 x 100	5	A6000100X030			
3.0 x 150	3	A6001150X030		A6021150X030	
3.0 x 100	3	A6001100X030		A6021100X030	
3.0 x 50	3	A6001050X030		A6021050X030	
3.0 x 30	3	A6001030X030			
2.1 x 100	5				A6006100X021
2.0 x 250	5	A6000250X020		A6020250X020	
2.0 x 150	5	A6000150X020	A6010150X020	A6020150X020	
2.0 x 100	5	A6000100X020	A6010100X020		
2.0 x 50	5	A6000050X020	A6010050X020	A6020050X020	
2.0 x 30	5	A6000030X020			
2.0 x 250	3	A6001250X020		A6021250X020	
2.0 x 150	3	A6001150X020	A6011150X020	A6021150X020	
2.0 x 100	3	A6001100X020	A6011100X020	A6021100X020	
2.0 x 50	3	A6001050X020	A6011050X020	A6021050X020	A6005050X020
2.0 x 30	3			A6021030X020	
2.0 x 20	3	A6001020X020			
1.0 x 150	3	A6001150X010			
1.0 x 100	3	A6001100X010		A6021100X010	

Pursuit XR^sUltra 2.8 HPLC Columns

Size (mm)	Particle Size (µm)	Pursuit XR ^s Ultra 2.8 C18	Pursuit XR ^s Ultra 2.8 C8	Pursuit XR ^s Ultra 2.8 Diphenyl
3.0 x 150	2.8	A7501150X030	A7511150X030	
3.0 x 100	2.8	A7501100X030		
2.0 x 150	2.8	A7501150X020		
2.0 x 100	2.8	A7501100X020	A7511100X020	A7521100X020
2.0 x 50	2.8	A7501050X020	A7511050X020	A7521050X020
2.0 x 30	2.8	A7501030X020	A7511030X020	A7521030X020

Pursuit UPS^{2.4} HPLC Columns

Size (mm)	Particle Size (µm)	Pursuit UPS ^{2.4}
3.0 x 100	2.4	A8100100X030H
3.0 x 50	2.4	A8100050X030H
2.0 x 100	2.4	A8100100X020H
2.0 x 50	2.4	A8100050X020H
2.0 x 30	2.4	A8100030X020H

Pursuit UPS^{1.9} HPLC Columns

Size (mm)	Particle Size (µm)	Pursuit UPS ^{1.9} C18	Pursuit UPS ^{1.9} Diphenyl
3.0 x 100	1.9	A8000100X030H	A8020100X030H
3.0 x 50	1.9	A8000050X030H	A8020050X030H
2.0 x 100	1.9	A8000100X020H	A8020100X020H
2.0 x 50	1.9	A8000050X020H	A8020050X020H
2.0 x 30	1.9	A8000030X020H	A8020030X020H

Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatographer.

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Polaris HPLC Columns

In areas like drug discovery where target compounds are increasingly polar, it is critical to have a reverse phase column that performs well under aqueous conditions. Retention is critical, but cannot come with troublesome secondary interactions. Likewise, phase collapse and shifting retention times need to be avoided. The answer is our Polaris line of polar-modified columns.

From the collapse-resistant pore structure of our base silica, to the "wettability" engineered into the bonded phases, Polaris columns have been designed for high aqueous conditions. The combination of high phase density bonding, ultra pure silica, and silanol shielding leads to excellent peak shape among polar-modified columns.

As a family, Polaris offers a variety of polar modifications in both C18 and C8 chemistries.

Polaris C18-A

Polaris C18-A is the best starting place for separations where the benefits of polar-modified columns are desired. The polar modifications of C18-A help it avoid poor peak shape and retention issues in low organic conditions.

Polaris C8-A

Polaris C8-A offers an alternative selectivity to standard C8 phases and has a lower hydrophobicity than Polaris C18-A, making it ideal for polar samples, or faster overall analysis times.

Polaris C18-Ether

Polaris C18-Ether offers an alternative selectivity to Polaris C18-A and standard C18 phases, and typically delivers increased retention of polar compounds away from the void volume.

Polaris C8-Ether

Polaris C8-Ether offers an alternative selectivity to Polaris C8-A with particular utility for hydrogen bonding compounds.

Column Specifications

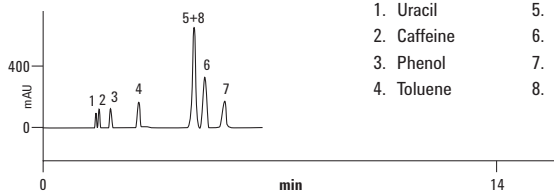
Bonded Phase	Pore Size	Surface Area	Carbon Load	Endcapped	Pore Volume	Ligand Coverage
Polaris C18-A	180Å	200 m ² /g	13.8%	Yes	1.1 cm ³ /g	3.9 μmol/m ²
Polaris C8-A	180Å	200 m ² /g	7.4%	Yes	1.1 cm ³ /g	4.8 μmol/m ²
Polaris C18-Ether	180Å	200 m ² /g	12.1%	Yes	1.1 cm ³ /g	3.3 μmol/m ²
Polaris C8-Ether	180Å	200 m ² /g	7.1%	Yes	1.1 cm ³ /g	4.5 μmol/m ²

Specifications represent typical values only.

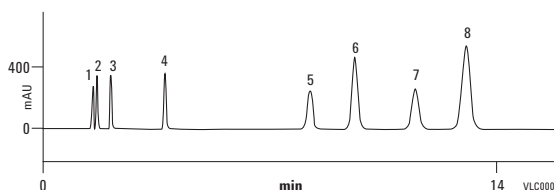
Selectivity text mix for Polaris columns

Mobile Phase: MeCN:water 70:30
 Flow Rate: 1.0 mL/min
 Temperature: Ambient
 Detector: UV, 254 nm

Polaris C8-A

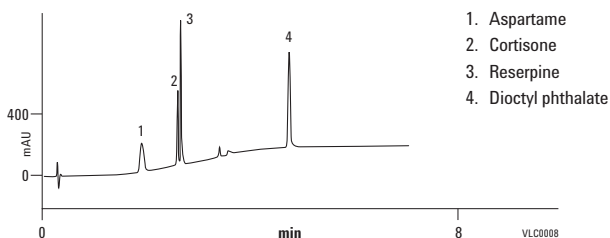


Polaris C18-A



LC/MS performance test mix for Polaris C8-A

Column: Polaris C8-A
 A2011030X030
 3.0 x 30 mm, 3 μm
 Mobile Phase: A: Water+0.05% HCOOH
 B: MeCN+0.05% HCOOH
 Gradient: 5-90% B in 3 min and hold for 4 min
 Flow Rate: 0.6 mL/min
 Temperature: Ambient
 Detector: UV, 220 nm



Polaris HPLC Columns

Size (mm)	Particle Size (µm)	Polaris C18-A	Polaris C8-A	Polaris C18-Ether	Polaris C8-Ether	Polaris NH2	Polaris Si-A
50 x 250	10	A2002250X500					A2004250X500
30 x 100	5	A2000100X300					
21.2 x 250	10	A2002250X212					A2004250X212
21.2 x 250	5	A2000250X212	A2010250X212	A2020250X212	A2030250X212	A2013250X212	A2003250X212
21.2 x 150	5	A2000150X212					A2003150X046
21.2 x 100	5	A2000100X212					
21.2 x 50	5						A2003050X212
10 x 250	5	A2000250X100		A2020250X100	A2030250X100	A2013250X100	
10 x 50	3			A2021050X100			
4.6 x 250	10	A2002250X046					A2003250X046
4.6 x 250	5	A2000250X046	A2010250X046	A2020250X046	A2030250X046	A2013250X046	
4.6 x 200	5	A2000200X046					
4.6 x 150	5	A2000150X046	A2010150X046	A2020150X046	A2030150X046	A2013150X046	A2003150X046
4.6 x 100	5	A2000100X046	A2010100X046			A2013100X046	A2003100X046
4.6 x 50	5	A2000050X046		A2020050X046		A2013050X046	A2003050X046
4.6 x 30	5	A2000030X046					
4.6 x 250	3	A2001250X046		A2021250X046	A2031250X046	A2014250X046	A2005250X046
4.6 x 150	3	A2001150X046	A2011150X046			A2014150X046	A2005150X046
4.6 x 100	3	A2001100X046	A2011100X046			A2014100X046	A2005100X046
4.6 x 75	3	A2001075X046	A2011075X046				
4.6 x 50	3	A2001050X046		A2021050X046	A2031050X046	A2014050X046	A2005050X046
4.6 x 30	3	A2001030X046					
4.0 x 250	5	A2000250X040				A2013250X040	A2003250X040
4.0 x 150	5	A2000150X040				A2013150X040	A2003150X040
4.0 x 125	5					A2013125X040	A2003125X040
3.0 x 250	5	A2000250X030				A2013250X030	A2005250X046
3.0 x 150	5	A2000150X030		A2020150X030		A2013150X030	A2003150X030
3.0 x 100	5	A2000100X030				A2013100X030	A2003100X030
3.0 x 50	5	A2000050X030					A2003050X030
3.0 x 250	3	A2001250X030				A2014250X030	A2003250X030
3.0 x 200	3	A2001200X030					
3.0 x 150	3	A2001150X030		A2021150X030		A2014150X030	A2005150X030
3.0 x 100	3	A2001100X030				A2014100X030	A2005100X030
3.0 x 50	3	A2001050X030		A2021050X030	A2031050X030	A2014050X030	A2005050X030
3.0 x 30	3	A2001030X030	A2011030X030				

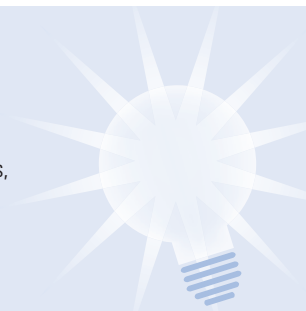
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Polaris HPLC Columns

Size (mm)	Particle Size (µm)	Polaris C18-A	Polaris C8-A	Polaris C18-Ether	Polaris C8-Ether	Polaris NH2	Polaris Si-A
2.0 x 250	5	A2000250X020		A2020250X020	A2030250X020	A2013250X020	A2003250X020
2.0 x 150	5	A2000150X020	A2010150X020	A2020150X020	A2030150X020	A2013150X020	A2003150X020
2.0 x 100	5	A2000100X020				A2013100X020	A2003100X020
2.0 x 50	5	A2000050X020	A2010050X020	A2020050X020	A2030050X020	A2013050X020	A2003050X020
2.0 x 30	5	A2000030X020				A2013030X020	A2003030X020
2.0 x 20	5	A2000020X020				A2013020X020	A2003020X020
2.0 x 250	3	A2001250X020	A2011250X020	A2021250X020	A2031250X020	A2014250X020	A2005250X020
2.0 x 150	3	A2001150X020	A2011150X020	A2021150X020	A2031150X020	A2014150X020	A2005150X020
2.0 x 100	3	A2001100X020		A2021100X020	A2031100X020	A2014100X020	A2005100X020
2.0 x 75	3			A2021075X020			
2.0 x 50	3	A2001050X020	A2011050X020	A2021050X020	A2031050X020	A2014050X020	A2005050X020
2.0 x 30	3	A2001030X020		A2021050X020		A2014030X020	A2005030X020
2.0 x 20	3	A2001020X020				A2014020X020	A2005020X020

Tips & Tools

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Polaris ChromSep Complete Cartridge Systems

Hardware	Size (mm)	Particle Size (μm)	Polaris C18-A
CS	4.6 x 250	5	A2000250C046
CS	4.6 x 150	5	A2000150C046
CS	4.6 x 100	5	A2000100C046
CS	4.6 x 250	3	A2001250C046
CS	4.6 x 150	3	A2001150C046
CS	3.0 x 250	5	A2000250C030
CS	3.0 x 100	5	A2000100C030
CS	2.0 x 100	5	A2000100C020
CS	2.0 x 150	3	A2001150C020
CS	2.0 x 100	3	A2001100C020
CS	2.0 x 50	3	A2001050C020







Polaris ChromSep Replacement Cartridges

Hardware	Size (mm)	Particle Size (μm)	Unit	Polaris C18-A
CS	4.6 x 250	5		A2000250R046
			3/pk	A2000250T046
CS	4.6 x 150	5		A2000150R046
			3/pk	A2000150T046
CS	4.6 x 100	5		A2000100R046
			3/pk	A2000100T046
CS	4.6 x 150	3		A2001150R046
			3/pk	A2001150T046
CS	4.6 x 100	3		A2001100R046
			3/pk	A2001100T046
CS	3.0 x 150	5		A2000150R030
			3/pk	A2000150T030
CS	3.0 x 100	5		A2000100R030
			3/pk	A2000100T030
CS	3.0 x 100	3		A2001100R030
			3/pk	A2001100T030
CS	2.0 x 150	3		A2001150R020
			3/pk	A2001150T020
CS	2.0 x 50	3		A2001050R020
			3/pk	A2001050T020

ZORBAX Original Reversed-Phase Columns

Agilent Original ZORBAX columns are made with Type A silica and are useful for many applications of acidic or neutral compounds. These columns have a higher activity level and are therefore useful for separating isomers (e.g. cis-trans, geometric) or other compounds where silanol activity enhances selectivity. These columns are used in many established methods.

ZORBAX Original Reversed Phase Columns

Hardware	Description	Size (mm)	Particle Size (µm)	ODS (C18) USP L1	C8 USP L7	Phenyl USP L11	CN USP L10	TMS USP L13
Standard Columns (no special hardware required)								
	Semi-Preparative	9.4 x 250	5	880952-202	880952-206			
	Analytical (Endcapped)	4.6 x 250	5	880952-702	880952-706	880952-712	884950-507	880952-710
	Analytical (Non-endcapped)	4.6 x 250	5	884950-543				
	Analytical	4.6 x 150	5	883952-702	883952-706	883952-712	884950-526	883952-710
	Solvent Saver	3.0 x 250	5	880952-302				
	Solvent Saver	3.0 x 150	5	883952-302				
Guard Columns (hardware required)								
	Guard Cartridge, 2/pk	9.4 x 15	7	820675-115	820675-115	820675-115	820675-124	
	Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-902	820950-906	820950-912	820950-905	820950-924
	Guard Hardware Kit			840140-901	840140-901	840140-901	840140-901	840140-901
	Guard Hardware Kit			820999-901	820999-901	820999-901	820999-901	820999-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)								
	PrepHT Cartridge	21.2 x 250	7	877952-102	877952-106		877952-105	
	PrepHT endfittings, 2/pk			820400-901	820400-901		820400-901	

Agilent TC-C18(2) and HC-C18(2)

TC-C18(2)

Agilent TC-C18(2) is the ideal choice for complex natural product extract samples, traditional medicines and environmental samples or any sample where you need to analyze mixtures of polar and non-polar compounds, including strong basic compounds.

- Lower carbon load – 12%
- Ideal for polar compounds and gradient separations that start at low % organic or cover a wide organic range
- Good choice for samples dissolved in water, or mostly water
- Use with most common mobile phases, including formic acid, acetic acid, trifluoroacetic acid (TFA) and phosphate buffers with acetonitrile and methanol as the organic modifiers
- Excellent performance from pH 2-8

HC-C18(2)

Agilent HC-C18(2) is a more retentive C18 with a higher carbon load. An excellent value alternative to other high carbon load columns, it also provides superior peak shape for basic compounds.

- Higher carbon load – 17% – provides greater retention for moderately polar and non-polar compounds
- Ideal for non-polar compounds and separations that start at mid-level % organic (at least greater than 10% organic)
- Good choice for industrial samples or samples dissolved in organic/mostly organic solvents
- Stable over a very wide pH range (2-9) for maximum flexibility

Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits	pH Range*	Endcapped	Carbon Load
TC-C18 (2)	170Å	290 m ² /g	60°C	2.0-8.0	Yes	12%
HC-C18 (2)	170Å	290 m ² /g	60°C	2.0-9.0	Yes	17%

Specifications represent typical values only.

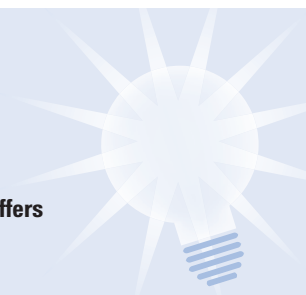
Agilent HC-C18(2) and TC-C18(2)

Description	Size (mm)	Particle Size (µm)	Part No.
Agilent HC-C18(2)	4.6 x 250	5	588905-902
Agilent HC-C18(2)	4.6 x 150	5	588915-902
Agilent TC-C18(2)	4.6 x 250	5	588925-902
Agilent TC-C18(2)	4.6 x 150	5	588935-902
Agilent HC-C18(2) guards, 2/pk	4.6 x 12.5	5	520518-904
Agilent TC-C18(2) guards, 2/pk	4.6 x 12.5	5	520518-905
Guard Hardware Kit			820999-901

Tips & Tools

Don't forget, we have special offers throughout the year.

To learn more, visit www.agilent.com/chem/specialoffers



Normal-Phase Columns

ZORBAX Normal-Phase Columns

For normal-phase chromatography, the Agilent ZORBAX product line offers a choice of bonded and non-bonded silica packings.

ZORBAX Rx-SIL

- Made from highly pure (>99.995%) porous silica microspheres (pore size is the space between the solid silica microparticles)
- Available in 1.8 and 5 μm particle sizes
- Stronger than other silica types
- Less acidic than ZORBAX-SIL, lower metal content
- Low acidity and low metal content make ZORBAX Rx-SIL ideal for normal-phase separation of polar compounds that exhibit poor peak symmetry on more acidic silica
- Useful for very hydrophilic compounds with high organic mobile phases in HILIC mode

ZORBAX Eclipse XDB-CN

- Made from highly pure Rx-SIL
- Excellent choice for normal-phase applications with basic compounds
- Equilibrates more rapidly than ZORBAX Rx-SIL and is used for many of the same normal-phase applications

Pursuit XRs Silica is another choice for normal-phase chromatography. For more information, see page 862–863.



ZORBAX CN

- Cyanopropyltrimethylsilane monolayer bonded to ZORBAX SIL
- Equilibrates more rapidly than ZORBAX SIL, and used for many of the same normal-phase applications
- Less prone to fouling and less water sensitive than silica

ZORBAX NH2

- Amino-propyl silane phase bonded to ZORBAX SIL
- Used for normal-phase and weak anion-exchange, and reversed-phase HPLC of polar compounds
- Vitamins A and D are separated in the normal-phase mode
- Carbohydrates and sugars are separated in the reversed-phase mode

Column Specifications

Bonded Phase	Pore Size	Surface Area	pH Range	Endcapped	Carbon Load
ZORBAX Rx-SIL	80Å	180 m ² /g	0-8.0	No	
ZORBAX Eclipse XDB-CN	80Å	180 m ² /g	2.0-8.0	Yes	4.3%
ZORBAX SIL	70Å	300 m ² /g	0-8.0	No	
ZORBAX CN	70Å	300 m ² /g	2.0-7.0	Yes	7%
ZORBAX NH ₂	70Å	300 m ² /g	2.0-7.0	Yes	4%

High Resolution Normal-Phase Separation of Octylphenoxy Ethanol Surfactant on ZORBAX CN

Column: ZORBAX CN
880952-705
4.6 x 250 mm, 5 µm

Mobile Phase: Primary: Heptane
Secondary: 2-Methoxyethanol/Isopropanol (50/50)

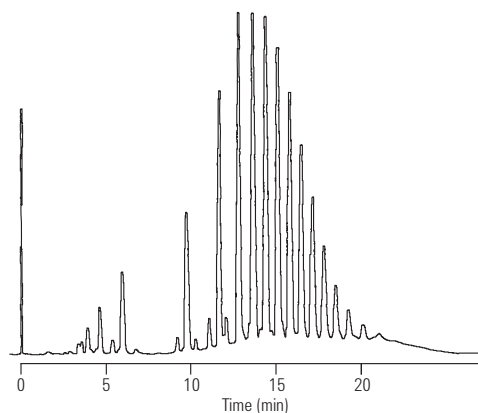
Flow Rate: 2 mL/min

Gradient: 2-20% Secondary in 10 min., Linear Hold at 20%

Temperature: 50°C











Detector: 278 nm

Sample: Octylphenoxy (polyethylene oxy)
Ethanol Surfactant (n= 10)













LCNP001

Normal-Phase Columns Based on ZORBAX Rx-SIL

Hardware	Description	Size (mm)	Particle Size (µm)	Rx-SIL USP L3	Eclipse XDB-CN USP L10
Standard Columns (no special hardware required)					
	Semi-Prep	9.4 x 250	5	880975-201	
	Analytical	4.6 x 250	5	880975-901	990967-905*
	Analytical	4.6 x 150	5	883975-901	993967-905*
	Rapid Resolution HT, 600 bar	4.6 x 100	1.8	828975-901	
	Rapid Resolution HT, 600 bar	4.6 x 50	1.8	827975-901	
	Rapid Resolution HT, 600 bar	3.0 x 100	1.8	828975-301	
	Rapid Resolution HT, 600 bar	3.0 x 50	1.8	827975-301	
	Narrow Bore	2.1 x 150	5	883700-901	993700-905*
	Rapid Resolution HT, 600 bar	2.1 x 100	1.8	828700-901	
	Rapid Resolution HT, 600 bar	2.1 x 50	1.8	827700-901	
Guard Columns (hardware required)					
	Guard Cartridge, 2/pk	9.4 x 15	5	820675-119	
	Guard Cartridges, 4/pk	4.6 x 12.5	5	820950-919	820950-935
	Guard Cartridge, 4/pk	2.1 x 12.5	5	821125-919	821125-935
	Guard Hardware Kit	9.4 x 15	0	840140-901	
	Guard Hardware Kit			820999-901	820999-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)					
	PrepHT Cartridge	21.2 x 250	7	877250-101	
	PrepHT Cartridge	21.2 x 250	7		
	PrepHT endfittings, 2/pk			820400-901	
	PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-919	
	Guard Cartridge Hardware			820444-901	

*These columns ship containing reversed-phase solvents. Flush with isopropanol before using normal-phase solvents. These columns can also be used in HILIC mode.

Normal-Phase Columns Based on ZORBAX Original SIL

Hardware Description	Size (mm)	Particle Size (µm)	SIL USP L3	CN USP L10	NH2 USP L8	Carbohydrate Analysis
Standard Columns (no special hardware required)						
Semi-Prep	9.4 x 250	5	880952-201	880952-205	880952-208	
Analytical	4.6 x 250	5	880952-701	880952-705	880952-708	840300-908
Analytical	4.6 x 150	5	883952-701	883952-705	883952-708	843300-908
Narrow Bore	2.1 x 50	5			860700-708	
Guard Columns (hardware required)						
 Guard Cartridge, 2/pk	9.4 x 15	5	820675-119	820675-111	820675-111	
 Guard Cartridges, 4/pk	4.6 x 12.5	5	820950-901	820950-905	820950-908	820950-908
 Guard Cartridge, 4/pk	2.1 x 12.5	5				
 Guard Hardware Kit	9.4 x 15		840140-901	840140-901	840140-901	
 Guard Hardware Kit			820999-901	820999-901	820999-901	820888-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)						
 PrepHT Cartridge	21.2 x 250	7	877952-101			
 PrepHT Cartridge	21.2 x 250	7		877952-105	877952-108	
 PrepHT endfittings, 2/pk			820400-901	820400-901	820400-901	
 PrepHT Guard Cartridge, 2/pk	17 x 7.5	5				
 Guard Cartridge Hardware						



ZORBAX HILIC Plus

- HILIC column for good retention of small, polar analytes
- Based on Eclipse Plus silica for excellent peak shape
- High sensitivity for LC/MS applications
- Recommended for EPA Method 1694

Agilent ZORBAX HILIC Plus columns are for use in hydrophilic interaction chromatography (HILIC) applications, which are typically used for the retention and resolution of small polar compounds. HILIC Plus columns are non-bonded silica columns based on the high performance silica used in ZORBAX Eclipse Plus columns. This silica provides excellent peak shape, critical for many polar, basic analytes. These columns ship prepared for use in HILIC mode – containing acetonitrile:water – in order to reduce the extensive equilibration typically required for HILIC separations. HILIC Plus columns are available in a 3.5 µm particle size for high resolution and in 2.1 and 4.6 mm ID for compatibility with mass spectrometers or with standard UV detectors.

Column Specifications

Bonded Phase	Pore Size	Surface Area	pH Range
Non-bonded silica	95Å	160 m ² /g	0-8.0

Specifications represent typical values only.

Tips & Tools

More information is a click away. We have a variety of educational primers, application notes, maintenance guides, and literature available from Agilent for free.

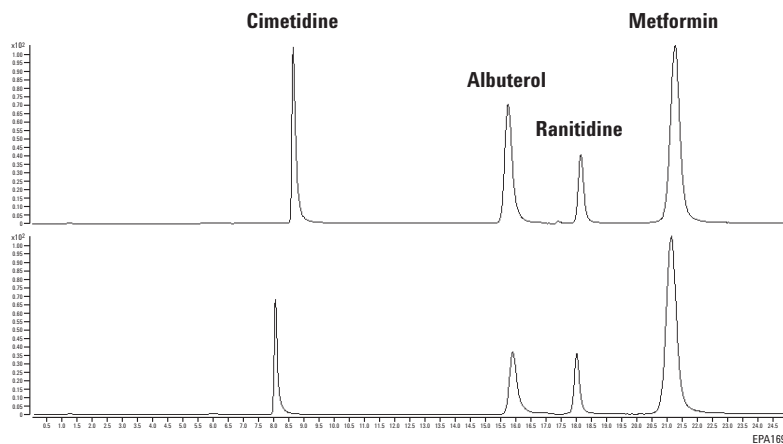
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Separation of Group 4 Analytes in EPA 1694 on ZORBAX HILIC Plus Column

Column: ZORBAX HILIC Plus
 959793-901
 2.1 x 100 mm, 3.5 μ m
Mobile Phase: 90% Acetonitrile:10% Water
Flow Rate: 0.25 mL/min
Gradient: Linear gradient to 55% acetonitrile
 in 7 min
 Held at 55%
Temperature: 25°C

Duplicate runs for column USCJP0004;
 10 min equilibration between two runs



ZORBAX HILIC Plus

Description	Size (mm)	Particle Size (μ m)	Part No.
Analytical	4.6 x 100	3.5	959961-901
Analytical	4.6 x 50	3.5	959943-901
Narrow Bore	2.1 x 100	3.5	959793-901
Narrow Bore	2.1 x 50	3.5	959743-901

Ion Exchange Columns

ZORBAX Ion Exchange Columns – SAX and SCX

- ZORBAX SAX and 300SCX columns are based on rugged ZORBAX silica
- Stable from pH 2-7
- Provide high efficiency, rapid separations
- Compatible with organic mobile phase modifiers

Agilent ZORBAX Strong Ion Exchange columns are available as both Strong Anion Exchange (SAX) and Strong Cation Exchange (300SCX) columns. Each column is packed with bonded, 5 μm , spherical silica particles for optimum efficiency.

ZORBAX SAX packing has a permanently bonded quaternary amine. A trifunctional organo-silane reagent is used in producing this packing to maximize its stability with aqueous mobile phases. This column is ideal for separation of water-soluble compounds such as aromatic and aliphatic carboxylic acids and sulfonic acids.

ZORBAX SCX packing has 300 \AA pore size silica particles chemically bonded to an aromatic sulfonic acid group. This column is used for separations of basic, water-soluble compounds and bio-molecules.

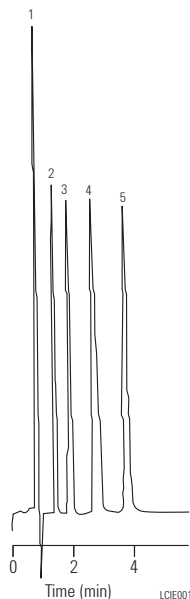
Column Specifications

Bonded Phase	Pore Size	Surface Area	pH Range	Functionality	Max Pressure
ZORBAX SAX	70 \AA	300 m ² /g	2.0-7.0	Quaternary amine	350 bar
ZORBAX 300SCX	300 \AA	50 m ² /g	2.0-7.0	Sulfonic acid	350 bar

Specifications represent typical values only.

Cough/Cold Remedies on ZORBAX 300SCX

Column: ZORBAX 300SCX
880952-704
4.6 x 250 mm, 5 µm
Mobile Phase: 100 mM NaH₂PO₄ (pH 6.5)
Flow Rate: 3 mL/min
Temperature: 20°C
Detector: 210 nm
Sample: Cold remedies



1. Pyrilamine
2. Theophylline
3. Glyceryl Guaicolate
4. Caffeine
5. Phenylephrine

ZORBAX Ion Exchange Columns – SAX and SCX

Description	Size (mm)	Particle Size (µm)	SAX	300SCX
Semi-preparative	9.4 x 250	5	880952-203	880952-204
Analytical	4.6 x 250	5	880952-703	880952-704
Analytical	4.6 x 150	5	883952-703	883952-704
Analytical	4.6 x 50	5		846952-704
Solvent Saver	3.0 x 50	5		860700-304
Narrow Bore	2.1 x 150	5		883700-704
Narrow Bore	2.1 x 50	5		860700-704
Guard Cartridge, 4/pk	4.6 x 12.5	6	820950-903	820950-904
Guard Hardware Kit			820888-901	820888-901

Hi-Plex HPLC Columns

- Preferred separation mechanism for the analysis of carbohydrates and oligosaccharides
- Matched to the USP definitions of media types L17, L19, L34 and L58
- Ideal for isocratic separations using water or dilute acid as the eluent

Hi-Plex columns are ion exchange or ligand exchange columns used predominantly for the separation of carbohydrates and organic acids. These columns are the preferred separation mechanism for the analysis of simple sugars, alcohols, oligosaccharides and organic acids in foodstuffs, but they can be used for the separation of other compounds as well.

The range comprises a 4% cross-linked resin for the analysis of oligosaccharides and an 8% cross-linked resin, with lower exclusion limit, for mono-, di- and tri-saccharide analysis. For carbohydrate and alcohol investigations, Hi-Plex columns use isocratic conditions with water as the eluent and temperature as the main variable for control of resolution. The exception is the Hi-Plex Na (Octo), which is used with sodium hydroxide eluents when pulsed amperometric detection (PAD) is employed.

Column Specifications

Bonded Phase	Temperature Range	Flow Rate (mL/min)	Eluent
Hi-Plex Ca	80-90°C	0.6	Water
Hi-Plex Ca USP L19	80-90°C	0.3	Water
Hi-Plex Pb	70-90°C	0.6	Water
Hi-Plex H for carbohydrates	60-70°C	0.6	Water
Hi-Plex H for organic acids	40-60°C	0.6	Dilute Acid
Hi-Plex Ca (Duo)	80-90°C	0.6	Water
Hi-Plex K	80-90°C	0.6	Water
Hi-Plex Na (Octo)	80-90°C	0.6	Water, Sodium Hydroxide
Hi-Plex Na	80-90°C	0.3	Water

Hi-Plex Column Selection

USP methods specify the type of HPLC media and column dimensions which should be used for the analysis. The Hi-Plex product range has four materials that comply with USP definitions.

Media Type L17

Strong cation exchange resin consisting of sulfonated, cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 7 to 11 μm in diameter – Hi-Plex H.

Media Type L19

Strong cation exchange resin consisting of sulfonated, cross-linked styrene-divinylbenzene copolymer in the calcium form, 9 μm in diameter – Hi-Plex Ca and Hi-Plex Ca (Duo).

Media Type L34

Strong cation exchange resin consisting of sulfonated, cross-linked styrene-divinylbenzene copolymer in the lead form, about 9 μm in diameter – Hi-Plex Pb.

Media Type L58

Strong cation exchange resin consisting of sulfonated, cross-linked styrene-divinylbenzene copolymer in the sodium form, 6 to 30 μm diameter – Hi-Plex Na and Hi-Plex Na (Octo).

In addition to the standard column sizes, the media is also packed in specific column dimensions for different USP methods, including sugar alcohol analysis.

For some application areas there are several column options, and the choice of the most appropriate Hi-Plex media will depend on sample matrix and exact carbohydrate composition.

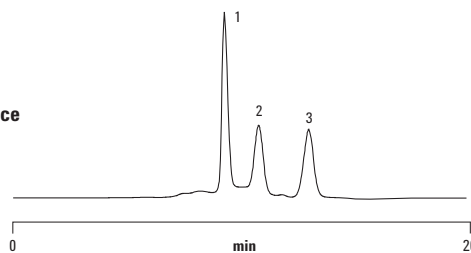
Hi-Plex Column Selection	
Application Area	Recommended Column
USP Methods Specifying L17 Media	Hi-Plex H
USP Methods Specifying L19 Media	Hi-Plex Ca and Hi-Plex Ca (Duo)
USP Methods Specifying L34 Media	Hi-Plex Pb
USP Methods Specifying L58 Media	Hi-Plex Na and Hi-Plex Na (Octo)
Mono- and Disaccharides	Hi-Plex Ca
	Hi-Plex Pb
	Hi-Plex H
	Hi-Plex Na (Octo)
Anomer Separations	Hi-Plex Ca
Organic Acids	Hi-Plex H
Alcohols	Hi-Plex Ca
	Hi-Plex K
	Hi-Plex H
	Hi-Plex Pb
Adulteration of Food and Beverages	Hi-Plex Ca and Hi-Plex Pb
Food Additives	Hi-Plex Ca and Hi-Plex Pb
Dairy Products	Hi-Plex Ca and Hi-Plex H
Sweetened Dairy Products	Hi-Plex Pb
Confectionery	Hi-Plex Ca and Hi-Plex Pb
Fruit Juice	Hi-Plex Ca
Wine	Hi-Plex H
Wood Pulp Hydrolysates (cellulose/hemi-cellulose)	Hi-Plex Pb
Fermentation Monitoring	Hi-Plex H
Oligosaccharides	Hi-Plex Na
Samples with High Salt Content (molasses)	Hi-Plex Na (Octo)
Oligosaccharides <Dp5 with Monosaccharides	Hi-Plex Ca (Duo)
Corn Syrups	Hi-Plex Na

Analysis of fruit juice

Column: Hi-Plex Ca
 PL1170-6810
 7.7 x 300 mm, 8 µm

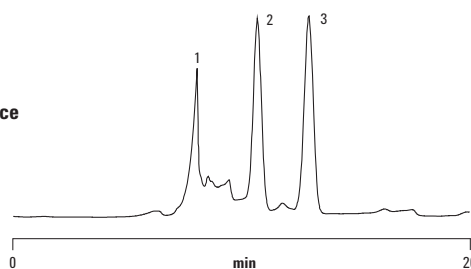
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Temperature: 85°C
Detector: RI

Orange juice

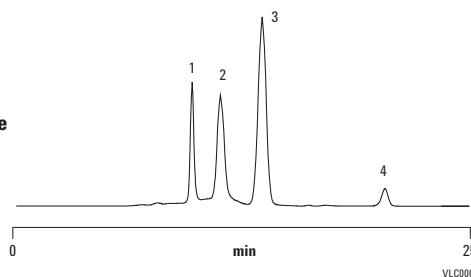


1. Sucrose
2. Glucose
3. Fructose
4. Sorbitol

Tomato juice



Apple juice



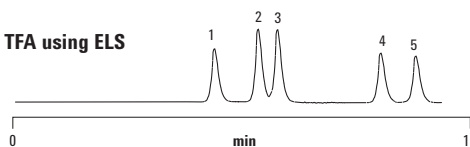
VLC0009

Organic acid analysis

Column: Hi-Plex H
 PL1170-6830
 7.7 x 300 mm, 8 µm

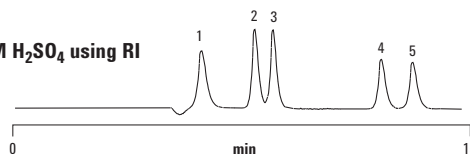
Mobile Phase: Water with acid as specified
Flow Rate: 0.6 mL/min
Temperature: 60°C
Detector: ELS (neb=80°C, evap=90°C, gas=0.7 SLM), RI

0.1% TFA using ELS



1. Oxalic acid
2. Citric acid
3. Tartaric acid
4. Succinic acid
5. Lactic acid

5 mM H₂SO₄ using RI

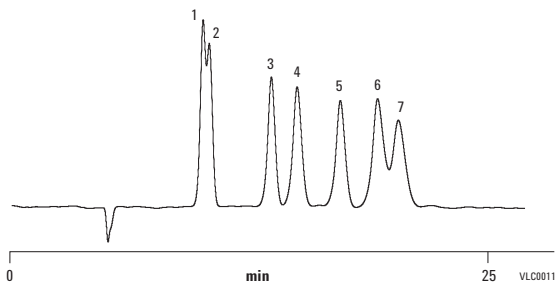


VLC0010

USP methods for sugar alcohols

Column: Hi-Plex Ca USP L19
PL1570-5810
4.0 x 250 mm, 8 μ m

Mobile Phase: Water
Flow Rate: 0.3 mL/min
Temperature: 60°C
Detector: RI

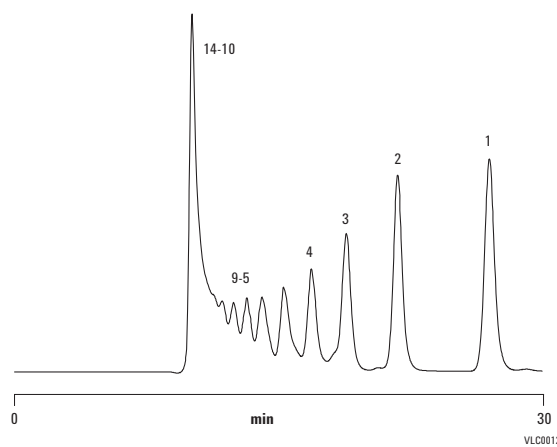


1. Iso-erythritol
2. Adonitol
3. Arabinol
4. Mannitol
5. Xylitol
6. Dulcitol
7. Sorbitol

Corn syrup, Hi-Plex

Column: Hi-Plex Na
PL1171-6140
7.7 x 300 mm, 10 μ m

Mobile Phase: Water
Pressure: 11 bar
Flow Rate: 0.3 mL/min
Temperature: 80°C
Detector: RI



1. Dp1
2. Dp2
3. Dp3
4. Dp4
5. Dp5
6. Dp6
7. Dp7
8. Dp8
9. Dp9
10. Dp10
11. Dp11
12. Dp12
13. Dp13
14. Dp14

Hi-Plex HPLC Columns

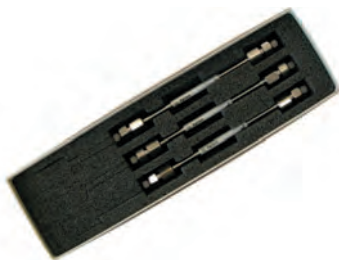
Description	Size (mm)	Particle Size (µm)	Crosslink Content (%)	Counter Ion	Part No.
Hi-Plex Ca USP L19	4.0 x 250	8	8	Ca ²⁺	PL1570-5810
Hi-Plex Ca (Duo)	6.5 x 300	8	8	Ca ²⁺	PL1F70-6850
Hi-Plex Ca	7.7 x 300	8	8	Ca ²⁺	PL1170-6810
Hi-Plex Pb USP L34	7.7 x 100	8	8	Pb ²⁺	PL1170-2820
Hi-Plex Pb	7.7 x 300	8	8	Pb ²⁺	PL1170-6820
Hi-Plex K	7.7 x 300	8	8	K ⁺	PL1170-6860
Hi-Plex H	6.5 x 300	8	8	H ⁺	PL1F70-6830
Hi-Plex H	7.7 x 300	8	8	H ⁺	PL1170-6830
Hi-Plex H USP L17	7.7 x 100	8	8	H ⁺	PL1170-2823
Hi-Plex Na	7.7 x 300	10	4	Na ⁺	PL1171-6140
Hi-Plex Na (Octo)	7.7 x 300	8	8	Na ⁺	PL1170-6840

Hi-Plex Guard Columns

Description	Size (mm)	Particle Size (µm)	Crosslink Content (%)	Counter Ion	Part No.
Hi-Plex Ca	7.7 x 50	8	8	Ca ²⁺	PL1170-1810
Hi-Plex Ca (Duo)	7.7 x 50	8	8	Ca ²⁺	PL1170-1850
Hi-Plex Pb	7.7 x 50	8	8	Pb ²⁺	PL1170-1820
Hi-Plex K	7.7 x 50	8	8	K ⁺	PL1170-1860
Hi-Plex H	7.7 x 50	8	8	H ⁺	PL1170-1830
Hi-Plex Na	7.7 x 50	10	4	Na ⁺	PL1171-1140
Hi-Plex Na (Octo)	7.5 x 50	8	8	Na ⁺	PL1170-1840

Hi-Plex Guard Cartridges, 2/pk

Description	Size (mm)	Particle Size (µm)	Crosslink Content (%)	Counter Ion	Part No.
Hi-Plex Ca	7.7 x 50	8	8	Ca ²⁺	PL1170-1810
Hi-Plex Ca	3.0 x 0.5	8	8	Ca ²⁺	PL1670-0810
Hi-Plex Ca (Duo)	3.0 x 0.5	8	8	Ca ²⁺	PL1670-0850
Hi-Plex Pb	3.0 x 0.5	8	8	Pb ²⁺	PL1670-0820
Hi-Plex K	3.0 x 0.5	8	8	K ⁺	PL1670-0860
Hi-Plex H	3.0 x 0.5	8	8	H ⁺	PL1670-0830
Hi-Plex Na	3.0 x 0.5	10	4	Na ⁺	PL1671-0140
Hi-Plex Na (Octo)	3.0 x 0.5	8	8	Na ⁺	PL1670-0840
Guard cartridge holder for 5 x 3 mm cartridges					PL1310-0016



Kits for Analytical HPLC

ZORBAX Method Development Kits

Agilent offers a series of kits that allow for fast method development at an attractive price. Each kit contains 3 columns. Six new kits have been added and are recommended for use with the new Agilent Automated Method Development LC. Several of these kits contain Rapid Resolution HT (1.8 μm) columns in a variety of bonded phases for easy method optimization and several kits contain Rapid Resolution (3.5 μm) columns in the same variety of bonded phases. These kits contain some of the Eclipse Plus family of columns for excellent peak shape and optimum performance with a wide variety of compounds.



ZORBAX Method Development Kits Recommended for use with the Agilent Automated Method Development LC System

Description	Part No.
Rapid Resolution HT (RRHT) Selectivity Method Development Kit, 2.1 mm ID Includes 2.1 x 50 mm, 1.8 μm , 600 bar columns: one each Eclipse Plus C18, Eclipse Plus Phenyl-Hexyl and Bonus-RP	5190-1431
Rapid Resolution HT (RRHT) pH Method Development Kit, 2.1 mm ID Includes 2.1 x 50 mm, 1.8 μm , 600 bar columns: one each Eclipse Plus C18, SB-C18 and Extend-C18	5190-1432
Rapid Resolution HT (RRHT) Selectivity Method Development Kit, 4.6 mm ID Includes 4.6 x 50 mm, 1.8 μm , 600 bar columns: one each Eclipse Plus C18, Eclipse Plus Phenyl-Hexyl and Bonus-RP	5190-1433
Rapid Resolution HT (RRHT) pH Method Development Kit, 4.6 mm ID Includes 4.6 x 50 mm, 1.8 μm , 600 bar columns: one each Eclipse Plus C18, SB-C18 and Extend-C18	5190-1434
Rapid Resolution Selectivity Method Development Kit, 4.6 mm ID Includes 4.6 x 100 mm, 3.5 μm columns: one each Eclipse Plus C18, Eclipse Plus Phenyl-Hexyl and Bonus-RP	5190-1435
Rapid Resolution pH Method Development Kit, 4.6 mm ID Includes 4.6 x 100 mm, 3.5 μm columns: one each Eclipse Plus C18, SB-C18 and Extend-C18	5190-1436

ZORBAX Method Development Kits

Description	Part No.
StableBond Method Development Kit Includes 4.6 x 150 mm, 5 µm columns; one each: SB-C18, SB-CN and SB-Phenyl phases	5183-4624
Fast StableBond Method Development Kit Includes 4.6 x 75 mm, 3.5 µm columns; one each: SB-C18, SB-CN and SB-Phenyl phases	5183-4625
Eclipse XDB Method Development Kit Includes 4.6 x 150 mm, 5 µm columns; one each: XDB-C18, XDB-C8, XDB-Phenyl phases	5183-4626
Fast Eclipse XDB Method Development Kit Includes 4.6 x 75 mm, 3.5 µm columns; one each: XDB-C18, XDB-C8 and XDB-Phenyl phases	5183-4627
pH Method Development Kit Includes 4.6 x 150 mm, 5 µm columns; one each: SB-C18, XDB-C18 and Extend-C18 phases	5185-5807
Fast pH Method Development Kit Includes 4.6 x 75 mm, 3.5 µm columns; one each: SB-C18, XDB-C18 and Extend-C18 phases	5185-5808
Aqueous Method Development Kit Includes 4.6 x 150 mm, 5 µm columns; one each: SB-Aq, Bonus RP and SB-C18	5185-5809
Fast Aqueous Method Development Kit Includes 4.6 x 75 mm, 3.5 µm columns; one each: SB-Aq, Bonus RP and SB-C18	5185-5810

ZORBAX Cartridge Column Starter Kits

Hardware Description	Part No.
 ZORBAX C18 Kit Includes one 4.6 x 150 mm, 5 µm Eclipse XDB-C18 column; one 4.6 x 150 mm, 5 µm StableBond C18 column; cartridge holder; mounting tool; replacement filter (2/pk); and open-end wrench	5183-2021
 ZORBAX C8 Kit Includes one 4.6 x 150 mm, 5 µm Eclipse XDB-C8 column; one 4.6 x 150 mm, 5 µm StableBond C8 column; cartridge holder; mounting tool; replacement filter (2/pk); and open-end wrench	5183-2022

ZORBAX Method Validation Kits

ZORBAX Method Validation Kits are supplied to customers who need the same HPLC column type (bonded phase, particle size, configuration) but from different manufacturing lots. To request columns from different lots, contact Agilent Technologies or your local Agilent Authorized Distributor using the following procedure:

- Request Validation Kits (columns from different lots) by using Part Number 899999-888
- Indicate the Part Number of the current column you are using
- Indicate the Lot Number of the current column you are using
- Indicate the number of additional columns needed from different lots (example: you have a current column and may need two additional lots)
- Please fax your request to **(302) 993-5354** or email to **cag_sales-na@agilent.com**. You will receive a quote from your Customer Service Representative within 1-2 business days. Delivery for your custom column is usually 3 weeks or less from the time your order is placed, depending on lot availability.

Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatographer.

For more information, visit www.agilent.com/chem/education



Custom HPLC Column Ordering

Columns not listed can be easily ordered using the following procedure:

- Request a Special Products Quotation (SPQ) using Part Number 899999-999
- Indicate column dimensions (example: 4.6 x 50 mm); bonded phase type (example: StableBond C3); particle size (example: 5 μm); and pore size (example: 80Å)
- Please fax your request to **(302) 993-5354** or email to **cag_sales-na@agilent.com**. You will receive a quote from your Customer Service Representative within 1-2 business days. Delivery for your custom column is usually 3 weeks or less from the time your order is placed, depending on lot availability.

Custom columns are priced with a minimal surcharge over the price of stocked columns.

Tips & Tools

Request custom LC columns online at
www.agilent.com/chem/customlccol



■ AGILENT COLUMNS FOR SPECIAL HPLC APPLICATIONS

Reproducible results for UHPLC and high-throughput LC

No matter how many samples you have, or how complex they may be, you need to feel confident that you can achieve reproducible results without wasting valuable time testing different columns and configurations.

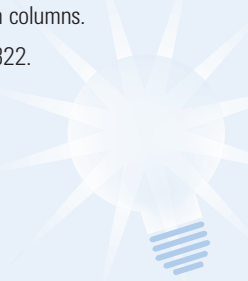
The following column families deliver industry-leading performance for specific measurement and purification challenges:

- ZORBAX Rapid Resolution High Definition (RRHD) Columns
- ZORBAX Rapid Resolution High Throughput (RRHT) Columns
- ZORBAX Solvent Saver Columns
- Chiral HPLC Columns
- Other Specialty HPLC Columns

Tips & Tools

Poroshell 120 columns are ideal for up to 600 bar for UHPLC and use up to 50% less pressure than sub 2 μm columns.

Turn to page 822.



UHPLC Columns

Agilent has UHPLC columns for systems with pressure limits up to 600 and 1200 bar to match all Agilent LC systems and for use on other UHPLCs. These columns provide the resolution and fast results expected for ultra high performance liquid chromatography.

- **ZORBAX Rapid Resolution High Throughput** – 1.8 μm columns for up to 600 bar
- **ZORBAX Rapid Resolution High Definition** – 1.8 μm columns for up to 1200 bar and the Agilent 1290 Infinity LC
- **Agilent Poroshell 120** – 2.7 μm superficially porous columns for up to 600 bar
Turn to page 822.
- **Pursuit UPS** – 1.9 and 2.4 μm columns for up to 1000 bar UHPLCs
Turn to page 864.

ZORBAX Rapid Resolution High Definition 1.8 μm

- High pressure (1200 bar) columns for optimum results with the 1290 Infinity LC or other UHPLC instruments
- 1.8 μm particles deliver maximum resolution for the most defined separations
- Available in ZORBAX Eclipse Plus C18 for superior peak shape and ZORBAX StableBond C18 for alternate selectivity and low pH stability
- Achieve the same selectivity on 3.5 and 5 μm ZORBAX columns with the same bonded phase for compatibility with any LC

ZORBAX Rapid Resolution High Definition (RRHD) columns are an expansion of the ZORBAX 1.8 μm particle column line. The new RRHD columns use improved packing processes to achieve stability up to 1200 bar for use with the Agilent 1290 Infinity LC or other UHPLC instruments. RRHD 1.8 μm columns are available in 50, 100 and 150 mm lengths for fast or high resolution – truly high definition – separations of your most complex samples.

Column Specifications

Bonded Phase	Pore Size	Surface Area	pH Range	Endcapped
ZORBAX Eclipse Plus C18	95Å	160 m ² /g	2.0-9.0	Yes
ZORBAX SB-C18	80Å	180 m ² /g	1.0-8.0*	No
ZORBAX SB-C8	80Å	180 m ² /g	1.8-8.0*	No

*StableBond columns are designed for optimal use at low pH. At pH 6-8 highest column stability for all silica based columns is obtained by operating at temperatures <40°C and using lower buffer concentrations – 10-20 mM. For pH 6-8 select the Eclipse Plus C18 column.

Separation of Licorice Root on RRHD Columns

Column A: ZORBAX RRHD SB-C18
857700-902

2.1 x 50 mm, 1.8 μ m

Column B: 858700-902

2.1 x 100 mm, 1.8 μ m

Column C: 859700-902

2.1 x 150 mm, 1.8 μ m

Mobile Phase: 10-100% B/30 min

A: 0.1% formic acid (fa)

B: acetonitrile with 0.1% fa

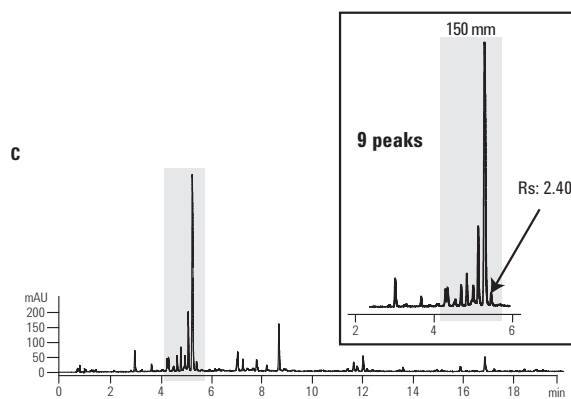
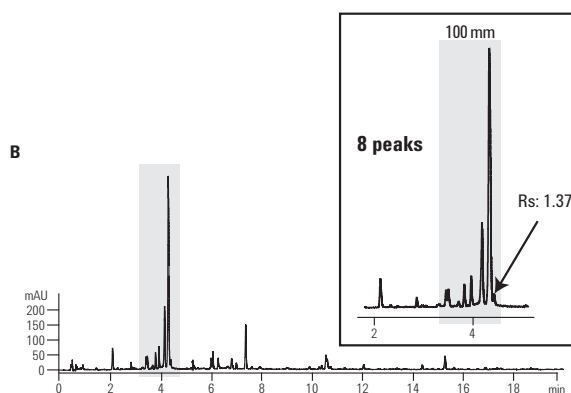
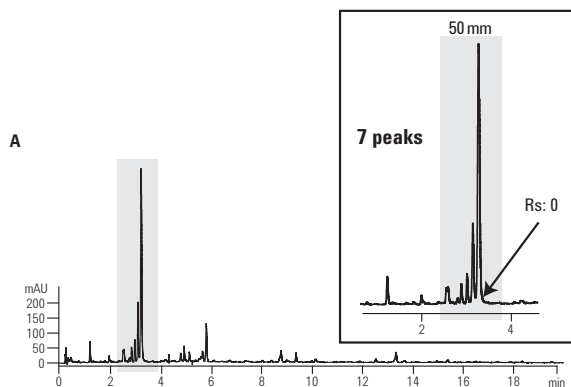
Flow Rate: F = 0.4 mL/min

Gradient: 30 minute gradient on each length

Temperature: Ambient

Detector: 280 nm UV

Instrument: 1290 Infinity LC



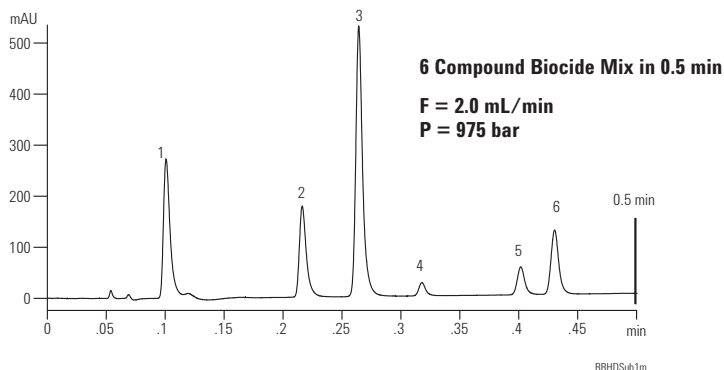
RRHD_Licorice

Sub-1 Minute Separations with RRHD Columns

Column: ZORBAX RRHD SB-C18
857700-902
2.1 x 50 mm, 1.8 μm

Gradient: H₂O (0.05% trifluoroacetic acid)/10-40% ACN/1min
Temperature: 60°C
Injection Volume: 0.5 μL x 100 ppm each
Detector Wavelength: 275 nm
Data Rate: 160 Hz

1. 2-methyl-4-isothiazolin-3-one
2. 5-chloro-2-methyl-4-isothiazolin-3-one
3. Carbendazim
4. Benzothiazol-3(2H)-one
5. 2-phenoxyethanol
6. Methylparaben



Rapid Resolution HD Columns for High Pressure Use (Maximum Pressure: 1200 bar)

Description	Size (mm)	Particle Size (μm)	Eclipse Plus C18 USP L1	Eclipse Plus C8 USP L7	SB-C18 USP L1	SB-C8 USP L7	SB-CN USP L10	SB-Phenyl USP L11	Extend-C18 USP L1	Eclipse XDB-C18 USP L1
Solvent Saver RRHD, 1200 bar	3.0 x 150	1.8	959759-302	959759-306	859700-302	859700-306			759700-302	981759-302
Solvent Saver RRHD, 1200 bar	3.0 x 100	1.8	959758-302	959758-306	858700-302	858700-306	858700-305	858700-905	758700-302	981758-302
Solvent Saver RRHD, 1200 bar	3.0 x 50	1.8	959757-302	959757-306	857700-302	857700-306	857700-305	857700-312	757700-302	981757-302
Narrow Bore RRHD, 1200 bar	2.1 x 150	1.8	959759-902	959759-906	859700-902	859700-906	859700-905	859700-912	759700-902	981759-902
Narrow Bore RRHD, 1200 bar	2.1 x 100	1.8	959758-902	959758-906	858700-902	858700-906	858700-905	858700-912	758700-902	981758-902
Narrow Bore RRHD, 1200 bar	2.1 x 50	1.8	959757-902	959757-906	857700-902	857700-906	857700-905	857700-912	757700-902	981757-902



ZORBAX Rapid Resolution High Throughput 1.8 µm

- High pressure (600 bar) columns for ultra high speed or maximum resolution analyses with Rapid Resolution HT columns packed with totally porous, 1.8 µm packings
- Carefully engineered particles deliver maximum resolution at 25% less pressure than other sub- 2 µm materials
- Reduce analysis time by up to 95%
- Develop HPLC methods more quickly
- Securely transfer conventional methods with over 140 RRHT column choices
- Analyze complex samples on shorter columns faster and maximize peak capacity
- Matching selectivity in 3.5, 5 and 7 µm particle sizes for complete method scalability
- Short (50 mm long and less) column can be used on some conventional LCs

Agilent ZORBAX Rapid Resolution HT (1.8 µm) columns use a totally porous, 1.8 µm particle to provide maximum resolution in fast, ultra-fast and high resolution analyses. You can reduce analysis time by up to 95% in comparison to 250 mm length columns. With more than 140 RRHT column choices, including the new high performance ZORBAX Eclipse Plus and many other ZORBAX column choices (Eclipse XDB, StableBond, Extend, Bonus-RP), methods can be developed quickly or securely transferred to a smaller particle size column with no loss in resolution. The small particle size provides double the efficiency of a 3.5 µm column in the same column length, providing the highest efficiency and resolution possible. This permits the analysis of complex samples on shorter columns with the highest resolution and peak capacity. The 1.8 µm Rapid Resolution HT columns take high-speed, high-resolution HPLC to a new level.

The 600 bar columns can be used with the Agilent 1200 Rapid Resolution LC up to this high pressure limit. In addition, the shorter columns can be used on many other LC's, including the Agilent 1200 and 1100 by using the RRHT-1100 conversion kits to maximize performance.

1100 Series Conversion Kits for Fast LC

These kits make it easy to convert your Agilent 1100 system with a binary pump to a lower-volume system for RRHT LC columns. Each kit contains all capillaries, a flow cell, starter columns, and detailed instructions for system conversion. Note: you will still be able to use your converted 1100 for standard methods and columns.

1100 Series Conversion Kits for Fast LC

Kit Selection	Description	Part No.
For Variable Wavelength Detectors (VWD)	Columns: 4.6 x 50 mm, 1.8 μ m (3) Flow Cell for VWD, 5 μ L capillaries, μ -LC inline filter	5188-5323
For Diode Array Detectors (DAD & DAD SL) and Multiple Wavelength Detectors (MWD)	Columns: 4.6 x 50 mm, 1.8 μ m (2) Flow Cell for DAD, 5 μ L capillaries, μ -LC inline filter	5188-5324
For Diode Array Detector and Mass Spec	Columns: 2.1 x 50 mm, 1.8 μ m (2) Flow Cell for DAD, 1.7 μ L capillaries, ZDV union	5188-5328

Rapid Resolution HT: Up to 20X Faster

Column A: ZORBAX SB-C18
883975-902
4.6 x 150 mm, 5 μ m

Column B: ZORBAX SB-C18
827700-902
2.1 x 50 mm, 1.8 μ m

Column C: ZORBAX SB-C18
827700-902
2.1 x 50 mm, 1.8 μ m

Mobile Phase: A: H₂O
B: ACN

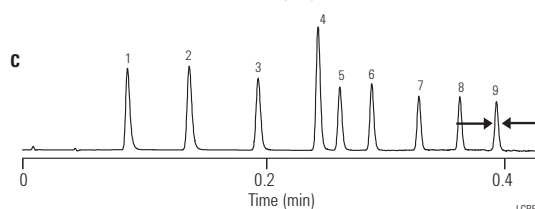
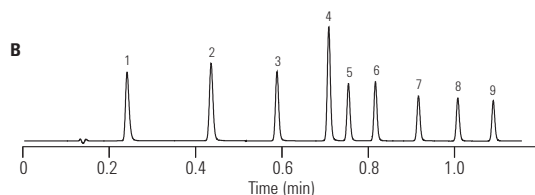
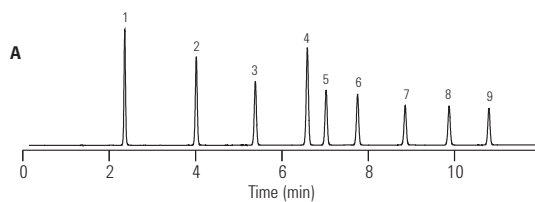
Gradient: 0.0 min 50% B
A: 11 min 100% B
B: 1.2 min 100% B
C: 0.4 min 100% B

Flow Rate: A: 1.2 mL/min
B: 1.0 mL/min
C: 2.4 mL/min

Temperature: A: 40°C
B: 40°C
C: 95°C

Detector: UV 254 nm

Sample: Alkylphenones



1. C₃-Alkylphenone
2. C₄-Alkylphenone
3. C₅-Alkylphenone
4. C₆-Alkylphenone
5. C₇-Alkylphenone
6. C₈-Alkylphenone
7. C₉-Alkylphenone
8. C₁₀-Alkylphenone
9. C₁₂-Alkylphenone

LCNR001

Rapid Resolution HT Provides Double the Efficiency of Rapid Resolution Columns

Column A: ZORBAX SB-C18
 835975-902
 4.6 x 50 mm, 3.5 μ m
Column B: ZORBAX SB-C18
 827975-901
 4.6 x 50 mm, 1.8 μ m

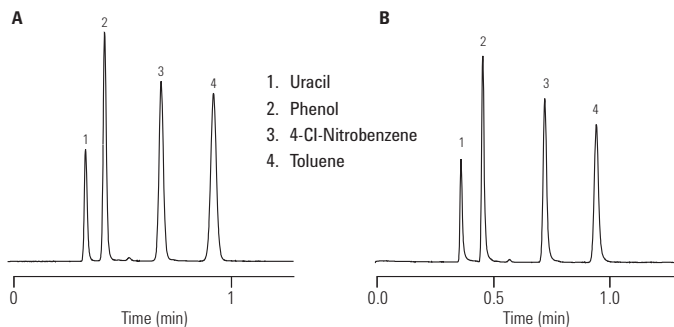
Mobile Phase: 25% Water, 75% MeOH
 Flow Rate: 1.5 mL/min
 Temperature: Ambient
 Detector: 254 nm

Plates (N)

1. 3476
 2. 4585
 3. 5673
 4. 6180

Plates (N)

1. 6560
 2. 8958
 3. 11508
 4. 12266

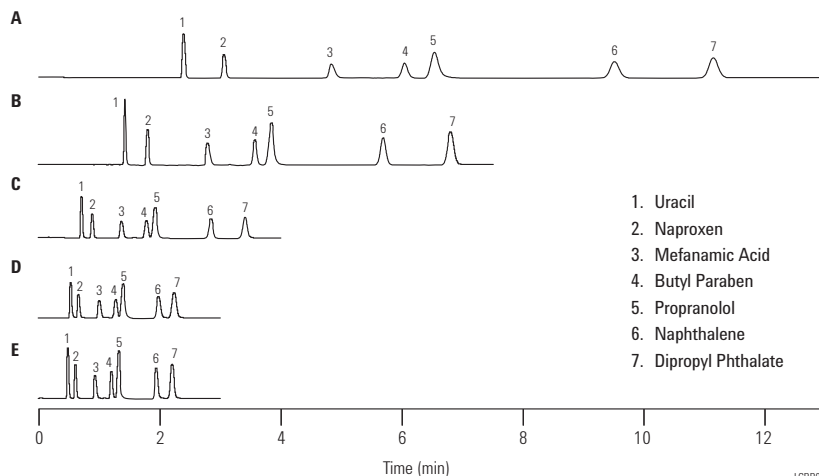


This figure shows that Rapid Resolution HT columns can provide double the efficiency of a 3.5 μ m column in the same column length. This high efficiency can be used for very high-resolution, high throughput analyses.

Reduce Analysis Time Dramatically with Rapid Resolution HT Columns

Column A: Eclipse XDB-C18
 990967-902
 4.6 x 250 mm, 5 μ m
Column B: Eclipse XDB-C18
 963967-902
 4.6 x 150 mm, 3.5 μ m
Column C: Eclipse XDB-C18
 966967-902
 4.6 x 75 mm, 3.5 μ m
Column D: ZORBAX Eclipse XDB-C18
 935967-902
 4.6 x 50 mm, 3.5 μ m
Column E: Eclipse XDB-C18
 925975-902
 4.6 x 50 mm, 1.8 μ m

Mobile Phase: 73% MeOH:27% 20 mM Phosphate Buffer, pH 7.0
 Flow Rate: 1 mL/min
 Temperature: Ambient
 Detector: 254 nm



This figure shows the dramatic reduction in analysis time made possible by using Rapid Resolution HT columns. Chromatogram A shows a separation that takes 11.5 minutes on a 25 cm, 5 μ m column. Rapid Resolution (3.5 μ m) columns, shown in chromatogram B and C, reduce analysis time substantially, but with a slight compromise in resolution. The Rapid Resolution HT column reduces analysis time to 2.2 minutes, an 80% reduction, while still maintaining baseline resolution.

Increase Peak Capacity with RRHT Columns

Column A: Eclipse XDB-C8
928700-906
2.1 x 100 mm, 1.8 μ m

Column B: Eclipse XDB-C18
961753-902
2.1 x 100 mm, 3.5 μ m

Mobile Phase: A: H₂O
B: ACN

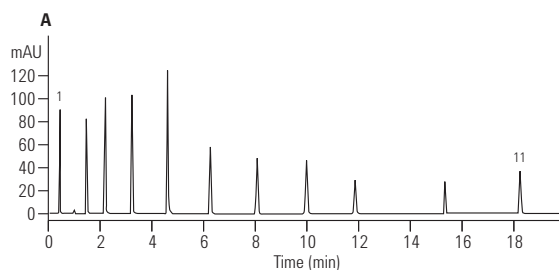
Peak capacity: A: 461
B: 343

Flow Rate: 0.5 mL/min
Gradient: 0.0 min 50% B
20.0 min 100% B

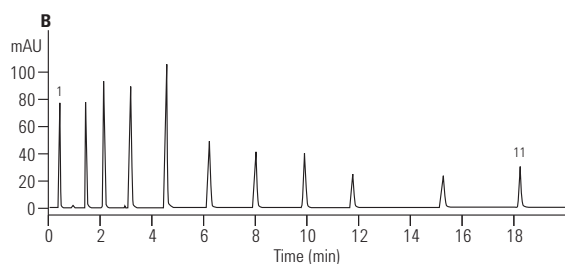
Temperature: 40°C

Detector: UV 254 nm

Sample: Alkylphenones



1. Uracil
2. C₃-Alkylphenone
3. C₄-Alkylphenone
4. C₅-Alkylphenone
5. C₆-Alkylphenone
6. C₇-Alkylphenone
7. C₈-Alkylphenone
8. C₉-Alkylphenone
9. C₁₀-Alkylphenone
10. C₁₂-Alkylphenone
11. C₁₄-Alkylphenone



LCRR004

Long Lifetime of RRHT Columns at Elevated Temperatures

Column: ZORBAX SB-C18
827700-902
2.1 x 50 mm, 1.8 μ m

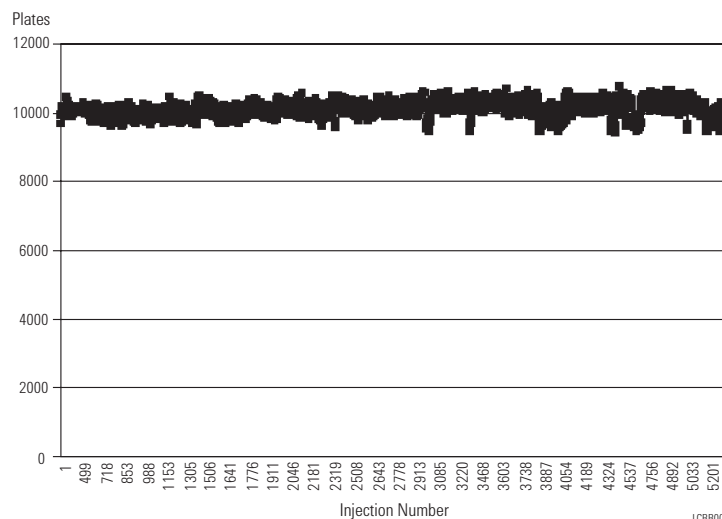
Mobile Phase: A: 60% H₂O
B: 40% ACN

Flow Rate: 1 mL/min

Temperature: 80°C

Detector: UV 254 nm

Sample: QC Test Mix



LCRR005














Rapid Resolution HT Columns for High Pressure Use (Maximum Pressure: 600 bar, 9000 psi)

Description	Size (mm)	Particle Size (µm)	Eclipse Plus C18 USP L1	Eclipse Plus C8 USP L7	Eclipse Plus Phenyl-Hexyl USP L11	Eclipse PAH USP L1	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7	Extend-C18 USP L1
Rapid Resolution HT, 600 bar	4.6 x 150	1.8	959994-902						
Rapid Resolution HT, 600 bar	4.6 x 100	1.8	959964-902	959964-906	959964-912	959964-918	928975-902		728975-902
Rapid Resolution HT, 600 bar	4.6 x 75	1.8	959951-902						
Rapid Resolution HT, 600 bar	4.6 x 50	1.8	959941-902	959941-906	959941-912	959941-918	927975-902	927975-906	727975-902
Rapid Resolution HT, 600 bar	4.6 x 30	1.8	959931-902	959931-906	959931-912	959931-918	924975-902	924975-906	724975-902
Rapid Resolution HT, 600 bar	4.6 x 20	1.8					926975-902	926975-906	726975-902
Solvent Saver HT, 600 bar	3.0 x 100	1.8	959964-302	959964-306	959964-312		928975-302		728975-302
Solvent Saver HT, 600 bar	3.0 x 50	1.8	959941-302	959941-306	959941-312		927975-302	927975-306	727975-302
Solvent Saver HT, 600 bar	3.0 x 30	1.8					924975-302	924975-306	724975-302
Solvent Saver HT, 600 bar	3.0 x 20	1.8					926975-302	926975-306	726975-302
Narrow Bore RRHT, 600 bar	2.1 x 150	1.8	959794-902						
Narrow Bore RRHT, 600 bar	2.1 x 100	1.8	959764-902	959764-906	959764-912	959764-918	928700-902	928700-906	728700-902
Narrow Bore RRHT, 600 bar	2.1 x 50	1.8	959741-902	959741-906	959741-912	959741-918	927700-902	927700-906	727700-902
Narrow Bore RRHT, 600 bar	2.1 x 30	1.8	959731-902	959731-906	959731-912		924700-902	924700-906	724700-902
Narrow Bore RRHT, 600 bar	2.1 x 20	1.8					926700-902	926700-906	726700-902

Rapid Resolution HT Columns for High Pressure Use (Maximum Pressure: 600 bar, 9000 psi)

Description	Size (mm)	Particle Size (µm)	Particle						Rx-SIL USP L3	Bonus-RP USP L60
			SB-C18 USP L1	SB-C8 USP L7	SB-Phenyl USP L11	SB-CN USP L10	SB-Aq			
Rapid Resolution HT, 600 bar	4.6 x 150	1.8	829975-902	829975-906	829975-912	829975-905	829975-914			
Rapid Resolution HT, 600 bar	4.6 x 100	1.8	828975-902	828975-906	828975-912	828975-905	828975-914	828975-901	828668-901	
Rapid Resolution HT, 600 bar	4.6 x 75	1.8		830975-906					830668-901	
Rapid Resolution HT, 600 bar	4.6 x 50	1.8	827975-901	827975-906	827975-912	827975-905	827975-914	827975-901	827668-901	
Rapid Resolution HT, 600 bar	4.6 x 30	1.8	824975-902	824975-906	824975-912	824975-905	824975-914			
Rapid Resolution HT, 600 bar	4.6 x 20	1.8	826975-902	826975-906						
Solvent Saver HT, 600 bar	3.0 x 150	1.8	829975-302	829975-306	829975-312	829975-305				
Solvent Saver HT, 600 bar	3.0 x 100	1.8	828975-302	828975-306	828975-312	828975-305	828975-314	828975-301	828668-301	
Solvent Saver HT, 600 bar	3.0 x 50	1.8	827975-302	827975-306	827975-312	827975-305	827975-314	827975-301	827668-301	
Solvent Saver HT, 600 bar	3.0 x 30	1.8	824975-302	824975-306		824975-305				
Solvent Saver HT, 600 bar	3.0 x 20	1.8	826975-302	826975-306						
Narrow Bore RRHT, 600 bar	2.1 x 150	1.8	820700-902	820700-906	820700-912	820700-905				
Narrow Bore RRHT, 600 bar	2.1 x 100	1.8	828700-902	828700-906	828700-912	828700-905	828700-914	828700-901	828768-901	
Narrow Bore RRHT, 600 bar	2.1 x 50	1.8	827700-902	827700-906	827700-912	827700-905	827700-914	827700-901	827768-901	
Narrow Bore RRHT, 600 bar	2.1 x 30	1.8	824700-902	824700-906	824700-912	824700-905	824700-914			
Narrow Bore RRHT, 600 bar	2.1 x 20	1.8	826700-902	826700-906						

Rapid Resolution HT Columns and Cartridges (Maximum Pressure: 400 bar, 6000 psi)

Hardware	Description	Size (mm)	Particle Size (µm)	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7	SB-C18 USP L1	SB-C8 USP L7	Extend-C18 USP L1
	Rapid Resolution HT	4.6 x 50	1.8	922975-902	922975-906	922975-902	822975-906	722975-902
	Rapid Resolution HT, 3/pk	4.6 x 50	1.8	922975-932		922975-932		
	Narrow Bore RRHT	2.1 x 50	1.8	922700-902		922700-902		
	Narrow Bore RRHT, 3/pk	2.1 x 50	1.8	922700-932		922700-932		
Rapid Resolution HT Cartridges (require hardware kit 820555-901)								
	Rapid Resolution HT Cartridge	4.6 x 50	1.8	925975-902		825975-902		
	Rapid Resolution HT Cartridge, 3/pk	4.6 x 50	1.8	925975-932		825975-932		
	Rapid Resolution HT Cartridge	2.1 x 50	1.8	925700-902		825700-902		
	Rapid Resolution HT Cartridge, 3/pk	2.1 x 50	1.8	925700-932		825700-932		
	Rapid Resolution HT Cartridge	4.6 x 30	1.8	923975-902		823975-902		
	Rapid Resolution HT Cartridge, 3/pk	4.6 x 30	1.8	923975-932		823975-932		
	Rapid Resolution HT Cartridge	2.1 x 30	1.8	923700-902		823700-902		
	Rapid Resolution HT Cartridge, 3/pk	2.1 x 30	1.8	923700-932		823700-932		
	Rapid Resolution HT Cartridge	4.6 x 15	1.8	921975-902		821975-902		
	Rapid Resolution HT Cartridge, 3/pk	4.6 x 15	1.8	921975-932		821975-932		
	Rapid Resolution HT Cartridge	2.1 x 15	1.8	921700-902		821700-902		
	Rapid Resolution HT Cartridge, 3/pk	2.1 x 15	1.8	921700-932		821700-932		
	Hardware Kit for RR and RRHT Cartridges			820555-901		820555-901		

Other Specialty Columns

ZORBAX Carbohydrate Analysis Columns

- Reproducible – each lot of this application-specific aminopropyl column packing material is use-tested for specific monosaccharide and disaccharide separations
- Efficient – uses ZORBAX porous silica microsphere technology; silica manufacturing, bonding and packing are all performed in Agilent's ISO 9001 facilities
- Flexible – can handle high volume injections – as much as 50 μ L on a 4.6 x 150 mm column
- Recommended for use with refractive index detectors (RID)

Column Specifications

Bonded Phase	Pore Size	Surface Area	pH Range	Endcapped	Carbon Load
ZORBAX Carbohydrate	70Å	300 m ² /g	2.0-8.0	No	3.5%

Specifications represent typical values only.

ZORBAX Carbohydrate Analysis Columns

Description	Size (mm)	Particle Size (μ m)	Part No.
ZORBAX Carbohydrate Analysis column	4.6 x 250	5	840300-908
ZORBAX Carbohydrate Analysis column	4.6 x 150	5	843300-908
ZORBAX NH ₂ Guard Cartridges, 4/pk	4.6 x 12.5	5	820950-908
Guard Hardware Kit			820999-901

Separation of Simple-Sugar and Sugar-Alcohol Standards

Column: ZORBAX Carbohydrate Analysis
843300-908
4.6 x 150 mm, 5 µm

Mobile Phase: 75% ACN/25% H₂O

Flow Rate: 2 mL/min

Temperature: 30°C

Detector: RID

Det. Temp: 30°C

Sample: Rhamnose, Xylose, Xylitol, Lactulose, Raffinose (54 µg each)

Fructose (10 µg), Glucose, Sucrose (36 µg each)

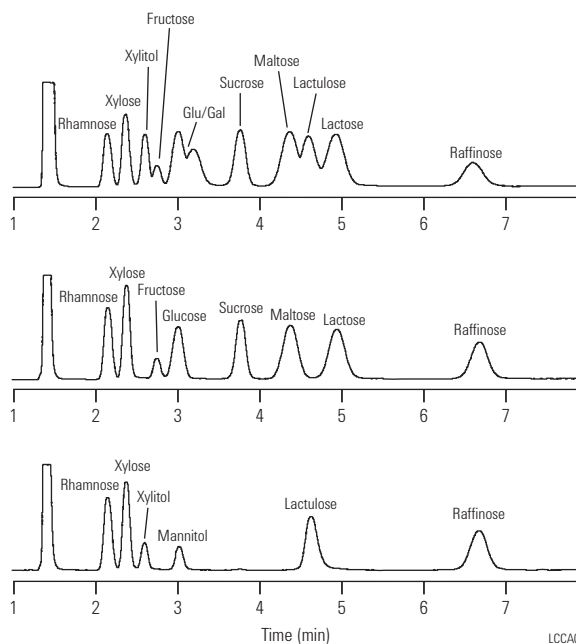
Maltose, Lactose (6 µg each), Inj. = 6.3 µL

Rhamnose, Xylose, Raffinose (54 µg each),

Fructose (10 µg) Glucose, Sucrose (36 µg each),

Maltose, Lactose (60 µg each) Inj. = 6.3 µL

Sample: (54 µg each), Inj. = 6.3 µL



Tips & Tools

Don't forget, we have special offers throughout the year.



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ZORBAX Eclipse Amino Acid Analysis (AAA) Columns

- High resolution and rapid analysis of 24 amino acids
- Tested for amino acid analysis
- Uses well-known OPA and FMOC precolumn derivatization chemistry
- Easily automated using a detailed online, derivatization protocol available for use with Agilent 1100/1200 autosampler

The Agilent ZORBAX Eclipse AAA high efficiency column rapidly separates amino acids following an updated and improved protocol. Total analysis from injection-to-injection can be achieved in as little as 14 min. (9 min. analysis time) on shorter, 7.5 cm length columns and 24 min. (18 min. analysis time) on the 15 cm column length. Exceptional sensitivity (5-50 pmol with DAD, FLD) and reliability are achieved using both OPA and FMOC derivatization chemistries in one fully automated procedure using the Agilent 1100/1200 HPLC instrument.

ZORBAX Eclipse Amino Acid Analysis (AAA) Columns

Hardware	Description	Size (mm)	Particle Size (µm)	Part No.
	Analytical routine sensitivity	4.6 x 150	5	993400-902
	Analytical routine sensitivity, high-resolution using FLD	4.6 x 150	3.5	963400-902
	Analytical routine sensitivity, high-throughput	4.6 x 75	3.5	966400-902
	Solvent Saver high sensitivity, high resolution	3.0 x 150	3.5	961400-302
	Guard Cartridges, 4/pk	4.6 x 12.5	5	820950-931
	Guard Hardware Kit			820999-901

High Resolution of 24 Amino Acids Using ZORBAX Eclipse AAA Protocol

Column: ZORBAX Eclipse AAA
963400-902
4.6 x 150 mm, 3.5 µm

Mobile Phase: A: 40 mM Na₂HPO₄, pH 7.8
B: ACN:MeOH:Water,
45:45:10 v/v

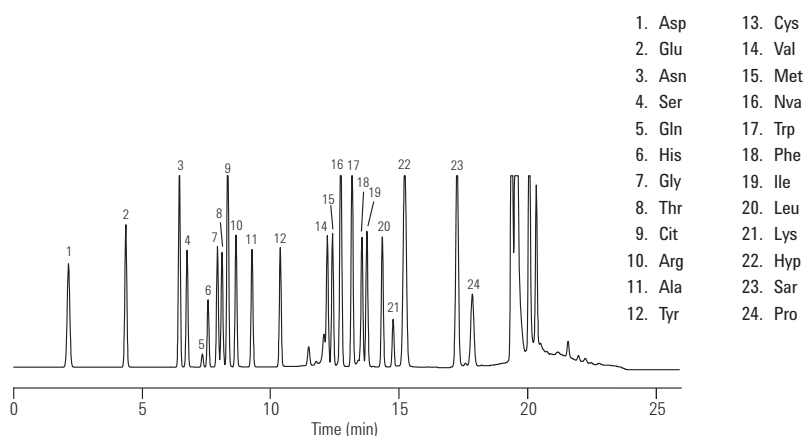
Flow Rate: 2 mL/min

Temperature: 40°C

Detector: Fluorescence

Sample: 24 Amino Acids

This high resolution separation of 24 amino acids is done in 18 minutes. If the Rapid Resolution 4.6 x 75 mm Eclipse AAA column is selected, these amino acids are resolved in 9 minutes.



LCPAN01

Amino Acid Standards

Each amino acid standard contains the following amino acids:

- Glycine
- L-cystine
- L-histidine
- L-tyrosine
- L-leucine
- L-methionine
- L-serine
- L-alanine
- L-phenylalanine
- L-glutamic acid
- L-proline
- L-isoleucine
- L-arginine
- L-threonine
- L-valine
- L-lysine
- L-aspartic acid

Amino Acid Standards, 10 x 1 mL ampoules*

Description	Part No.
1 nmol/μL	5061-3330
250 pmol/μL	5061-3331
100 pmol/μL	5061-3332
25 pmol/μL	5061-3333
10 pmol/μL	5061-3334
Amino acids supplement kit Includes 1 g each of norvaline, sarcosine, asparagine, glutamine, tryptophan, and 4-hydroxyproline	5062-2478

*Consider shelf-life and buy limited quantities, P/N 5062-2478 ships as 1 g vials

Amino Acid Separations Reagents

Description	Part No.
OPA reagent, 10 mg/mL each in 0.4 M borate buffer o-phthalaldehyde (OPA) and 3-mercaptopropionic acid, 6 x 1 mL ampoules	5061-3335
FMOC reagent, 2.5 mg/mL in acetonitrile, 9-fluorenylmethylchloroformate, 1 mL, 10 ampoules	5061-3337
Borate buffer, 100 mL	5061-3339
DTDPA (Dithiodipropionic) reagent, for analysis of cysteine, 5 g	5062-2479



ZORBAX Eclipse PAH

- High resolution separation of 16 PAHs in EPA Method 610
- Extensive range of particle sizes (1.8, 3.5 and 5 μm) and sizes for fast and high resolution separations
- Each batch of material is specifically tested with PAHs for maximum reproducibility under expected operating conditions
- Excellent performance using the high quality, improved silica of Eclipse Plus columns
- Good for applications requiring "shape selectivity" or the separation of geometric isomers

Agilent ZORBAX Eclipse PAH columns are recommended for the separation of polycyclic aromatic hydrocarbons. PAHs are considered priority pollutants and the analysis of these potentially carcinogenic compounds in water, soil and food is of major importance. Eclipse PAH columns separate all 16 PAHs in EPA method 610 quickly and with high resolution.

Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits	pH Range	Endcapped	Carbon Load
ZORBAX Eclipse PAH	95Å	160 m ² /g	60°C	2.0-8.0	No	14%

Specifications represent typical values only.




Tips & Tools

More information is a click away. We have a variety of educational primers, application notes, maintenance guides, and literature available from Agilent for free.

To learn more, visit www.agilent.com/chem/OnlineLibrary



ZORBAX Eclipse PAH

Hardware Description	Size (mm)	Particle Size (μm)	Eclipse PAH USP L1
Analytical	4.6 x 250	5	959990-918
Analytical	4.6 x 150	5	959993-918
Analytical	4.6 x 100	5	959996-918
Rapid Resolution	4.6 x 150	3.5	959963-918
Rapid Resolution	4.6 x 100	3.5	959961-918
Rapid Resolution	4.6 x 50	3.5	959943-918
Rapid Resolution HT, 600 bar	4.6 x 100	1.8	959964-918
Rapid Resolution HT, 600 bar	4.6 x 50	1.8	959941-918
Rapid Resolution HT, 600 bar	4.6 x 30	1.8	959931-918
Solvent Saver	3.0 x 250	5	959990-318
Narrow Bore	2.1 x 250	5	959790-918
Narrow Bore	2.1 x 150	5	959701-918
Narrow Bore RR	2.1 x 100	3.5	959793-918
Narrow Bore RRHT, 600 bar	2.1 x 100	1.8	959764-918
Narrow Bore RRHT, 600 bar	2.1 x 50	1.8	959741-918
 Guard Cartridges, 4/pk	4.6 x 12.5	5	820950-939
 Guard Cartridges, 4/pk	2.1 x 12.5	5	821125-939
 Guard Hardware Kit			820999-901

High Resolution and Fast Analysis on RRHT Eclipse PAH Column

Column: Eclipse PAH
959941-918
4.6 x 50 mm, 1.8 μm

Mobile Phase: A: Water; B: Acetonitrile

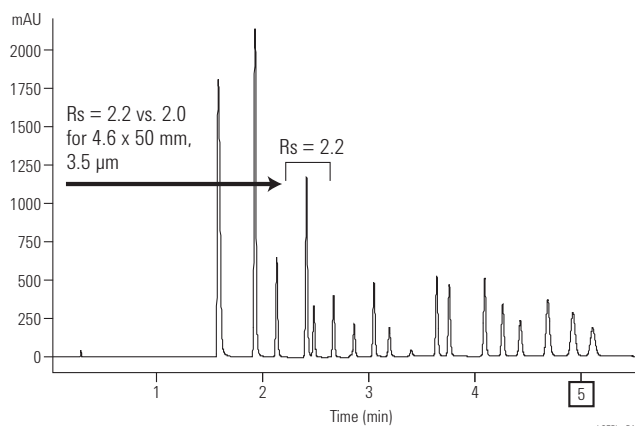
Gradient:	Time (Min)	% B
	0.00	40
	3.5	100
	5.2	100
	5.5	40
	6.5	40

Flow Rate: 2.0 mL/min

Temperature: 25°C

Detector: DAD 220, 4 nm No Ref. DAD Stop Time = 6.0 min

Stop Time = 7.0



Pursuit PAH

- Fast analysis times for higher throughput
- Complete resolution of PAHs for easy integration
- Reproducible columns for rugged method development

Agilent Pursuit PAH columns are based on a specially tailored, polymerically bonded C18 phase designed for the complete resolution of polycyclic aromatic hydrocarbons (PAHs). Using the 100 x 4.6 mm Pursuit 3 μ m PAH column, all 16 components of the PAH mixture defined by EPA Method 610 can be fully resolved in less than ten minutes. Separation of critical pairs is maintained, while run times are reduced by as much as a factor of two.

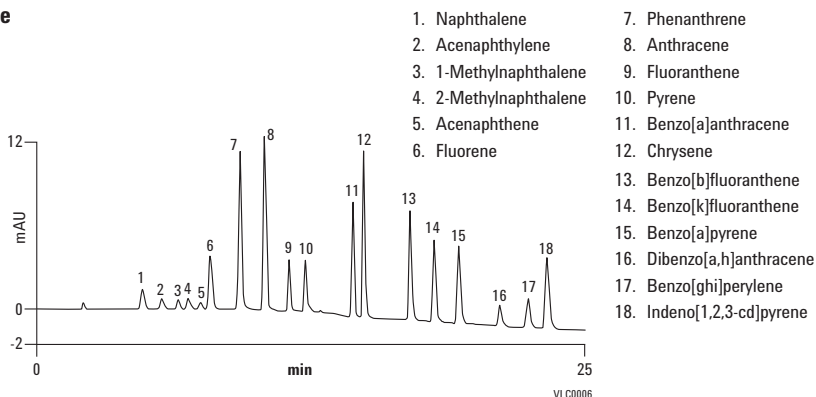
Pursuit PAH

Hardware	Dimensions	Particle Size (μ m)	Part No.
	4.6 x 250	5	A7000250X046
	4.6 x 150	5	A7000150X046
	4.6 x 100	3	A7001100X046
	3.0 x 100	3	A7001100X030
	2.0 x 100	3	A7001100X020
Pursuit PAH ChromSep Complete Cartridge Systems			
CS	4.6 x 250	5	A7000250C046
CS	4.6 x 150	5	A7000150C046
CS	4.6 x 150	3	A7001150C046
CS	4.6 x 100	3	A7001100C046
CS	3.0 x 100	5	A7000100C030

**Polycyclic aromatic hydrocarbons
according to Florida Administrative Code
(Pre 9/97) 62.770**

Column: Pursuit PAH
A7001100X046
4.6 x 100 mm, 3 μ m

Sample: PAH test mix
Temperature: 25°C
Detector: UV, 254 nm





ZORBAX Solvent Saver

- Provide 60% reduction in mobile phase usage and waste generation compared to a 4.6 mm ID column
- Provide 2- to 3-fold signal-to-noise (S/N ratio) improvement
- Deliver optimal LC/MS performance at intermediate flow rates
- Can be used with most conventional LC instrument configurations without modification
- Solvent Saver columns are available in 1.8, 3.5 and 5 μm particle sizes

Agilent ZORBAX Solvent Saver columns have a 3.0 mm ID, which is ideal for reducing solvent usage by 50% compared to 4.6 mm ID columns. Also ideal for LC/MS, with a typical flow rate of 0.5 mL/min, these columns are compatible with almost all LC interfaces. Solvent Saver columns improve sensitivity 2 to 3 times over 4.6 mm ID columns and can be used with conventional HPLC instruments.

Solvent Saver Columns Provide up to 60% Reduction in Solvent Use and Waste

Column A: ZORBAX SB-C18
883975-902
4.6 x 150 mm, 5 μm

Column B: ZORBAX SB-C18
883975-302
3.0 x 150 mm, 5 μm

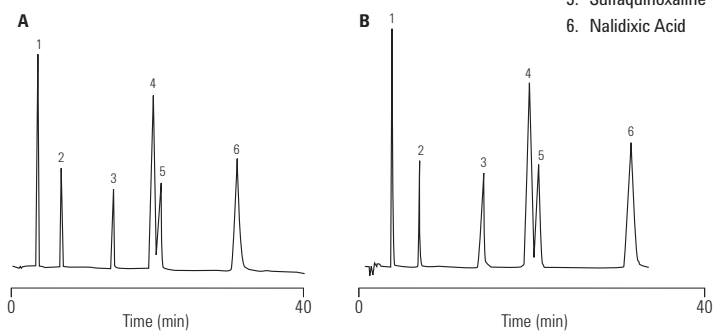
Mobile Phase: 20% ACN:80% 0.2 M Na_2HPO_4
+ 0.1 M Citric Acid, pH 2.6

Temperature: Ambient

Sample: Antibacterials

This separation of antibacterials on 4.6 and 3.0 mm ID columns shows that solvent use is reduced by 50% simply by changing to a Solvent Saver column with no change in the chromatography, dramatically reducing the cost of analyses.

Less solvent consumption, less waste



LCSS001

Solvent Saver Columns Increase Sensitivity

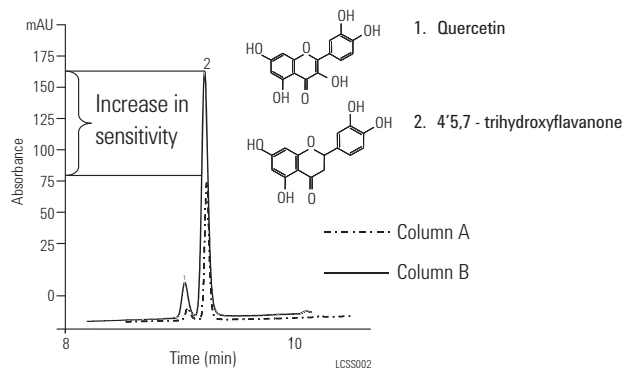
Column A: ZORBAX SB-C18
863953-902
4.6 x 150 mm, 3.5 µm

Column B: ZORBAX SB-C18
863954-302
3.0 x 150 mm, 3.5 µm

Mobile Phase: 25% Methanol:
75% 0.4% Formic Acid

Detector: 254 nm

This figure shows sensitivity is increased 2-3 times with Solvent Saver columns compared to 4.6 mm ID columns when the same mass sample is injected. No change in the HPLC instrumentation is required to see the sensitivity improvements.



Solvent Saver Columns are Ideal for LC/MS

Column: ZORBAX SB-C18
861954-302
3.0 x 100 mm, 3.5 µm

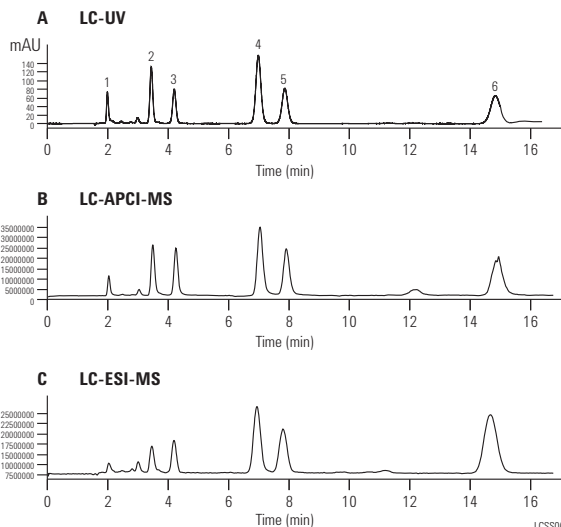
Mobile Phase: A: 70% Methanol+0.4% Formic Acid
B: 30% Water+0.4% Formic Acid

Flow Rate: 0.425 mL/min

Detector: A: UV 254 nm
B: Positive Ion APCI
C: Positive Ion Electrospray

Sample: Steroids

1. Triamcinolone
2. Hydrocortisone
3. Cortisone acetate
4. Deoxycorticosterone
5. Hydroxyprogesterone
6. Progesterone



Solvent Saver columns are ideal for LC/MS because the typical 0.5 mL/min flow rate allows samples to be evaluated and analyzed without changing columns when the MS interface is changed from electrospray to APCI.

ZORBAX Eclipse Plus

Description	Size (mm)	Particle Size (µm)	Eclipse Plus C18 USP L1	Eclipse Plus C8 USP L7	Eclipse Plus Phenyl-Hexyl USP L11	Eclipse PAH USP L1
Solvent Saver	3.0 x 250	5				959990-318
Solvent Saver	3.0 x 150	5	959993-302	959993-306		
Solvent Saver Plus	3.0 x 150	3.5	959963-302	959963-306	959963-312	
Solvent Saver Plus	3.0 x 100	3.5	959961-302	959961-306	959961-312	
Solvent Saver RRHD, 1200 bar	3.0 x 150	1.8	959759-302	959759-306		
Solvent Saver RRHD, 1200 bar	3.0 x 100	1.8	959758-302	959758-306		
Solvent Saver RRHD, 1200 bar	3.0 x 50	1.8	959757-302	959757-306		
Solvent Saver HT, 600 bar	3.0 x 100	1.8	959964-302	959964-306	959964-312	
Solvent Saver HT, 600 bar	3.0 x 50	1.8	959941-302	959941-306	959941-312	

ZORBAX 80Å Eclipse XDB

Description	Size (mm)	Particle Size (µm)	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7	Eclipse XDB-Phenyl USP L11	Eclipse XDB-CN USP L10
Solvent Saver	3.0 x 250	5	990967-302	990967-306	990967-312	990967-305
Solvent Saver	3.0 x 150	5	993967-302	993967-306	993967-312	993967-905
Solvent Saver Plus	3.0 x 150	3.5	963954-302	963954-306	963954-305	963954-305
Solvent Saver Plus	3.0 x 100	3.5	961967-302	961967-306	961967-312	
Solvent Saver Plus	3.0 x 75	3.5	966954-302			
Solvent Saver RRHD, 1200 bar	3.0 x 150	1.8	981759-302			
Solvent Saver RRHD, 1200 bar	3.0 x 100	1.8	981758-302			
Solvent Saver RRHD, 1200 bar	3.0 x 50	1.8	981757-302			
Solvent Saver HT, 600 bar	3.0 x 100	1.8	928975-302	928975-306		
Solvent Saver HT, 600 bar	3.0 x 50	1.8	927975-302	927975-306		
Solvent Saver HT, 600 bar	3.0 x 30	1.8	924975-302	924975-306		
Solvent Saver HT, 600 bar	3.0 x 20	1.8	926975-302	926975-306		

ZORBAX 80Å StableBond

Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1	SB-C8 USP L7	SB-CN USP L10	SB-C3 USP L56	SB-Phenyl USP L11	SB-Aq
Solvent Saver	3.0 x 250	5	880975-302	880975-306	880975-305	880975-309	880975-312	880975-314
Solvent Saver	3.0 x 150	5	883975-302	883975-306	883975-305	883975-309	883975-312	883975-314
Solvent Saver Plus	3.0 x 150	3.5	863954-302	863954-306	863954-305	863954-309	863954-312	863954-314
Solvent Saver Plus	3.0 x 100	3.5	861954-302	861954-306	861954-305	861954-309	861954-312	861954-314
Solvent Saver Plus	3.0 x 75	3.5	866953-302					

(Continued)

ZORBAX 80Å StableBond

Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1	SB-C8 USP L7	SB-CN USP L10	SB-C3 USP L56	SB-Phenyl USP L11	SB-Aq
Solvent Saver RRHD, 1200 bar	3.0 x 150	1.8	859700-302	859700-306				
Solvent Saver RRHD, 1200 bar	3.0 x 100	1.8	858700-302	858700-306	858700-305		858700-312	
Solvent Saver RRHD, 1200 bar	3.0 x 50	1.8	857700-302	857700-306	857700-305		857700-312	
Solvent Saver HT, 600 bar	3.0 x 150	1.8	829975-302	829975-306	829975-305		829975-312	
Solvent Saver HT, 600 bar	3.0 x 100	1.8	828975-302	828975-306	828975-305	828975-309	828975-312	828975-314
Solvent Saver HT, 600 bar	3.0 x 50	1.8	827975-302	827975-306	827975-305			
Solvent Saver HT, 600 bar	3.0 x 30	1.8	824975-302	824975-306	824975-305		827975-312	827975-314
Solvent Saver HT, 600 bar	3.0 x 20	1.8	826975-302	826975-306				

ZORBAX 300Å StableBond

Description	Size (mm)	Particle Size (µm)	300SB-C18 USP L1	300SB-C8 USP L7	300SB-CN USP L10	300SB-C3 USP L56
Solvent Saver Plus	3.0 x 150	3.5	863974-302	863974-306	863974-309	863974-309
Solvent Saver Plus	3.0 x 100	3.5		861973-306		
Solvent Saver Plus	3.0 x 75	3.5	866953-302			

ZORBAX 80Å Bonus-RP and Rx

Description	Size (mm)	Particle Size (µm)	Bonus-RP USP L60	Rx-C18 USP L1	Rx-C8 USP L7
Solvent Saver	3.0 x 250	5	880668-301	880967-302	880975-306
Solvent Saver	3.0 x 150	5	883668-301	883967-302	883975-306
Solvent Saver Plus	3.0 x 150	3.5	863668-301	863967-302	863954-306
Solvent Saver Plus	3.0 x 100	3.5	864668-301	861967-302	861954-306

ZORBAX 80Å Extend-C18

Description	Size (mm)	Particle Size (µm)	Extend-C18 USP L1
Solvent Saver	3.0 x 250	5	770450-302
Solvent Saver	3.0 x 150	5	773450-302
Solvent Saver Plus	3.0 x 150	3.5	763954-302
Solvent Saver Plus	3.0 x 100	3.5	764953-302
Solvent Saver Plus	3.0 x 50	3.5	735954-302



Chiral HPLC Columns

Ultron ES Chiral Columns

- Direct racemic separations without derivatization
- Use Ultron ES-OVM as the USP L57 choice and to separate enantiomers of acidic and basic pharmaceuticals, such as hexobarbital, ibuprofen, and profenamine
- Ultron ES-Pepsin Chiral columns are best suited to separate basic compounds that are difficult to separate with other chiral columns
- ES-OVM and ES-Pepsin columns contain 120Å, 5 µm silica particles bonded with an ovomucoid protein and pepsin protein, respectively
- Both types of chiral columns are usable with reversed-phase mobile phases such as acetonitrile or ethanol and phosphate buffer

Ultron ES Chiral columns are immobilized protein columns that feature numerous chiral recognition sites for enantiomeric separations of dozens of chiral compounds. They are engineered with two complementary protein-based chiral stationary phases, making them an excellent choice for the HPLC separation of enantiomers without derivatization – including a growing number of drug substances of interest.

Separation of Enantiomers of Fluoxetine (Prozac)

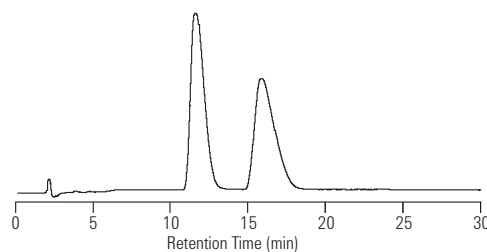
Column: Ultron ES-OVM Chiral
702111651
4.6 x 150 mm, 5 µm

Mobile Phase: 25:75 (v/v) EtOH/20 mM KH₂PO₄, pH 5.5
(adjusted with NaOH)

Temperature: Ambient

Detector: UV (225 nm)

Sample: Mixture Fluoxetine (Prozac) enantiomers



Courtesy of D. S. Risley and V. S. Sharp of Lilly Research Laboratories, Eli Lilly and Co.

Separation of Ethiazide (diuretic drug) on ULTRON ES-OVM Column

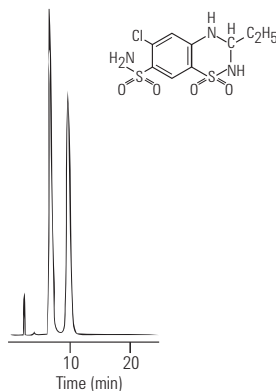
Column: Ultron ES-OVM Chiral
702111651
4.6 x 150 mm, 5 µm

Mobile Phase: 20 mM KH₂PO₄ (pH 4.6)

Flow Rate: 1 mL/min

Temperature: 25°C

Detector: 220 nm



Chiral Separation of Warfarin Enantiomers R and S Limit of Quantitation %RSD at 100 fg/mL

Column: Ultron ES-OVM Chiral
702111610
2.0 x 150 mm, 5 µm

Temperature: 30°C

Injection Volume: 5 µL

Autosampler Temperature: 10°C

Needle Wash: Flush port (50:25:25 H₂O, IPA:MeOH:H₂O, 5 seconds)

Mobile Phase: 83% A = H₂O + 5mM Ammonium Formate
17% B = ACN

Flow Rate: 0.5 mL/min
Stop time: 7.0 min

MS Conditions: Agilent 6410A Triple Quadrupole LC/MS/MS with MultiMode Source

Ion Mode: ESI, Negative

Source Conditions

Capillary Voltage: 2000 V

Drying Gas (nitrogen): 5 L/min

Drying Gas Temperature: 300°C

Nebulizer Gas (nitrogen): 40 psi

Vaporizer: 200°C

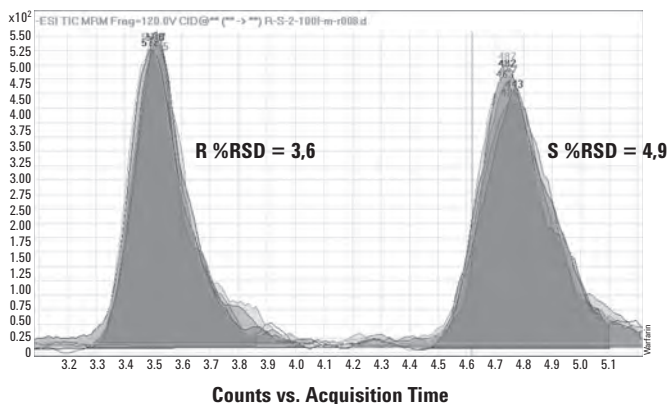
Product Ion Scan

Mass Range: 50-500 m/z

Scan Speed: 500 msec

MRM acquisition (Q1 peak width = 1.2 and Q2 peak width = 0.70 amu)

Delta EMV: 1000V





Ultron ES Chiral Columns

Description	Size (mm)	Particle Size (µm)	ES-OVM	
			USP L57	ES-Pepsin
Semi-Prep	10 x 150	5	722111723	
Analytical	4.6 x 250	10	724111653	
Analytical	4.6 x 150	5	702111651	822111651
Analytical, with Guard	4.6 x 150	5	702111651A	822111631A
Narrow Bore	2.0 x 150	5	702111610	
Guard Column	4.0 x 10	5	712111630	832111630

ChiraDex Chiral Columns

- For routine separation of enantiomers
- Available as ChiraDex cartridge columns
- Novel manufacturing process bonds β -cyclodextrin to spherical 5 μm silica gel by means of a chemical spacer
- Enantiomeric separations have been achieved with ChiraDex using simple nonchiral solvent systems such as MeOH/water, MeOH/buffer, and ACN/TEAA

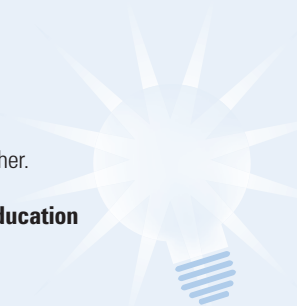
ChiraDex Chiral Columns

Hardware	Description	Size (mm)	Particle Size (μm)	Part No.
	Cartridge Column	4.0 x 250	5	79925CB-584
	Cartridge Holder, 5021-1845			5021-1845

Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatographer.

For more information, visit www.agilent.com/chem/education



■ PREPARATIVE HPLC COLUMNS AND FLASH CHROMATOGRAPHY

Agilent provides a range of preparative columns for direct scale-up of analytical separations or preparative scale purification of organic compounds. Preparative LC columns are used when resolution is critical and high-efficiency columns are key. Column choices range from semi-prep to several inches in internal diameter for use on analytical and preparative HPLC systems.

Flash chromatography can be used to purify reaction products and isolate target compounds. This is a popular purification technique for fast results and high throughput with many samples. Flash columns have larger particle sizes and lower pressure than traditional HPLC columns. They are often disposable and very cost-effective. Corresponding flash systems are available for convenient use of flash cartridges.

Some choices shown in this section include the following:

- **ZORBAX PrepHT** – ideal for analytical to preparative separations on ZORBAX phases where resolution is critical
- **Agilent Prep** – cost-effective preparative separation choice and are available in 21.2, 30 and 50 mm ID sizes with matching scalar columns in either 5 or 10 μm particle sizes
- **Dynamax Preparative** – use a modular design with dynamic axial compression to eliminate column voids and are available with cost-effective, high-capacity packing materials
- **High Efficiency Purification** – range of Pursuit and Polaris HPLC materials for small molecule separations
- **Load & Lock Preparative HPLC** – enable you to quickly and easily pack your own preparative high efficiency columns
- **SuperFlash Purification** – maximum recovery of high purity compounds every time
- **Flash F75/F150 Cartridges** – designed for routine, quick purification of several grams or more of your target compounds



ZORBAX PrepHT

- Easy scale-up from analytical to preparative scale with ZORBAX phases
- Fast preparative separations, up to 2000 mg
- 5 to 7 μm particles for high efficiency and high yield
- Easy to install finger-tight connections seal up to 5000 psi/350 bar

High purity, high recovery and high throughput can be easily achieved with Agilent ZORBAX PrepHT columns. These are available in a variety of bonded phases – Eclipse XDB, StableBond, Bonus-RP, and Extend-C18 – for optimized resolution and loadability under any conditions.

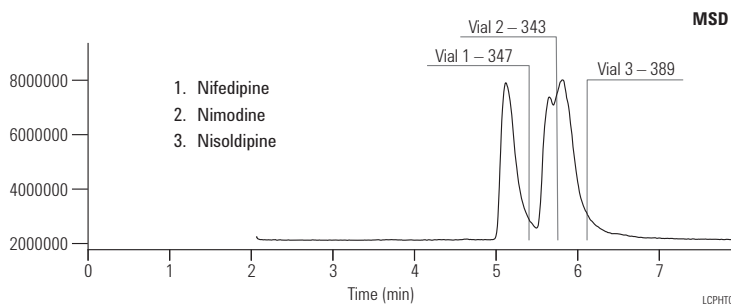
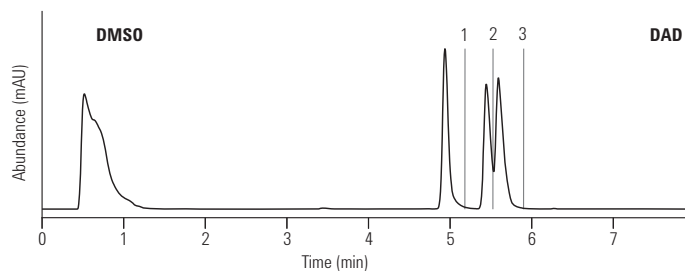
ZORBAX PrepHT columns are packed with 5 and 7 μm particle sizes for very high resolution. The high resolution allows high loadability, high yield, and high purity of compounds. The larger diameter columns and mechanically stronger ZORBAX particles allow for flow rates up to 100 mL/min, thus increasing throughput.

ZORBAX PrepHT columns are designed for rapid scale-up from analytical to preparative scale without losing resolution. For complex separations on larger columns (21.2 mm ID, 150 mm length and longer), Agilent has carefully chosen the 7 μm particle size to achieve a balance between high efficiency and high loadability.

High Purity and High Recovery with ZORBAX PrepHT Columns

Sample: Antianginal drugs

Mass-based fraction collection using ZORBAX SB-C18 column shows high purity and high recovery of each compound (Application Note publication number 5988-7113EN). The separation of the three antianginal drugs was successfully done in a single run with high recovery and >90% purity. Separations up to 2000 mg are possible depending on the complexity of separation.



	Amount Nifedipin [mg]	Amount Nifmodipin [mg]	Amount Nifsoldipin [mg]		
Fraction 1	18.90	0.11	0.16	Purity Nifedipin	98.6%
Fraction 2	0.29	17.66	0.77	Purity Nifmodipin	94.4%
Fraction 3	0.49	1.66	18.36	Purity Nifsoldipin	89.5%
Recovery [mg]	19.68	19.43	19.29		
Recovery [%]	101.3	102.0	101.9		

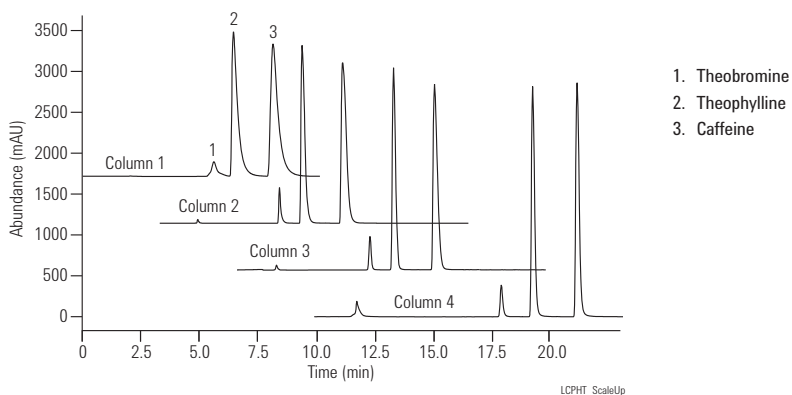
ZORBAX PrepHT columns are designed for rapid scale-up from analytical to preparative scale without losing resolution. For complex separations for larger columns (21.2 mm ID and higher, 150 mm length and higher), Agilent has carefully chosen the 7 μm particle size to achieve a balance between high efficiency and high loadability.

Scale-Up from Analytical to Prep ZORBAX SB-C18 Columns Using the Same Pump







Column	Size	Flow (mL/min)	Injection (μL)	Detector Cell	Part No.
Column 1	50 x 150 mm	100	2200	0.3 mm quartz	Custom Column
Column 2	21.2 x 150 mm	18	400	0.3 mm quartz	877150-102
Column 3	9.4 x 150 mm	3.5	80	0.3 mm quartz	883975-202
Column 4	4.6 x 150 mm	0.85	2.0	3 mm SST	883975-902

Using the same 1100 pump, a scale-up from 4.6 mm to 50 mm ID was possible without any loss of resolution. This increases throughput by reducing the time required for redeveloping and adjusting the method.







Scale-Up to PrepHT




ZORBAX PrepHT 80ÅStableBond (require hardware 820400-901)

Hardware Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1	SB-C8 USP L7	SB-Aq	SB-CN USP L10	SB-Phenyl USP L11
 PrepHT Cartridge	21.2 x 250	7	877250-102	877250-106	877250-114	877250-105	877250-112
 PrepHT Cartridge	21.2 x 150	7	877150-102	877150-106	877150-114		
 PrepHT Cartridge	21.2 x 150	5	870150-902	870150-906	870150-914		
 PrepHT Cartridge	21.2 x 100	5	870100-902	870100-906	870100-914		
 PrepHT Cartridge	21.2 x 50	5	870050-902	870050-906	870050-914		
 PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-920	820212-915	820212-933	820212-933	820212-915







ZORBAX PrepHT 300ÅStableBond (require hardware 820400-901)

Hardware Description	Size (mm)	Particle Size (µm)	300SB-C18 USP L1	300SB-C8 USP L7	300SB-C3 USP L56	300SB-CN USP L10
 PrepHT Cartridge	21.2 x 250	7	897250-102	897250-106	897250-109	897250-105
 PrepHT Cartridge	21.2 x 150	7	897150-102	897150-106	897150-109	
 PrepHT Cartridge	21.2 x 150	5	895150-902	895150-906	895150-909	
 PrepHT Cartridge	21.2 x 100	5	895100-902	895100-906	895100-909	
 PrepHT Cartridge	21.2 x 50	5	895050-902	895050-906	895050-909	
 PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-921	820212-918	820212-924	820212-924
Guard Cartridge Hardware			820444-901	820444-901	820444-901	820444-901
Includes guard column end fitting, polymeric seal, and seal insertion tool (seal holder and seal pusher)						
PrepHT endfittings, 2/pk			820400-901	820400-901	820400-901	820400-901







ZORBAX PrepHT Original (require hardware 820400-901)

Hardware Description	Size (mm)	Particle Size (µm)	ODS (C18) USP L1	C8 USP L7	CN USP L10	NH2 USP L8	SIL USP L3
 PrepHT Cartridge	21.2 x 250	7	877952-102	877952-106	877952-105	877952-108	877952-101
PrepHT endfittings, 2/pk			820400-901	820400-901	820400-901	820400-901	820400-901




ZORBAX PrepHT Eclipse XDB (require hardware 820400-901)

Hardware Description	Size (mm)	Particle Size (µm)	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7
 PrepHT Cartridge	21.2 x 250	7	977250-102	977250-106
 PrepHT Cartridge	21.2 x 150	7	977150-102	977150-106
 PrepHT Cartridge	21.2 x 150	5	970150-902	970150-906
 PrepHT Cartridge	21.2 x 100	5	970100-902	970100-906
 PrepHT Cartridge	21.2 x 50	5	970050-902	970050-906
 PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-925	820212-926
Guard Cartridge Hardware Includes guard column end fitting, polymeric seal, and seal insertion tool (seal holder and seal pusher)			820444-901	820444-901
PrepHT endfittings, 2/pk			820400-901	820400-901




ZORBAX PrepHT Bonus-RP and Extend-C18 (require hardware 820400-901)

Hardware Description	Size (mm)	Particle Size (µm)	Bonus-RP USP L60	Extend-C18 USP L1
 PrepHT Cartridge	21.2 x 250	7	878250-101	
 PrepHT Cartridge	21.2 x 150	7	878150-101	
 PrepHT Cartridge	21.2 x 150	5	868150-901	770150-902
 PrepHT Cartridge	21.2 x 100	5	868100-901	770100-902
 PrepHT Cartridge	21.2 x 50	5	868050-901	770050-902
 PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-928	820212-930
Guard Cartridge Hardware Includes guard column end fitting, polymeric seal, and seal insertion tool (seal holder and seal pusher)			820444-901	820444-901
PrepHT endfittings, 2/pk			820400-901	820400-901

ZORBAX PrepHT Rx-SIL (require hardware 820400-901)

Hardware Description	Size (mm)	Particle Size (µm)	Rx-SIL USP L3	Rx-C18 USP L1
 PrepHT Cartridge	21.2 x 250	7	877250-101	
 PrepHT Cartridge	21.2 x 250	7		877967-102
 PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-919	820212-914
Guard Cartridge Hardware Includes guard column end fitting, polymeric seal, and seal insertion tool (seal holder and seal pusher)			820444-901	820444-901
PrepHT endfittings, 2/pk			820400-901	820400-901

ZORBAX PrepHT Accessories

Hardware Description	Part No.
 Guard Cartridge Hardware	820444-901
 PrepHT endfittings, 2/pk	820400-901
 Replacement Seals	820385-901

Agilent Prep LC Columns

- High loadability for maximum sample purification
- Easy scalability from 4.6 up to 50 mm ID for rapid method development
- High throughput 21.2 mm ID cartridges for fast purification
- Exceptional column stability and loadability up to pH 10

Agilent Prep LC columns are designed for high loadability to purify milligram to gram quantities of products. Preparative sized columns are available in 21.2, 30, and 50 mm internal diameters with lengths ranging from 50-250 mm. Columns are available in 5 and 10 μm particle sizes with very high efficiency in every dimension. These column choices accommodate almost every preparative sample.

Agilent Prep 21.2 mm ID columns are available with Agilent's Preparative Cartridge Hardware. This reliable cartridge hardware makes it simple to use columns with different lengths to increase sample load. Guard columns are easily integrated onto these columns, providing superior protection of the analysis column. Analytical size 4.6 mm ID scalar columns are available for method development and optimization prior to scaling up to larger columns. Bulk material is also available.

Agilent Prep columns are available in a C18 bonded phase suitable for purification of a wide variety of non-polar and polar compounds. Unbonded silica columns are also available.

Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits	pH Range	Endcapped	Carbon Load
C18	100Å	400 m ² /g	60°C*	2.0-10.0	Single	24%
Silica	100Å	400 m ² /g	**	1.0-8.0	N/A	N/A

Specifications represent typical values only.

*Temperature limits are 60°C up to pH 8, 40°C from pH 8-10.

**Temperature limits for bare silica are determined by the pH of the mobile phase.

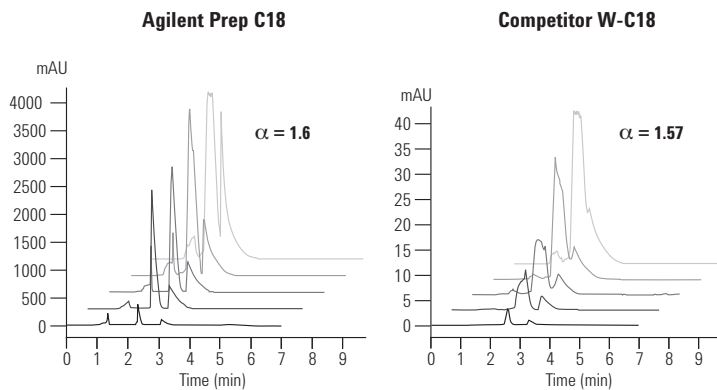
Superior Loadability on Agilent Prep C18 with Basic Compounds

Column: Agilent Prep C18
443905-902
4.6 x 150 mm, 5 μ m

Mobile Phase: 50% 0.1%TFA:50% ACN

Flow Rate: 1 mL/min

Sample: 10 μ L
Doxepin/Amitriptyline
0.5-50 mg/mL



Agilent Prep columns show better resolution and loadability than competitor columns.

Steroids: Easy Scalability Using Agilent Prep Columns

Column A: Agilent Prep C18
443905-902
4.6 x 150 mm, 5 μ m

Column B: 443905-102
21.2 x 150 mm, 5 μ m

Column C: 413910-302
30.0 x 150 mm, 10 μ m

Column D: 413910-502
50.0 x 150 mm, 10 μ m

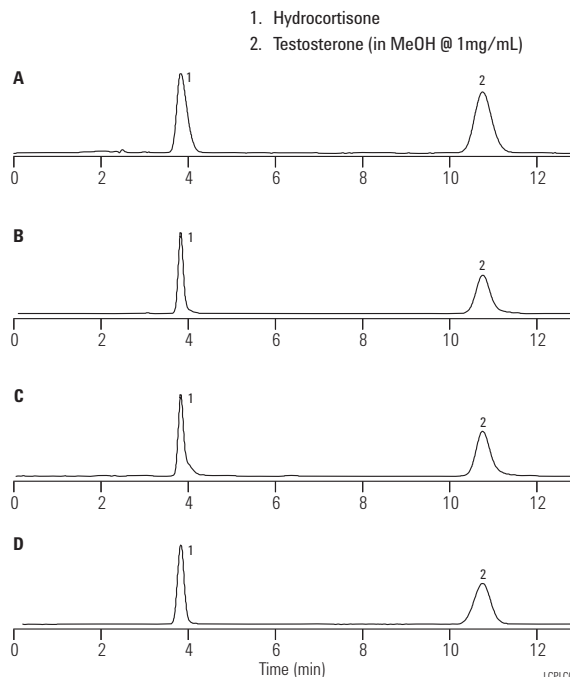
Mobile Phase: 55% Water:45% ACN

Flow Rate: 0.7 mL/min
14.87 mL/min
29.77 mL/min
85.37 mL/min

Temperature: Ambient











Detector: 240 nm

Sample: 2 μ L
42.4 μ L
170 μ L
488 μ L



Agilent Prep C18 shows excellent scalability, making method transfer simple and predictable.

Agilent Prep LC Columns

Hardware	Description	Size (mm)	Particle Size (µm)	C18	Silica
Standard Columns (no special hardware required)					
	Scalar	4.6 x 250	10	440910-902	440910-901
	Scalar	4.6 x 150	10	443910-902	443910-901
	Scalar	4.6 x 100	10	449910-902	
	Scalar	4.6 x 250	5	440905-902	440905-901
	Scalar	4.6 x 150	5	443905-902	443905-901
	Scalar	4.6 x 100	5	449905-902	449905-901
	Scalar	4.6 x 50	5	446905-902	446905-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)*					
	PrepHT	21.2 x 250	10	410910-102	410910-101
	PrepHT	21.2 x 150	10	413910-102	413910-101
	PrepHT	21.2 x 50	10	446910-102	
	PrepHT	21.2 x 150	5	443905-102	443905-101
	PrepHT	21.2 x 100	5	449905-102	449905-101
	PrepHT	21.2 x 50	5	446905-102	446905-101
	PrepHT endfittings, 2/pk			820400-901	820400-901
Standard Columns (no special hardware required)					
	Prep 30	30.0 x 250	10	410910-302	410910-301
	Prep 30	30.0 x 150	10	413910-302	413910-301
	Prep 30	30.0 x 100	10	419910-302	419910-301
	Prep 30	30.0 x 100	5	449905-302	449905-301
	Prep 30	30.0 x 50	5	446905-302	446905-301
	Prep 50	50.0 x 250	10	410910-502	410910-501
	Prep 50	50.0 x 150	10	413910-502	413910-501
	Prep 50	50.0 x 100	10	419910-502	419910-501
	Prep 50	50.0 x 100	5	449905-502	449905-501
Guard Columns (hardware required)					
	PrepHT Guard Cartridges, 2/pk	21.2 x 10	10	420212-902	420212-901
	Guard Cartridge Hardware			820444-901	820444-901
	PrepHT External Guard Hardware Kit			420420-901	420420-901
	Bulk Packing (1kg)		10	420910-902	420910-901

*All PrepHT cartridge columns require hardware kit P/N 820400-901. If a guard column is desired for the 21.2 mm ID columns, the PrepHT Guard Hardware Kit, P/N 820444-901, is also required. If the guard column is used on a 30 mm ID column then the external guard column hardware kit, P/N 420420-901, is required.

High Efficiency Purification for Small Molecule Separations

- Small column sizes for high-speed media selection, method development and purification
- Comprehensive range of selectivities
- Packed columns and bulk media

Agilent offers a range of high efficiency, small particle silica and polymeric HPLC materials. These are pre-packed preparative columns and bulk media for reverse phase, normal phase and ion exchange purification. A range of pore sizes is available, providing maximum capacity for all applications, from small molecules to biological macromolecules.

Small Molecule Separations

Separation	Media Characterization	Column
Hydrophobic	Highest Mass Loading	Pursuit XRs 100Å C18 Pursuit XRs 100Å C8
	Hydrophobic Work Horse	Pursuit 200Å C18 Pursuit 200Å C8
	Aromatic/Double Bonds	Pursuit 200Å Diphenyl
Hydrophilic	Polar Selectivity	Polaris 200Å C18-A Polaris 200Å C8-A
	H-bond Accepting	Polaris 200Å C18-Ether Polaris 200Å C8-Ether
	Reverse or Normal-Phase	Polaris 200Å NH2
	H-bonding	Polaris 200Å Amide-C8
	Normal-Phase Organic Soluble	Pursuit XRs Si Pursuit XRs Diol
Extreme Conditions	pH Extremes/High Temperatures	PLRP-S 100Å, 8 µm

Pursuit High Efficiency XRs Columns for Small Molecule Separations

Size (mm)	Particle Size (µm)	XRs C18	XRs C8	XRs Diphenyl	XRs Diol	XRs Si
21.2 x 250	10	A6002250X212				A6004250X100
21.2 x 250	5	A6000250X212		A6020250X212	A3040250X212	
21.2 x 100	5		A6010100X212			
10.0 x 250	10	A6002250X100				
10.0 x 250	5	A6000250X100		A6020250X100		
High Efficiency Bulk Media						
100 g	10	A6002100G	A6012100G			A6004100G

Pursuit High Efficiency Columns for Small Molecule Separations

Size (mm)	Particle Size (µm)	C18	C8	Diphenyl	PFP
21.2 x 250	10	A6002250X212	A3032250X212	A3042250X212	
21.2 x 250	5	A3000250X212	A3030250X212	A3040250X212	A3050250X212
10.0 x 250	10	A6002250X100	A3032250X100	A3042250X100	
10.0 x 250	5	A3000250X100	A3030250X100	A3040250X100	A3050250X100

Polaris High Efficiency Columns for Small Molecule Separations

Size (mm)	Particle Size (µm)	Particle Size						
		C18-A	C18-Ether	Amide C18	C8-A	C8-Ether	NH2	Si-A
21.2 x 250	10	A2002250X212		A2008250X212				A2004250X212
21.2 x 250	5	A2000250X212	A2030250X212	A2006250X212	A2010250X212	A2030250X212	A2013250X212	A2003250X212
10.0 x 250	10			A2008250X100				
10.0 x 250	5	A2000250X100	A2020250X100	A2006250X100	A2010250X100	A2030250X100	A2013250X100	

Dynamax Preparative HPLC Columns

- Modular design with reusable end fittings reduces hardware costs
- Three internal diameters – 10, 21.4 and 41.4 mm – for easy scale-up
- Integral guard column option for longer column lifetimes with complex samples

The Dynamax preparative column hardware utilizes a patented dynamic axial compression (DAC) design and is the ideal format for the development and optimization of a high throughput or high yield purification. The DAC principle of operation maintains packed bed integrity and improves column performance over an extended period of time with a reduction in operating costs.

Agilent offers Dynamax columns as compression modules (cartridges) onto which separate axial compression end fittings are fitted. This provides a means of eliminating voids that may form at the column inlet during use and also enables the end fittings to be reused. When changing the column it is only necessary to replace the compression module with one of a similar internal diameter.

There are three options when configuring a Dynamax column. To simplify choice, end fittings kits are available for each of the configurations. Kit #1 contains the end fittings for using the Dynamax column without a guard module. Kit #2 contains all the parts needed to operate with a protective guard module. There is also a guard coupling assembly parts kit to upgrade Kit #1 to Kit #2. When the guard column is used as a short preparative column only the standalone guard holder is needed.

SepTech ST60 10-C18 and SepTech ST150 10-C18 media designed for high performance separations at high capacity are available in the Dynamax format for rapid method development and small-scale separations.

Dynamax Column Hardware Kits

Description	ID (mm)	Part No.
End fittings kit #1	10	R000083810
	21.4	R000083820
	41.4	R000083840
End fittings kit #2	10	R000083812
	21.4	R000083822
	41.4	R000083842
Guard coupling assembly	10	R000083811
Upgrades kit #1 to kit #2	21.4	R000083821
	41.4	R000083841
Standalone guard holder	10	R000083814
	21.4	R000083824
	41.4	R000083844

SepTech C18 Reverse Phase Media

- Symmetrical peaks improve yield of high purity product
- High capacity delivers maximum throughput
- Narrow particle size distribution improves packed bed stability

SepTech media has been developed specifically for prep to process HPLC, from the definition of the base silica particle, pore sizes, pore volume, specific surface area, mechanical strength and particle size distribution through to the bonding chemistry, ligand density and end capping. The result is two products: SepTech ST60 10-C18 – optimized for small molecule purifications, and SepTech ST150 10-C18 – the preferred option for larger, natural molecules and biomolecules.

The high level of batch-to-batch reproducibility and particle integrity give consistent performance and ease of column packing, which are essential for minimizing production downtime. SepTech media helps you meet the demands of a robust and economical process by purifying the maximum amount of product at the required purity in the shortest period of time.

Column Specifications

Characteristics	SepTech ST60 10-C18	SepTech ST150 10-C18
Nominal Particle Size	10 µm	10 µm
Nominal Pore Size	60Å	150Å
Nominal Distribution	<2 d90/d10	<2 d90/d10
Shape	Spherical	Spherical
Silica Purity	99.999%	99.999%
Chemistry	Octadecyl	Octadecyl
End Capping	Yes	Yes
Carbon Load	25%	15%
Ligand Coverage	3.5 µmol/m ²	3.8 µmol/m ²
Working pH Range	1.5-10	1.5-10

SepTech ST60 10-C18

Description	Size (mm)	Part No.
Method Development Column	4.6 x 250	A8060250X046
Dynamax Packed Cartridge Module	10 x 50	A8060050DG100
	10 x 250	A8060250DM100
	21.2 x 50	A8060050DG214
	21.2 x 250	A8060250DM214
	41.4 x 50	A8060050DG414
	41.4 x 250	A8060250DM414
Bulk media	100 g	A80600100G
	1 kg	A8060001KG

SepTech ST150 10-C18

Description	Size (mm)	Part No.
Method Development Column	4.6 x 250	A8150250X046
Dynamax Packed Cartridge Module	10 x 50	A8150050DG100
	10 x 250	A8150250DM100
	21.2 x 50	A8150050DG214
	21.2 x 250	A8150250DM214
	41.4 x 50	A8150050DG414
	41.4 x 250	A8150250DM414
Bulk media	100 g	A81500100G
	1 kg	A8150001KG

Tips & Tools

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To learn more, visit www.agilent.com/chem/specialoffers



FlowTrap

- Reduced dry-down times improve productivity
- Desalting in situ preserves compound integrity
- Retentive sorbent handles a wide range of sample pH and pKa

FlowTrap columns contain ultra-retentive, high capacity, and hydrophobic polymeric material that captures and concentrates small molecules. Once trapped, the desired analyte can be back eluted using a small volume of volatile organic solvent, affording simple compound isolation. FlowTrap columns give you excellent retention and easy elution. The efficiency of the packed bed delivers superior reproducibility and can be used for up to 500 flow-trapping cycles when run under optimized conditions.

With FlowTrap you can solvent switch from a high volume of water-based HPLC eluent to a low volume of volatile solvent, dramatically reducing the evaporation times needed for compound isolation. Ion pairing reagents such as TFA can be removed from the compound during trapping, allowing the isolation of free-base compounds and reducing the risk of potential compound hydrolysis.

FlowTrap is available in standard HPLC column hardware covering a range of column sizes that handle seamless scale-up as compound batch sizes increase. Using FlowTrap columns will help you dramatically reduce dry-down times, increasing throughput for compound recovery.

Tips & Tools

More information is a click away. We have a variety of educational primers, application notes, maintenance guides, and literature available from Agilent for free.

To learn more, visit www.agilent.com/chem/OnlineLibrary



FlowTrap

Size (mm)	Capacity Range (mg)*	Part No.
4.6 x 150	50	PL1560-3M07
7.5 x 150	50-150	PL1160-3M07
10.0 x 150	150-200	PL1060-3M07
21.2 x 150	200-400	PL1E60-3M07

*Recommendation only, based on representative loading studies. Capacity will vary according to compound type and eluent constitution.

Metronidazole TFA removal

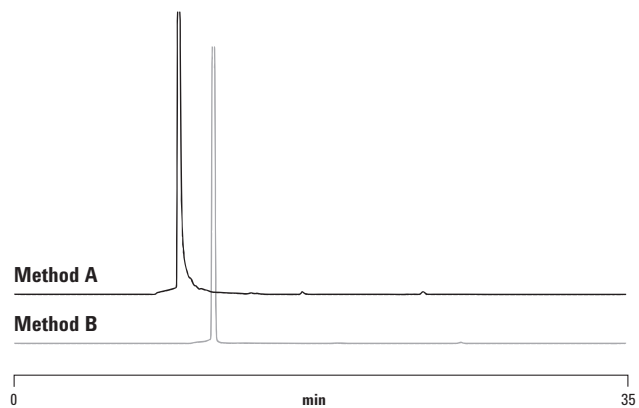
Column: FlowTrap
PL1560-3M07
4.6 x 150 mm, μm

Mobile Phase: Metronidazole (12 mL) @ 2 mg/mL
in water + 0.1% TFA
Caffeine @ 2 mg/mL in water + 0.1% TFA

Detector: UV, 280 nm

Wash Conditions: Method A: R.O. water flow rate: 4 mL/min for 4 min
Method B: 2 M NH_3 , flow rate: (4 mL/min) for 2 min then
R.O. water, flow rate: (4 mL/min) for 4 min

Elution: 100% CH_3CN over 5 min flow rate:
(4 mL/min)



Load & Lock Preparative HPLC Systems

Agilent offers a complete range of Load & Lock column systems for laboratory and process preparative LC. They are designed to enable you to easily and quickly pack your own preparative high efficiency columns. This is the right solution for applications ranging in scale from discovery (milligrams) to production (multi-kilos) of pharmaceutical compounds, peptides, and natural products. Our Load & Lock columns have a unique fluid/sample distribution system to maximize productivity. It is the only system that provides dynamic axial compression (DAC) and static "locked" axial compression (SAC) and is designed for easy operation to deliver greater convenience.

Laboratory Load & Lock Columns

- Mobile packing station supports three different column sizes
- Runs on compressed air with no need for a power supply
- Quick and easy packing and unpacking within minutes

Agilent's laboratory scale Load & Lock columns combine excellent packed-bed stability with enhanced flow distribution to deliver the highest quality purification possible with maximum speed, flexibility and ease of operation. Three different column sizes are supported: 1 in., 2 in. and 3 in. ID. Because the station is powered by compressed air, it is the perfect solution for hazardous environments. The quick-release single bolt clamp offers speedy and easy packing and unpacking within minutes.

Load & Lock Preparative HPLC Systems

Description	Water Jacket	Size (mm)	Part No.
Load & Lock 4001 Column	No	25 x 500	PCG93LL500X25
	Yes	25 x 500	PCG93LL500X25WJ
	Spare parts kit		PCG931AAKIT
Load & Lock 4002 Column	No	50 x 500	PCG93LL500X50
	Yes	50 x 500	PCG93LL500X50WJ
	Spare parts kit		PCG932AAKIT
Load & Lock 4003 Column	No	75 x 500	PCG93LL500X75
	Yes	75 x 500	PCG93LL500X75WJ
	Spare parts kit		PCG933AAKIT
Mobile packing station (air driven hydraulic)			PCG93LLSTAND123

Flash Chromatography

- Isolate compounds from synthesis mixtures quickly and easily
- Maximize compound purity and recovery with superior purification columns
- Enhance gradient accuracy with solid loading system

Flash chromatography purifies reaction products to isolate the target compound. Flash columns are designed for purification. Every element has been thought out, custom designed and carefully manufactured for excellent purification performance, time after time.

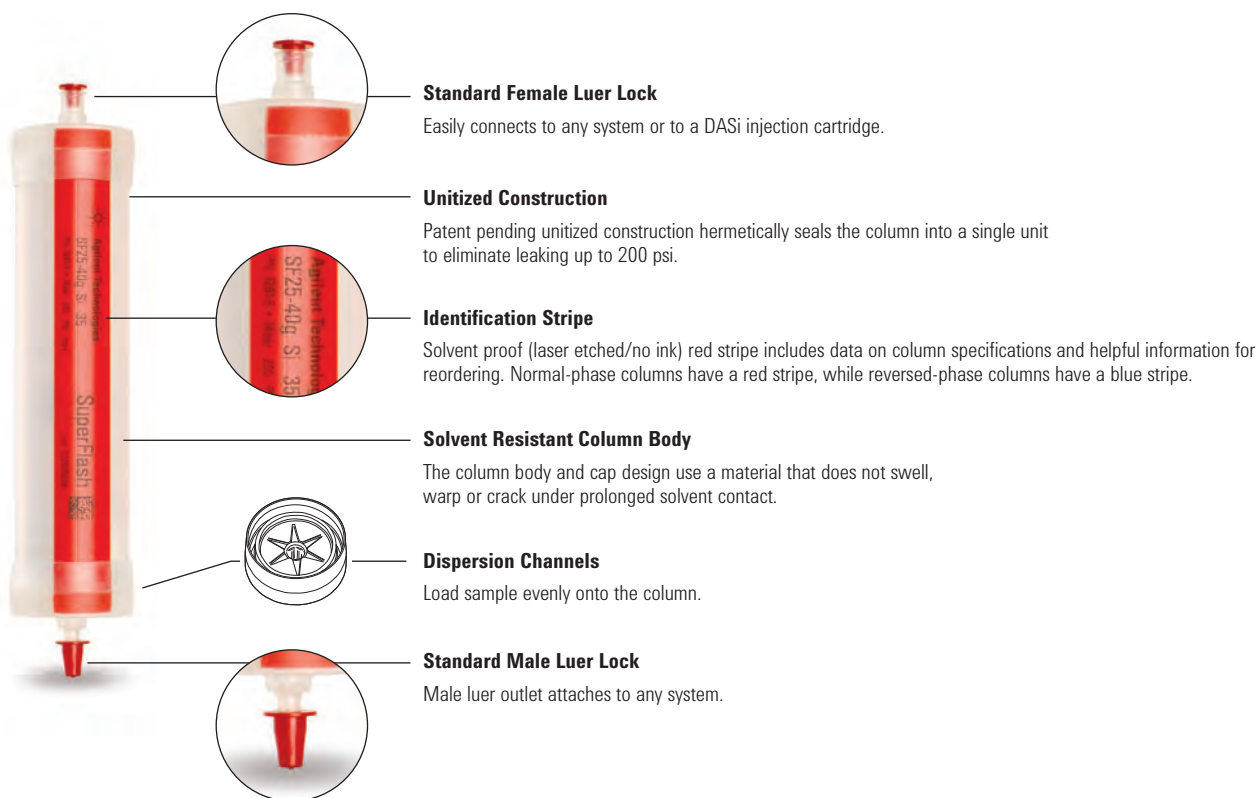
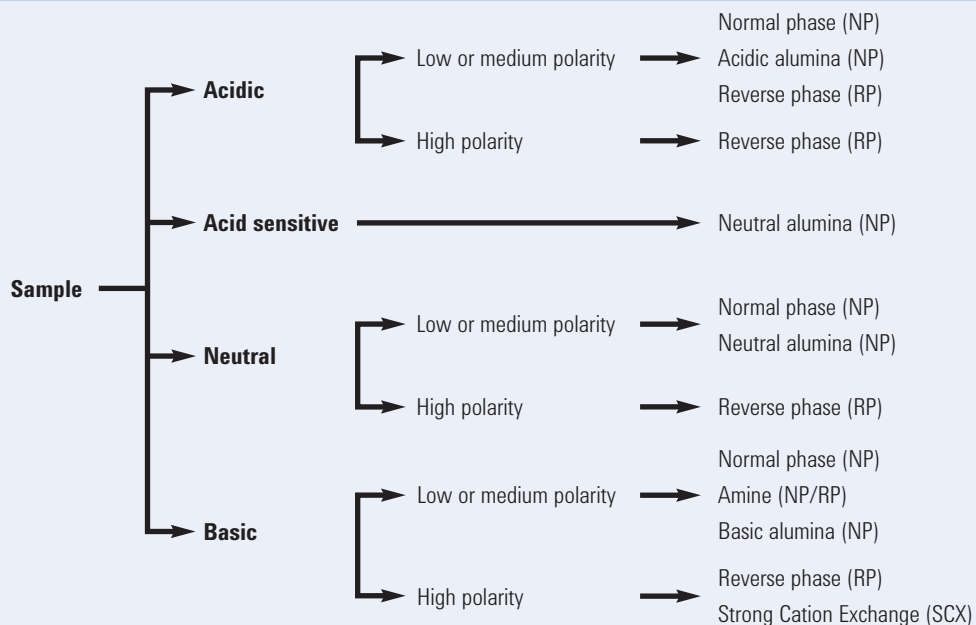



SuperFlash Purification Columns

- Sixteen standard sizes plus customized sizes for a wide application range
- Short, wide columns for speed and long, thin columns for resolution
- Flat packaging for stock room organization and supply visibility to maintain inventory

Each element of the SuperFlash compound purification column, with our patented and patent-pending technologies, delivers optimal performance, offering maximum recovery of high purity compounds time after time. Our columns, available in Si 50, Si 35, C18, PLRP-S and SCX for normal and reverse phase separations, and a variety of other sorbents, eliminate the common problems of leaking, size limitations, complicated connections and poor compound separation. Instead, you receive a cost-effective, high performance disposable column specifically designed for delivering convenient, efficient separations.

Media selection



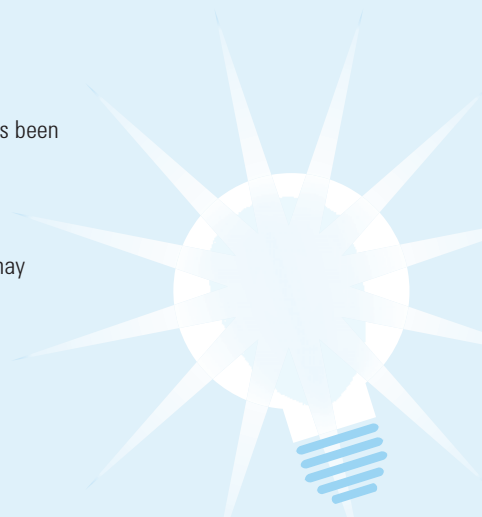
Solvent Polarity		
Polarity Index at 20°C		Solvent
Non-polar  Polar	0.0	Heptane
	0.0	Hexane
	0.0	Pentane
	0.2	Cyclohexane
	1.0	Trichloroethylene
	1.6	Carbon tetrachloride
	2.8	di-Ethyl ether
	3.1	Dichloromethane
	3.9	Propan-2-ol
	4.0	Propan-1-ol
	4.0	Tetrahydrofuran
	4.1	Chloroform
	5.1	Acetone
	5.1	Methanol
5.2	Ethanol	
5.8	Acetonitrile	
9.0	Water	



SuperFlash Notes

This information applies to the following SuperFlash ordering tables.

- Maximum pressure for all columns is 14 bar (200 psi).
- Obey pressure maximum limits marked on every column. Confirm the instrument has been set to the appropriate maximum pressure before attaching column.
- Dimensions are for sorbent bed diameter x overall column length.
- Flow rates up to 40% higher than the recommended normal operating flow rates may be used to reduce equilibration times.
- Sample loading values are suggested. Results may vary with specific samples.



Normal Phase (NP)

SuperFlash Si 50

Model	Diameter x Length (mm)	Particle Size (µm)	Flow Rate (mL/min)	Sample Load	Unit	Part No.
SF10 - 4 g	14.2 x 95	50	18	40 - 400 mg	8/pk	AX1368-8
SF10 - 8 g	14.2 x 136	50	18	80 - 800 mg	8/pk	AX1403-8
SF15 - 12 g	20.8 x 112	50	30	120 mg - 1.2 g	7/pk	AX1369-7
SF15 - 24 g	20.8 x 175	50	30	240 mg - 2.4 g	7/pk	AX1404-7
SF25 - 40 g	28.2 x 164	50	40	400 mg - 4 g	6/pk	AX1281-6
SF25 - 60 g	28.2 x 214	50	40	600 mg - 6 g	6/pk	AX1212-6
SF25 - 80 g	28.2 x 280	50	40	800 mg - 8 g	6/pk	AX1213-6
SF25 - 120 g	28.2 x 388	50	40	1.2 - 12 g	6/pk	AX1214-6
SF25 - 160 g	28.2 x 507	50	40	1.6 - 16 g	6/pk	AX1215-6
SF40 - 80 g	40.6 x 158	50	85	800 mg - 8 g	4/pk	AX1356-4
SF40 - 120 g	40.6 x 202	50	85	1.2 - 11.5 g	4/pk	AX1216-4
SF40 - 150 g	40.6 x 257	50	85	1.5 - 15 g	4/pk	AX1217-4
SF40 - 240 g	40.6 x 371	50	85	2.4 - 24 g	4/pk	AX1218-4
SF65 - 200 g	66 x 156	50	100	2 - 20 g	3/pk	AX1357-3
SF65 - 400 g	66 x 256	50	100	4 - 40 g	3/pk	AX1219-3
SF65 - 600 g	66 x 365	50	100	6 - 60 g	3/pk	AX1220-3

SuperFlash Si 35

Model	Diameter x Length (mm)	Particle Size (µm)	Flow Rate (mL/min)	Sample Load	Unit	Part No.
SF10 - 4 g	14.2 x 95	35	18	40 - 400 mg	8/pk	AX1370-8
SF10 - 8 g	14.2 x 136	35	18	80 - 800 mg	8/pk	AX1407-8
SF15 - 12 g	20.8 x 112	35	30	120 mg - 1.2 g	7/pk	AX1371-7
SF15 - 24 g	20.8 x 175	35	30	240 mg - 2.4 g	7/pk	AX1408-7
SF25 - 40 g	28.2 x 164	35	40	400 mg - 4 g	6/pk	AX1393-6
SF25 - 60 g	28.2 x 215	35	40	600 mg - 6 g	6/pk	AX1292-6
SF25 - 80 g	28.2 x 280	35	40	800 mg - 8 g	6/pk	AX1293-6
SF25 - 120 g	28.2 x 388	35	40	1.2 - 12 g	6/pk	AX1294-6
SF25 - 160 g	40.6 x 507	35	40	1.6 - 16 g	6/pk	AX1295-6
SF40 - 80 g	40.6 x 158	35	85	800 mg - 8 g	4/pk	AX1405-4
SF40 - 115 g	40.6 x 202	35	85	1.2 - 11.5 g	4/pk	AX1296-4
SF40 - 150 g	40.6 x 257	35	85	1.5 - 15 g	4/pk	AX1297-4
SF40 - 240 g	40.6 x 371	35	85	2.4 - 24 g	4/pk	AX1298-4
SF65 - 200 g	66 x 156	35	100	2 - 20 g	3/pk	AX1406-3
SF65 - 400 g	66 x 256	35	100	4 - 40 g	3/pk	AX1299-3
SF65 - 600 g	66 x 365	35	100	6 - 60 g	3/pk	AX1300-3

SuperFlash Aminopropyl – NH2

Model	Diameter x Length (mm)	Particle Size (µm)	Flow Rate (mL/min)	Unit	Part No.
SF10 - 5 g	14.2 x 96	40	18	1/pk	AX1374-1
SF10 - 10 g	14.2 x 136	40	18	1/pk	AX1511-1
SF15 - 15 g	20.8 x 113	40	30	1/pk	AX1375-1
SF15 - 30 g	20.8 x 174	40	30	1/pk	AX1512-1
SF25 - 50 g	28.2 x 163	40	40	1/pk	AX1311-1
SF25 - 75 g	28.2 x 220	40	40	1/pk	AX1376-1
SF25 - 100 g	28.2 x 277	40	40	1/pk	AX1377-1
SF25 - 150 g	28.2 x 391	40	40	1/pk	AX1378-1
SF25 - 200 g	28.2 x 506	40	40	1/pk	AX1379-1
SF40 - 100 g	40.6 x 159	40	85	1/pk	AX1380-1
SF40 - 150 g	40.6 x 207	40	85	1/pk	AX1316-1
SF40 - 200 g	40.6 x 255	40	85	1/pk	AX1317-1
SF40 - 300 g	40.6 x 379	40	85	1/pk	AX1381-1
SF65 - 250 g	66 x 157	40	100	1/pk	AX1382-1
SF65 - 500 g	66 x 262	40	100	1/pk	AX1319-1
SF65 - 750 g	66 x 365	40	100	1/pk	AX1383-1

Strong Cation Exchange (SCX)

SuperFlash SCX

Model	Diameter x Length (mm)	Particle Size (µm)	Flow Rate (mL/min)	Unit	Part No.
SF10 - 5 g	14.2 x 49	50	18	8/pk	AX2130-8
SF10 - 8 g	14.2 x 81	50	18	8/pk	AX2135-8
SF15 - 14 g	20.8 x 63	50	30	7/pk	AX2140-7
SF15 - 25 g	20.8 x 114	50	30	7/pk	AX2145-7
SF25 - 45 g	28.2 x 114	50	40	6/pk	AX2150-6
SF25 - 70 g	28.2 x 186	50	40	6/pk	AX2155-6
SF25 - 80 g	28.2 x 206	50	40	6/pk	AX2160-6
SF25 - 120 g	28.2 x 308	50	40	6/pk	AX2165-6
SF25 - 160 g	28.2 x 414	50	40	6/pk	AX2170-6
SF40 - 80 g	40.6 x 99	50	85	4/pk	AX2175-4
SF40 - 125 g	40.6 x 153	50	85	4/pk	AX2180-4
SF40 - 160 g	40.6 x 208	50	85	4/pk	AX2185-4
SF40 - 245 g	40.6 x 299	50	85	4/pk	AX2190-4
SF65 - 250 g	66 x 118	50	100	3/pk	AX2195-3
SF65 - 440 g	66 x 204	50	100	3/pk	AX2200-3
SF65 - 650 g	66 x 302	50	100	3/pk	AX2205-3



Reversed Phase (RP)**SuperFlash PLRP-S**

Model	Diameter x Length (mm)	Particle Size (µm)	Flow Rate (mL/min)	Sample Load	Unit	Part No.
SF10 - 2.5 g	14.2 x 95	50	12	15 - 60 mg	1/pk	AX2250-1
SF10 - 4 g	14.2 x 127	50	12	25 - 100 mg	1/pk	AX2255-1
SF15 - 7 g	20.8 x 112	50	20	41 - 167 mg	1/pk	AX2260-1
SF15 - 13 g	20.8 x 163	50	20	75 - 300 mg	1/pk	AX2265-1
SF25 - 24 g	28.2 x 163	50	30	138 - 500 mg	1/pk	AX2270-1
SF25 - 38 g	28.2 x 235	50	30	188 - 750 mg	1/pk	AX2275-1
SF25 - 42 g	28.2 x 255	50	30	250 mg - 1 g	1/pk	AX2280-1
SF25 - 63 g	28.2 x 357	50	30	375 mg - 1.5 g	1/pk	AX2285-1
SF25 - 85 g	28.2 x 463	50	30	500 mg - 2 g	1/pk	AX2290-1
SF40 - 42 g	40.6 x 148	50	50	250 mg - 1 g	1/pk	AX2295-1
SF40 - 65 g	40.6 x 202	50	50	375 mg - 1.5 g	1/pk	AX2300-1
SF40 - 90 g	40.6 x 257	50	50	500 mg - 2 g	1/pk	AX2305-1
SF40 - 130 g	40.6 x 348	50	50	750 mg - 3 g	1/pk	AX2310-1
SF65 - 133 g	66 x 170	50	65	750 mg - 3 g	1/pk	AX2315-1
SF65 - 230 g	66 x 256	50	65	1.4 - 5.4 g	1/pk	AX2320-1
SF65 - 340 g	66 x 354	50	65	2 - 8 g	1/pk	AX2325-1

SuperFlash C18

Model	Diameter x Length (mm)	Particle Size (µm)	Flow Rate (mL/min)	Sample Load	Unit	Part No.
SF10 - 5 g	14.2 x 95	50	12	15 - 60 mg	1/pk	AX1372-1
SF10 - 10 g	14.2 x 127	50	12	25 - 100 mg	1/pk	AX1409-1
SF15 - 16 g	20.8 x 112	50	20	41 - 167 mg	1/pk	AX1373-1
SF15 - 30 g	20.8 x 163	50	20	75 - 300 mg	1/pk	AX1410-1
SF25 - 55 g	28.2 x 163	50	30	138 - 500 mg	1/pk	AX1394-1
SF25 - 75 g	28.2 x 235	50	30	188 - 750 mg	1/pk	AX1302-1
SF25 - 100 g	28.2 x 255	50	30	250 mg - 1 g	1/pk	AX1303-1
SF25 - 150 g	28.2 x 357	50	30	375 mg - 1.5 g	1/pk	AX1304-1
SF25 - 200 g	28.2 x 463	50	30	500 mg - 2 g	1/pk	AX1305-1
SF40 - 100 g	40.6 x 148	50	50	250 mg - 1 g	1/pk	AX1411-1
SF40 - 150 g	40.6 x 202	50	50	375 mg - 1.5 g	1/pk	AX1306-1
SF40 - 205 g	40.6 x 257	50	50	500 mg - 2 g	1/pk	AX1307-1
SF40 - 300 g	40.6 x 348	50	50	750 mg - 3 g	1/pk	AX1308-1
SF65 - 300 g	66 x 172	50	65	750 mg - 3 g	1/pk	AX1412-1
SF65 - 540 g	66 x 256	50	65	1.4 - 5.4 g	1/pk	AX1309-1
SF65 - 800 g	66 x 354	50	65	2 - 8 g	1/pk	AX1310-1

Normal Phase (NP) Alumina

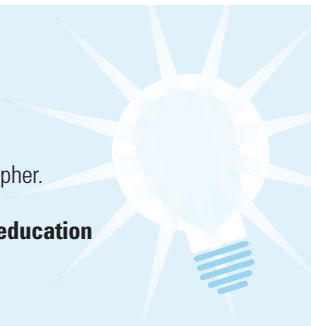
SuperFlash Alumina

Model	Diameter x Length (mm)	Particle Size (µm)	Sample Load	Unit	Alumina Neutral	Alumina Acidic	Alumina Basic
SF10 - 8 g	14.2 x 95	125	80 - 400 mg	8/pk	AX1448-8	AX1474-8	AX1450-8
SF10 - 16 g	14.2 x 136	125	150 - 750 mg	8/pk	AX1477-8	AX1494-8	AX1476-8
SF15 - 24 g	20.8 x 112	125	230 mg - 1.2 g	7/pk	AX1466-7	AX1495-7	AX1467-7
SF15 - 48 g	20.8 x 175	125	450 mg - 2.2 g	7/pk	AX1468-7	AX1496-7	AX1469-7
SF25 - 80 g	28.2 x 163	125	750 mg - 2.2 g	6/pk	AX1449-6	AX1497-6	AX1478-6
SF25 - 120 g	28.2 x 215	125	1.1 - 5.5 g	6/pk	AX1481-6	AX1498-6	AX1480-6
SF25 - 160 g	28.2 x 280	125	1.5 - 7.5 g	6/pk	AX1483-6	AX1499-6	AX1482-6
SF25 - 240 g	28.2 x 388	125	2.2 - 11 g	6/pk	AX1462-6	AX1500-6	AX1464-6
SF25 - 320 g	28.2 x 507	125	3 - 15 g	6/pk	AX1485-6	AX1501-6	AX1484-6
SF40 - 160 g	40.6 x 158	125	1.5 - 7.5 g	4/pk	AX1487-4	AX1502-4	AX1486-4
SF40 - 230 g	40.6 x 214	125	2.2 - 11 g	4/pk	AX1489-4	AX1503-4	AX1488-4
SF40 - 300 g	40.6 x 256	125	2.8 - 10 g	4/pk	AX1438-4	AX1504-4	AX1437-4
SF40 - 480 g	40.6 x 388	125	4.5 - 22.5 g	4/pk	AX1473-4	AX1505-4	AX1479-4
SF65 - 400 g	66 x 157	125	3.7 - 18.5 g	3/pk	AX1463-3	AX1506-3	AX1465-3
SF65 - 800 g	66 x 262	125	7.5 - 37.5 g	3/pk	AX1491-3	AX1507-3	AX1490-3
SF65 - 1200 g	66 x 365	125	11.2 - 56 g	3/pk	AX1493-3	AX1508-3	AX1492-3

Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatographer.

For more information, visit www.agilent.com/chem/education



Flash F75/F150 Cartridges

- Available in a variety of sizes for development systems
- Convenient sorbents to meet your needs
- Consistent packing for less channelling and fraction dilution

If you regularly purify more than a few grams of compound, Flash F75/F150 cartridges deliver the convenience and compatibility you need. The cartridges are packed with silica for normal phase separations and silica C18 for reverse phase purifications. For development scale they are available in different bed diameters and bed masses to provide solutions for a range of sample sizes.

Flash F75 Cartridges

Model	Sorbent	Unit	Part No.
F75S - 200 g	Si 50	2/pk	AX0346-2
F75S - 200 g	Si 50	10/pk	AX0346-10
F75S - 200 g	Si 35	2/pk	AX1363-2
F75S - 200 g	Si 35	10/pk	AX1363-10
F75S - 300 g	C18	1/pk	AX0349-1
F75M - 400 g	Si 50	2/pk	AX0347-2
F75M - 400 g	Si 35	10/pk	AX0347-10
F75M - 400 g	Si 35	2/pk	AX1364-2
F75M - 400 g	Si 35	10/pk	AX1364-10
F75M - 600 g	C18	1/pk	AX0350-1
F75L - 800 g	Si 50	2/pk	AX0348-2
F75L - 800 g	Si 50	10/pk	AX0348-10
F75L - 800 g	Si 35	2/pk	AX1352-2
F75L - 800 g	Si 35	10/pk	AX1352-10
F75L - 1.2 kg	C18	1/pk	AX0351-1
F75XL - 1.6 kg	Si 50	2/pk	AX1178-2

Flash F150 Cartridges

Model	Sorbent	Unit	Part No.
F150M - 2.5 kg	Si 50	2/pk	AX0355-2
F150M - 2.5 kg	Si 50	10/pk	AX0355-10
F150M - 2.5 kg	Si 35	2/pk	AX1360-2
F150M - 2.5 kg	Si 35	10/pk	AX1360-10
F150M - 3.9 kg	C18	1/pk	AX0357-1
F150L - 5 kg	Si 50	2/pk	AX0356-2
F150L - 5 kg	Si 50	10/pk	AX0356-10
F150L - 5 kg	Si 35	2/pk	AX1361-2
F150L - 5 kg	Si 35	10/pk	AX1361-10
F150L - 9 kg	C18	1/pk	AX0414-1

DASi Sample Loading Module

- For even loading of low solubility and high viscosity compounds
- Modules are available in three sizes to match your sample needs
- Adjustable plunger eliminates dead volume and maintains gradient accuracy
- Provides security as a guard column for high-cost, specialty-sorbent columns

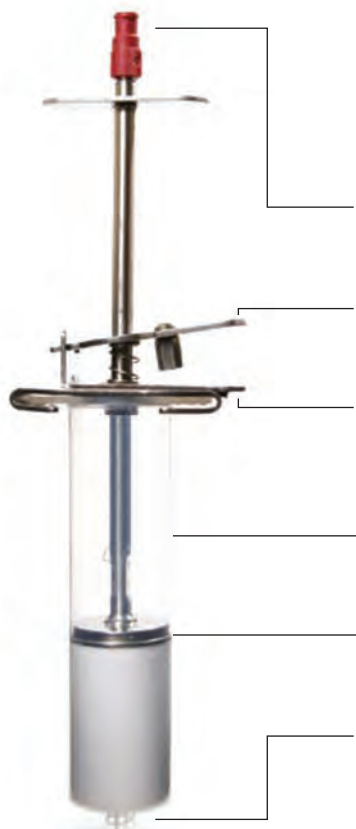
DASi Module Kits

Description	Part No.
DASi 12 module kit Includes five empty cartridges and two Si 50, 5 g packed cartridges	AX1238-1
DASi 35 module kit Includes five empty cartridges, two Si 50, 5 g packed cartridges and two Si 50, 10 g packed cartridges	AX1237-1
DASi 65 module kit Includes five empty cartridges, two Si 50, 5 g packed cartridges, two Si 50, 15 g packed cartridges and two Si 50, 25 g packed cartridges	AX1236-1
DASi 12, 35 and 65 module kit	AX1239-1

Each module kit contains plunger assembly and appropriate DASi Si Cartridge Sampler Kit

DASi Si Cartridge Sampler Pack

Description	Part No.
DASi 12 cartridge sampler pack	AX1266-1
DASi 35 cartridge sampler pack	AX1263-1
DASi 65 cartridge sampler pack	AX1252-1



DASi Module (showing one pre-packed cartridge)

Standard Female Luer Lock

Easily connect the DASi to any system with a female Luer lock top fitting.

Patent Pending Locking Mechanism

Easily push piston down. Assembly will remain in position until released.

Adjustable Plunger Head

Eliminates dead volume to maintain the superior gradient accuracy of the 971-FP instrument (especially important for DCM/methanol solvent combination).

Sample Cartridge

Solvent compatible cartridge body does not swell, warp, or crack under prolonged solvent contact.

Dispersion Channels

Distribute solvent evenly on the sample bed for tight, thin separation bands.

Standard Male Luer Lock

Male Luer outlet attaches to any system or to the top of a SuperFlash column.



Flash Purification

- Excellent purification performance of UV-active compounds at different wavelengths
- Eliminates uncontrolled sample loss to ensure sample security and retention
- Method-guiding functionality optimizes solvent, column and gradient options to increase efficiency and flexibility
- Ready-to-Run technology reduces downtime

The 971-FP system enhances productivity through its ready-to-run technology that eliminates warmup time, performs self diagnostics to ensure proper operation, supplies helpful navigation run start software and introduces walk-away start features like system auto-prime and sample auto-inject. The instrument incorporates the latest compound separation innovations, and contains new sample security and retention technology.

Solutions

Description	Part No.
971-FP multiple wavelength UV flash chromatography workstation Includes advanced features pack (AFP)	AX1600-1
971-FP single wavelength UV flash chromatography workstation	AX1605-1

Instrument Supplies

Agilent offers several accessories to support the 971-FP, including a Multi-column Controller to connect additional stations for uninterrupted column operation. The Advanced Feature Package (AFP) offers uninterrupted solvent supply, waste level monitoring and feedback, Guide Me functionality and dynamic run queues for multi-column control capacity. A high-speed processor and advanced operating software are integral to the AFP. The integral fume enclosure traps solvent fumes for use in areas without hoods (requires a 4 in. or greater exhaust ventilation connection), and the solvent bottle safety tray provides additional support of storing 4 L solvent bottles.

Instrument Supplies

Description	Part No.
MCC2 – Multi-column controller	AX1426-1
Advanced feature package (AFP)	AX1440-1
Integral fume enclosure	AX1429-1
Solvent bottle safety tray	AX1441-1

Accessory Racks

A variety of accessory racks for the 971-FP, all with radio frequency identification (RFID), is available.

Accessory Racks

Description	Part No.
13 x 100 mm rack, holds 90 tubes	AX1442-1
16 x 100 mm rack, holds 60 tubes	AX1443-1
16 x 150 mm rack, holds 60 tubes	AX1444-1
18 x 150 mm rack, holds 40 tubes	AX1446-1
25 x 150 mm rack, holds 24 tubes	AX1447-1

GPC/SEC COLUMNS AND CALIBRANTS

Agilent delivers leading solutions for characterizing and separating polymers by GPC/SEC. We manufacture all components for accurate polymer analysis, including columns and standards.

With the addition of Varian in 2010, Agilent greatly expanded its GPC/SEC portfolio to include the highly respected PLgel, PolarGel, PlusPore, and PL aquagel-OH column families, as well as an extensive line of polymer standards for GPC/SEC.

If you're currently using one of these part numbers for GPC/SEC columns or standards, reorder using the new part number listed below:

Cross Reference Guide for GPC/SEC Columns & Standards

If you're using...		Reorder this...	
Part No.	Description	Size (mm)	New Part No.
Organic GPC			
79911GP-110	PLgel 10 μm guard	7.5 x 50	PL1110-1120
79911GP-510	PLgel 5 μm guard	7.5 x 50	PL1110-1520
79911GP-MXB	PLgel 10 μm MIXED-B	7.5 x 300	PL1110-6100
79911GP-100	PLgel 10 μm 50Å	7.5 x 300	PL1110-6115
79911GP-101	PLgel 10 μm 100Å	7.5 x 300	PL1110-6120
79911GP-102	PLgel 10 μm 500Å	7.5 x 300	PL1110-6125
79911GP-103	PLgel 10 μm 10 ³ Å	7.5 x 300	PL1110-6130
79911GP-104	PLgel 10 μm 10 ⁴ Å	7.5 x 300	PL1110-6140
79911GP-105	PLgel 10 μm 10 ⁵ Å	7.5 x 300	PL1110-6150
79911GP-106	PLgel 10 μm 10 ⁶ Å	7.5 x 300	PL1110-6160
79911GP-MXA	PLgel 20 μm MIXED-A	7.5 x 300	PL1110-6200
79911GP-MXE	PLgel 3 μm MIXED-E	7.5 x 300	PL1110-6300
79911GP-MXC	PLgel 5 μm MIXED-C	7.5 x 300	PL1110-6500
79911GP-MXD	PLgel 5 μm MIXED-D	7.5 x 300	PL1110-6504
79911GP-500	PLgel 5 μm 50Å	7.5 x 300	PL1110-6515
79911GP-501	PLgel 5 μm 100Å	7.5 x 300	PL1110-6520
79911GP-502	PLgel 5 μm 500Å	7.5 x 300	PL1110-6525
79911GP-503	PLgel 5 μm 10 ³ Å	7.5 x 300	PL1110-6530
79911GP-504	PLgel 5 μm 10 ⁴ Å	7.5 x 300	PL1110-6540
79911GP-505	PLgel 5 μm 10 ⁵ Å	7.5 x 300	PL1110-6550

(Continued)

Cross Reference Guide for GPC/SEC Columns & Standards

If you're using...			Reorder this...
Part No.	Description	Size (mm)	New Part No.
Aqueous SEC of Polymers			
79911GF-083	PL aquagel-OH 30 8 μ m	7.5 x 300	PL1120-6830
79911GF-080	PL aquagel-OH 8 μ m guard	7.5 x 50	PL1149-1840
79911GF-MXA	PL aquagel-OH MIXED-H 8 μ m	7.5 x 300	PL1149-6800
79911GF-084	PL aquagel-OH 40 8 μ m	7.5 x 300	PL1149-6840
79911GF-085	PL aquagel-OH 50 8 μ m	7.5 x 300	PL1149-6850
79911GF-086	PL aquagel-OH 60 8 μ m	7.5 x 300	PL1149-6860
Polymer Standards for GPC/SEC			
79911-60500	S-L-10 polystyrene calibration kit, 10 x 0.5 g		PL2010-0101
79911-60501	S-M-10 polystyrene calibration kit, 10 x 0.5 g		PL2010-0100
79911-60502	S-H-10 polystyrene calibration kit, 10 x 0.5 g		PL2010-0103
5064-8281	EasiVial PS-H, pre-weighted calibration kit		PL2010-0201
1535-4545	Polyethylene glycol/oxide calibration kits, PEG-10, 10 x 0.5 g		PL2070-0100
5064-8280	EasiVial PEG/PEO, pre-weighted calibration kit		PL2080-0201
1535-4546	Polyacrylic acid - Na salt calibration kit, PAA-10, 10 x 0.2 g		PL2140-0100

Organic GPC

PLgel GPC Columns

- Robust performance under the most exacting conditions
- Temperature stability up to 220°C
- Solvent compatibility allows easy and rapid transfer between solvents of varying polarity

PLgel materials have high pore volume and high efficiency to maximize resolution. Their unequalled solvent compatibility makes for easy transfer between polar and non-polar eluents, and outstanding physical rigidity provides extended lifetimes that minimize downtime.

The key to successful GPC separations is the correct choice of columns. The comprehensive range of PLgel products has been designed to cover virtually all organic solvent-based polymer analysis application areas, and to make selection of the correct column, solvent and calibration standard fast and reliable.

PLgel is a highly cross-linked, porous polystyrene/divinylbenzene matrix, which is recognized as a market leader in GPC column technology. PLgel is manufactured to ISO 9001:2000 and benefits from comprehensive QC/QA for total reproducibility, batch-to-batch and column-to-column.

Tips & Tools

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Solvent Compatibility

Solvent Polarity	Solvent
6.0	Perfluoroalkane
7.3	Hexane
8.2	Cyclohexane
8.9	Toluene
9.1	Ethyl acetate
9.1	Tetrahydrofuran (THF)
9.3	Chloroform
9.3	Methyl ethyl ketone (MEK)
9.7	Dichloromethane
9.8	Dichloroethene
9.9	Acetone
10.0	o-Dichlorobenzene (o-DCB)
10.0	Trichlorobenzene (TCB)
10.2	m-Cresol
10.2	o-Chlorophenol (o-CP)
10.7	Pyridine
10.8	Dimethyl acetamide (DMAc)
11.3	n-Methyl pyrrolidone (NMP)
12.0	Dimethyl sulfoxide (DMSO)
12.1	Dimethyl formamide (DMF)

Tips & Tools

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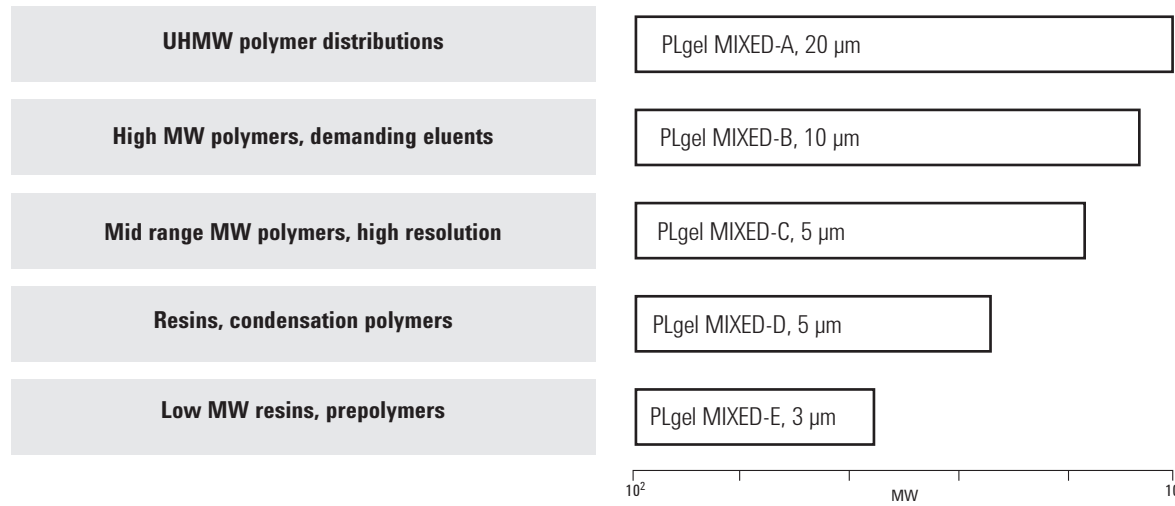


PLgel MIXED Columns

The PLgel MIXED range greatly simplifies column selection for easy decision making. Using these mixed columns you can eliminate mismatched column sets and spurious peaks for more reliable results. Every column contains a mixture of individual pore size materials, accurately blended to cover a specified broad range of molecular weight with a linear calibration to eliminate column mismatch. Simply add extra columns for even greater resolution.

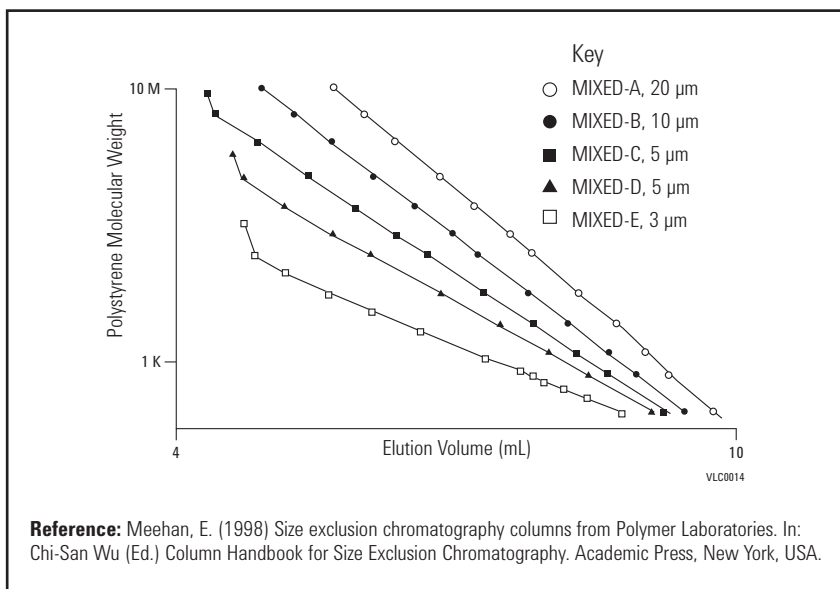
Column Specifications						
Column	Linear MW Operating Range (g/mol)	Guaranteed Column Efficiency	Typical Pressure	Maximum Flow Rate	Maximum Pressure	Maximum Temperature
MIXED-A	2,000-40,000,000	> 17,000 p/m	1 mL/min (7.5 mm ID): ≈ 3 bar (44 psi) per 300 mm 0.3 mL/min (4.6 mm ID): ≈ 2.4 bar (35 psi) per 250 mm (THF @ 20°C, TCB @ 140°C)	7.5 mm ID: 1.5 mL/min 4.6 mm ID: 0.5 mL/min	150 bar (2175 psi)	220°C
MIXED-B	500-10,000,000	> 35,000 p/m	1 mL/min (7.5 mm ID): ≈ 10 bar (145 psi) per 300 mm 0.3 mL/min (4.6 mm ID): ≈ 8 bar (116 psi) per 250 mm (THF @ 20°C, TCB @ 140°C)	7.5 mm ID: 1.5 mL/min 4.6 mm ID: 0.5 mL/min	150 bar (2175 psi)	220°C
MIXED-C	200-2,000,000	> 50,000 p/m	1 mL/min (7.5 mm ID): ≈ 30 bar (435 psi) per 300 mm 0.3 mL/min (4.6 mm ID): ≈ 24 bar (348 psi) per 250 mm (THF @ 20°C, TCB @ 140°C)	7.5 mm ID: 1.5 mL/min 4.6 mm ID: 0.5 mL/min	150 bar (2175 psi)	150°C
MIXED-D	200-400,000	> 50,000 p/m	1 mL/min (7.5 mm ID): ≈ 30 bar (435 psi) per 300 mm 0.3 mL/min (4.6 mm ID): ≈ 24 bar (348 psi) per 250 mm (THF @ 20°C, TCB @ 140°C)	7.5 mm ID: 1.5 mL/min 4.6 mm ID: 0.5 mL/min	150 bar (2175 psi)	150°C
MIXED-E	up to 30,000	7.5 x 300 mm: > 80,000 p/m 4.6 x 250 mm: > 70,000 p/m	1 mL/min (7.5 mm ID): ≈ 50 bar (725 psi) per 300 mm 0.3 mL/min (4.6 mm ID): ≈ 42 bar (609 psi) per 250 mm (THF @ 20°C)	7.5 mm ID: 1.5 mL/min 4.6 mm ID: 0.5 mL/min	180 bar (2611 psi)	110°C

PLgel MIXED Column Selection Guide



PLgel MIXED Gel Calibration Curves

MIXED gel calibration curves are designed to be linear over a specified molecular weight range, ensuring that the same degree of resolution is achieved across the full operating range of the column. The particle size of the packing and porosity of a particular MIXED gel column are carefully matched to the MW range and application, thus optimizing performance and eliminating the effects of shear degradation. Resolution in GPC is controlled by the slope of the calibration curve and the particle size of the packing material. Agilent has scientifically determined the minimum number of MIXED gel columns required to perform accurate MWD determinations based on specific resolution (R_{sp}). Thus you can have complete confidence in the accuracy and precision of the calculated data.



PLgel MIXED Columns

Description	Size (mm)	Part No.
PLgel 20 μ m MIXED-A	7.5 x 300	PL1110-6200
PLgel 10 μ m MIXED-B	7.5 x 300	PL1110-6100
PLgel 5 μ m MIXED-C	7.5 x 300	PL1110-6500
PLgel 5 μ m MIXED-D	7.5 x 300	PL1110-6504
PLgel 3 μ m MIXED-E	7.5 x 300	PL1110-6300

PLgel MIXED Guards

Size (mm)	Particle Size (μm)	Part No.
7.5 x 50	20	PL1110-1220
7.5 x 50	10	PL1110-1120
7.5 x 50	5	PL1110-1520
7.5 x 50	3	PL1110-1320

PLgel MIXED-LS Columns

- Obtain an instant improvement in data quality
- No need for conditioning, saving time and solvent costs
- Maximize the potential of light scattering detectors

The PLgel MIXED-LS series is a PS/DVB packing using an innovative proprietary suspension polymerization technique to virtually eliminate nano-particle leakage. A startling improvement is achieved immediately in the quality of light scattering data obtained with PLgel MIXED-LS columns in place of conventional GPC columns. The light scattering chromatograms shown here were obtained after flushing the columns for one hour in THF at 1 mL/min. A polystyrene standard (Mp 210,000) was injected at 1 mg/mL in order to illustrate the dramatic improvement in signal-to-noise with the PLgel MIXED-LS column.

The performance of PLgel MIXED-LS columns has been matched to PLgel 20 μm MIXED-A and PLgel 10 μm MIXED-B columns in terms of calibration, column efficiency, wide solvent compatibility and operating temperature. MIXED-LS are also ideal for online viscosity detection, minimizing the risk of capillary blockage, and can be used with regular PLgel guard columns that are packed with rigid low pore size gels with no particle bleed.

PLgel MIXED-LS Columns

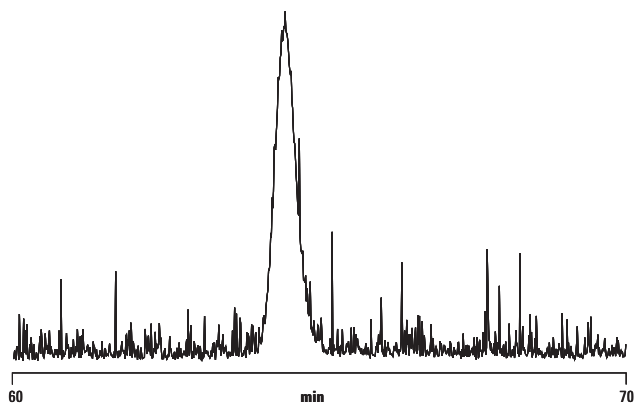
Description	Size (mm)	Linear MW Operating Range (g/mol) (PS)	Guaranteed Efficiency (p/m)	Part No.
PLgel 10 μm MIXED-B LS	7.5 x 300	500-10,000,000	> 35,000	PL1110-6100LS
PLgel 10 μm guard	7.5 x 50			PL1110-1120
PLgel 20 μm MIXED-A LS	7.5 x 300	2,000-40,000,000	> 17,000	PL1110-6200LS
PLgel guard 20 μm	7.5 x 50			PL1110-1220

Conventional GPC column**Column:** Conventional GPC column

Mobile Phase: THF

Flow Rate: 1.0 mL/min

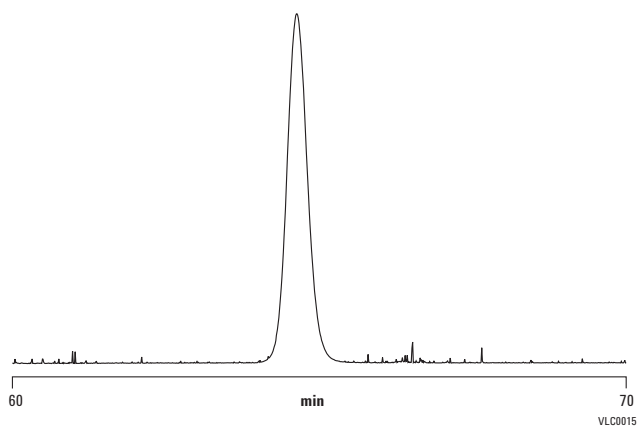
Detector: LS

**PLgel LS column****Column:** PLgel 10 μ m MIXED-B LS
PL1110-6100LS
7.5 x 300 mm, 10 μ m

Mobile Phase: THF

Flow Rate: 1.0 mL/min

Detector: LS



PLgel MiniMIX Columns

- Use about 70% less solvent and save money
- Store less solvent and increase operator safety
- High performance comparable to Agilent's conventional ID columns

For reduced solvent cost and consumption, use industry standard PLgel MiniMIX mixed gel columns in 250 x 4.6 mm narrow bore dimensions. These narrow bore columns offer high performance, excellent solvent compatibility and mechanical stability. PLgel MiniMIX columns can be used with conventional GPC equipment.

To maintain the same linear velocity through the column, the volumetric flow rate must be reduced to 0.3 mL/min in line with the column cross sectional area, resulting in significantly lower solvent consumption. Sample loading should also be scaled down in line with reduced column volume, and system dead volume should be minimized to avoid excessive band broadening.

PLgel MiniMIX Columns

Description	Size (mm)	Linear MW Operating Range (g/mol) (PS)	Guaranteed Efficiency (p/m)	Part No.
PLgel 20 µm MiniMIX-A	4.6 x 250	2,000-40,000,000	> 17,000	PL1510-5200
PLgel 20 µm MiniMIX-A guard	4.6 x 50			PL1510-1200
PLgel 10 µm MiniMIX-B	4.6 x 250	500-10,000,000	> 35,000	PL1510-5100
PLgel 10 µm MiniMIX-B guard	4.6 x 50			PL1510-1100
PLgel 5 µm MiniMIX-C	4.6 x 250	200-2,000,000	> 50,000	PL1510-5500
PLgel 5 µm MiniMIX-C guard	4.6 x 50			PL1510-1500
PLgel 5 µm MiniMIX-D	4.6 x 250	200-400,000	> 50,000	PL1510-5504
PLgel 5 µm MiniMIX-D guard	4.6 x 50			PL1510-1504
PLgel 3 µm MiniMIX-E	4.6 x 250	up to 30,000	> 70,000	PL1510-5300
PLgel 3 µm MiniMIX-E guard	4.6 x 50			PL1510-1300

PLgel Individual Pore Size Columns

- Very high efficiency improves productivity
- Choose the optimum column for a perfect match of performance and application
- Fast analysis with fewer columns saves time and money

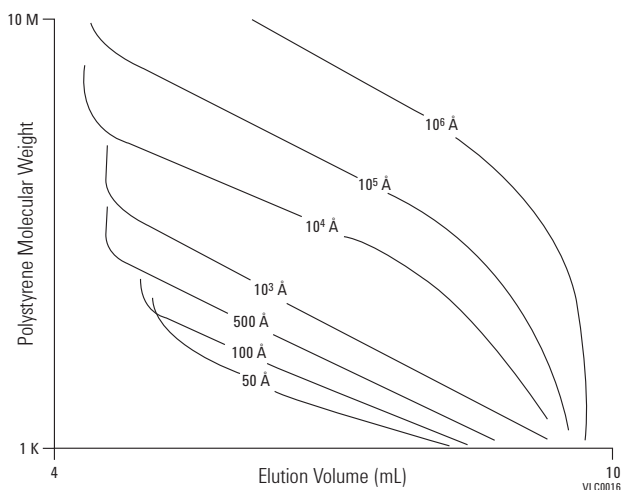
Individual pore size GPC columns offer high resolution over a specific molecular weight range. The linear portion of the calibration curve, where the slope is at its shallowest, defines the MW region over which optimum resolution will be achieved.

PLgel Individual Pore Size Columns

Size (mm)	Particle Size (µm)	Pore Size (Å)	Linear MW Operating Range (g/mol) (PS)	Guaranteed Efficiency (p/m)	Part No.
7.5 x 300	3	100	up to 4,000	> 100,000	PL1110-6320
7.5 x 300	5	50	up to 2,000	> 60,000	PL1110-6515
7.5 x 300	5	100	up to 4,000	> 60,000	PL1110-6520
7.5 x 300	5	500	500-30,000	> 60,000	PL1110-6525
7.5 x 300	5	10 ³	500-60,000	> 50,000	PL1110-6530
7.5 x 300	5	10 ⁴	10,000-600,000	> 50,000	PL1110-6540
7.5 x 300	5	10 ⁵	60,000-2,000,000	> 50,000	PL1110-6550
7.5 x 300	10	50	up to 2,000	> 35,000	PL1110-6115
7.5 x 300	10	100	500-30,000	> 35,000	PL1110-6120
7.5 x 300	10	500	500-30,000	> 35,000	PL1110-6125
7.5 x 300	10	10 ³	500-60,000	> 35,000	PL1110-6130
7.5 x 300	10	10 ⁴	500-60,000	> 35,000	PL1110-6140
7.5 x 300	10	10 ⁵	10,000-600,000	> 35,000	PL1110-6150
7.5 x 300	10	10 ⁶	60,000-2,000,000	> 35,000	PL1110-6160

Calibration curves

Calibrant: Polystyrene
 Mobile Phase: THF
 Flow Rate: 1.0 mL/min



PLgel Preparative Columns

- Excellent column efficiency provides optimum resolution
- High loading can isolate mg amounts for further study
- Over 10 times scale up permits efficient quantification

Preparative GPC is generally employed to fractionate polymers, isolate components in a polymer formulation or simplify mixtures of relatively small molecules in complex matrices. Mixtures of materials are easily separated on the basis of size, preferably in a low boiling organic solvent. They are then collected as a series of discrete fractions and isolated by simple evaporation of the solvent.

PLgel preparative columns are packed with the same rigid, high performance media as the analytical columns. The 10 μm particle provides high column efficiency ($> 25,000$ p/m) for optimum resolution and loading characteristics. PLgel 25 mm ID preparative columns offer over 10 times scale-up compared to the 7.5 mm analytical columns. The increased ID and column volume permit even higher loading. With low molecular weight materials, sample concentration can also be significantly increased, enabling production of milligram quantities of very pure material. The actual loading is ultimately controlled by the sample and its molecular weight.

PLgel Preparative Columns

Size (mm)	Particle Size (μm)	Pore Size (\AA)	Linear MW Operating Range (g/mol) (PS)	Part No.
25 x 300	10	50	up to 2,000	PL1210-6115
25 x 300	10	10	up to 4,000	PL1210-6120
25 x 300	10	500	500-30,000	PL1210-6125
25 x 300	10	10^3	500-60,000	PL1210-6130
25 x 300	10	10^4	10,000-600,000	PL1210-6140
25 x 300	10	10^5	60,000-2,000,000	PL1210-6150
25 x 300	10	10^6	600,000-10,000,000	PL1210-6160
MIXED-B 25 x 300	10		500-10,000,000	PL1210-6100
MIXED-D 25 x 300	10		200-400,000	PL1210-6104
Prep guard 25 x 25				PL1210-1120

Columns for Special GPC/SEC Applications

EnviroPrep

- High sample loading ensures effective trace analysis
- Simple clean-up procedure saves sample preparation costs
- Optimized particle size distribution provides high resolution

EnviroPrep columns permit a simple, one stage clean-up as part of a methodology to determine pesticides in many organic matrices. The higher molecular weight fractions such as lipids, polymers, natural resins and dispersed high molecular weight components are easily eliminated in the GPC analysis.

Preparative GPC for soil extract clean-up is described in EPA Method 3640A using 300 x 25 mm and 150 x 25 mm columns to give higher sample loading and fraction yields, which is particularly useful for low levels of pollutants. Low pore size EnviroPrep columns are ideal for this method. The columns have 10 μm particles with 100Å pore sizes for high resolution, with an exclusion limit of 4000 MW. The preparative columns offer good resolution and high loading through optimization of the particle size distribution.

EnviroPrep

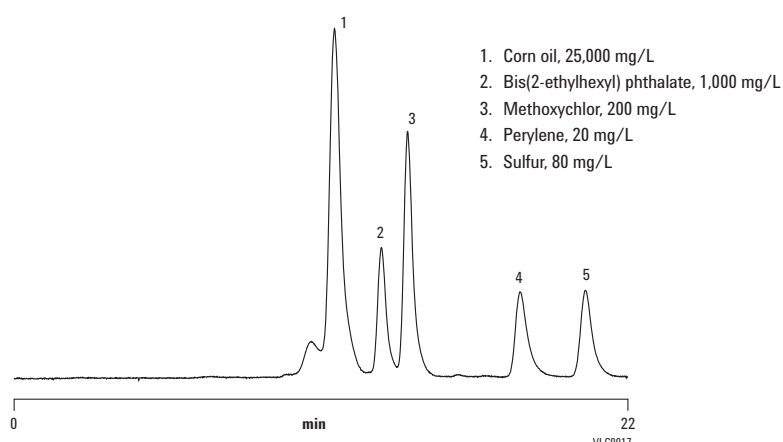
Size (mm)	Part No.
21.2 x 150	PL1E10-3120EPA
25 x 150	PL1210-3120EPA
21.2 x 300	PL1E10-6120EPA
25 x 300	PL1210-6120EPA

Columns for sample clean-up

Column: EnviroPrep
PL1210-6120EPA
25 x 300

Column: PL1210-3120EPA
25 x 150

Mobile Phase: DCM
Flow Rate: 10 mL/min
Detector: UV, 254 nm



PLgel Olexis

- Optimized design for polyolefin analysis
- High temperature capability
- High resolution with no damage from sample shear provides clean separations

PLgel Olexis is designed for the analysis of very high molecular weight polymers, specifically polyolefins. The column resolves up to 100,000,000 g/mol (polystyrene in THF), and is packed with 13 μm particles to optimize efficiency and resolution without the risk of sample shear degradation during analysis. The packing of PLgel Olexis has the mechanical stability and robustness expected from a PLgel column, and so it is able to operate up to 220°C for the analysis of highly crystalline materials.

PLgel Olexis

Description	Size (mm)	Part No.
PLgel Olexis	7.5 x 300	PL1110-6400
PLgel Olexis guard	7.5 x 50	PL1110-1400

PLgel Olexis reveals true modalities across the range of polyolefins

Column: 3 x PLgel Olexis, 7.5 x 300 mm
PL1110-6400

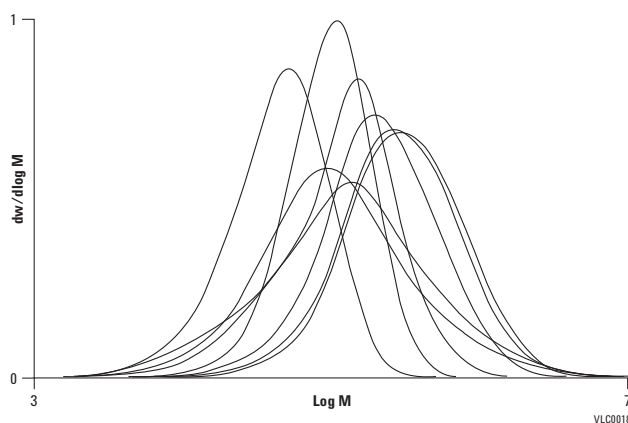
Mobile Phase: Trichlorobenzene + 0.0125% BHT

Flow Rate: 1.0 mL/min

Injection Volume: 200 μL

Temperature: 160°C

Detector: PL-GPC 220 (RI)



PL HFIPgel

- Optimized separation range delivers high performance with no artifacts
- Highly durable packing prolongs column lifetime
- Low operating pressure reduces system wear and unnecessary downtimes

Hexafluoroisopropanol (HFIP) is used as a solvent in GPC for the analysis of important industrial polymers such as polyesters, polyamides and polylactide/glycolide copolymers. For greatly improved performance in extremely polar solvents such as HFIP and trifluoroethanol, we have developed novel "multipore" technology to produce PL HFIPgel, a PS/DVB packing featuring a monodisperse particle size, high pore volume and high resolution.

Using PL HFIPgel avoids issues associated with conventional packing and HFIP, such as excessive curvature of calibration curves, dislocations/shoulders on peaks for polydisperse samples and poor resolution in the low MW region.

Column efficiency is guaranteed > 30,000 p/m and the columns are very durable, with a maximum operating pressure of 145 bar (2030 psi). They are packed and tested in methanol but shipped ready-to-use in HFIP.

PL HFIPgel columns with 7.5 mm ID normally operate at 1 mL/min. However, the 4.6 mm ID columns run at 0.3 mL/min, providing a 70% reduction in solvent consumption with consequent savings in the cost of buying and disposing of solvents.

PL HFIPgel

Description	Size (mm)	Part No.
PL HFIPgel	4.6 x 250	PL1514-5900HFIP
PL HFIPgel	7.5 x 300	PL1114-6900HFIP
PL HFIPgel guard	7.5 x 50	PL1114-1900HFIP
PL HFIPgel guard	4.6 x 50	PL1514-1900HFIP

Polyamides

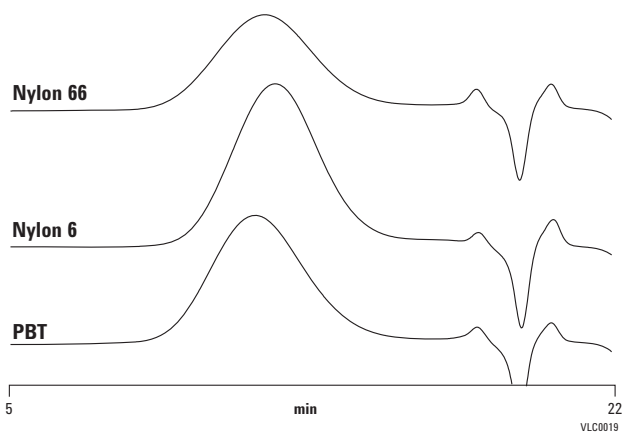
Column: 2 x PL HFIPgel, 7.5 x 300 mm
PL1110-6400

Mobile Phase: HFIP + 20mM NaTFAc

Flow Rate: 1.0 mL/min

Temperature: 40°C

Detector: PL-GPC 50 Plus (RI)



PL Rapide

- Analysis in less than ten minutes saves time
- Significantly increased sample throughput improves efficiency
- Reduced solvent consumption and disposal costs save money
- Available in L, M and H versions for low, medium and high molecular weights; available in F version for flow injection analysis

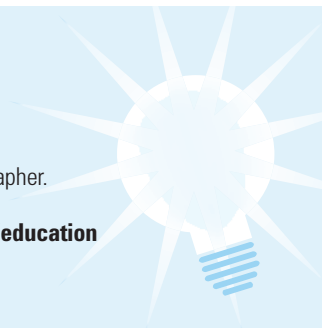
Rapid GPC is an excellent tool for screening polymer MWD for trend analysis. Short PL Rapide columns reduce analysis times while maintaining the excellent solvent compatibility and mechanical stability of all GPC columns from Agilent.

PL Rapide columns are ideal for high speed applications such as high throughput screening, process monitoring, or tracking changes in MW distributions, where time is the most critical factor in the analysis. Packed with high quality gels, these columns cover the complete spectrum of molecular weights and are available for the analysis of both organic and water soluble polymers. Key features include high pore volume and high resolution packing materials, no special system requirements, choice of molecular weight resolving range, wide solvent compatibility, and excellent mechanical stability.

Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatographer.

For more information, visit www.agilent.com/chem/education

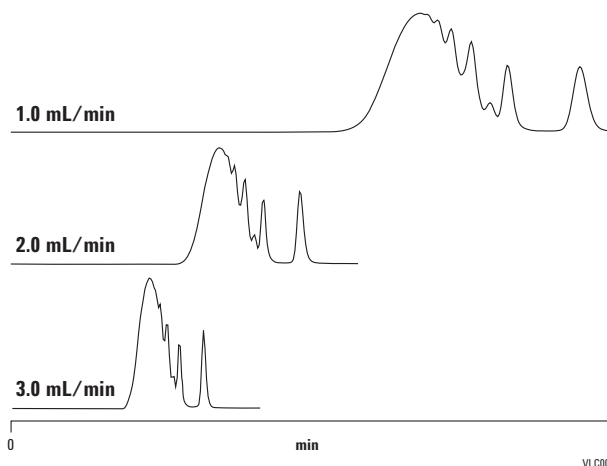


PL Rapide

Description	Size (mm)	MW Range (g/mol)	Guaranteed Efficiency (p/m)	Part No.
PL Rapide H	7.5 x 150 10 x 100	500-10,000,000	> 35,000	PL1113-3100 PL1013-2100
PL Rapide M	7.5 x 150 10 x 100	200-2,000,000	> 60,000	PL1113-3500 PL1013-2500
PL Rapide L	7.5 x 150 10 x 100	200-400,000	> 80,000	PL1113-3300 PL1013-2300
PL Rapide F	7.5 x 150 10 x 100	up to 4,500 up to 4,000	> 55,000 > 40,000	PL1113-3120 PL1013-2120
PL Rapide Aqua H	7.5 x 150 10 x 100	100-10,000,000	> 35,000	PL1149-3800 PL1049-2800
PL Rapide Aqua L	7.5 x 150 10 x 100	100-30,000	> 35,000	PL1120-3830 PL1020-2830

Resin analysis by rapid GPC

Column: PL Rapide L
 PL1013-2300
 10 x 100 mm
Sample: Epoxy resin
Mobile Phase: THF
Flow Rate: 1.0, 2.0 and 3.0 mL/min
Detector: UV, 254 nm



PolarGel

- Medium polarity surface and high mechanical stability
- Operate in a wide range of solvents and solvent combinations
- Available in two resolving ranges, PolarGel-L and PolarGel-M

The PolarGel range is ideal for use with polar solvents, such as dimethyl formamide (DMF) and dimethyl sulfoxide (DMSO), and for solvent combinations such as tetrahydrofuran with water. These eluents are very useful in GPC/SEC to separate polar materials, such as polar resins, modified polysaccharides or complex polar polymers that are difficult to analyze in traditional SEC solvents, such as tetrahydrofuran alone. PolarGel-L is used for low molecular weight polar polymers and PolarGel-M for high MW polar polymers.

With polar polymers, highly polar groups can lead to non-specific interactions and secondary separation mechanisms when using polar solvents and traditional non-polar styrene/divinylbenzene columns. Additives and/or column conditioning are normally required to reduce these interactions. PolarGel has no need for these interventions, and also avoids the interactions and secondary effects that produce chromatogram distortions.

These PolarGel "mixed bed" columns have a medium polarity surface and high mechanical stability. They are capable of operating in a wide range of solvents and solvent combinations, greatly enhancing your ability to analyze polar polymers that are not necessarily water soluble. PolarGel is available in two resolving ranges to meet your precise requirements.

PolarGel

Description	Size (mm)	Part No.
PolarGel-L	7.5 x 300	PL1117-6830
PolarGel-L guard	7.5 x 50	PL1117-1830
PolarGel-L repair gel		PL1417-0830
PolarGel-M	7.5 x 300	PL1117-6800
PolarGel-M guard	7.5 x 50	PL1117-1800
PolarGel-M repair gel		PL1417-0800

Two samples of melamine resin analyzed by PolarGel-L

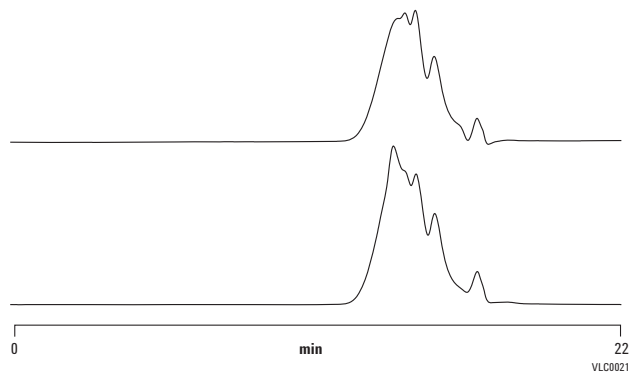
Column: 2 x PolarGel-L, 300 x 7.5 mm
PL1117-6830

Mobile Phase: Dimethylacetamide + 0.1% LiBr

Flow Rate: 1.0 mL/min

Injection Volume: 100 µL

Detector: Agilent PL-GPC 220 (RI)



Excellent separation of two phenol formaldehyde resins with PolarGel-M

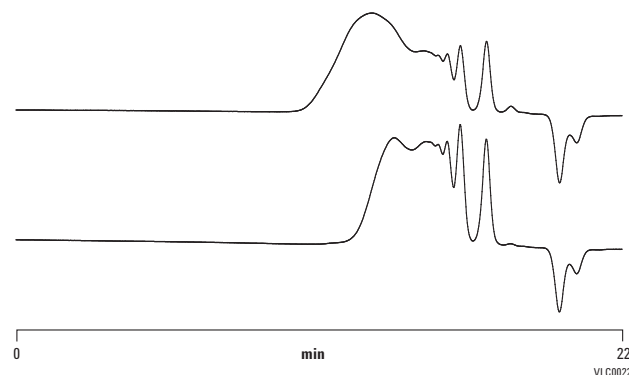
Column: 2 x PolarGel-M, 300 x 7.5 mm
PL1117-6800

Mobile Phase: 0.2% (w/v) DMF & 0.1% LiBr to reduce sample aggregation

Flow Rate: 1.0 mL/min

Injection Volume: 100 µL

Detector: Agilent PL-GPC 50 (RI)

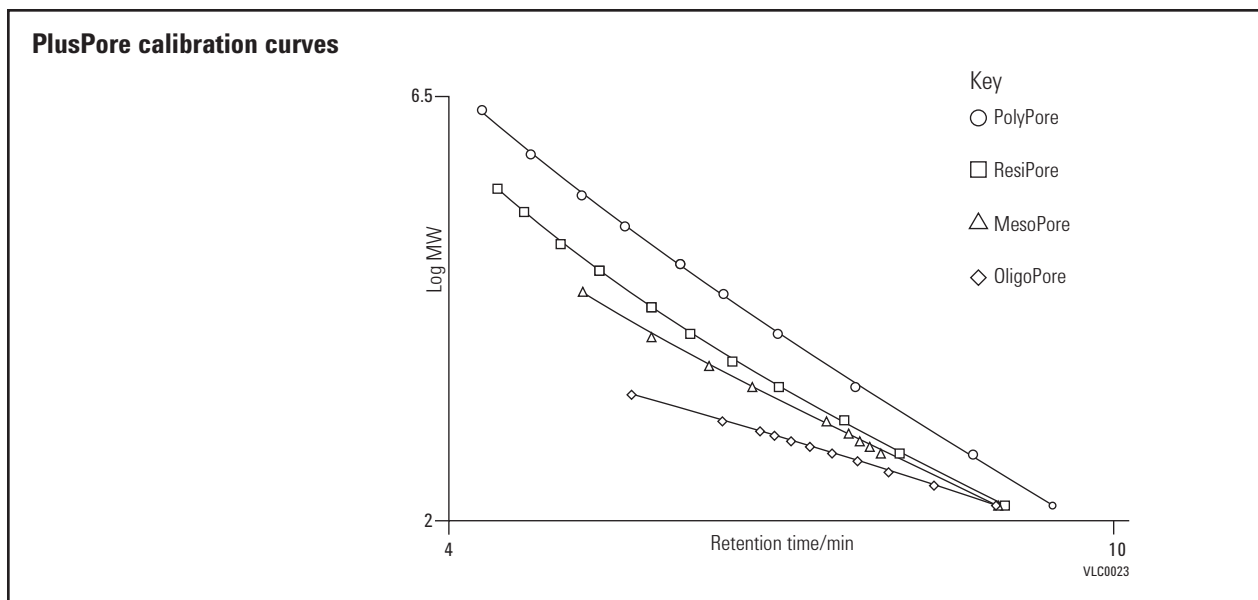


PlusPore

The PlusPore range has an increased pore volume that provides high resolution for specific applications. The high stability media permits the use of a wide range of organic solvents with accuracy and precision so that there is no distortion of the MW distribution shape.

The PlusPore series of columns has been specifically designed for high resolution GPC, and represents the very latest in GPC column technology. These novel packing materials are based on the industry standard, highly cross-linked polystyrene/divinylbenzene (PS/DVB), for the widest applicability and solvent compatibility. Each is made using a novel polymerization process to produce particles that exhibit a specific, controlled pore structure for optimum GPC performance. Typical applications include resins, condensation polymers, prepolymers, and oligomers.

For high resolution polymer analysis, the PolyPore, ResiPore, MesoPore and OligoPore columns of the PlusPore product series exhibit a wide pore size distribution with near linear calibration curves covering an extended molecular weight range. These so-called "multipore" structures have increased pore volume compared to regular PS/DVB packing materials. This results in very high resolution GPC columns designed for specific application areas. The highly cross-linked porous particles provide excellent chemical and physical stability and permit easy transfer across the full range of organic solvents with little change in the shape of the calibration curve or the efficiency of the columns. As this multipore column technology does not require the combination of individual pore size packing materials, the result is high accuracy and precision without any artifacts in the shape of the molecular weight distribution.



PlusPore Selection Guide

Column	MW Range (g/mol) (PS)	Nominal Particle Size (µm)	Typical Efficiency (p/m)	Recommended Calibrants	Frit Porosity (µm)
PolyPore	200-2,000,000	5	> 60,000	EasiCal PS-1 or EasiVial PS-H	2
ResiPore	200-400,000	3	> 80,000	EasiCal PS-2 or EasiVial PS-M	2
MesoPore	up to 25,000	3	> 80,000	Polystyrene S-L-10 Kit	2
OligoPore	up to 4,500	6	> 55,000	Polystyrene S-L2-10 Kit	2

PolyPore

- Routine polymer analysis with very high resolution
- Wide operating range simplifies column choice
- Low particle size extracts maximum information from the analyte

PolyPore columns have been specifically developed to give unrivaled resolution for the analysis of polymers with broad molecular weight distributions. With a wide operating range covering many decades of molecular weight, PolyPore columns combine a low 5 μm particle size with extremely high pore volume to give the highest possible resolution, ensuring the most detailed information possible from your analysis.

PolyPore

Description	Size (mm)	Part No.
PolyPore	7.5 x 300	PL1113-6500
PolyPore guard	7.5 x 50	PL1113-1500

Tips & Tools

More information is a click away. We have a variety of educational primers, application notes, maintenance guides, and literature available from Agilent for free.

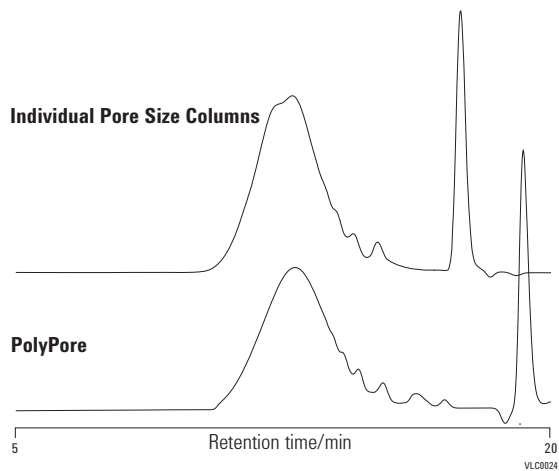
To learn more, visit www.agilent.com/chem/OnlineLibrary



Comparison of PolyPore with conventional individual pore size GPC columns

Column: 2 x PolyPore, 300 x 7.5 mm
PL1113-6500

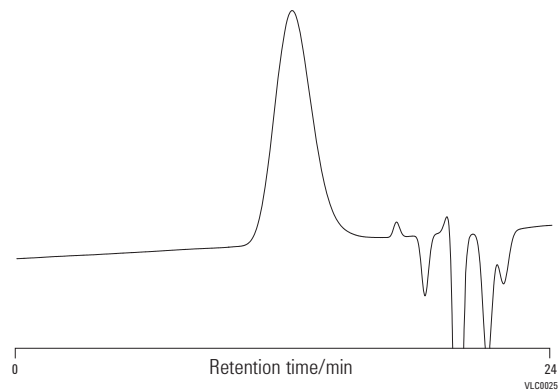
Sample: High MW Resin
Mobile Phase: THF
Flow Rate: 1.0 mL/min
Injection Volume: 100 µL
Detector: Agilent PL-GPC 50 (RI)



Polymethylmethacrylate in DMF

Column: 2 x PolyPore, 7.5 x 300 mm
PL1113-6500

Sample: Commercial PMMA
Mobile Phase: DMF + 0.1% LiBr
Flow Rate: 1.0 mL/min
Temperature: 80°C
Injection Volume: 100 µL
Detector: Agilent PL-GPC 50 (RI)



ResiPore

- Efficient separation of complex molecular weight distributions
- Reveals oligomer content to provide a true representation of the sample
- High pore volume extracts maximum information from the analyte

ResiPore columns are the ideal choice for the analysis of resins and condensation polymers with complex molecular weight distributions that include oligomer content. By combining a low 3 μm particle size and high pore volume, high efficiency ResiPore columns offer maximum resolution of these intermediate molecular weight polymers.

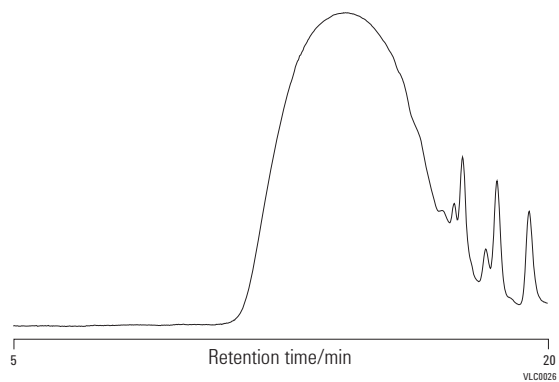
ResiPore

Description	Size (mm)	Part No.
ResiPore	7.5 x 300	PL1113-6300
ResiPore guard	7.5 x 50	PL1113-1300

Alkyd resin

Column: 2 x ResiPore, 7.5 x 300 mm
PL1113-6500

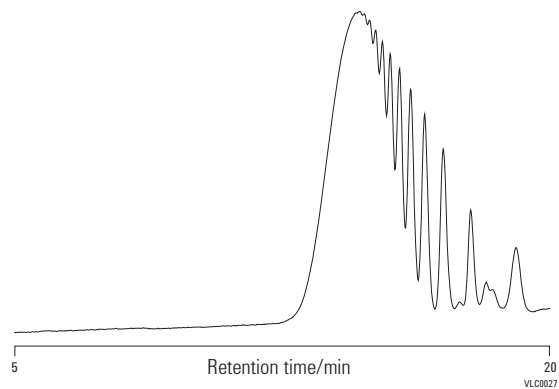
Mobile Phase: THF
Flow Rate: 1.0 mL/min
Injection Volume: 20 μ L
Detector: UV, 254 nm



Polyester

Column: 2 x ResiPore, 7.5 x 300 mm
PL1113-6500

Mobile Phase: THF
Flow Rate: 1.0 mL/min
Injection Volume: 20 μ L
Detector: UV, 254 nm



MesoPore

- Full solvent compatibility with no detrimental effect on efficiency
- Low particle size extracts maximum information from the analyte
- No MWD dislocations so the distribution is an accurate representation of the sample

MesoPore columns have been specifically designed to provide optimum results in the analysis of prepolymers, i.e. polymeric materials with a large oligomeric component. By combining a 3 μm particle size with high pore volume, MesoPore columns give the highest resolution separations for the analysis of low molecular weight polymers, such as prepolymers, resins, polyols and siloxanes.

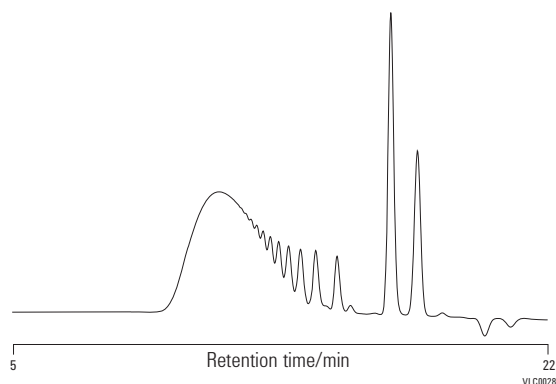
MesoPore

Description	Size (mm)	Part No.
MesoPore	7.5 x 300	PL1113-6325
MesoPore guard	7.5 x 50	PL1113-1325

Polyurethanes

Column: 2 x MesoPore, 7.5 x 300 mm
PL1113-6500

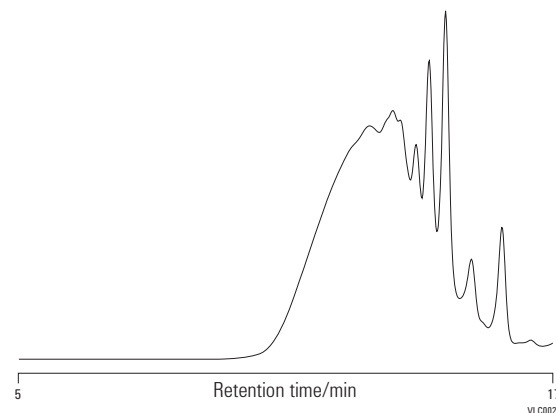
Mobile Phase: THF
Flow Rate: 1.0 mL/min
Injection Volume: 20 μL
Detector: Agilent PL-GPC 50 (RI)



Polyesterimide

Column: 2 x MesoPore, 7.5 x 300 mm
PL1113-6500

Mobile Phase: THF
Flow Rate: 1.0 mL/min
Injection Volume: 20 μL
Detector: Agilent PL-GPC 50 (RI)



OligoPore

- Near linear calibration curve for best accuracy and precision
- Very stable media allows for a wide choice of solvents
- Isolation of individual fractions reveals more information from whole samples

OligoPore columns have been developed from an innovative new media that exhibits significantly increased pore volumes compared to conventional low pore size GPC columns. The outcome is higher resolution in the oligomeric region. The 300 x 25 mm preparative column offers high resolution at greatly increased loading for effective isolation of individual components. Oligomer fractions collected from the OligoPore preparative column can then be re-injected on analytical columns to check for the purity of the fractions and for comparison with the whole sample.

OligoPore

Description	Size (mm)	Part No.
OligoPore	25 x 300	PL1213-6520
OligoPore	7.5 x 300	PL1113-6520
OligoPore guard	7.5 x 50	PL1113-1320

Tips & Tools

Don't forget, we have special offers throughout the year.

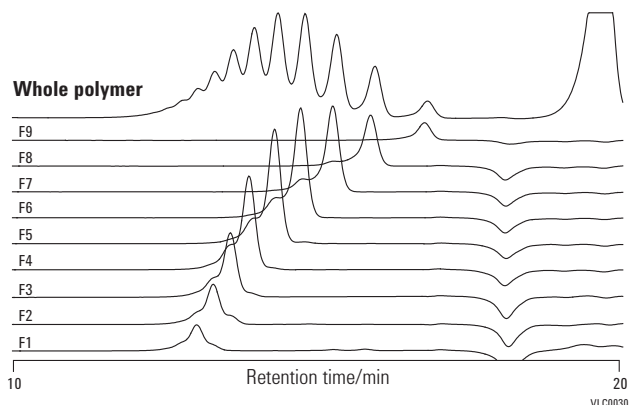
To learn more, visit www.agilent.com/chem/specialoffers



Analysis of low molecular weight polystyrene and oligomer fractions collected from OligoPore preparative columns

Column: 2 x OligoPore, 7.5 x 300 mm
PL1113-6500

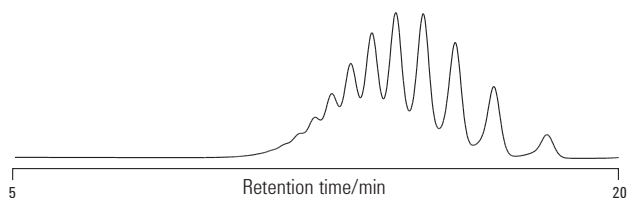
Mobile Phase: THF
Flow Rate: 1.0 mL/min
Detector: UV



Analytical separation of low molecular weight polystyrene

Column: 2 x OligoPore, 7.5 x 300 mm
PL1113-6500

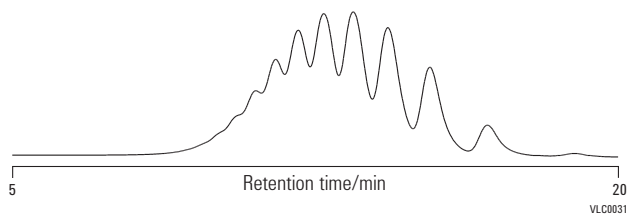
Mobile Phase: THF
Flow Rate: 1.0 mL/min
Loading: 0.2%, 100 mL
Detector: UV



Preparative separation of low molecular weight polystyrene

Column: 2 x OligoPore, 25 x 300 mm
PL1113-6500

Mobile Phase: THF
Flow Rate: 10.0 mL/min
Loading: 2.0%, 2 mL
Detector: UV



Aqueous SEC of Polymers

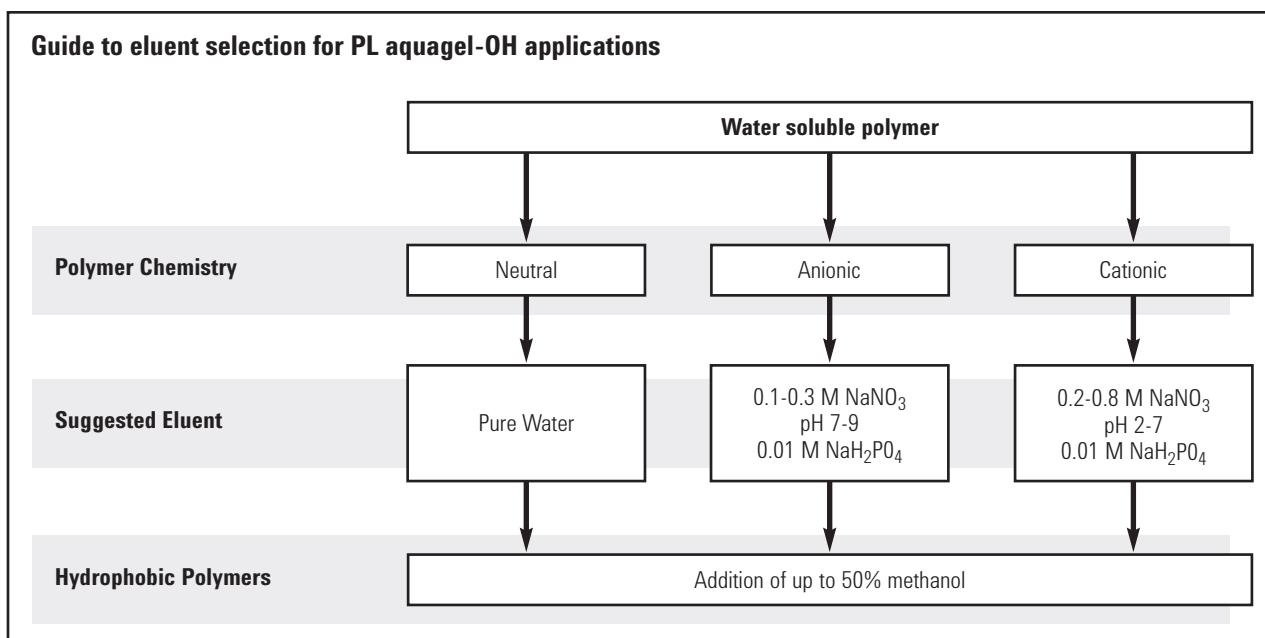
PL aquagel-OH SEC

Aqueous size exclusion chromatography (SEC) is widely used for the determination of molecular weight distributions of a variety of synthetic and naturally occurring water-soluble polymers, and separations of oligomers and small molecules. The requirement to eliminate ionic and hydrophobic effects makes aqueous SEC very demanding.

The PL aquagel-OH series provides a chemically and physically stable matrix for reliable aqueous SEC separations. The columns are packed with macroporous copolymer beads with an extremely hydrophilic polyhydroxyl functionality. The "neutral" surface and the capability to operate across a wide range of eluent conditions provide for high performance analyses of compounds with neutral, ionic and hydrophobic moieties, alone or in combination. PL aquagel-OH is available for analytical and preparative applications.

Optimizing Conditions for Aqueous SEC with PL aquagel-OH Columns

Due to the complex nature of water-soluble polymers, it is often necessary to modify the eluent in order to avoid sample-to-sample and sample-to-column interactions which can result in poor aqueous SEC separations. The excellent stability of the PL aquagel-OH packing material allows the eluent to be tailored to suit the polymer, while retaining the high column efficiency. For ionic interactions, the eluent can be modified by the addition of salt and/or the adjustment of pH. For water soluble polymers with a hydrophobic character, only the addition of a weak organic solvent (methanol) is required to inhibit hydrophobic interactions.

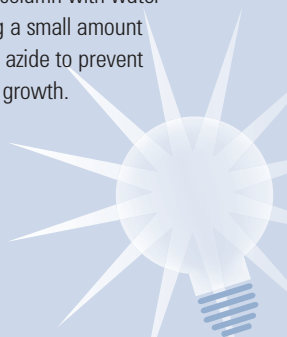


PL aquagel-OH Column Selection Guide

Sample Type	Typical Applications	Recommended Column Sets
Low MW polymers and oligomers	Surfactants, oligosaccharides, PEGs, lignosulfonates, polyacrylates	2 or 3 30, 20 PL aquagel-OH 8 µm, or PL aquagel-OH 20 5 µm, or PL aquagel-OH MIXED-M 8 µm
Polydisperse synthetic or naturally occurring polymers	Polysaccharides, PVA, cellulose derivatives, PEO, polyacrylic acid	2 or 3 PL aquagel-OH MIXED-H 8 µm, or PL aquagel-OH 60/50/40 8 µm
Very high MW polymers	Polyacrylamides, hyaluronic acids, CMC, starches, gums	PL aquagel-OH 60/50/40 15 µm in series

Tips & Tools

Buffers in a stored column may crystallize and cause damage. Flush the column with water containing a small amount of sodium azide to prevent biological growth.



PL aquagel-OH Analytical

- Highly stable matrix ensures reliable separations, even with modified eluents
- MIXED columns cover a wide range of molecular weights, simplifying column selection
- Highly versatile for neutral, polar, anionic and cationic samples

The PL aquagel-OH analytical series has a pH range of 2-10, compatibility with organic solvent (up to 50% methanol), mechanical stability up to 140 bar (2030 psi) and low column operating pressures.

PL aquagel-OH Analytical

Description	Size (mm)	MW Range (g/mol) (PEG/PEO)	Guaranteed Efficiency (p/m)	Part No.
PL aquagel-OH 20 5 µm	7.5 x 300	100-20,000	> 55,000	PL1120-6520
PL aquagel-OH 20 8 µm	7.5 x 300	100-20,000	> 35,000	PL1149-6820
PL aquagel-OH 30 8 µm	7.5 x 300	100-30,000	> 35,000	PL1120-6830
PL aquagel-OH 40 8 µm	7.5 x 300	10,000-200,000	> 35,000	PL1149-6840
PL aquagel-OH 40 15 µm	7.5 x 300	10,000-200,000	> 15,000	PL1149-6240
PL aquagel-OH 50 8 µm	7.5 x 300	50,000-1,000,000	> 35,000	PL1149-6850
PL aquagel-OH 50 15 µm	7.5 x 300	50,000-1,000,000	> 15,000	PL1149-6250
PL aquagel-OH 60 8 µm	7.5 x 300	200,000 - > 10,000,000	> 35,000	PL1149-6860
PL aquagel-OH 60 15 µm	7.5 x 300	200,000 - > 10,000,000	> 15,000	PL1149-6260
PL aquagel-OH MIXED-H 8 µm	7.5 x 300	100-10,000,000	> 35,000	PL1149-6800
PL aquagel-OH MIXED-M 8 µm	7.5 x 300	100-10,000,000	> 35,000	PL1149-6801
PL aquagel-OH 10 µm guard	25 x 25			PL1249-1120
PL aquagel-OH 5 µm guard	7.5 x 50			PL1149-1530
PL aquagel-OH 8 µm guard	7.5 x 50			PL1149-1840

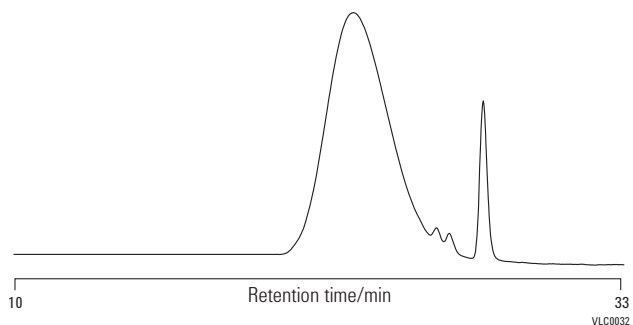
Polyvinyl alcohol

Column: 3 x PL aquagel-OH MIXED
 PL1149-6800
 7.5 x 300 mm, 8 µm

Mobile Phase: 0.2 M NaNO₃, 0.01 M NaH₂PO₄, pH 7

Flow Rate: 1.0 mL/min

Detector: Agilent PL-GPC 50 (RI)



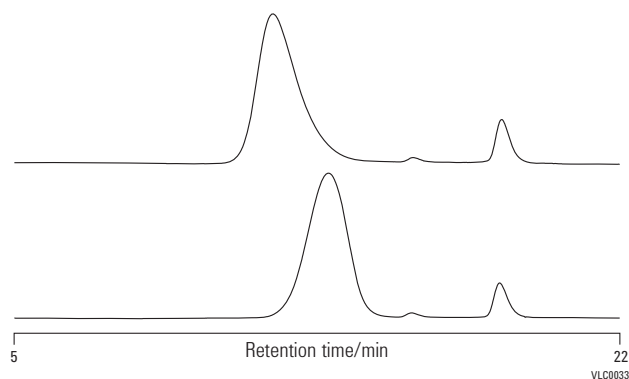
Heparin

Column: 2 x PL aquagel-OH 30
 PL1120-6830
 7.5 x 300 mm, 8 µm

Mobile Phase: 0.2 M NaNO₃, 0.01 M NaH₂PO₄, pH 7

Flow Rate: 1.0 mL/min

Detector: Agilent PL-GPC 50 (RI)



Hyaluronic acid

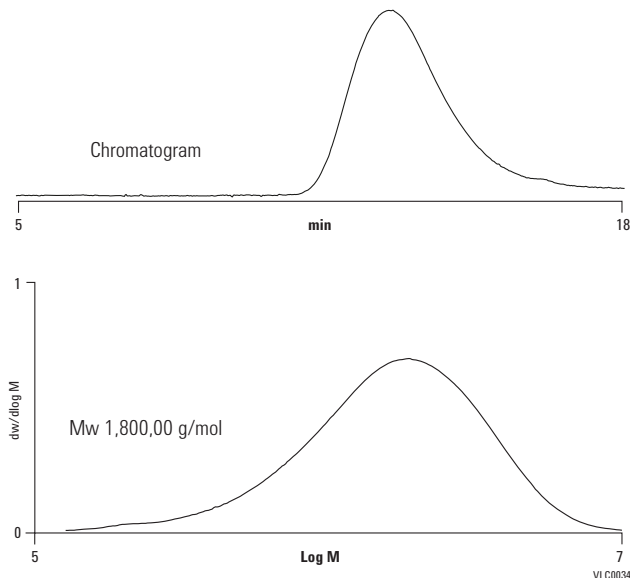
Column: PL aquagel-OH 60 15 μ m
PL1149-6260
7.5 x 300 mm, 15 μ m

Column: PL aquagel-OH 40 15 μ m
PL1149-6240
7.5 x 300 mm, 15 μ m

Mobile Phase: 0.2 M NaNO₃, 0.01 M NaH₂PO₄, pH 7

Flow Rate: 1.0 mL/min

Detector: Agilent PL-GPC 50 (RI)



Differences in composition of two alkyl naphthalene sulfonates

Column: 2 x PL aquagel-OH 20
PL1120-6520
7.5 x 300 mm, 5 μ m

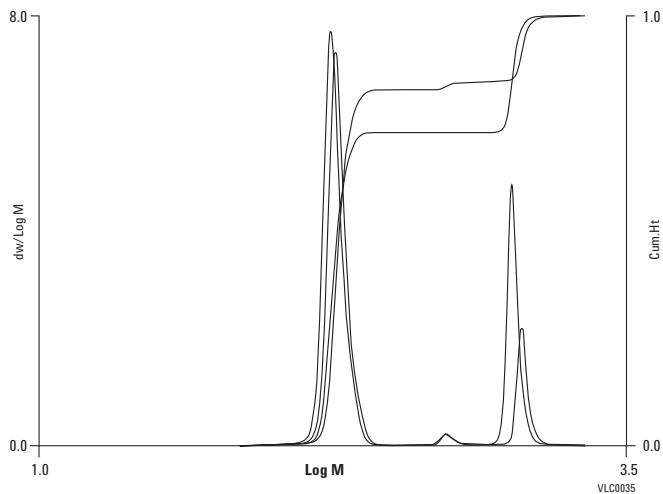
Mobile Phase: 0.25 M ammonium formate in water

Flow Rate: 1.0 mL/min

Injection Volume: 20 μ L

Software: Cirrus GPC module for Galaxie CDS

Detector: ELS (neb=30°C, evap=30°C, gas=1.4 SLM)



PL aquagel-OH Preparative

- Up to 10 times scale-up maximizes yield
- High loading maximizes sample throughput
- Carefully chosen particle size provides optimum resolution

Preparative SEC is used for the fractionation of a wide variety of water-soluble samples based on their size in solution. The technique is applied to the fractionation of disperse polymers or to isolate components in a polymer formulation.

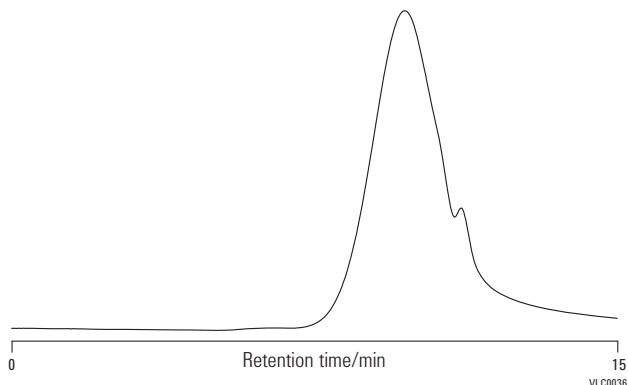
Preparative PL aquagel-OH columns and associated guard columns enable rapid and convenient scale-up from analytical separations. The 25 mm ID prep column offers at least a 10 times scale-up in loading from the 7.5 mm ID analytical columns. Typically, a 10 mL/min flow rate results in a separation time of ten minutes with a 300 mm column. The columns are packed with the same robust macroporous particles as the analytical column range. The 8 μm particle size provides optimum resolution and loading characteristics with column efficiency > 20,000 plates/m.

PL aquagel-OH Preparative

Description	Size (mm)	MW Range (g/mol) (PEG/PEO)	Part No.
PL aquagel-OH 30 8 μm	25 x 300	100-30,000	PL1220-6130
PL aquagel-OH 40 8 μm	25 x 300	10,000-200,000	PL1249-6140
PL aquagel-OH 50 8 μm	25 x 300	50,000-1,000,000	PL1249-6150
PL aquagel-OH MIXED 8 μm	25 x 300	100-10,000,000	PL1249-6100
PL aquagel-OH 10 μm guard	25 x 25		PL1249-1120

Polyvinyl alcohol

Column: PL aquagel-OH 40 8 µm
 PL1249-6140
 25 x 300 mm, 8 µm
Mobile Phase: 0.2 M NaNO₃, 0.01 M NaH₂PO₄, pH 7
Flow Rate: 10.0 mL/min
Loading: 10 mg/mL, 2 mL
Detector: Agilent PL-GPC 50 (RI)



GPC Column Accessories

Description	Unit	Part No.
Frit removal tool for threaded columns only	1/pk	PL1310-0001
2 µm frit kit for threaded columns, 7.5 mm ID	5/pk	PL1310-0002
5 µm frit kit for threaded columns, 7.5 mm ID	5/pk	PL1310-0012
10 µm frit kit for threaded columns, 7.5 mm ID	5/pk	PL1310-0036
PLgel column repair gel, 10 µm	1/pk	PL1410-0101
PLgel column repair gel, 5 µm	1/pk	PL1410-0501
Column connecting nuts, 1/16 in. tube	5/pk	PL1310-0007
Tubing ferrules, 1/16 in. tube	5/pk	PL1310-0008
Connecting tubing, 10 cm length, 0.01 in. ID	10/pk	PL1310-0048
LDV intercolumn stainless steel connector	1/pk	PL1310-0005

Polymer Standards for GPC/SEC

Polymer standards from Agilent are the ideal reference materials for generating accurate, reliable GPC/SEC column calibrations, with the assurance of the ISO 9001:2000 quality standard. Additional applications for our highly characterized homopolymers and copolymers exhibiting unique characteristics are as model polymers for research and analytical method development.

Agilent manufactures the highest quality polymer standards with extremely narrow polydispersity and the widest molecular weight range commercially available. These quality polymer standards are supplied with extensive characterization data utilizing a variety of independent techniques (e.g. light scattering and viscometry) and high performance GPC to verify polydispersity and assign that all important peak molecular weight (Mp).

Our comprehensive range of EasiVial, EasiCal and traditional calibration kits has been specifically designed to cover all molecular weight ranges for organic and aqueous GPC/SEC applications. We provide you with the widest choice to maximize your specific characterization needs. In addition, we supply other polymers as individual molecular weights, and broad distribution polymers for system validation or broad standard calibration procedures.

Calibration Kits

Agilent offers a wide range of polymer standards kits for conventional GPC/SEC column calibration or for calibrating light scattering and viscometry detectors. The kits are in boxed sets of ten different polymer standards covering a particular molecular weight range, to be used with organic and aqueous, medium polarity and polar solvents. Every individual polymer has its own Certificate of Analysis of the analytical conditions and values, such as M_p needed for constructing a calibration plot. The polymers are chosen to give equidistant calibration points on a logarithmic MW scale, providing a more uniform calibration curve.

Individual Polymer Molecular Weights

We design our individual standards to have the narrowest molecular weight distribution commercially available. Additionally, they cover the widest molecular weight range, from 162-15 million MW. The current polystyrene nominal molecular weight of 15 million MW has a polydispersity ≤ 1.10 . These standards are generally available in 1, 5 and 10 g quantities, and each comes with its own Certificate of Analysis detailing analysis conditions and relevant data.

GPC/SEC Standards Selection Guide

Polymer Type	Individual Calibration		EasiCal	EasiVial	Type of GPC/SEC
	MW	Kits			
Polystyrene	◆	◆	◆	◆	Organic
Polymethylmethacrylate	◆	◆		◆	Organic
Polyethylene	◆	◆			Organic
Polyethylene glycol (PEG)	◆	◆		◆	Organic/Aqueous
Polyethylene oxide (PEO)	◆	◆		◆	Organic/Aqueous
Pullulan polysaccharide	◆	◆			Organic/Aqueous
Polyacrylic acid Na salt	◆	◆			Aqueous

EasiVial

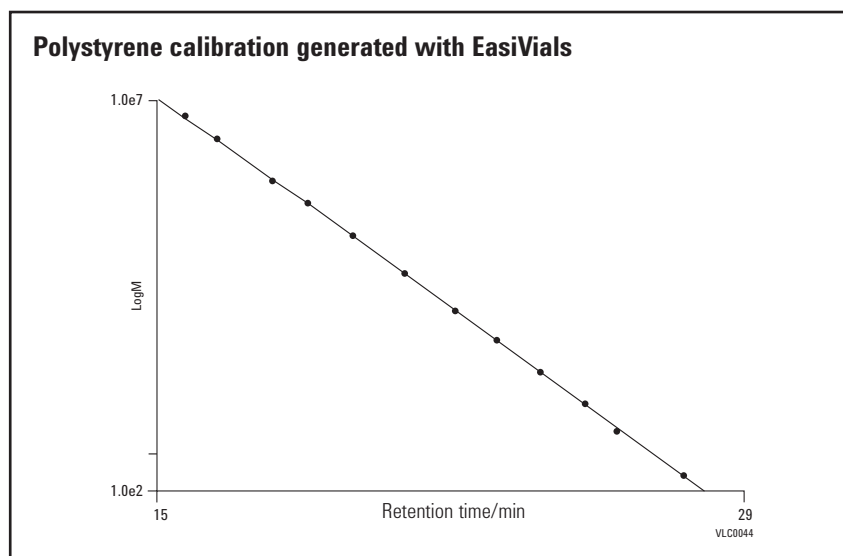
- Eliminates tedious weighing procedures to improve calibration accuracy
- Reduces solvent dispensing to limit risks associated with handling solvents
- For conventional and multi-detector GPC to maximize applicability

For organic and aqueous GPC/SEC column calibration, this premier product is the quickest and most convenient method to deliver an accurate 12-point column calibration.

The key to achieving baseline separation from polymer mixtures, therefore eliminating doubt and errors, is in selecting only the narrowest polydispersity polymers. This is where Agilent polymer standards excel and deliver, as shown in the chromatograms.

The EasiVial standards kit is a pre-prepared, time saving product for rapid and reliable GPC column calibration. EasiVial kits contain three vials, each with a mixture of four accurately pre-weighed polymer standards, providing a 12-point GPC calibration in just three injections. The mass of each polymer in the vial is accurately known, so that upon addition of a fixed volume of eluent, the solution is prepared at a precise concentration. EasiVial is ideal for both conventional and multi-detector GPC calibration. Simply prepare and manually inject, or transfer to autosampler vials, or place directly into a compatible autosampler.

Every EasiVial kit contains 30 vials (ten of each type) that are color-coded for easy identification and are available in 4 or 2 mL vials making them suitable for most autosamplers. The kits are available for polystyrene (PS), polymethylmethacrylate (PMMA), polyethylene glycol/oxide (PEG/PEO) and polyethylene glycol (PEG). For added value, a Tri-Pack (90 vials) is offered, extending reproducibility.



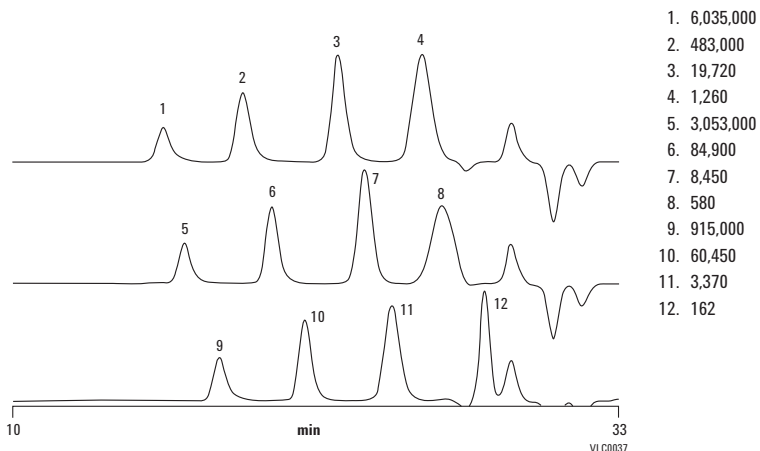
EasiVial Pre-weighed Calibration Kits

Description	Range of Nominal Mp (g/mol)	Vial Volume (mL)	Unit	Part No.
EasiVial PEG/PEO	100-1,200,000	2	30/pk	PL2080-0201
EasiVial PEG/PEO	100-1,200,000	4	30/pk	PL2080-0200
EasiVial PEG	106-35,000	2	30/pk	PL2070-0201
EasiVial PEG	106-35,000	4	30/pk	PL2070-0200
EasiVial PM	600-2,000,000	2	30/pk	PL2020-0201
EasiVial PM	600-2,000,000	4	30/pk	PL2020-0200
EasiVial PS-H	162-6,000,000	2	30/pk	PL2010-0201
EasiVial PS-H	162-6,000,000	4	30/pk	PL2010-0200
EasiVial PS-M	162-400,000	2	30/pk	PL2010-0301
EasiVial PS-M	162-400,000	4	30/pk	PL2010-0300
EasiVial PS-L	162-40,000	2	30/pk	PL2010-0401
EasiVial PS-L	162-40,000	4	30/pk	PL2010-0400
PEG/PEO Tri-Pack		2	90/pk	PL2080-0202
PEG/PEO Tri-Pack		4	90/pk	PL2080-0203
PEG Tri-Pack		2	90/pk	PL2070-0202
PEG Tri-Pack		4	90/pk	PL2070-0203
PMMA Tri-Pack		2	90/pk	PL2020-0202
PMMA Tri-Pack		4	90/pk	PL2020-0203
PS-H Tri-Pack		2	90/pk	PL2010-0202
PS-H Tri-Pack		4	90/pk	PL2010-0203
PS-L Tri-Pack		3	90/pk	PL2010-0402
PS-L Tri-Pack		4	90/pk	PL2010-0403

EasiVial PS-H

Column: 3 x PLgel MIXED-B, 10 µm
 PL1110-6100
 7.5 x 300 mm, 10 µm

Mobile Phase: THF
 Flow Rate: 1.0 mL/min
 Temperature: 40°C
 Detector: PL-GPC 220 (RI)



EasiCal

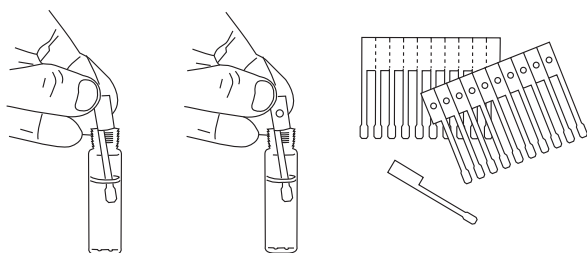
- Easy three-step process with no fuss
- Cost-effective format saves money
- Only two injections for improved productivity

The EasiCal system for organic solvents consists of two different combs, each with ten detachable spatulas, supporting a mixture of five polymer standards. The thin film of polymer (approximately 5 mg) on the tip of the PTFE spatulas rapidly dissolves when immersed in eluent to provide two GPC/SEC calibration solutions. A single pack provides ten spatulas of each type, with MWs selected to provide equidistant calibration points for greater accuracy.

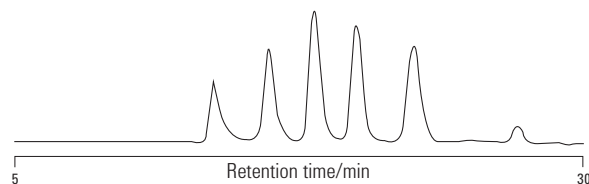
EasiCal Pre-prepared Polystyrene Kits

Description	Range of Nominal Mp (g/mol)	Unit	Part No.
Polystyrene PS-1	580-7,500,000	1/pk	PL2010-0501
		5/pk	PL2010-0505
Polystyrene PS-2	580-400,000	1/pk	PL2010-0601
		5/pk	PL2010-0605

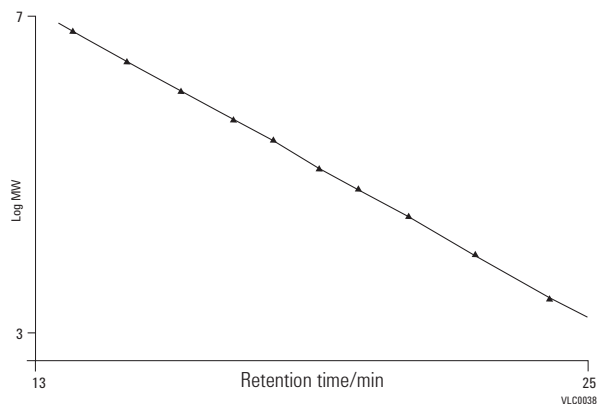
Column calibration for GPC/SEC is as easy as 1, 2, 3...



1. Place one spatula of each type into appropriate volume of solvent.



2. Chromatograph each solution; only two injections required



3. Generate a 10-point calibration

Polystyrene

- Compatible with most organic solvents
- Certificate of Analysis meets international protocols
- Calibration capability for virtually all applications

Polystyrene standards are the first choice for many organic solvents, either for conventional GPC column calibration or for calibrating light scattering and viscosity detectors. Our organic polymers cover a range from 162-15 million MW, with MWs selected to provide equidistant calibration points for greater accuracy. Every kit contains 0.5 g of ten different molecular weight standards.

Calibration Kits

Description	Range of Nominal Mp (g/mol)	Part No.
S-H-10, 10 x 0.5 g	300,000-15,000,000	PL2010-0103
S-H2-10, 10 x 0.5 g	1,000-15,000,000	PL2010-0104
S-M-10, 10 x 0.5 g	580-3,000,000	PL2010-0100
S-M2-10, 10 x 0.5 g	580-300,000	PL2010-0102
S-L-10, 10 x 0.5 g	162-20,000	PL2010-0101
S-L2-10, 10 x 0.5 g	162-4,500	PL2010-0105

Tips & Tools

More information is a click away. We have a variety of educational primers, application notes, maintenance guides, and literature available from Agilent for free.

To learn more, visit www.agilent.com/chem/OnlineLibrary



Individual Polymer Molecular Weights

Polymer Nominal Mp (g/mol)	Nominal Mw/Mn	1 g Part No.	5 g Part No.	10 g Part No.
162	1.00	PL2012-1001	PL2012-1005	PL2012-1010
370	1.11	PL2012-0001	PL2012-0005	PL2012-0010
580	1.11	PL2012-2001	PL2012-2005	PL2012-2010
1,000	1.09	PL2012-3001	PL2012-3005	PL2012-3010
1,300	1.07	PL2012-4001	PL2012-4005	PL2012-4010
2,000	1.05	PL2012-5001	PL2012-5005	PL2012-5010
3,000	1.04	PL2012-6001	PL2012-6005	PL2012-6010
5,000	1.03	PL2012-7001	PL2012-7005	PL2012-7010
7,000	1.04	PL2012-8001	PL2012-8005	PL2012-8010
10,000	1.02	PL2012-9001	PL2012-9005	PL2012-9010
20,000	1.02	PL2013-1001	PL2013-1005	PL2013-1010
30,000	1.02	PL2013-2001	PL2013-2005	PL2013-2010
50,000	1.03	PL2013-3001	PL2013-3005	PL2013-3010
70,000	1.03	PL2013-4001	PL2013-4005	PL2013-4010
100,000	1.02	PL2013-5001	PL2013-5005	PL2013-5010
130,000	1.01	PL2013-6001	PL2013-6005	PL2013-6010
200,000	1.05	PL2013-7001	PL2013-7005	PL2013-7010
300,000	1.03	PL2013-8001	PL2013-8005	PL2013-8010
500,000	1.03	PL2013-9001	PL2013-9005	PL2013-9010
700,000	1.03	PL2014-0001	PL2014-0005	PL2014-0010
1,000,000	1.05	PL2014-1001	PL2014-1005	PL2014-1010
1,500,000	1.04	PL2014-2001	PL2014-2005	PL2014-2010
2,000,000	1.04	PL2014-3001	PL2014-3005	PL2014-3010
2,500,000	1.05	PL2014-4001	PL2014-4005	PL2014-4010
4,000,000	1.04	PL2014-6001	PL2014-6005	PL2014-6010
7,000,000	1.04	PL2014-7001	PL2014-7005	PL2014-7010
10,000,000	1.06	PL2014-8001	PL2014-8005	PL2014-8010
15,000,000	1.06	PL2014-9001	PL2014-9005	PL2014-9010

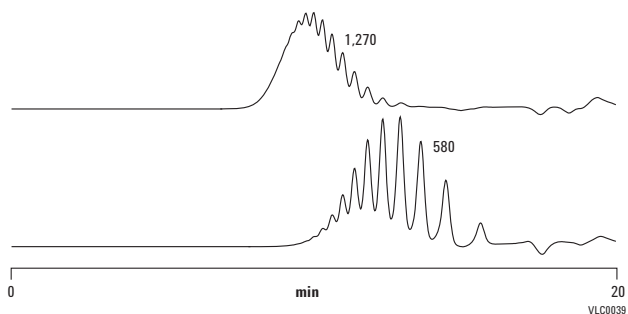
Polystyrene standards

Column: 2 x OligoPore
PL1113-6520
7.5 x 300

Mobile Phase: THF

Flow Rate: 1.0 mL/min

Detector: Agilent PL-GPC 50 (RI)



Polymethylmethacrylate

- Many solvent options increase applicability
- Stringent quality control improves performance
- Proprietary manufacturing methods ensure consistent supply

Polymethylmethacrylate (PMMA) standards are extremely versatile as they can be used for organic GPC with a wide range of medium polarity eluents, such as tetrahydrofuran, toluene, methyl ethyl ketone, and ethyl acetate. They also work well with more polar organic eluents, for example dimethylformamide, dimethylacetamide, and hexafluoroisopropanol. The MWs are selected to provide equidistant calibration points for greater accuracy, covering from 600-1.5 million MW. Every kit contains 0.5 g of ten different molecular weight standards.

Calibration Kits

Description	Range of Nominal Mp (g/mol)	Part No.
M-L-10, 10 x 0.5 g	600-50,000	PL2020-0100
M-M-10, 10 x 0.5 g	1,000-1,500,000	PL2020-0101

Individual Polymer Molecular Weights

Polymer Nominal Mp (g/mol)	Nominal Mw/Mn	1 g Part No.	5 g Part No.	10 g Part No.
500	1.19	PL2022-2001	PL2022-2005	PL2022-2010
1,000	1.26	PL2022-3001	PL2022-3005	PL2022-3010
2,000	1.08	PL2022-5001	PL2022-5005	PL2022-5010
3,000	1.08	PL2022-6001	PL2022-6005	PL2022-6010
5,000	1.09	PL2022-7001	PL2022-7005	PL2022-7010
7,000	1.08	PL2022-8001	PL2022-8005	PL2022-8010
10,000	1.03	PL2022-9001	PL2022-9005	PL2022-9010
13,000	1.03	PL2023-0001	PL2023-0005	PL2023-0010
20,000	1.03	PL2023-1001	PL2023-1005	PL2023-1010
30,000	1.02	PL2023-2001	PL2023-2005	PL2023-2010
50,000	1.02	PL2023-3001	PL2023-3005	PL2023-3010
70,000	1.02	PL2023-4001	PL2023-4005	PL2023-4010
100,000	1.02	PL2023-5001	PL2023-5005	PL2023-5010
130,000	1.05	PL2023-6001	PL2023-6005	PL2023-6010
200,000	1.02	PL2023-7001	PL2023-7005	PL2023-7010
300,000	1.02	PL2023-8001	PL2023-8005	PL2023-8010
500,000	1.06	PL2023-9001	PL2023-9005	PL2023-9010
700,000	1.03	PL2024-0001	PL2024-0005	PL2024-0010
1,000,000	1.09	PL2024-1001	PL2024-1005	PL2024-1010
15,000,000	1.09	PL2024-2001	PL2024-2005	PL2024-2010

Polymethylmethacrylate standards

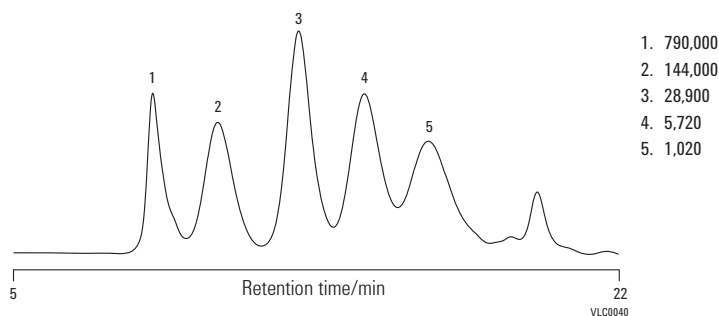
Column: 2 x PL HFIPgel
PL1114-6900HFIP
7.5 x 300

Mobile Phase: HFIP + 20 mM NaTFAc

Flow Rate: 1.0 mL/min

Temperature: 40°C

Detector: Agilent PL-GPC 50 (RI)



Polyethylene Glycol/Oxide

- Simple-to-use kit form
- Combines glycols and oxides to extend the MW range and cover more applications
- MWs selected to provide equidistant calibration points for greater accuracy

These hydrophilic polymers are suitable for both aqueous SEC and organic GPC using the majority of polar organic solvents. The oxides are available in high molecular weights, while the glycols cover the lower molecular weight range. The two types are chemically similar so they can be used together across a wider molecular weight range, with aqueous and organic polymers from 106-1 million MW. Every kit contains 0.2 g or 0.5 g of ten different molecular weight standards.

Calibration Kits

Description	Range of Nominal Mp (g/mol)	Part No.
PEG-10, 10 x 0.5 g	106-20,000	PL2070-0100
PEO-10, 10 x 0.5 g	20,000-1,000,000	PL2080-0101

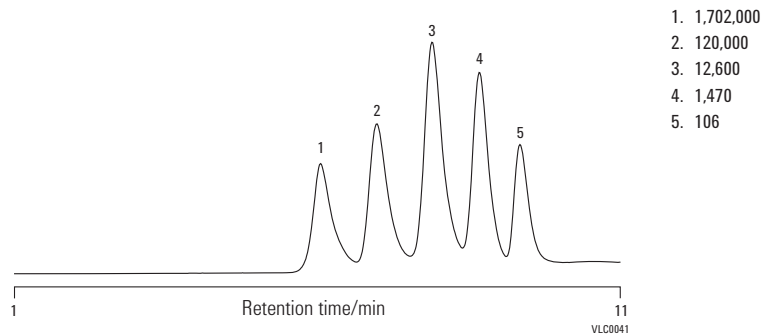
Individual Polymer Molecular Weights

Polymer Nominal Mp (g/mol)	Nominal Mw/Mn	1 g Part No.	5 g Part No.	10 g Part No.
Polyethylene Glycol				
106	1.00	PL2070-1001	PL2070-1005	PL2070-1010
194	1.00	PL2070-2001	PL2070-2005	PL2070-2010
238	1.00	PL2071-2001	PL2071-2005	PL2071-2010
282	1.00	PL2071-3001	PL2071-3005	PL2071-3010
420	1.09	PL2070-3001	PL2070-3005	PL2070-3010
600	1.06	PL2070-4001	PL2070-4005	PL2070-4010
1,000	1.04	PL2070-5001	PL2070-5005	PL2070-5010
1,500	1.04	PL2070-6001	PL2070-6005	PL2070-6010
4,000	1.03	PL2070-7001	PL2070-7005	PL2070-7010
7,000	1.04	PL2070-8001	PL2070-8005	PL2070-8010
10,000	1.05	PL2070-9001	PL2070-9005	PL2070-9010
13,000	1.07	PL2071-0001	PL2071-0005	PL2071-0010
20,000	1.07	PL2071-1001	PL2071-1005	PL2071-1010
Polyethylene Oxide				
20,000	1.05	PL2083-1001	PL2083-1005	PL2083-1010
30,000	1.07	PL2083-2001	PL2083-2005	PL2083-2010
50,000	1.05	PL2083-3001	PL2083-3005	PL2083-3010
70,000	1.05	PL2083-4001	PL2083-4005	PL2083-4010
100,000	1.06	PL2083-5001	PL2083-5005	PL2083-5010
130,000	1.07	PL2083-6001	PL2083-6005	PL2083-6010
200,000	1.07	PL2083-7001	PL2083-7005	PL2083-7010
300,000	1.07	PL2083-8001	PL2083-8005	PL2083-8010
500,000	1.06	PL2083-9001	PL2083-9005	PL2083-9010
700,000	1.07	PL2084-0001	PL2084-0005	PL2084-0010
1,000,000	1.12	PL2084-1001	PL2084-1005	PL2084-1010
1,500,000	1.13	PL2084-2001	PL2084-2005	PL2084-2010

Polyethylene Glycol/Oxide standards

Column: PL aquagel-OH MIXED-H 8 μ m
 PL1149-6800
 7.5 x 300 mm, 8 μ m

Mobile Phase: Water
 Flow Rate: 1.0 mL/min
 Detector: Agilent PL-GPC 50 (RI)



Polysaccharides

- Comprehensive format provides full MW range in one handy kit
- Also available as individual standards

The pullulan polysaccharides kit consists of several simple sugars with relatively narrow polydispersity linear macromolecules of maltotriose units.

Calibration Kits

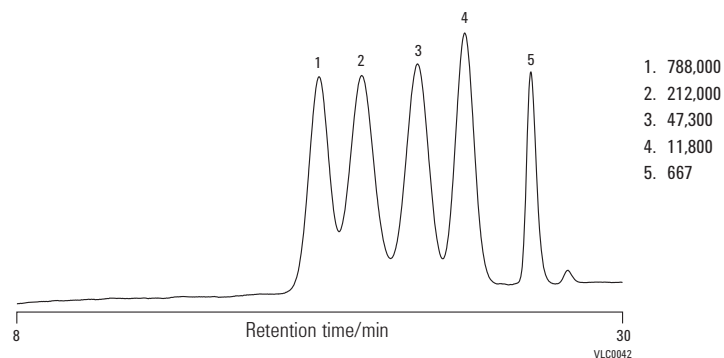
Description	Range of Nominal Mp (g/mol)	Part No.
SAC-10, 10 x 0.2 g	180-700,000	PL2090-0100

Individual Polymer Molecular Weights

Polymer Nominal Mp (g/mol)	Unit	Part No.
1,500	0.2 g	PL2091-2000
2,000	0.2 g	PL2091-3000
3,000	0.2 g	PL2091-4000
5,000	0.5 g	PL2090-1000
20,000	0.5 g	PL2090-3000
50,000	0.5 g	PL2090-4000
100,000	0.5 g	PL2090-5000
200,000	0.5 g	PL2090-6000
700,000	0.5 g	PL2090-8000
1,660,000	0.2 g	PL2091-1000

Pullulan polysaccharide standards

Column: 3 x PL aquagel-OH MIXED
PL1149-6800
7.5 x 300 mm, 8 µm
Mobile Phase: 0.2 M NaNO₃, 0.01 M NaH₂PO₄, pH 7
Flow Rate: 1.0 mL/min
Detector: Agilent PL-GPC 50 (RI)



Polyethylene

- Robust particles provide reliable high temperature calibrations
- Two linear molecular weight ranges maximize choice
- Short chain branching kit, for FT-IR calibration and TREF/CRYSTAF reference

Linear polyethylene standards with low polydispersities (1.01 to 1.9) deliver accurate GPC/SEC calibration curves, from 170-1.5 million MW. The E-MW-10 kit is recommended for polyolefins, and is designed for direct column calibration in solvents such as trichlorobenzene and o-dichlorobenzene from 135-180°C. Every kit contains 0.1 or 0.2 g of ten different molecular weight standards.

Short chain branching standards

Determination of short chain branching (SCB) as a function of MWD in polyethylene is now possible using high temperature GPC coupled with FT-IR. This series of well-characterized polyethylene SCB standards is a valuable reference set for temperature rising elution fractionation/crystallization analysis fractionation (TREF/CRYSTAF).

Calibration Kits

Description	Range of Nominal Mp (g/mol)	Part No.
E-M-10, 10 x 0.2 g	170-120,000	PL2650-0101
E-MW-10, 10 x 0.1 g	5,000-1,500,000	PL2650-0102
Polyethylene Short Chain Branching Calibration Kit	Range of Polymer Nominal Methyl/1000 Total Carbons (NMR)	Part No.
E-SCB, 10 x 0.1 g	1.27-62.50	PL2650-0103

Individual Polymer Molecular Weights

Polymer Nominal Mp (g/mol)	Nominal Mw/Mn	Unit	Part No.
170	1.00	1 g	PL2650-8001
282	1.00	1 g	PL2650-9001
394	1.00	1 g	PL2650-0001
540	1.09	1 g	PL2650-4001
750	1.18	1 g	PL2650-1001
1,100	1.09	1 g	PL2650-2001
2,155	1.14	1 g	PL2650-3001
14,000	1.2	0.2 g	PL2650-5000
32,000	1.11	0.2 g	PL2650-6000
120,000	1.19	0.2 g	PL2650-7000
Polyethylene Broad MWD Individual Molecular Weights			
250,000	9.50	1 g	PL2660-7001
Polyethylene Broad MWD/SCB Individual Molecular Weights			
35,000	5.0	0.2 g	PL2660-8001
400,000	5.0	0.2 g	PL2660-9001

Polyacrylic Acid

- Compatible with all aqueous columns for wide applicability
- Aqueous polymers 1,000-1 million MW
- Well-characterized Mp values ensure wide utility

Calibration Kits

Description	Range of Nominal Mp (g/mol)	Part No.
PAA-10, 10 x 0.2 g	1,000-1,000,000	PL2140-0100

Individual Polymer Molecular Weights

Polymer Nominal Mp (g/mol)	0.2 g Part No.	1 g Part No.
1,000	PL2142-3000	PL2142-3001
2,000	PL2142-5000	PL2142-5001
3,000	PL2142-6000	PL2142-6001
5,000	PL2142-7000	PL2142-7001
7,000	PL2142-8000	PL2142-8001
13,000	PL2143-0000	PL2143-0101
30,000	PL2143-2000	PL2143-2001
50,000	PL2143-3000	PL2143-3001
70,000	PL2143-4000	PL2143-4001
100,000	PL2143-5000	PL2143-5001
130,000	PL2143-6000	PL2143-6001
200,000	PL2143-7000	PL2143-7001
300,000	PL2143-8000	PL2143-8001
500,000	PL2143-9000	PL2143-9001
700,000	PL2144-0000	PL2144-0101
1,000,000	PL2144-1000	PL2144-1001
1,500,000	PL2144-2000	PL2144-2001
2,000,000	PL2144-3000	PL2144-3001

Methoxy Polyethylene Glycols (MPEGs)

Agilent offers a range of highly characterized, very narrow polydispersity methoxy polyethylene glycols (MPEGs). These very pure polymers are ideal as molecular weight reference materials or for further modification where cross-linking should be avoided.

Methoxy Polyethylene Glycols (MPEGs)

Polymer Nominal Mp (g/mol)	Nominal Mw/Mn	Part No.
5,000	1.03	PL2570-5001
10,000	1.05	PL2571-0001
20,000	1.05	PL2572-0001
30,000	1.06	PL2573-0001
40,000	1.06	PL2574-0001
50,000	1.06	PL2575-0001

■ AGILENT BIOSOLUTIONS AND COLUMNS FOR BIOLOGIC CHARACTERIZATION

Is your lab ready for the ever-increasing number and variety of HPLC applications for biocharacterization and analysis of biomolecules?

Basic peptide separations. High-sensitivity, high-resolution amino acid analyses. Fast size exclusion separations of antibodies. The number of bio-HPLC applications continues to grow at an unprecedented rate. Agilent's durable and reproducible line of silica and polymeric bio-HPLC columns can help meet your lab's evolving needs for performance and speed.

On the following pages, you will find key facts and specifications for the following columns for bio-HPLC:

- Size Exclusion Columns
- Ion Exchange Columns
- Reversed-Phase Columns for Proteins
- Capillary, Nano and MicroBore Columns
- Preparative HPLC Columns
- Oligo Solutions

Size Exclusion Columns

Agilent Bio SEC-3 HPLC Columns

- Exceptional loading capacity, stability, and reproducibility for size-based, bio-molecule separations
- Sharper peaks, higher resolution, and better protein recovery
- Faster separations than large-particle SEC columns
- Compatibility with most aqueous buffers
- Excellent stability in high-salt and low-salt conditions

Agilent Bio SEC-3 HPLC columns are a breakthrough technology for size exclusion chromatography (SEC). They are packed with spherical, narrowly dispersed 3 μm silica particles coated with a proprietary hydrophilic layer. This thin polymeric layer is chemically bonded to pure, mechanically stable silica under controlled conditions, ensuring a highly efficient size exclusion particle.

Agilent Bio SEC-3 HPLC columns are available in 100 \AA , 150 \AA and 300 \AA pore sizes to accommodate most peptide and protein size exclusion separations.

Column Specifications	
Column phase	Size Exclusion
Packing	Spherical, high purity, porous silica with a hydrophilic polymeric coating
Particle size	3 μm
Pore structure	100 \AA , 150 \AA , 300 \AA
Column exclusion limits (in Daltons)	100 \AA MW range: 100-100,000 150 \AA MW range: 500-150,000 300 \AA MW range: 5,000-1,250,000
pH stability	2-8.5
Operating temperature limit	Recommended range: 10-30°C Maximum: 80°C
Operating pressure limit	Recommended operating pressure: 137 bar (2,000 psi) Maximum pressure: 240 bar (3,500 psi)
Mobile phase compatibility	Recommended: 150 mM phosphate buffer, pH 7.0 Other aqueous buffers with high and low salt can be used
Working flow rate	0.1-1.25 mL/min for 7.8 mm ID columns 0.1-0.4 mL/min for 4.6 mm ID columns

Aggregation Analysis of a Humanized Monoclonal Antibody

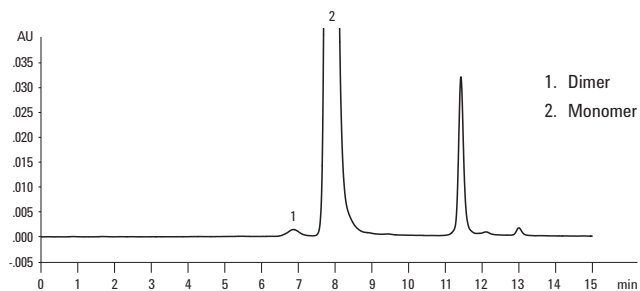
Column: Bio SEC-3, 300Å
5190-2511
7.8 x 300 mm, 3 µm

Mobile Phase: 150 mM Phosphate, pH 7

Flow Rate: 1.0 mL/min

Temperature: Ambient

Sample: Monoclonal antibody
(10 µL, 5 mg/mL)



Agilent Bio SEC-3 HPLC columns provide baseline separation of the antibody aggregate and monomer peaks in 15 minutes.

Separation of E. coli Lysate

Column: Bio SEC-3, 150Å
5190-2506
7.8 x 300 mm, 3 µm

Column: Bio SEC-3, 300Å
5190-2511
7.8 x 300 mm, 3 µm

Mobile Phase: 0.15 M Phosphate, pH 7.0

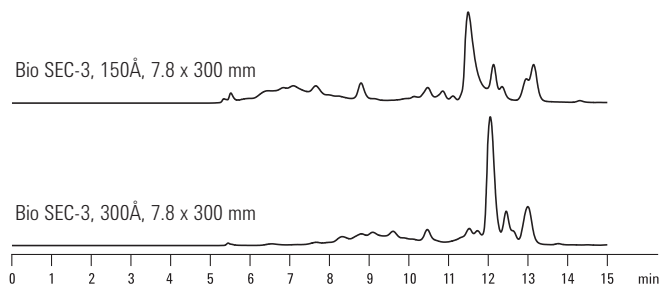
Flow Rate: 1.0 mL/min

Temperature: Ambient

Detector: UV 214 nm

Injection: 10 µL

Sample: E. coli lysate (2.5 mg/mL)



Separation of E. coli lysate on 150Å and 300Å Agilent Bio SEC-3 HPLC columns. The smaller pore size 150Å column provides better resolution of smaller proteins.

Agilent Bio SEC-3 HPLC Columns

Size (mm)	Particle Size (µm)	Bio SEC-3 100Å	Bio SEC-3 150Å	Bio SEC-3 300Å
7.8 x 300	3	5190-2501	5190-2506	5190-2511
7.8 x 150	3	5190-2502	5190-2507	5190-2512
4.6 x 300	3	5190-2503	5190-2508	5190-2513
4.6 x 150	3	5190-2504	5190-2509	5190-2514
7.8 x 50, Guard	3	5190-2505	5190-2510	5190-2515

Agilent Bio SEC-5 HPLC Columns

- Maximum recovery for a broad range of size-based, biomolecule separations
- Outstanding reproducibility and column lifetime
- Excellent stability, even under high-pH, high-salt, and low-salt conditions
- Compatibility with most aqueous buffers

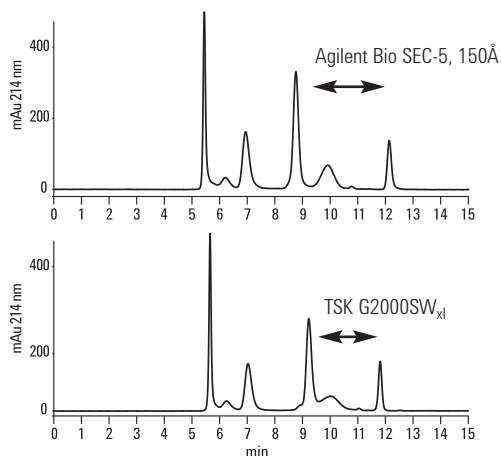
Agilent Bio SEC-5 HPLC columns are packed with 5 μm silica particles coated with a proprietary, neutral, hydrophilic layer for maximum efficiency and stability. Our specially designed packing also provides high pore volume, improving both peak capacity and resolution.

Bio SEC-5 columns are available in 5 μm particles with 100 \AA , 150 \AA , 300 \AA , 500 \AA , 1000 \AA , and 2000 \AA nominal pore sizes.

Column Specifications

Column phase	Size Exclusion
Packing	Spherical, high purity, porous silica with a hydrophilic polymeric coating
Particle size	5 μm
Pore structure	100 \AA , 150 \AA , 300 \AA , 500 \AA , 1000 \AA , 2000 \AA
Column exclusion limits (in Daltons)	100 \AA MW range: 100-100,000 150 \AA MW range: 500-150,000 300 \AA MW range: 5,000-1,250,000 500 \AA MW range: 15,000-5,000,000 1000 \AA MW range: 50,000-7,500,000 2000 \AA MW range: >10,000,000
pH stability	2-8.5
Operating temperature limit	Recommended range: 10-30°C Maximum: 80°C
Operating pressure limit	Recommended operating pressure: 137 bar (2,000 psi) Maximum pressure: 240 bar (3,500 psi)
Mobile phase compatibility	Recommended: 150 mM phosphate buffer, pH 7.0 Other aqueous buffers with high and low salt can be used
Working flow rate	0.1-1.25 mL/min for 7.8 mm ID columns 0.1-0.4 mL/min for 4.6 mm ID columns

Side-by-side Comparison



1. Thyroglobulin, 5.43 min
2. BSA dimer, 6.19 min
3. BSA monomer, 6.93 min
4. Ribonuclease A, 8.74 min
5. Poly-DL-alanine (1.5 kDa), 9.90 min
6. Uracil, 12.13 min

1. Thyroglobulin, 5.64 min
2. BSA dimer, 6.23 min
3. BSA monomer, 7.02 min
4. Ribonuclease A, 9.22 min
5. Poly-DL-alanine (1.5 kDa), 10.02 min
6. Uracil, 11.81 min

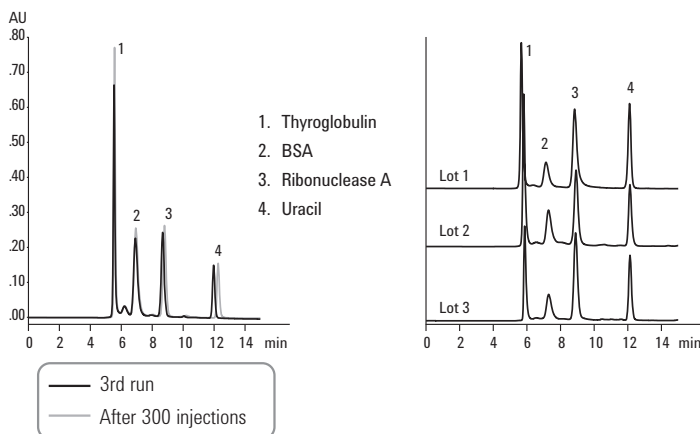
Separation of a protein mixture on an Agilent Bio SEC-5 HPLC column and a Tosoh TSK-Gel column. Notice the sharper peaks and better resolution on the Agilent Bio SEC-5 HPLC column.

Exceptional Lot-to-lot Reproducibility

Column: Bio SEC-5, 150Å
5190-2521
7.8 x 300 mm, 5 µm

Mobile Phase: 150 mM Phosphate
Buffer, pH 7.0

The four protein mixture shows excellent retention time reproducibility over 300 injections and on three columns from different manufacturing lots.



Agilent Bio SEC-5 HPLC Columns

Size (mm)	Particle Size (µm)	Bio SEC-5 100Å	Bio SEC-5 150Å	Bio SEC-5 300Å	Bio SEC-5 500Å	Bio SEC-5 1000Å	Bio SEC-5 2000Å
7.8 x 300	5	5190-2516	5190-2521	5190-2526	5190-2531	5190-2536	5190-2541
7.8 x 150	5	5190-2517	5190-2522	5190-2527	5190-2532	5190-2537	5190-2542
4.6 x 300	5	5190-2518	5190-2523	5190-2528	5190-2533	5190-2538	5190-2543
4.6 x 150	5	5190-2519	5190-2524	5190-2529	5190-2534	5190-2539	5190-2544
7.8 x 50, Guard	5	5190-2520	5190-2525	5190-2530	5190-2535	5190-2540	5190-2545

ZORBAX GF-250 and GF-450 Gel Filtration Columns

- High efficiency and reproducibility with short analysis time
- Hydrophilic diol bonded phase for good protein recovery
- Compatible with organic modifiers and denaturants
- Wide usable pH range (3-8)

Agilent ZORBAX GF-250 and GF-450 size exclusion (gel filtration) columns are ideal for the size separations of proteins and other biomolecules. The separation range is 4,000-900,000 for globular proteins when using GF-250 and GF-450 columns in series. The GF-250/GF-450 size exclusion columns have a hydrophilic diol bonded phase for high recovery of proteins (typically >90%) and a unique zirconia modification of the silica for a pH operating range from 3-8. The GF-250 and GF-450 columns are packed with precisely sized porous silica microspheres with narrow pore size and particle size distributions. The result is a highly efficient, rugged and reproducible size exclusion column for separations of proteins with flow rates of up to 3 mL/min. These columns are compatible with organic modifiers (<25%) and denaturants in the mobile phase to eliminate protein aggregation for proper size determination. Some common applications include separations of protein monomers, dimers and aggregates, desalting, protein molecular weight estimation and separations of modified proteins.

Column Specifications

Bonded Phase	Pore Size	Particle Size	MW Range	Surface Area	pH Range	Flow Rate	Max Pressure
ZORBAX GF-250	150Å	4 µm	4,000-400,000	140 m ² /g	3.0-8.0	<3.0 mL/min	350 bar
ZORBAX GF-450	300Å	6 µm	10,000-900,000	50 m ² /g	3.0-8.0	<3.0 mL/min	350 bar

Specifications represent typical values only.

Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatographer.

For more information, visit www.agilent.com/chem/education

Separation of Protein Standards on the ZORBAX GF-250 SEC Column

Column: ZORBAX GF-250
884973-901
9.4 x 250 mm, 4 µm

Mobile Phase: 200 mM Sodium Phosphate, pH 7.0

Flow Rate: 2 mL/min

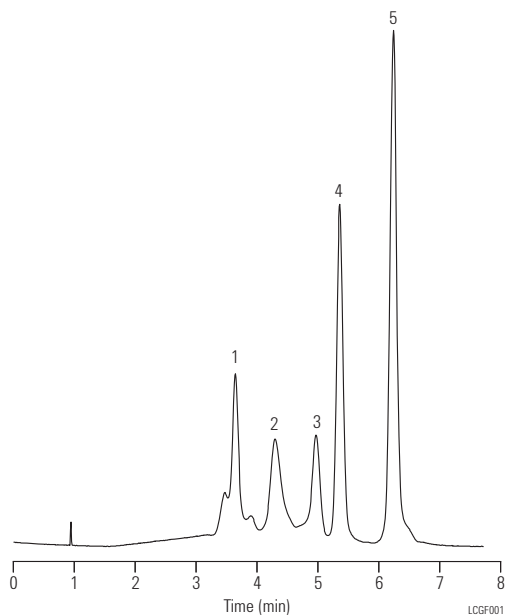
Temperature: Ambient

Detector: 254 nm

Sample: BioRad Gel Filtration Standards for Size Exclusion

1. Thyroglobulin 670,000 Da
2. Bovine Gamma Globulin 158,000 Da
3. Chicken Ovalbumin 44,000 Da
4. Equine Myoglobin 17,000 Da
5. Vitamin B-12 1,350 Da

The protein standards separated here are a commonly selected set of standards. The ZORBAX GF-250 column shows excellent resolution for this sample. Additional resolution of the thyroglobulin can be obtained by adding the GF-450 column in series.



High-Speed Size Exclusion Separations 1

Column: ZORBAX GF-450
884973-902
9.4 x 250 mm, 6 µm

Mobile Phase: PBS (phosphate buffered saline), pH 7.4

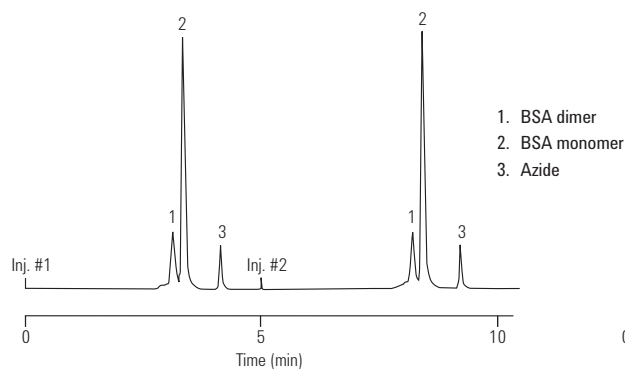
Flow Rate: 3 mL/min

Temperature: Ambient

Detector: 220 nm

Sample: BSA and BSA Dimers

BSA and BSA Dimers (duplicate injections)



High-Speed Size Exclusion Separations 2

Column: ZORBAX GF-450
884973-902
9.4 x 250 mm, 6 µm

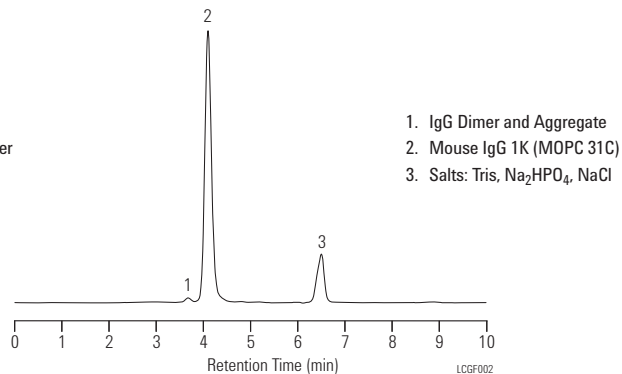
Mobile Phase: 200 mM Na Phosphate Monobasic pH 7.0/0.1% Azide

Flow Rate: 2 mL/min













Detector: 225 nm

Sample: 10 µg in 50 mM Sodium Phosphate pH 7.0

Antibody Separation



ZORBAX GF-250 (USP L33) and GF-450 (USP L35) Gel Filtration Columns

Hardware Description	Size (mm)	Particle Size (µm)	Part No.
GF-250, 150Å	9.4 x 250	4	884973-901
GF-250, 150Å	4.6 x 250	4	884973-701
GF-450, 300Å	9.4 x 250	6	884973-902
Guard Columns (hardware required)			
 GF-250 Diol, Guard Cartridge, 2/pk	9.4 x 15	6	820675-111
 GF-250 Diol, Guard Cartridge, 4/pk	4.6 x 12.5	6	820950-911
 GF-450 Diol, Guard Cartridge, 2/pk	9.4 x 15	6	820675-111
 GF-250 Diol, Guard Cartridge, 4/pk	4.6 x 12.5	6	820950-911
 Guard Hardware Kit			840140-901
 Guard Hardware Kit			820999-901
PrepHT Columns			
 PrepHT GF-250, 150Å	21.2 x 250	6	877974-901
 PrepHT GF-450, 300Å	21.2 x 250	6	877974-910
 PrepHT endfittings, 2/pk			820400-901
 PrepHT GF-250, Guard Cartridge, 2/pk	17 x 7.5	5	820212-911
 PrepHT GF-450, Guard Cartridge, 2/pk	17 x 7.5	5	820212-911
 Guard Cartridge Hardware			820444-901

Ion Exchange Columns

Agilent Bio MAb HPLC Columns

- A packing support composed of a rigid, spherical, highly cross-linked polystyrene divinylbenzene (PS/DVB) non-porous bead
- Particles grafted with a hydrophilic, polymeric layer, virtually eliminating non-specific binding of antibody proteins
- Particles use a different process to layer the weak cation exchange phase to the particle making it a higher density than the Agilent Bio WCX column particles

Thorough characterization of monoclonal antibodies includes the identification and monitoring of acidic and basic isoforms. Agilent Bio MAb HPLC columns feature a unique resin specifically designed for high-resolution, charge-based separations of monoclonal antibodies.

Bio MAb columns are available in 1.7, 3, 5 and 10 μm sizes, providing higher resolution with smaller particles.

Column Specifications

Column phase	Weak Cation Exchange (carboxylate)
Packing	Non-porous, poly(styrene divinylbenzene) (PS/DVB), grafted hydrophilic coating and bonded with a uniform, weak cation exchange layer
Particle size	1.7, 3, 5 and 10 μm
Pore structure	Non-porous
pH stability	2-12
Operating temperature limit	80°C
Column hardware operating pressure limit	600 bar (8,700 psi) for stainless steel column hardware 400 bar (5,800 psi) for PEEK column hardware
Particle operating pressure limit	275 bar (4,000 psi) for 10 μm particles 413 bar (6,000 psi) for 5 μm particles 551 bar (8,000 psi) for 3 μm particles 689 bar (10,000 psi) for 1.7 μm particles
Mobile phase compatibility	Compatible with aqueous solution buffers, acetonitrile/acetone/methanol and water mixtures. Commonly used buffers: phosphate, tris, MES and acetate.
Working flow rate	Typical 0.1-1.0 mL/min for a 4.6 mm ID column or 2.1 mm I.D. column; always start a low flow rate and set default to the maximum hardware and/or particle pressure, whichever is lower.

Virtually Eliminate Retention Time Variations

Column: Bio MAb, stainless steel
5190-2413
4.6 x 250 mm, 10 µm

Mobile Phase: A: 10 mM phosphate, pH 6.0
B: A + 1.0 M NaCl

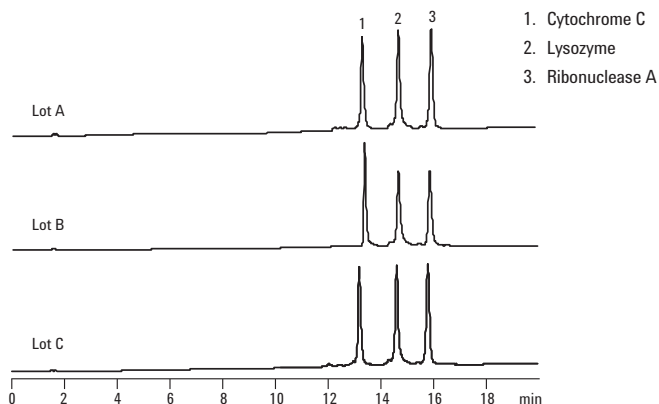
Flow Rate: 1.0 mL/min

Gradient: 0-100% B in 42 min

Temperature: 25°C

Detector: UV 214 nm

The combination of well-controlled resin production, column surface chemistry, and column packing virtually eliminates retention time variations from column-to-column and lot-to-lot.


Isoform Characterization of a Monoclonal Antibody

Column: Bio MAb, stainless steel
5190-2413
4.6 x 250 mm, 10 µm

Mobile Phase: A: 10 mM phosphate, pH 7.5
B: A + 0.1M NaCl

Flow Rate: 0.8 mL/min

Gradient: A: 15-75% B in 30 min

B: 15-65% B in 30 min

C: 15-55% B in 30 min

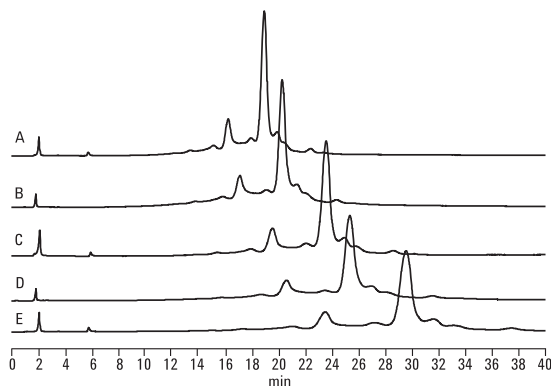
D: 15-47.5% B in 30 min

E: 15-40% B in 30 min

Temperature: 25°C

Detector: UV 214 nm

Sample: Monoclonal antibody



Optimization of method conditions for the isoform characterization of a monoclonal antibody. Changes in the gradient conditions sharpen peaks and increase resolution of acidic and basic isoforms.

Agilent Bio MAb HPLC Columns

Size (mm)	Particle Size (µm)	Bio MAb PEEK	Bio MAb Stainless Steel
4.6 x 250	10	5190-2415	5190-2413
4.6 x 50, Guard	10	5190-2416	
4.6 x 250	5	5190-2407	5190-2405
4.6 x 50, Guard	5	5190-2408	
4.6 x 50	3		5190-2403
4.6 x 50	1.7		5190-2401
4.0 x 10, Guard	10		5190-2414
4.0 x 10, Guard	5		5190-2406
4.0 x 10, Guard	3		5190-2404
4.0 x 10, Guard	1.7		5190-2402
2.1 x 250	10	5190-2419	
2.1 x 50, Guard	10	5190-2420	
2.1 x 250	5	5190-2411	
2.1 x 50, Guard	5	5190-2412	

Agilent Bio IEX HPLC Columns

- Highly cross-linked and rigid nonporous poly(styrene divinylbenzene) (PS/DVB) particles are grafted with a hydrophilic, polymeric layer, eliminating nonspecific binding
- Uniform, densely packed ion exchange functional groups are chemically bonded to the hydrophilic layer (multiple ion exchange groups per anchoring) to increase column capacity
- Particles, coating and bonding are resistant to high pressures, promoting higher resolution and faster separations
- Multiple ion-exchange groups are captured on one anchoring to increase capacity

Agilent Bio IEX HPLC columns are packed with polymeric, nonporous, ion exchange particles and are designed for high resolution, high recovery and highly efficient separations of peptides, oligonucleotides and proteins.

The Bio IEX family offers strong cation exchange (SCX), weak cation exchange (WCX), strong anion exchange (SAX) and weak anion exchange (WAX) phases. All phases are available in 1.7, 3, 5 and 10 μm non-porous particles sizes.

Tips & Tools

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Column Specifications

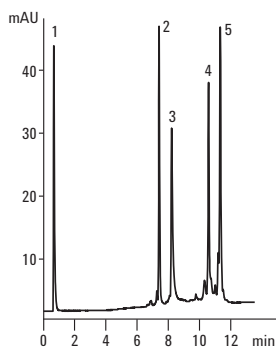
Column phase	SCX (Strong cation exchange) – SO_3H WCX (Weak cation exchange) – COOH SAX (Strong anion exchange) – $\text{N}(\text{CH}_3)_3$ WAX (Weak anion exchange) – $\text{N}(\text{C}_2\text{H}_5)_2$			
Packing	Non-porous, poly(styrene divinylbenzene) (PS/DVB), grafted hydrophilic coating and bonded with a uniform, ion exchange layer			
Particle size	1.7, 3, 5 and 10 μm			
Pore structure	Non-porous			
pH stability	2-12			
Operating temperature limit	80°C			
Column hardware operating pressure limit	600 bar (8,700 psi) for stainless steel column hardware 400 bar (5,800 psi) for PEEK column hardware			
Particle operating pressure limit	275 bar (4,000 psi) for 10 μm particles 413 bar (6,000 psi) for 5 μm particles 551 bar (8,000 psi) for 3 μm particles 689 bar (10,000 psi) for 1.7 μm particles			
Mobile phase compatibility	Compatible with aqueous solution buffers, acetonitrile/acetone/methanol and water mixtures. Commonly used buffers: phosphate, tris, MES and acetate			
Working flow rate	Typical 0.1-1.0 mL/min for a 4.6 mm ID column or 2.1 mm I.D. column; always start a low flow rate and set default to the maximum hardware and/or particle pressure, whichever is lower.			
Dynamic binding capacity		NP3	NP5	NP10
	SCX	53 mg/mL	38 mg/mL	20 mg/mL
	WCX	19 mg/mL	15 mg/mL	10 mg/mL
	SAX	35 mg/mL	28 mg/mL	17 mg/mL
	WAX	26 mg/mL	18 mg/mL	12 mg/mL

Exceptional Separating Power

Column: Agilent Bio SCX, stainless steel
5190-2423
4.6 x 50 mm, 3 μm

Buffer: 10 mM Phosphate, pH 6.0
Flow Rate: 0.5 mL/min
Gradient: 0-1.0 M NaCl, 15 min
Detector: 280 nm

The hydrophilic, polymeric layer and densely packed ion exchange functional groups provide extremely sharp peak shapes and high resolution of a mixture of proteins with a broad range of isoelectric points (pI).



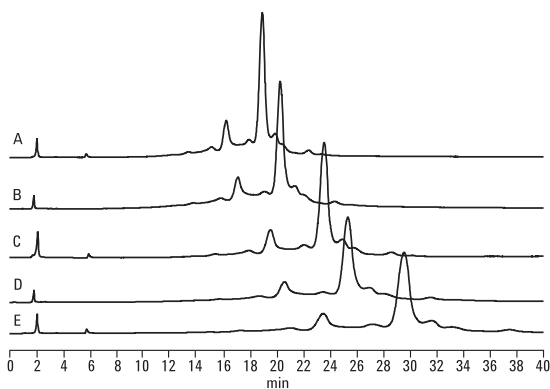
1. Ovalbumin, 4.6 pI
 2. Ribonuclease A, 8.7 pI
 3. Cytochrome C, 9.6 pI
 4. Aprotinin, 10.0 pI
 5. Lysozyme, 11.0 pI
- N > 100,000/50 mm for Lysozyme

Resolving Ovalbumin and BSA using Agilent Bio SAX

Column: Agilent Bio SAX, stainless steel
5190-2463
4.6 x 50 mm, 3 μm

Buffer: 20 mM Tris, pH 8.0
Flow Rate: 0.5 mL/min
Gradient: 0-0.3 M NaCl (15 min)
Backpressure: 1,600 psi
Detector: 214 nm

Isoforms and impurities of both ovalbumin and BSA can easily be resolved when an Agilent Bio SAX NP3 (3 μm particle) column is used.



Agilent Bio IEX HPLC Columns, PEEK

Size (mm)	Particle Size (µm)	Bio SCX Part No.	Bio WCX Part No.	Bio SAX Part No.	Bio WAX Part No.
4.6 x 250	10	5190-2435	5190-2455	5190-2475	5190-2495
4.6 x 50, Guard	10	5190-2436	5190-2456	5190-2476	5190-2496
4.6 x 250	5	5190-2427	5190-2447	5190-2467	5190-2487
4.6 x 50, Guard	5	5190-2428	5190-2448	5190-2468	5190-2488
2.1 x 250	10	5190-2439	5190-2459	5190-2479	5190-2499
2.1 x 50, Guard	10	5190-2440	5190-2460	5190-2480	5190-2500
2.1 x 250	5	5190-2431	5190-2451	5190-2471	5190-2491
2.1 x 50, Guard	5	5190-2432	5190-2452	5190-2472	5190-2492

Agilent Bio IEX HPLC Columns, Stainless Steel

Size (mm)	Particle Size (µm)	Bio SCX Part No.	Bio WCX Part No.	Bio SAX Part No.	Bio WAX Part No.
4.6 x 250	10	5190-2433	5190-2453	5190-2473	5190-2493
4.6 x 250	5	5190-2425	5190-2445	5190-2465	5190-2485
4.6 x 50	3	5190-2423	5190-2443	5190-2463	5190-2483
4.6 x 50	1.7	5190-2421	5190-2441	5190-2461	5190-2481
4.0 x 10, Guard	10	5190-2434	5190-2454	5190-2474	5190-2494
4.0 x 10, Guard	5	5190-2426	5190-2446	5190-2466	5190-2486
4.0 x 10, Guard	3	5190-2424	5190-2444	5190-2464	5190-2484
4.0 x 10, Guard	1.7	5190-2422	5190-2442	5190-2462	5190-2482

Tips & Tools

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Agilent Bio-Monolith HPLC Columns

- Polymer-based, monolith HPLC columns designed for macro bio-molecule separations
- Flow-rate independent separations; no diffusion, no pores and no void volume make transport between mobile and stationary phase very rapid
- Monolith disk is 5.2 mm x 4.95 mm (100 µL column volume) with continuous channels, eliminating diffusion mass transfer
- Extremely fast separations speed up method development time and decrease costs. Locking in method parameters takes significantly less time and buffer

Agilent Bio-Monolith HPLC columns provide high resolution and rapid separations of antibodies (IgG, IgM), plasmid DNA, viruses, phages and other macro bio-molecules. The product family offers strong cation exchange, strong and weak anion exchange and Protein A phases. Bio-Monolith HPLC columns are compatible with HPLC and preparative LC systems, including Agilent 1100 and 1200 HPLC systems.

Column Specifications

Dimensions	5.2 mm x 4.95 mm
Column volume	100 µL
Maximum pressure	150 bar (15 MPa, 2200 psi)
Temperature min/max	Working: 4°C-40°C Storage: 4°C-30°C
Recommended pH	Working range: 2-13 Cleaning-in-place: 1-14
Materials of construction	Hardware: Stainless steel Packing: poly (glycidyl methacrylate-co-ethylene dimethacrylate) highly porous monolith
Color ring identifier	Bio-Monolith QA: Blue Bio-Monolith DEAE: Green Bio-Monolith SO ₃ : Red Bio-Monolith Protein A: White
Shelf life/expiration date	Protein A: 12 months SO ₃ , QA, DEAE: 24-36 months

Agilent Bio-Monolith HPLC Column Selection Guide

Column	Description	Key Applications	Part No.
Bio-Monolith QA	The quaternary amine bonded phase (Strong Anion Exchange) is fully charged over a working pH range of 2-13, binding negatively charged bio-molecules.	<ul style="list-style-type: none"> Adenovirus process monitoring and quality control IgM purification monitoring and quality control Monitoring DNA impurity removal Monitoring endotoxin removal HSA Purity 	5069-3635
Bio-Monolith DEAE	The diethylaminoethyl bonded phase (Weak Anion Exchange) offers increased selectivity of bio-molecules with negative charge over a working pH range of 3-9.	<ul style="list-style-type: none"> Process monitoring and quality control of bacteriophage manufacturing and purification Process monitoring and quality control of plasmid DNA purification 	5069-3636
Bio-Monolith SO ₃	The sulfonfyl bonded phase (Strong Cation Exchange) is fully charged over a working pH range of 2-13, binding positively charged bio-molecules.	<ul style="list-style-type: none"> Fast and high resolution analytical separations of large molecules such as proteins and antibodies Hemoglobin A1c fast analytics 	5069-3637
Bio-Monolith Protein A	The Protein A affinity column is designed for the analytical separation of all IgG (human and mouse), except for IgG class3.	<ul style="list-style-type: none"> Quantitative determination of IgG (fermentation titer calculation) 	5069-3639

Bio-Monolith DEAE Column Monitors Phage Production During Fermentation

Column: DEAE
5069-3636
5.2 x 4.95 mm

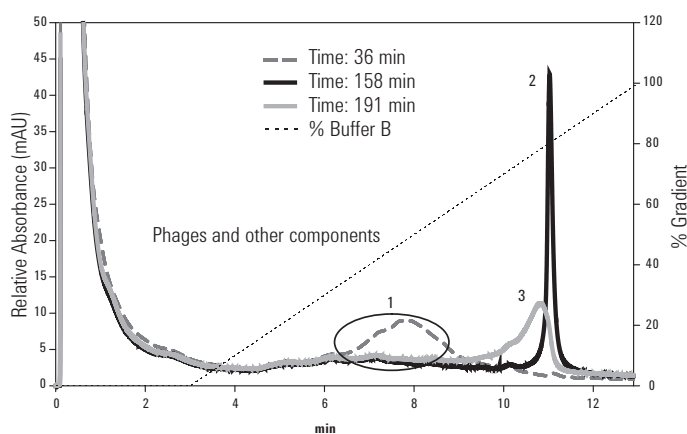
Mobile Phase: A: 125 mM Phosphate buffer, pH 7.0
B: 125 mM Phosphate buffer + 1 M NaCl, pH 7.0

Flow Rate: 1 mL/min

Gradient: 100% buffer A (2.5 min)
0-100% buffer B (10 min)
100% buffer A (2 min)

Detector: UV at 280 nm

Instrument: High pressure gradient HPLC system, Agilent 1200



As phage proliferation progresses, the genomic DNA (gDNA) concentration increases as the host cells are being lysed. In the late stages of fermentation, gDNA begins to degrade into fragments. These gDNA fragments cannot be easily removed by purification media, therefore it is critical to stop the fermentation cycle prior to the degradation of the genomic DNA. The chromatogram above represents three samples taken from the bioreactor at 36, 158 and 191 minutes. Peak 1 represents phage, media and host cells, peak 2 the intact gDNA and peak 3 the fragmented gDNA.

ZORBAX Bio-SCX Series II

ZORBAX has Bio-SCX Series II columns designed for optimized 2-D separations of peptides and proteins using LC/MS. This packing is based on ultra-pure 3.5 µm ZORBAX silica particles, bonded with a bio-friendly polymer that is functionalized with sulfonic acid groups. This gives strong retention and good peak shape in the ion exchange step of 2-D analysis of peptides and proteins.

Column Specifications

Bonded Phase	Pore Size	Surface Area	pH Range	Functionality	Max Pressure
ZORBAX Bio-SCX Series II	300Å	90 m ² /g	2.5-8.5	Sulfonic acid	350 bar

ZORBAX Bio-SCX Series II

Description	Size (mm)	Particle Size (µm)	Bio-SCX Series II
Capillary	0.3 x 35	3.5	5065-9912
Capillary	0.8 x 50	3.5	5065-9942
Guard Cartridge, 4/pk	4.6 x 12.5	6	820950-903
Guard Hardware Kit			820888-901

ZORBAX Bio-SCX Series II Provides More Retention of Small Peptides

Column: ZORBAX Bio SCX Series II 5065-9912

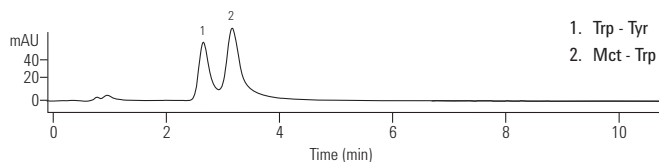
0.3 x 35 mm, 3.5 µm

Mobile Phase: 95% 40 mM NaCl: 5% ACN, 0.3% Formic Acid

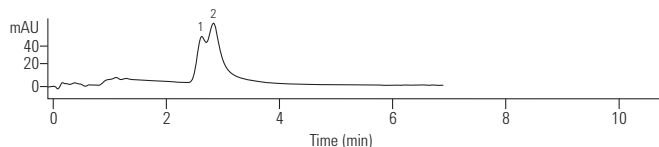
Flow Rate: 5 µL/min

Detector: 230 nm

Sample: Synthetic Dipeptides



The new ZORBAX Bio-SCX Series II column retains smaller peptides more strongly than some other SCX columns. The result is increased resolution of more hydrophilic peptides fragments and more accurate identification when these columns are used in 2-D HPLC analysis.



LC06002

PL-SAX Strong Anion Exchange Columns

- Small particles deliver excellent chromatographic performance
- Wide range of particle sizes for flexible analysis to scale-up purification
- Exceptional stability for long column lifetime

PL-SAX -N(CH₃)₃⁺ is ideal for the anion exchange HPLC separations of proteins and deprotected synthetic oligonucleotides under denaturing conditions. The strong anion exchange functionality, covalently linked to a chemically stable polymer, extends the operating pH range. In addition, the anion exchange capacity is independent of pH. For synthetic oligonucleotides, separations using denaturing conditions of temperature, organic solvent, and high pH are all possible. PL-SAX delivers improved chromatography for self-complementary or G-rich sequences that may associate to form aggregates or hairpin structures. The 5 μm material provides high efficiency separations of n and n-1 sequences. A wide range of particle sizes and column geometries permits analysis and scale-up to purification. The strong anion exchange functionality provides a material with exceptional chemical and thermal stability, even with sodium hydroxide eluents, leading to long column lifetime.

High resolution separation of a Poly-T-Oligonucleotide size standard spiked with 10mer, 15mer, 30mer and 50mer (main peaks)

Column: PL-SAX 1000Å
PL1551-1802
4.6 x 50 mm, 8 μm

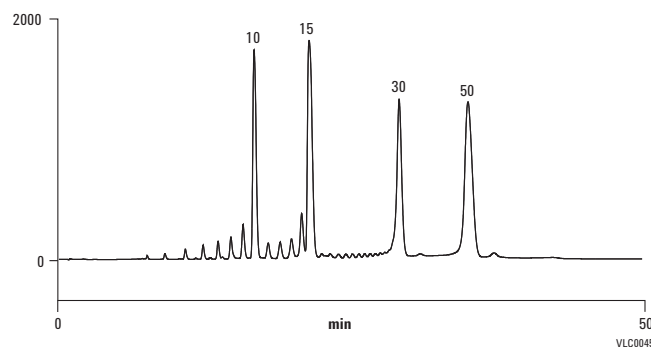
Mobile Phase: A: 7:93 v/v ACN: 0.1 M TEAA, pH 8.5
B: 7:93 v/v ACN: 0.1 M TEAA, 1 M ammonium chloride, pH 8.5

Gradient: 0-40% B in 10 min, followed by 40-70% B in 14 min and 70-100% B in 25 min

Flow Rate: 1.5 mL/min

Temperature: 60°C

Detector: UV, 220 nm



PL-SAX Strong Anion Exchange Columns

Size (mm)	Particle Size (μm)	PL-SAX 1000Å	PL-SAX 4000Å
7.5 x 150	8	PL1151-3802	PL1151-3803
7.5 x 50	8	PL1151-1802	PL1151-1803
4.6 x 250	30	PL1551-5702	PL1551-5703
4.6 x 150	30	PL1551-3702	PL1551-3703
4.6 x 250	10	PL1551-5102	PL1551-5103
4.6 x 150	10	PL1551-3102	PL1551-3103
4.6 x 150	8	PL1551-3802	PL1551-3803
4.6 x 50	8	PL1551-1802	PL1551-1803
4.6 x 50	5	PL1551-1502	PL1551-1503
2.1 x 150	8	PL1951-3802	PL1951-3803
2.1 x 50	8	PL1951-1802	PL1951-1803
2.1 x 50	5	PL1951-1502	PL1951-1503

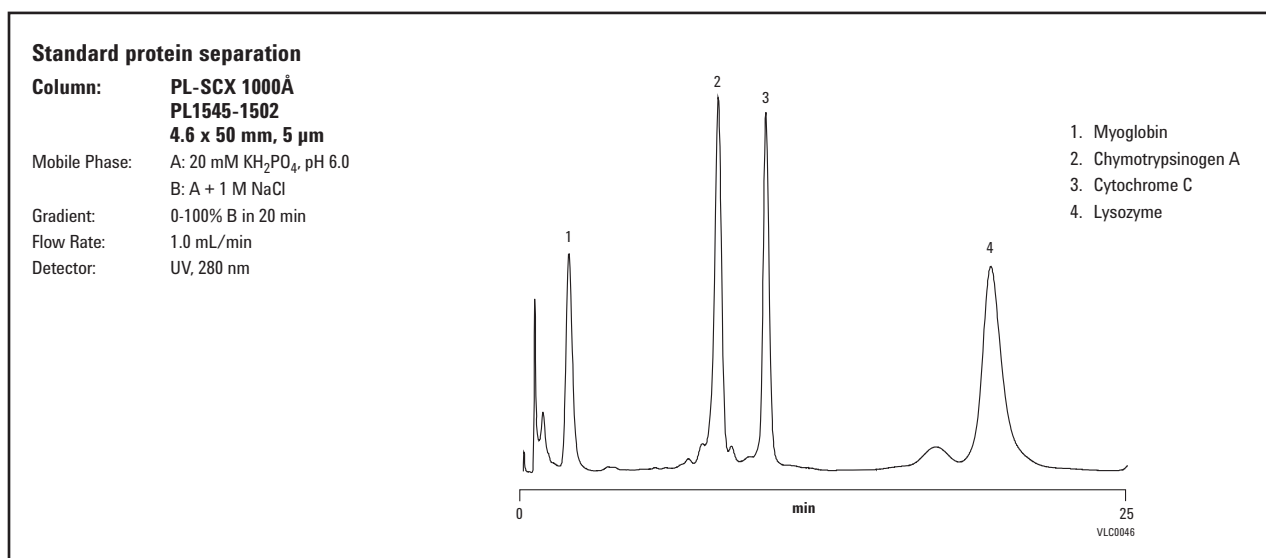
PL-SAX and PL-SCX columns are also available for Prep to Process.

Turn to page 1042.

PL-SCX Strong Cation Exchange Columns

- Optimal design for effective separation of biomolecules
- Pore sizes allow use of a range of solute sizes
- Exceptional stability for long column lifetime

PL-SCX -SO₃⁻ is a macroporous PS/DVB matrix with a very hydrophilic coating and strong cation exchange functionality. This process is controlled to provide the optimum density of strong cation exchange moieties for the analysis, separation and purification of a wide range of biomolecules, from small peptides to large proteins. Two pore sizes are available, 1000Å and 4000Å, to provide good mass transfer characteristics for a range of solute sizes. The 5 µm media delivers separations at higher resolution with the 30 µm media used for medium pressure liquid chromatography.



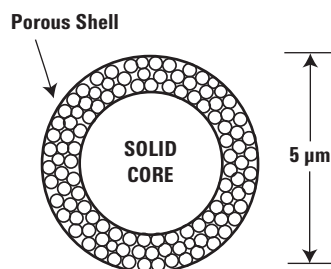
PL-SCX Strong Cation Exchange Columns

Size (mm)	Particle Size (µm)	PL-SCX 1000Å	PL-SCX 4000Å
7.5 x 50	8	PL1145-1802	PL1145-1803
4.6 x 250	30	PL1545-5702	PL1545-5703
4.6 x 150	30	PL1545-3702	PL1545-3703
4.6 x 250	10	PL1545-5102	PL1545-5103
4.6 x 150	10	PL1545-3102	PL1545-3103
4.6 x 150	8	PL1545-3802	PL1545-3803
4.6 x 50	8	PL1545-1802	PL1545-1803
4.6 x 50	5	PL1545-1502	PL1545-1503
2.1 x 150	8	PL1945-3802	PL1945-3803
2.1 x 50	8	PL1945-1802	PL1945-1803
2.1 x 50	5	PL1945-1502	PL1945-1503



Reversed-Phase Columns for Proteins and Peptides

Poroshell 300



- High-resolution separations of biomolecules with superficially porous particles
- High efficiency and recovery with proteins (up to 1,000 kDa) and monoclonal antibodies
- Achieve long lifetime at low pH with Poroshell 300SB; at high pH with 300Extend-C18
- Optimize recovery and selectivity with four different bonded phases – 300SB-C18, 300SB-C8, 300SB-C3, and 300Extend-C18

Agilent Poroshell 300 columns are ideal for fast separations of proteins and peptides because the superficially porous particle allows for fast flow rates to be used while maintaining sharp, efficient peaks. Peptides and proteins are typically separated slowly to reduce the potential peak broadening of these slow diffusing analytes. However, Poroshell columns use a superficially porous particle made with a thin layer of porous silica on a solid core of silica, reducing the diffusion distance for proteins making practical rapid HPLC separations of peptides and proteins up to 500-1,000 kDa. Poroshell columns bonded with StableBond bonded phases provide excellent stability and selectivity choices with TFA and formic acid mobile phases. The Poroshell 300Extend-C18 column can be used from pH 2-11 for unique separations. These columns can be used for analytical protein separations as well as LC/MS separations.

Column Specifications

Bonded Phase	Pore Size	Temp. Limits*	pH Range	Endcapped
Poroshell 300SB-C18, C8, C3	300Å	90°C	1.0-8.0	No
Poroshell 300Extend-C18	300Å	40°C above pH 8 60°C below pH 8	2.0-11.0	Yes

Specifications represent typical values only.

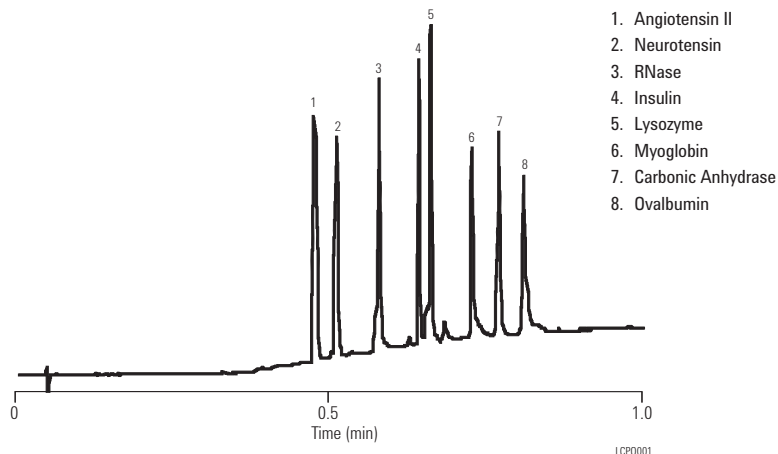
*300StableBond columns are designed for optimal use at low pH. At pH 6-8, highest column stability for all silica-based columns is obtained by operating at temperatures <40°C and using low buffer concentrations in the range of 0.01-0.02 M. At mid or high pH, 300Extend-C18 is recommended.

Poroshell 300 Columns Separate Proteins and Peptides in Seconds

Column: Poroshell 300SB-C18
660750-902
2.1 x 75 mm, 5 μ m

Mobile Phase: A: 0.1% TFA in H₂O
B: 0.07% TFA in ACN
Flow Rate: 3.0 mL/min
Gradient: 5-100% B in 1.0 min
Temperature: 70°C, 260 bar pressure
Detector: 215 nm
Sample: Proteins and Peptides

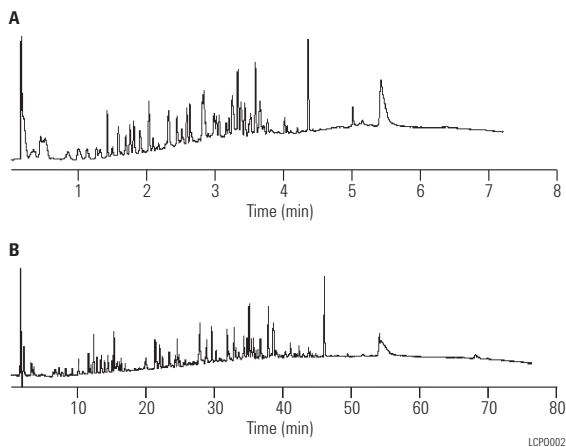
This separation of eight polypeptides and proteins is completed in less than 60 seconds. Each peak is sharp and efficient.


Reduce Peptide Map Analysis Time by 90% with Poroshell 300SB

Column A: Poroshell 300SB-C18
660750-902
2.1 x 75 mm, 5 μ m

Column B: ZORBAX 300SB-C18
883750-902
2.1 x 150 mm, 5 μ m

Mobile Phase: A: 95% H₂O, 5% ACN, 0.1% TFA
B: 5% H₂O, 95% ACN, 0.07% TFA
Flow Rate: 1 mL/min
0.208 mL/min
Gradient: 0-100% B = 12 min
0-100% B = 120 min
Temperature: 70°C
Sample: 20 μ L (0.22 μ g/1 μ L)
BSA Tryptic Digest
(15 hours, 70 pmol)



A single chromatographic run of a protein tryptic digest can require one hour or more to complete. With Poroshell columns, the same complex separation can be completed in 1/10th the time.

MicroBore Poroshell 300 Columns Provide Maximum Sensitivity for LC/MS

Column: Poroshell 300SB-C18
661750-902
1.0 x 75 mm, 5 µm

Mobile Phase: A: Water + 0.1% Formic Acid
B: ACN + 0.1% Formic Acid

Flow Rate: 600 µL/min

Gradient: 20-100% B in 5.5 min

Temperature: 80°C

MS Conditions: LC/MS: Pos. Ion ESI – Vcap 6000 V

Drying Gas Flow: 12 L/min

Drying Gas Temperature: 350°C

Nebulizer: 45 psi

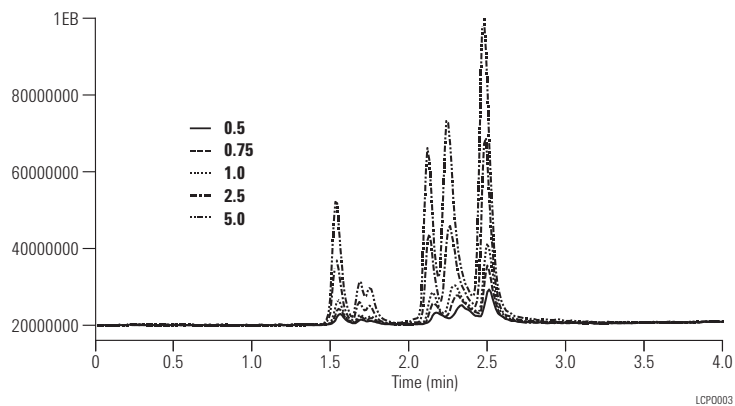
Fragmentor Volatage: 140 V

Scan: 600-2500

Stepsize: 0.15 amu

Peak width: 0.06 min

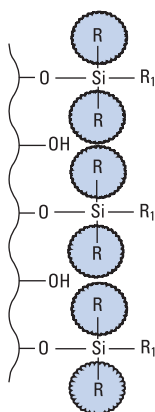
Sample: 1 µL



With narrow bore diameters of 2.1 mm, 1.0 mm, and 0.5 mm, Poroshell columns make an ideal LC/MS partner. When the sample is very limited, the 1.0 mm or 0.5 mm ID Poroshell columns are an excellent choice for high sensitivity LC/MS analyses. Sensitive MS molecular weight determinations are possible with as little as 0.5 to 5 pmole of protein on Poroshell columns. Poroshell columns have also been used for rapid MS identification of intact proteins, even in the presence of stabilizers and tissue culture media.

Poroshell 300

Hardware Description	Size (mm)	Particle Size (µm)	Poroshell 300SB-C18	Poroshell 300SB-C8	Poroshell 300SB-C3	Poroshell 300Extend-C18
Narrow Bore	2.1 x 75	5	660750-902	660750-906	660750-909	670750-902
MicroBore	1.0 x 75	5	661750-902	661750-906	661750-909	671750-902
Capillary	0.5 x 75	5		5065-4468		
Guard Cartridge, 4/pk	2.1 x 12.5	5	821075-920	821075-918	821075-924	
Guard Hardware Kit			820999-901	820999-901	820999-901	
MicroBore Guard, 3/pk	1.0 x 17	5	5185-5968	5185-5968	5185-5968	5185-5968



Sterically Protected 300StableBond Bonded Phase

ZORBAX 300Å StableBond

Agilent ZORBAX 300StableBond columns are an ideal choice for the reproducible separations of proteins and peptides for two key reasons. First, wide-pore, 300Å columns are necessary for an efficient separation of proteins and peptides, or other large molecules, in order to allow these analytes to completely access the bonded phase. Second, 300StableBond columns are unmatched in their durability at low pH, such as with TFA-containing mobile phases typically used for protein and peptide separations. For LC/MS separations at low pH, 300StableBond columns can also be used with formic acid and acetic acid mobile phase modifiers. These columns are available in four different bonded phases (C18, C8, C3, and CN) for selectivity and recovery optimization of proteins and polypeptides. To further increase sample recovery and improve efficiency for difficult proteins, 300StableBond columns can be used up to 80-90°C. 300SB-C18 and 300SB-C8 columns are an ideal choice for complex protein and protein digest separations. These columns are available in capillary (0.3 and 0.5 mm ID) and nano (0.075 and 0.10 mm ID) dimensions for reversed-phase LC/MS separations of protein digests. Capillary and nano columns can be used for either 1-D or 2-D proteomics separations.

Column Specifications

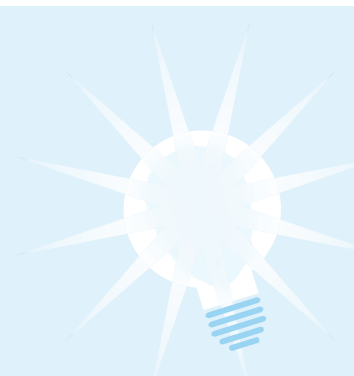
Bonded Phase	Pore Size	Surface Area	Temp. Limits*	pH Range*	Endcapped	Carbon Load
ZORBAX 300SB-C18	300Å	45 m ² /g	90°C	1.0-8.0	No	2.8%
ZORBAX 300SB-C8	300Å	45 m ² /g	80°C	1.0-8.0	No	1.5%
ZORBAX 300SB-C3	300Å	45 m ² /g	80°C	1.0-8.0	No	1.1%
ZORBAX 300SB-CN	300Å	45 m ² /g	80°C	1.0-8.0	No	1.2%

Specifications represent typical values only.

*300StableBond columns are designed for optimal use at low pH. At pH 6-8, highest column stability for all silica-based columns is obtained by operating at temperatures <40°C and using low buffer concentrations in the range of 0.01-0.02 M. At mid or high pH, 300Extend-C18 is recommended.

Tips & Tools

Typical mobile phases for protein and peptide separations combine a very low pH with TFA (or other acids) to solubilize proteins. StableBond columns have extremely long lifetimes under these conditions. They are available in 300Å pore size for proteins up to 100-500 kDa, or 80Å pore size for peptides below 4000 Da.



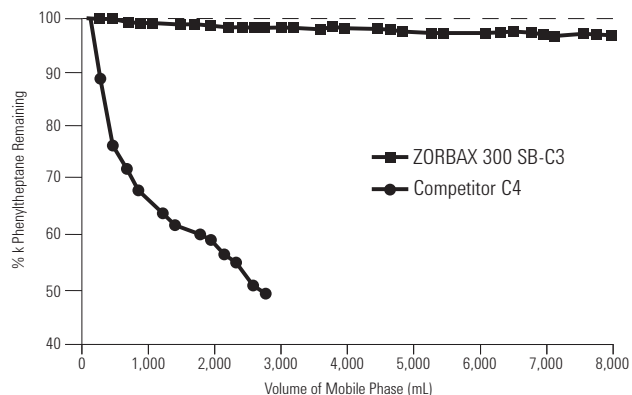
Short-Chain ZORBAX 300SB-C3 is Stable at Low pH, High Temperature

Column: ZORBAX 300SB-C3
883995-909
4.6 x 150 mm, 5 µm

Mobile Phase: Gradients 0-100% B in 80 min
A: 0.5% TFA in Water
B: 0.5% TFA in Acetonitrile

Isocratic Retention Test Conditions:
1-phenylheptane 50% A, 50% B

Flow Rate: 1.0 mL/min
Temperature: 60°C



Four Different 300SB Bonded Phases Optimize Separation of Large Polypeptides

Column A: ZORBAX 300SB-C18
883995-902
4.6 x 150 mm, 5 µm

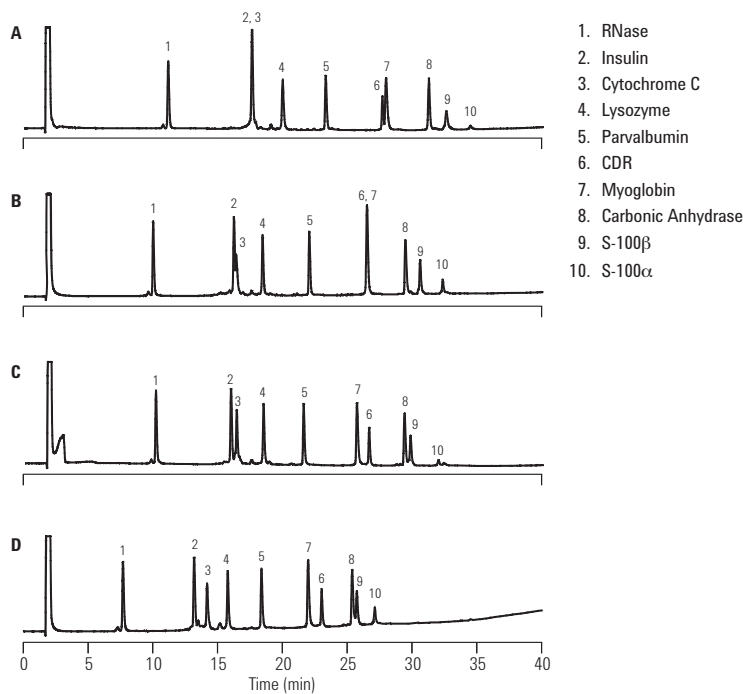
Column B: ZORBAX 300SB-C8
883995-906
4.6 x 150 mm, 5 µm

Column C: ZORBAX 300SB-C3
883995-909
4.6 x 150 mm, 5 µm

Column D: ZORBAX 300SB-CN
883995-905
4.6 x 150 mm, 5 µm

Mobile Phase: Linear Gradient, 25 - 70% B in 40 min
A: 0.1% TFA in Water
B: 0.09% TFA in 80% Acetonitrile/20% Water

Flow Rate: 1.0 mL/min
Temperature: 60°C
Sample: 3 µg each protein



The 300SB-C18, C8, C3, and CN bonded phases all provide a different separation of this group of polypeptides. This adds an important parameter for quickly optimizing protein separations. The 300SB-CN column offers unique selectivity for more hydrophilic polypeptides.

Capillary Columns for HPLC Analyses with UV and MS Detection

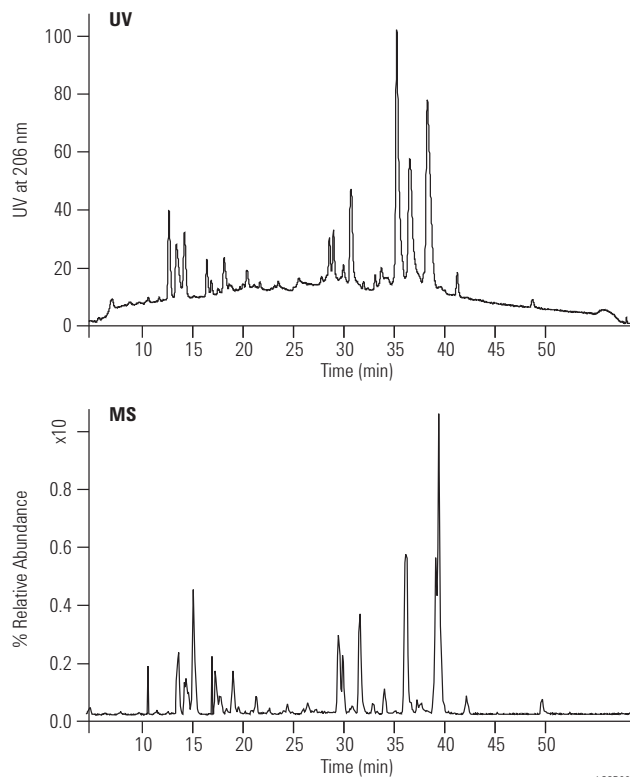
Column: ZORBAX 300SB-C18
 5064-8263
 0.3 x 150 mm, 5 μ m

Mobile Phase: 5-55% B in 50 min, to 85% B from 55-57 min
 A: 0.1% Formic Acid in Water
 B: 0.1% Formic Acid in ACN

Flow Rate: 5.5 μ L/min
Detector: 206 nm
MS Conditions: LC/MS: Pos. Ion ESI with
 LC/MSD trap-Vcap 4000 V
 Drying Gas Flow: 7 L/min
 Drying Gas Temperature: 250°C
 Nebulizer: 15 psi
 Capillary Exit Volt: 50 V
 Max Accum Time: 300 ms
 Total Averages: 3
 Isolation Width: 3 m/z
 Frag Amplitude: 1.0 V

Sample: 100 nL
 Beta Casein Digest (4 pmol)

A ZORBAX 300SB-C18 capillary column (0.3 mm ID) is used for the separation of the protein digest. Detection is by both UV and Electro spray MS. MS detection can be used for identification of peptide fragments.

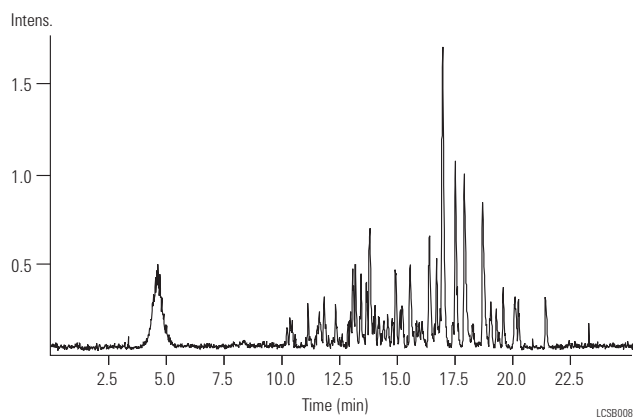

ZORBAX Nano Columns For High Sensitivity Protein Digest Analysis by LC/MS

Column: ZORBAX 300SB-C18
 5065-9911
 0.075 x 150 mm, 3.5 μ m

Mobile Phase: A: Water + 0.1% Formic Acid,
 B: ACN + 0.1% Formic Acid

Flow Rate: 600 nL/min
Gradient: 2% B to 52% B in 25 min
Detector: Positive Ion Nano Electrospray MS
Sample: 100 fm (1 μ l) Digest of 8 Proteins

A ZORBAX nano HPLC column, 0.075 mm ID, is used for high sensitivity LC/MS analysis of a protein digest sample.











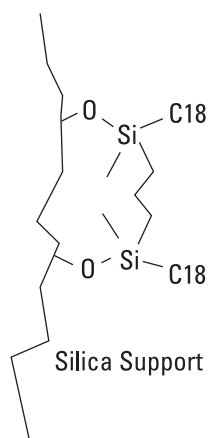
ZORBAX 300Å StableBond

Hardware Description	Size (mm)	Particle Size (µm)	300SB-C18 USP L1	300SB-C8 USP L7	300SB-CN USP L10	300SB-C3 USP L56
Standard Columns (no special hardware required)						
Semi-Preparative	9.4 x 250	5	880995-202	880995-206	880995-205	880995-209
Analytical	4.6 x 250	5	880995-902	880995-906	880995-905	880995-909
Analytical	4.6 x 150	5	883995-902	883995-906	883995-905	883995-909
Analytical	4.6 x 50	5	860950-902	860950-906	860950-905	860950-909
Rapid Resolution	4.6 x 150	3.5	863973-902	863973-906	863973-905	863973-909
Rapid Resolution	4.6 x 100	3.5	861973-902	861973-906		
Rapid Resolution	4.6 x 50	3.5	865973-902	865973-906	865973-905	865973-909
Solvent Saver Plus	3.0 x 150	3.5	863974-302	863974-306		863974-309
Solvent Saver Plus	3.0 x 100	3.5		861973-306		
Narrow Bore	2.1 x 250	5	881750-902			
Narrow Bore	2.1 x 150	5	883750-902	883750-906	883750-905	883750-909
Narrow Bore RR	2.1 x 150	3.5		863750-906		
Narrow Bore RR	2.1 x 100	3.5	861775-902	861775-906		
Narrow Bore RR	2.1 x 50	3.5	865750-902	865750-906		
MicroBore	1.0 x 250	5	861630-902			
MicroBore RR	1.0 x 150	3.5	863630-902	863630-906		
MicroBore RR	1.0 x 50	3.5	865630-902	865630-906		
MicroBore Guard, 3/pk	1.0 x 17	5	5185-5920	5185-5920		
P Guard Cartridge, 2/pk	9.4 x 15	7	820675-124	820675-124	820675-124	820675-124
ZGC Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-921	820950-918	820950-923	820950-924
ZGC Guard Cartridge, 4/pk	2.1 x 12.5	5	821125-918	821125-918	821125-924	821125-924
P Guard Hardware Kit			840140-901	840140-901	840140-901	840140-901
ZGC Guard Hardware Kit			820999-901	820999-901	820999-901	820999-901

(Continued)

ZORBAX 300Å StableBond

Hardware Description	Size (mm)	Particle Size (µm)	300SB-C18 USP L1	300SB-C8 USP L7	300SB-CN USP L10	300SB-C3 USP L56
PrepHT Cartridge Columns (require endfittings kit 820400-901)						
 PrepHT Cartridge	21.2 x 250	7	897250-102	897250-106	897250-105	897250-109
 PrepHT Cartridge	21.2 x 150	7	897150-102	897150-106		897150-109
 PrepHT Cartridge	21.2 x 150	5	895150-902	895150-906		895150-909
 PrepHT Cartridge	21.2 x 100	5	895100-902	895100-906		895100-909
 PrepHT Cartridge	21.2 x 50	5	895050-902	895050-906		895050-909
 PrepHT endfittings, 2/pk			820400-901	820400-901	820400-901	820400-901
 PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-921	820212-918	820212-924	820212-924
 Guard Cartridge Hardware			820444-901	820444-901	820444-901	820444-901
Capillary Glass-lined Columns						
Capillary	0.5 x 250	5	5064-8266			
Capillary	0.5 x 150	5	5064-8264			
Capillary	0.5 x 35	5	5064-8294			
Capillary RR	0.5 x 150	3.5	5064-8268			
Capillary RR	0.5 x 35	3.5	5065-4459			
Capillary	0.3 x 250	5	5064-8265			
Capillary	0.3 x 150	5	5064-8263			
Capillary	0.3 x 35	5	5064-8295			
Capillary RR	0.3 x 150	3.5	5064-8267	5065-4460		
Capillary RR	0.3 x 100	3.5	5064-8259	5065-4461		
Capillary RR	0.3 x 35	3.5	5064-8270	5065-4462		
Capillary RR	0.3 x 50	3.5	5064-8300	5065-4463		
Nano Columns (PEEK fused silica)						
Nano RR	0.1 x 150	3.5	5065-9910			
Nano RR	0.075 x 150	3.5	5065-9911			
Nano RR	0.075 x 50	3.5	5065-9924	5065-9923		
Trap/Guard, 5/pk	0.3 x 5	5	5065-9913	5065-9914		
Trap/Guard Hardware kit			5065-9915	5065-9915		



Novel Bidentate C18-C18 Bonding for Extend-C18 Bonded Phase

ZORBAX 300Å Extend-C18

- Rugged, high and low pH separations of polypeptides and peptides from pH 2-11.5
- Different selectivity possible at high and low pH
- High efficiency and good recovery of hydrophobic peptides at high pH
- Ideal for LC/MS with ammonium-hydroxide-modified mobile phase

Agilent ZORBAX 300Extend C-18 is a wide-pore HPLC column for high efficiency separations of peptides from pH 2-11.5. The unique, bidentate bonded phase provides excellent lifetime and reproducibility at high and low pH. At high pH, retention and selectivity of peptides and polypeptides can change dramatically as a result of changes in charge on molecules. Excellent recoveries of hydrophobic polypeptides have been achieved at room temperature and high pH. LC/MS sensitivity of peptides and polypeptides can also be improved at high pH using a simple ammonium-hydroxide-containing mobile phase.

Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits*	pH Range	Endcapped	Carbon Load
ZORBAX 300Extend-C18	300Å	45 m ² /g	60°C	2.0-11.5	Double	4%

Specifications represent typical values only.

*Temperature limits are 60°C up to pH 8, 40°C from pH 8-11.5.

Long Life at High pH with 300Extend-C18

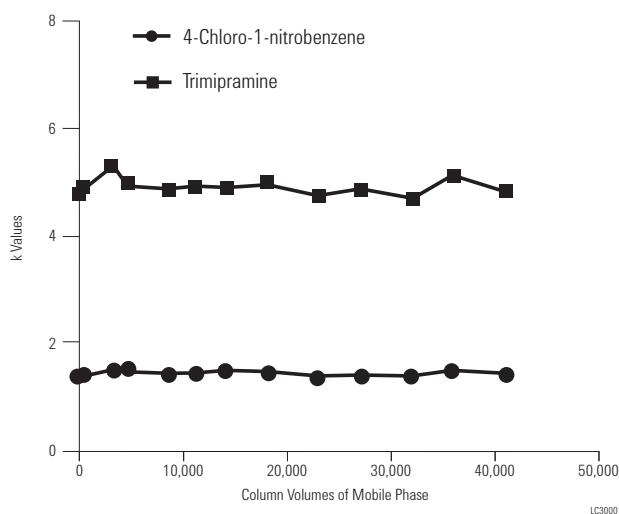
Column: ZORBAX Extend-C18
773450-902
4.6 x 150 mm, 5 µm

Mobile Phase: 20% 20 mM NH₄OH, pH 10.5
80% Methanol

Flow Rate: 1.5 mL/min

Temperature: Aging 24°C
Tests 40°C

Each 10,000 column volume is approximately one working month.



LC30001

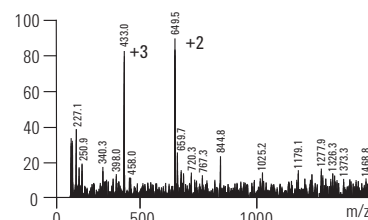
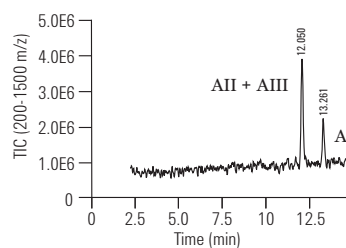
LC/MS Analysis of Angiotensin on Extend-C18

Column: ZORBAX Extend-C18
773700-902
2.1 x 150 mm, 5 µm

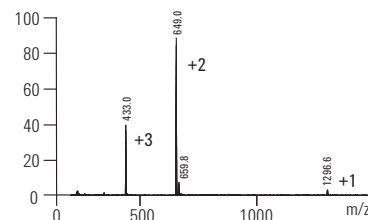
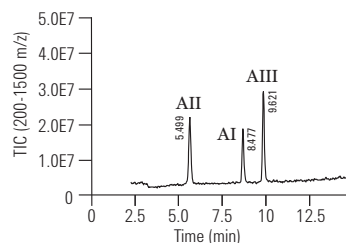
Mobile Phase: Acidic Conditions:
A: 0.1% TFA in water
B: 0.085% TFA in 80% acetonitrile (ACN)
Basic Conditions:
A: 10 mM NH₄OH in water
B: 10 mM NH₄OH in 80% ACN

Flow Rate: 0.2 mL/min
Gradient: 15-50% B in 15 min
Temperature: 35°C
MS Conditions: Pos. Ion ESI- Vf 70 V, Vcap 4.5 kV,
N2- 35 psi, 12 L/min., 325°C
Sample: 2.5 µL sample (50 pmol each)
Angiotensin I, II, III

A
Angiotensin I
Max: 10889
Low pH



B
Angiotensin I
Max: 367225
High pH






LC30003

Both small and large peptides demonstrate selectivity changes at high and low pH. At high pH, due to a change in charge, all three Angiotensins can be resolved. In addition, the spectral clarity of Angiotensin I is dramatically improved at high pH with the ammonium hydroxide mobile phase. The Extend-C18 column can be used for the analysis of small peptides at high pH as well.

Reference: B.E. Boyes. Separation and Analysis of Peptides at High pH Using RP-HPLC/ESI-MS, 4th WCBP, San Francisco, CA, Jan. 2000.

ZORBAX 300Å Extend-C18

Hardware	Description	Size (mm)	Particle Size (µm)	Part No.
	Analytical	4.6 x 250	5	770995-902
	Analytical	4.6 x 150	5	773995-902
	Rapid Resolution	4.6 x 150	3.5	763973-902
	Rapid Resolution	4.6 x 100	3.5	761973-902
	Rapid Resolution	4.6 x 50	3.5	765973-902
	Narrow Bore RR	2.1 x 150	3.5	763750-902
	Narrow Bore RR	2.1 x 100	3.5	761775-902
	Narrow Bore RR	2.1 x 50	3.5	765750-902
	Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-932
	Guard Cartridge, 4/pk	2.1 x 12.5	5	821125-932
	Guard Hardware Kit		0	820888-901
Capillary Glass-lined Columns				
	Capillary RR	0.3 x 150	3.5	5065-4464
	Capillary RR	0.3 x 100	3.5	5065-4465
	Capillary RR	0.3 x 75	3.5	5065-4466
	Capillary RR	0.3 x 50	3.5	5065-4467

Tips & Tools

More information is a click away. We have a variety of educational primers, application notes, maintenance guides, and literature available from Agilent for free.

To learn more, visit www.agilent.com/chem/OnlineLibrary



PLRP-S HPLC Columns

- Contain durable and resilient particles that deliver reproducible results over longer lifetimes
- Thermally and chemically stable
- Comply with USP L21 designation
- Used in bioscience, chemical, clinical research, energy, environmental, food and agriculture, material science and pharmaceutical industries

The PLRP-S family of columns consists of a range of pore sizes and particle sizes, all with identical chemistry and fundamental adsorptive characteristics. The particles are inherently hydrophobic, therefore no bonded phase, alkyl ligand is required for reverse phase separations. This gives a highly reproducible material that is free from silanols and heavy metal ions. Columns within the extensive product range are suitable for nano/capillary separations, including both bottom-up and top-down proteomics, analytical separations, and preparative purifications. In addition, process columns can be packed with bulk media.

Column Specifications

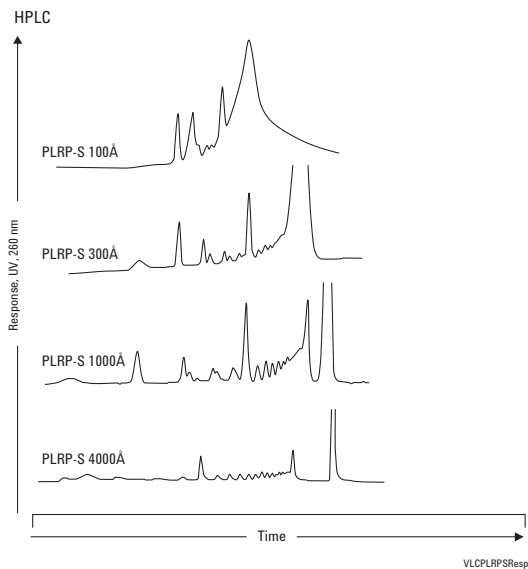
pH Range	1-14
Buffer Content	Unlimited
Organic Modifier	1-100%
Temperature Limits	200°C
Maximum Pressure	5-8 µm: 3000 psi (210 bar) 3 µm: 4000 psi (300 bar)

PLRP-S Applications

Pore Size	Application
100Å	Small molecules/synthetic biomolecules
300Å	Recombinant peptides/proteins
1000Å	Large proteins
4000Å	DNA/high speed

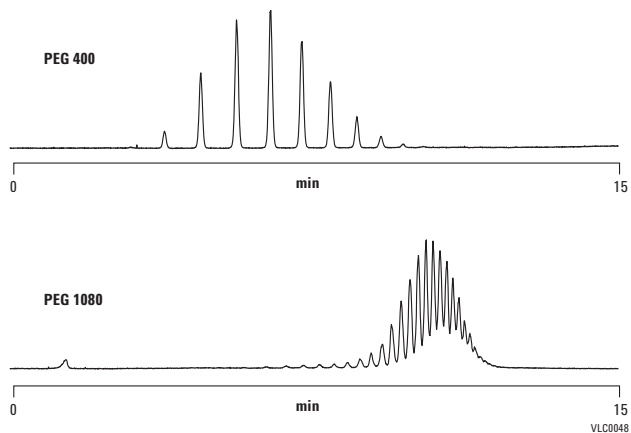
HPLC of 25 bp DNA ladder

Column: PLRP-S, 2.1 x 150 mm
Mobile Phase: A: 0.1 M TEAA
 B: 0.1 M TEAA in 50% water:50% ACN
Flow Rate: 200 μ L/min
Gradient: 12.5-50% B in 150 min



Polyethylene glycols

Column: PLRP-S 100Å
 PL1111-3500
 4.6 x 150 mm, 5 μ m
Mobile Phase: A: Water
 B: ACN
Gradient: 10-30% B in 12 min, held at 30% B for 3 min
Flow Rate: 1.0 mL/min
Injection Volume: 10 μ L
Sample Conc: 1 mg/mL
Detector: ELS (neb=50°C, evap=70°C, gas=1.6 SLM)



**Exploiting chemical stability:
NH₄OH concentration**

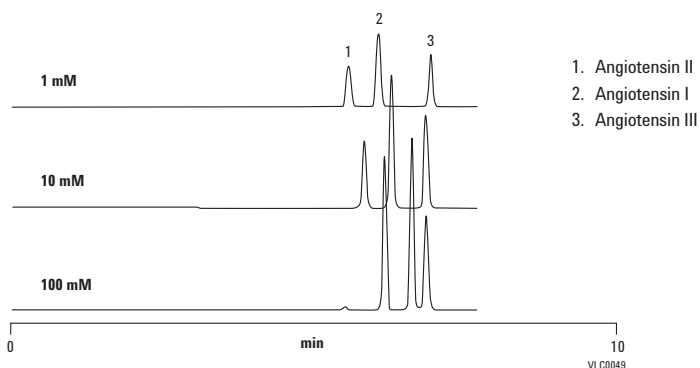
Column: PLRP-S 100Å
PL1512-5500
4.6 x 250 mm, 5 μm

Mobile Phase: A: NH₄OH (various mM) in water
B: NH₄OH (various mM) in ACN

Gradient: Linear 10-100% B in 15 min

Flow Rate: 1.0 mL/min

Detector: ELS (neb=80°C, evap=85°C, gas=1.0 SLM)



Alberta Peptide Institute test mix

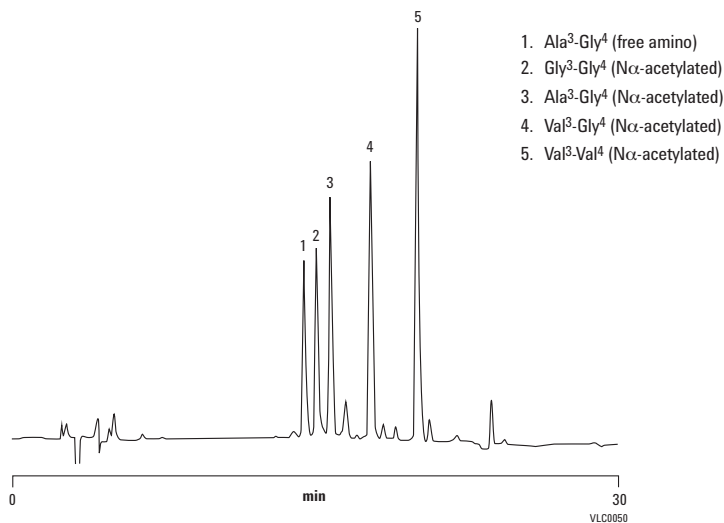
Column: PLRP-S 100Å
PL1512-5500
4.6 x 250 mm, 5 μm

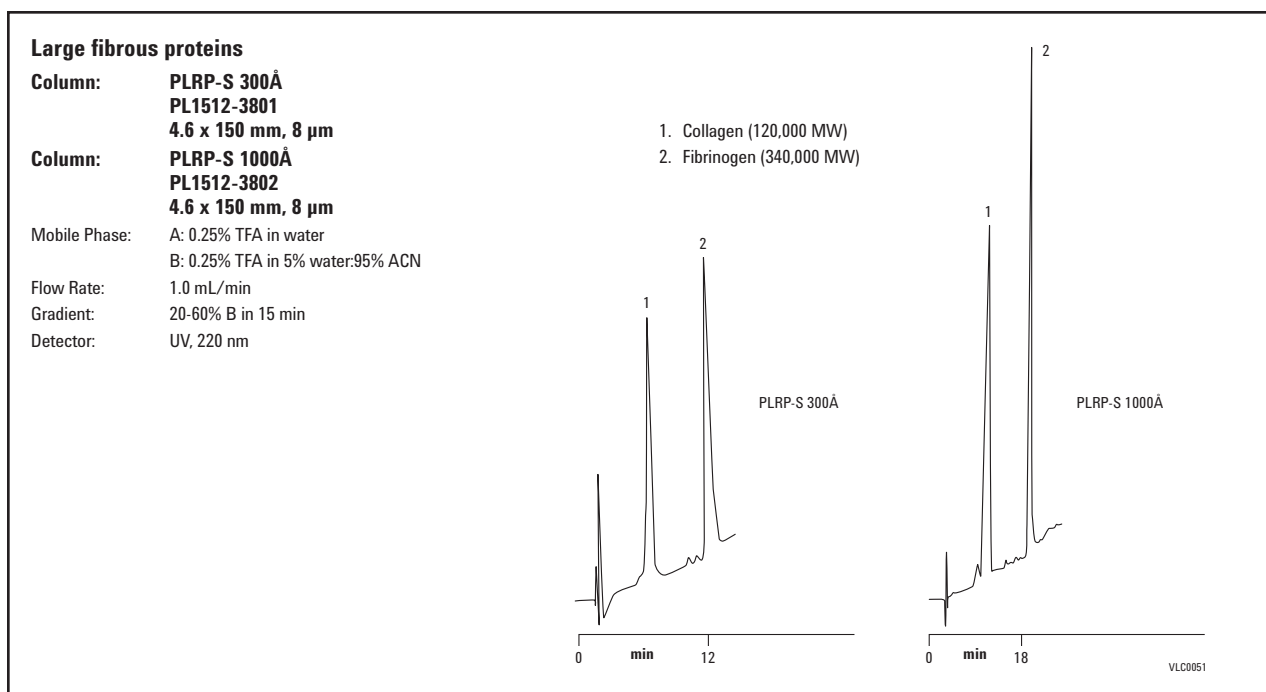
Mobile Phase: A: 0.1% TFA in 99% water:1% ACN
B: 0.1% TFA in 70% water:30% ACN

Gradient: 0-100% B in 30 min

Flow Rate: 1.0 mL/min

Detector: UV, 220 nm





PLRP-S HPLC Columns

Size (mm)	Particle Size (μm)	PLRP-S 100Å	PLRP-S 300Å	PLRP-S 1000Å	PLRP-S 4000Å
4.6 x 250	8	PL1512-5800	PL1512-5801	PL1512-5802	
4.6 x 150	8	PL1512-3800	PL1512-3801	PL1512-3802	PL1512-3803
4.6 x 50	8		PL1512-1801	PL1512-1802	PL1512-1803
4.6 x 250	5	PL1512-5500	PL1512-5501		
4.6 x 150	5	PL1111-3500	PL1512-3501		
4.6 x 50	5	PL1512-1500	PL1512-1501	PL1512-1502	PL1512-1503
4.6 x 150	3	PL1512-3300	PL1512-3301		
4.6 x 50	3	PL1512-1300	PL1512-1301		
2.1 x 250	8		PL1912-5801		
2.1 x 150	8		PL1912-3801	PL1912-3802	PL1912-3803
2.1 x 50	8		PL1912-1801	PL1912-1802	PL1912-1803
2.1 x 250	5	PL1912-5500	PL1912-5501		
2.1 x 150	5	PL1912-3500	PL1912-3501		
2.1 x 50	5	PL1912-1500	PL1912-1501	PL1912-1502	PL1912-1503
2.1 x 150	3	PL1912-3300	PL1912-3301		
2.1 x 50	3	PL1912-1300	PL1912-1301		
PLRP-S Guard Cartridges for 5 x 3 mm, 2/pk		PL1612-1801	PL1612-1801	PL1612-1801	PL1612-1801
Guard cartridge holder for 5 x 3 mm cartridges		PL1310-0016	PL1310-0016	PL1310-0016	PL1310-0016



Capillary, Nano and MicroBore Columns

ZORBAX Capillary and Nano

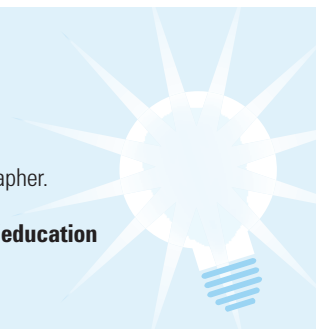
- Highest sensitivity for your smallest sample sizes
- Compatible with all LC/MS interfaces
- Internal diameters of 0.5, 0.3, 0.1, and 0.075 mm
- Packings/phases for both small and large molecules (80Å and 300Å pore sizes, respectively)
- Ideal for 1-D and 2-D (proteomics) applications

Agilent ZORBAX Capillary (0.5 and 0.3 mm ID) and Nano (0.1 and 0.075 mm ID) columns are now available in a wide variety of phases, pore sizes, and dimensions. These columns are ideal for very sample-limited applications because they provide enhanced sensitivity by reducing on-column sample dilution. This high sensitivity can be provided with exceptional reproducibility using Agilent columns and low dispersion HPLC instruments. The fastest growing application for capillary and nano columns is 2-D LC/MS for complex proteomics samples. Agilent provides all the columns needed for the 2-D separation – the SCX columns for the first dimension, the reversed-phase trapping column, and the reversed-phase column for the second dimension.

Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatographer.

For more information, visit www.agilent.com/chem/education



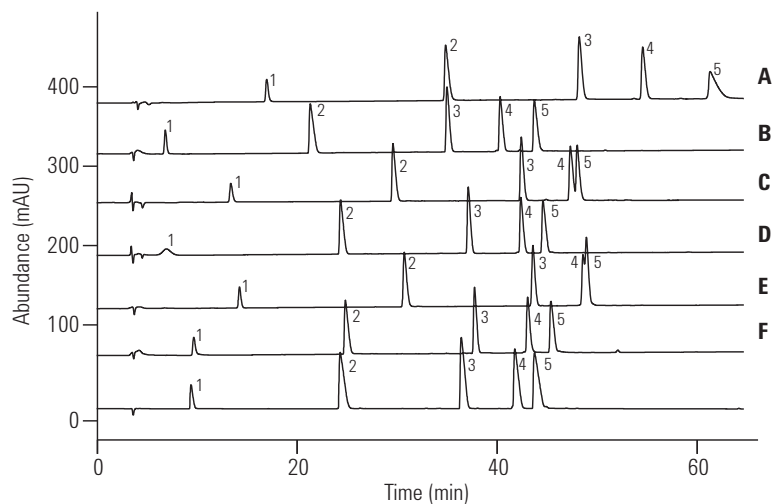
Separation of Peptides on Capillary Columns

Column A:	ZORBAX 300SB-C8 5065-4460 0.3 x 150 mm, 3.5 µm	Column D:	ZORBAX SB-C18 5064-8255 0.3 x 150 mm, 5 µm
Column B:	ZORBAX Eclipse XDB-C18 5064-8291 0.3 x 150 mm, 5 µm	Column E:	ZORBAX 300SB-C18 5064-8267 0.3 x 150 mm, 3.5 µm
Column C:	ZORBAX Eclipse XDB-C18 5064-8291 0.3 x 150 mm, 5 µm	Column F:	ZORBAX 300Extend-C18 5065-4464 0.3 x 150 mm, 3.5 µm

Mobile Phase: Water + 0.05% TFA, pH = 2.2 = A
Acetonitrile + 0.045% TFA = B
Gradient 0.5% B/min at 0 min = 1% B,
at 60 min = 31% B, at 70 min = 50% B, at 75 min = 85% B,
at 80 min = 85% B, at 81 min = 1% B, at 110 min = 1% B

Flow Rate: 5.5 µL/min
Low Solvent Consumption:
200-500 µL/min
Temperature: 30°C
Detector: 206/10 nm, ref 450/80 nm

Sample: 0.1 µL, automatic delay
volume reduction was
activated Peptides



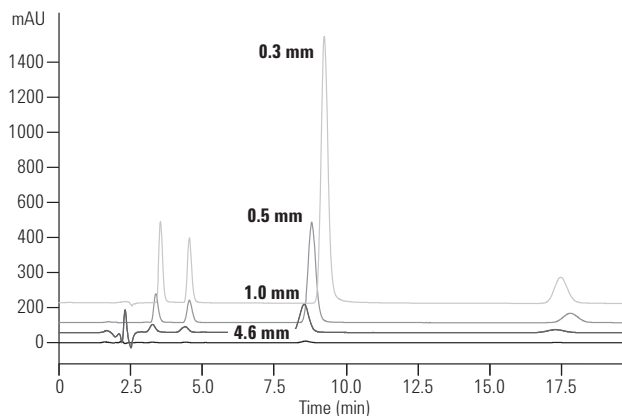
1. Gly-Tyr, 5 ng/100 nL
2. Val-Tyr-Val, 20 ng/100 nL
3. Met Enkephalin, 28 ng/100 nL
4. Low Enkephalin, 20 ng/100 nL
5. Angiotensin II, 20 ng/100 nL

This example shows a peptide standard mixture separated on a variety of ZORBAX capillary columns. These chromatograms demonstrate the wide range of selectivities available, which can be used to optimize your specific separation.

LCCN001

High Sensitivity with Capillary Columns

Column:	ZORBAX SB-C18 5064-8255 0.3 x 150 mm, 5 µm
Column:	ZORBAX SB-C18 5064-8256 0.5 x 150 mm, 5 µm
Column:	ZORBAX SB-C18 863600-902 1.0 x 150 mm, 3.5 µm
Column:	ZORBAX SB-C18 883975-902 4.6 x 150 mm, 5 µm
Sample:	200 ng Biphenyl



LCCN002

Sample-limited applications require capillary column dimensions to minimize on-column sample dilution and to enhance sensitivity. The 0.3 mm capillary in this example provides 100 times more sensitivity than the standard 4.6 mm column. Nanobore (0.1 mm-0.075 mm ID) columns can provide up to 2000 times more sensitivity for your most limited sample applications.

Excellent Column-to-Column Reproducibility with Agilent Capillary Columns

Column: ZORBAX SB-C18
5064-8256
0.5 x 150 mm, 5 µm

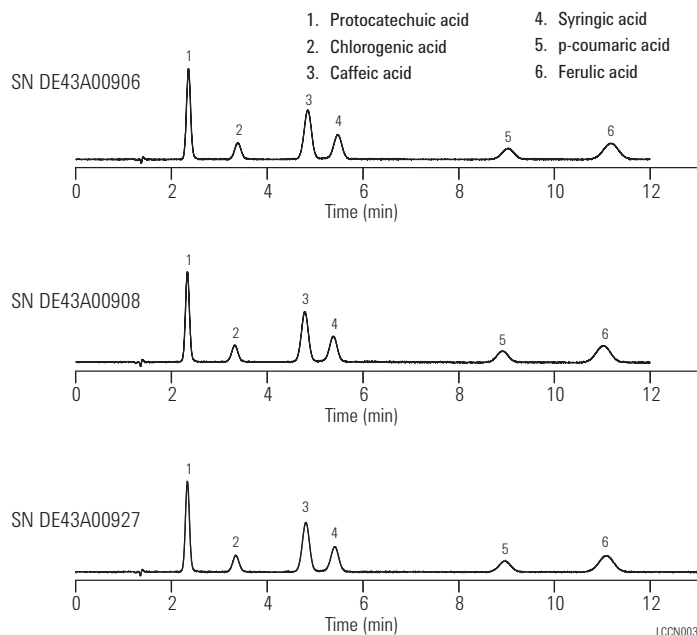
Mobile Phase: A: 75% H₂O with 0.4% formic acid
B: 25% MeOH with 0.4% formic acid

Flow Rate: 20 µL/min

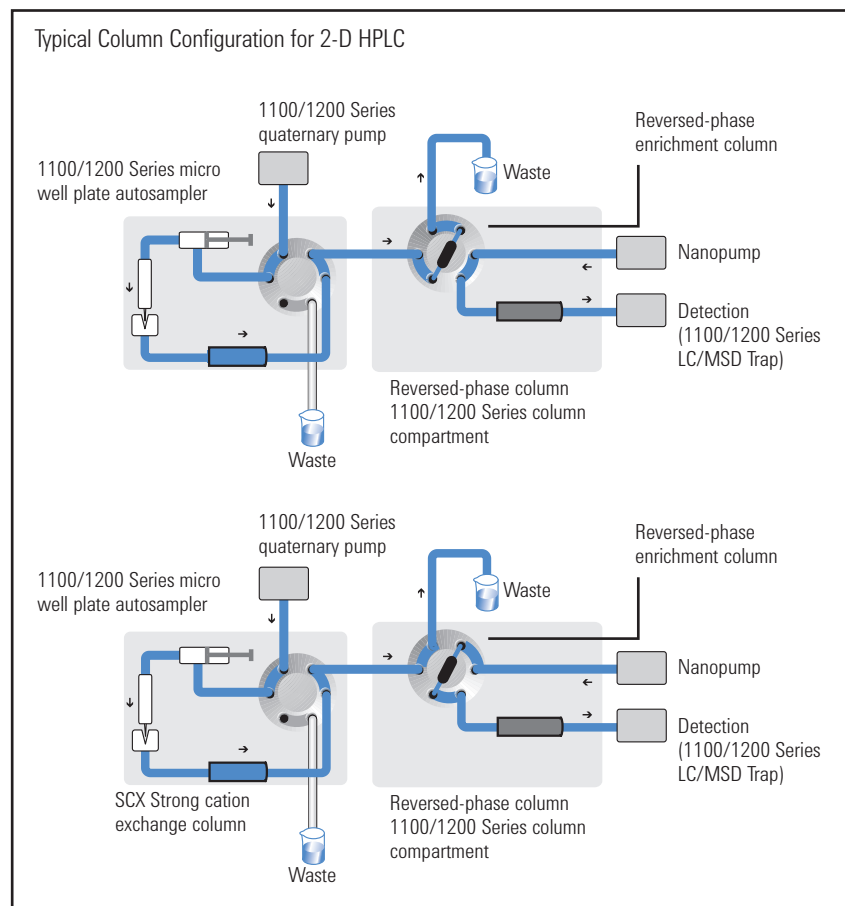
Temperature: 25°C

Sample: 0.1 µL
Polar organic acids

Excellent reproducibility is seen for a separation of polar organic acids on three different StableBond-C18, 0.5 x 150 mm, 5 µm columns. Retention (k) varied less than 0.8% RSD and selectivity (α) varied less than 0.4% RSD.



2-D LC/MS Analyses Using ZORBAX Capillary and Nano LC Columns



Flow path of the Agilent 1100 Series Nanoflow Proteomics Solution system.

1. Sample loading, elution from SCX and trapping on enrichment column
2. Valve switch in column compartment, elution from enrichment column; separation on RP, and MS analysis

Proteins in a Complex Sample by 2-D HPLC with Nano HPLC Columns

Column: ZORBAX 300SB-C18
5065-9913
0.3 x 5 mm, 5 µm

Column: ZORBAX 300SB-C18
5065-9911
0.075 x 150 mm, 3.5 µm

Mobile Phase: Quaternary Pump: 3% Acetonitrile/0.1% Formic Acid
Nanopump: A = Water, 0.1% Formic Acid, B = ACN, 0.1% Formic Acid

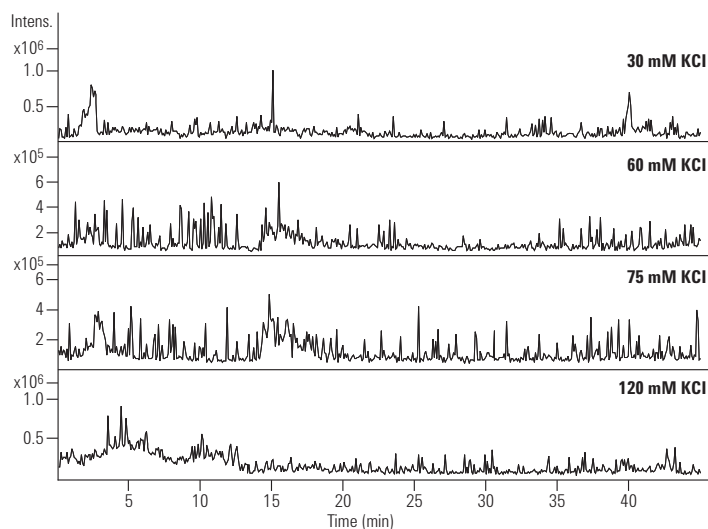
Flow Rate: Quaternary Pump: 30 µL/min
Nanopump: 300 nL/min

Gradient: Quaternary Pump: Isocratic
Nanopump:
6 min = 3% B, 120 min = 60% B, 125 min = 80% B,
130 min = 80% B, 131 min = 3% B, 140 min = 3% B

MS Conditions: Source: Nano ESI, drying gas flow: 5 L/min, drying gas temp: 225°C
Ion Trap: Skim: 1:35 V, cap exit offset: 115 V, octopole 1:12 V, octopole 2:3.5 V,
trap drive: 80 V. ICC: on, averages: 4, max accu time: 150 ms; target 60,000,
ion mode positive, MS/MS mode.

Sample: Tryptic Digest of bovine serum albumin
Volume: 1 to 8 µL
Salt Step Elution: 8 mL of 10 mM-100 mM KCl (10 mM increments), 125 mM,
150 mM, 200 mM, 300 mM, 500 mM, 1 M.

Tryptic digest of bovine serum albumin (BSA). The base peak chromatograms show a selection of fractions from a 2-D HPLC separation. Single chromatograms represent peptides from BSA eluting at a given salt concentration followed by enrichment and reversed-phase chromatography.



LCCN004

ZORBAX HPLC Capillary Columns (glass-lined stainless steel)

Description	Size (mm)	Particle Size (µm)	Eclipse			Poroshell		300Extend	Bio-SCX
			SB-C18	XDB-C18	300SB-C18	300SB-C8	300SB-C8	C18	Series II
Capillary	0.8 x 50	3.5							5065-9942
Capillary	0.5 x 250	5	5064-8258	5064-8286	5064-8266				
Capillary	0.5 x 150	5	5064-8256	5064-8287	5064-8264				
Capillary	0.5 x 75	5					5065-4468		
Capillary	0.5 x 35	5	5064-8254	5064-8296	5064-8294				
Capillary RR	0.5 x 35	3.5	5064-8260	5064-8298	5065-4459				
Capillary	0.3 x 250	5	5064-8257	5064-8269	5064-8265				
Capillary	0.3 x 150	5	5064-8255	5064-8291	5064-8263				
Capillary	0.3 x 35	5	5064-8253	5064-8297	5064-8295				
Capillary	0.3 x 35	3.5							5065-9912
Capillary RR	0.3 x 150	3.5	5064-8261	5064-8271	5064-8267	5065-4460		5065-4464	
Capillary RR	0.3 x 100	3.5			5064-8259	5065-4461		5065-4465	
Capillary RR	0.3 x 75	3.5			5064-8270	5065-4462		5065-4466	
Capillary RR	0.3 x 50	3.5			5064-8300	5065-4463		5065-4467	
Replacement Screens, 10/pk			5065-4427	5065-4427	5065-4427	5065-4427	5065-4427	5065-4427	

ZORBAX Nano HPLC Columns (PEEK)

Description	Size (mm)	Particle Size (µm)	300SB-C18 USP L1	300SB-C8 USP L7
Nano RR	0.1 x 150	3.5	5065-9910	
Nano RR	0.075 x 150	3.5	5065-9911	
Nano RR	0.075 x 50	3.5	5065-9924	5065-9923
Trap/Guard, 5/pk	0.3 x 5	5	5065-9913	5065-9914
Trap/Guard Hardware kit			5065-9915	5065-9915

ZORBAX MicroBore (1.0 mm ID)

- High sensitivity for small sample sizes
- Compatible with LC/MS interfaces
- Wide variety of bonded phases

Agilent ZORBAX MicroBore (1.0 mm ID) columns are often a good choice when sample sizes are limited. They can improve detection limits 5 times over 2.1 mm ID columns when the same sample mass is used. This increase in sensitivity can be critical. MicroBore columns use low flow rates (typically ~ 50 $\mu\text{L}/\text{min}$). Therefore, these columns are ideal for use with detectors requiring low flow rates such as some mass spectrometers and with capillary LC systems.

MicroBore columns perform optimally with HPLC systems purchased or modified for microbore use. A wide variety of bonded phases is available for use up to 400 bar including StableBond SB-C18, SB-C8, 300SB-C18; Eclipse XDB-C18 and XDB-C8; Bonus RP, Extend C-18; and Poroshell columns. Guard columns are also now available with an adjustable tube stop depth to provide a perfect zero dead volume connection every time.

**Separation of a Tryptic Digest
on ZORBAX MicroBore 300SB-C18**

Column: ZORBAX 300SB-C18
863630-902
1.0 x 150 mm, 3.5 μm

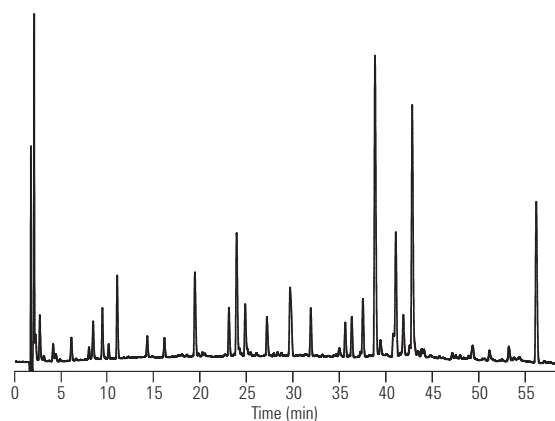
Mobile Phase: Gradient: 2-60% B in 60 Min.
A: 0.1% TFA
B: 0.075% TFA/80% ACN

Flow Rate: 50 $\mu\text{L}/\text{min}$

Temperature: 50°C

Detector: 215 nm

Sample: 2 μL
Tryptic Digest of rhGH



This example of a tryptic digest separated on a MicroBore column demonstrates the high sensitivity and resolution possible with 1.0 mm ID columns.

ZORBAX MicroBore (1.0 mm ID)

Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1	SB-C8 USP L7	300SB-C18 USP L1	300SB-C8 USP L7
MicroBore	1.0 x 250	5			861630-902	
MicroBore RR	1.0 x 150	3.5	863600-902	863600-906	863630-902	863630-906
MicroBore RR	1.0 x 50	3.5	865600-902	865600-906	865630-902	865630-906
MicroBore RR	1.0 x 30	3.5	861600-902	861600-906		
MicroBore Guard, 3/pk	1.0 x 17	5	5185-5920	5185-5920	5185-5920	5185-5920

Description	Size (mm)	Particle Size (µm)	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7	Bonus-RP USP L60	Extend-C18 USP L1
MicroBore RR	1.0 x 150	3.5	963600-902	963600-906	863608-901	763600-902
MicroBore RR	1.0 x 50	3.5	965600-902	965600-906	865608-901	765600-902
MicroBore RR	1.0 x 30	3.5	961600-902	961600-906	861608-901	761600-902
MicroBore Guard, 3/pk	1.0 x 17	5	5185-5921	5185-5921	5185-5922	5185-5923

Description	Size (mm)	Particle Size (µm)	Poroshell 300SB-C18	Poroshell 300SB-C8	Poroshell 300SB-C3	Poroshell 300Extend-C18
MicroBore	1.0 x 75	5	661750-902	661750-906	661750-909	671750-902
MicroBore Guard, 3/pk	1.0 x 17	5	5185-5968	5185-5968	5185-5968	

Preparative HPLC Columns

PLRP-S for Reverse Phase Prep to Process

- Discovery stage to multi-kg cGMP production reduces method development time
- Chemical stability for separations, sanitation and regeneration increases selectivity and column lifetime
- Single batch packing of multiple columns reduces system down time and validation costs

The PLRP-S media, rigid poly(styrene/divinylbenzene) particles, are available in a range of pore sizes for small molecule, synthetic biomolecule and macromolecule purification. Their thermal and chemical stability makes them ideal for purifications that require extreme conditions for sample preparation, compound elution and column regeneration.

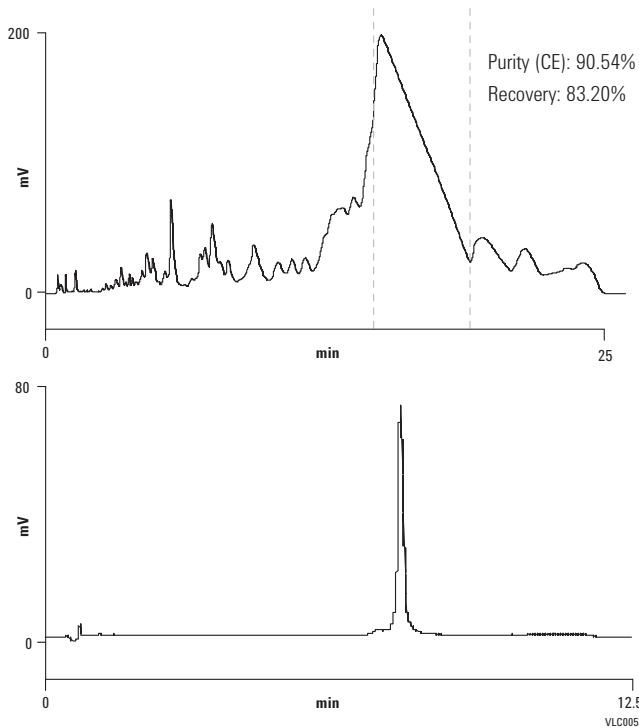
Capacity and resolution are two key parameters for maximizing the throughput of a purification. With a wide choice of pore sizes and extended range of operating conditions, PLRP-S provides more options to achieve the optimum process. Particle sizes range from 3 μm to 50 μm for scale-up from the $\mu\text{g}/\text{mg}$ discovery stage to multi-kg cGMP production. Excellent chemical stability, up to 1 M NaOH, permits sanitation and regeneration that increase column lifetime. Finished product batch sizes of up to 600 L are available, providing single batch packing of multiple columns.

As part of our commitment to quality and continuity of supply, all manufacturing is carried out under a fully documented process. A Type II Drug Master File and regulatory support files are available for process materials, and facility audits are routinely conducted.

PLRP-S Prep to Process Application Guide

Application	PLRP-S Media Pore Size			
	100Å	300Å	1000Å	4000Å
Synthetic biomolecules, peptides and oligonucleotides	◆	◆		
Recombinant biomolecules, peptides and proteins	◆	◆		
Large biomolecules, antibodies, DNA fragments			◆	◆
Small molecules, unstable compounds including metal sensitivity	◆			

Purification of a 25mer trityl-off oligonucleotide and analytical quantitation of the fraction using PLRP-S 100Å, 4.6 x 50 mm



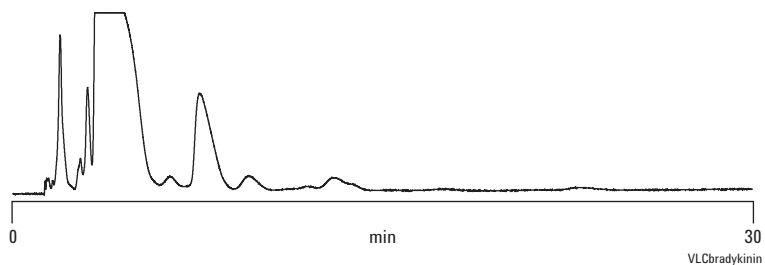
Crude bradykinin prep load

Column: PLRP-S 100Å
PL1512-5100
4.6 x 250 mm, 10 µm

Sample: 30 µL containing 1.5 mg of crude peptide

Mobile Phase: 0.1% TFA in 21% ACN:79% water

Flow Rate: 1 mL/min (360 cm/hr)



Prep to Process PLRP-S

Size (mm)	Particle Size (µm)	PLRP-S 100Å	PLRP-S 300Å	PLRP-S 1000Å	PLRP-S 4000Å
50 x 300	8	PL1712-6800	PL1712-6801		
50 x 150	30			PL1712-3702	PL1712-3703
50 x 150	15-20	PL1712-3200	PL1712-3201		
50 x 150	10-15	PL1712-3400	PL1712-3401		
50 x 150	10	PL1712-3100	PL1712-3101	PL1712-3102	PL1712-3103
50 x 150	8	PL1712-3800	PL1712-3801		
25 x 300	15-20	PL1212-6200	PL1212-6201		
25 x 300	10-15	PL1212-6400	PL1212-6401		
25 x 300	10	PL1212-6100	PL1212-6101		
25 x 300	8	PL1212-6800	PL1212-6801		
25 x 150	30			PL1212-3702	PL1212-3703
25 x 150	10	PL1212-3100	PL1212-3101	PL1712-3102	PL1712-3103
25 x 150	8	PL1212-3800	PL1212-3801		
25 x 50	10			PL1212-1102	PL1212-1103

Prep to Process Evaluation PLRP-S

4.6 x 250	30			PL1512-5702	PL1512-5703
4.6 x 250	15-20	PL1512-5200	PL1512-5201		
4.6 x 250	10-15	PL1512-5400	PL1512-5401		
4.6 x 250	10	PL1512-5100	PL1512-5101	PL1512-5102	PL1512-5103
4.6 x 250	8	PL1512-5800	PL1512-5801		
4.6 x 150	30			PL1512-3702	PL1512-3703
4.6 x 150	15-20	PL1512-3200	PL1512-3201		
4.6 x 150	10-15		PL1512-3401		
4.6 x 150	10	PL1512-3100	PL1512-3101	PL1512-3102	PL1512-3103
4.6 x 150	8	PL1512-3800	PL1512-3801		

PLRP-S Bulk Media

Particle Size (µm)	Unit	PLRP-S 100Å	PLRP-S 200Å	PLRP-S 300Å	PLRP-S 1000Å	PLRP-S 4000Å
50	1 kg	PL1412-6K00	PL1412-6K05	PL1412-6K01	PL1412-6K02	
	100 g	PL1412-4K00	PL1412-4K05	PL1412-4K01	PL1412-4K02	
30	1 kg				PL1412-6702	PL1412-6703
	100 g				PL1412-4702	PL1412-4703
15-20	1 kg	PL1412-6200		PL1412-6201		
	100 g	PL1412-4200		PL1412-4201		
10-15	1 kg	PL1412-6400		PL1412-6401		
	100 g	PL1412-4400		PL1412-4401		
10	1 kg	PL1412-6100		PL1412-6101	PL1412-6102	PL1412-6103
	100 g	PL1412-4100		PL1412-4101	PL1412-4102	PL1412-4103
8	1 kg	PL1412-6800		PL1412-6801		

PL-SAX and PL-SCX for Prep to Process

- Ion exchange purifications over a wider pH range extend applications
- HPLC flow rates and rapid equilibration reduce purification cycle times
- Large pore size for improved mass transfer delivers high speed, high resolution purifications

These rigid, strong ion exchange materials are extremely hydrophilic and are designed for purification of biomolecules. The PL-SAX and PL-SCX materials are totally polymeric and are chemically and thermally stable over a full range of HPLC conditions. The strong ion exchange functionalities, covalently linked to a chemically stable polymer, facilitate ion exchange purifications over a wider pH range. This stability can be exploited for column sanitation and clean-up. Thermal stability also enables the use of denaturing conditions and stabilizing/solubilizing agents for the purification of target compounds that may associate or degrade under the purification conditions, such as the purification of synthetic oligonucleotides with self-complementary sequences.

Both the 1000Å and 4000Å wide-pore materials are mechanically stable and robust and can be operated over a wide range of linear velocities, with fast loading of dilute solutions and wash cycles. HPLC flow rates and rapid equilibration reduces purification cycle times.

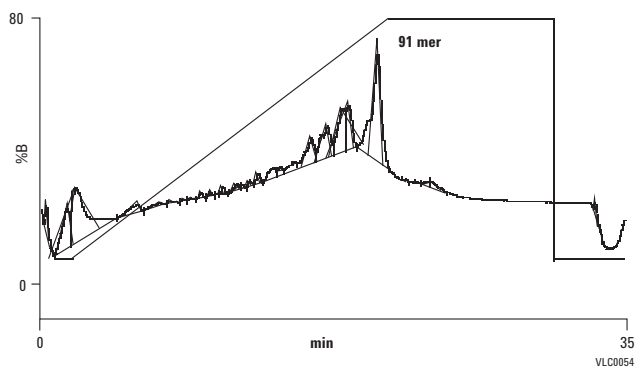
Packing in dynamic axial compression (DAC) column hardware is straightforward and high efficiency columns are achieved with excellent reproducibility and lifetimes. The 1000Å pore size is for high-capacity purifications and the 4000Å gigaporous particles with improved mass transfer are intended for large biomolecules and high-speed, high-resolution purifications.

Column Specifications

	PL-SAX	PL-SCX
Matrix	Fully polymeric	Fully polymeric
Pore Sizes	1000Å, 4000Å	1000Å, 4000Å
Particle Sizes	10 µm, 30 µm	10 µm, 30 µm
Bead Form	Rigid spherical	Rigid spherical
Functionality	Quaternary amine	Sulfonic acid
Pressure Stability	3000 psi	3000 psi
Temperature Stability	80°C	80°C
pH Range	1 to 14	1 to 14
Eluent Compatibility	All anion exchange buffers	All cation exchange buffers
Packed Bed Density	0.39 g/mL	0.39 g/mL

Purification of a large oligonucleotide

Column: PL-SAX 1000Å, 8 µm
Mobile Phase: A: 93% 0.1 M TEAA, pH 7.7% ACN
 B: 93% 0.1 M TEAA, 3.24 M ammonium acetate, pH 7.7% ACN
Gradient: 0-100% B in 20 min
Flow Rate: 1.5 mL/min
Temperature: 60°C
Detector: UV, 290 nm


Prep to Process PL-SAX and PL-SCX

Dimensions	Particle Size (µm)	PL-SAX 1000Å	PL-SAX 4000Å	PL-SCX 1000Å	PL-SCX 4000Å
100 x 300	30	PL1851-3102	PL1851-3103	PL1845-3102	PL1845-3103
100 x 300	10	PL1851-2102	PL1851-2103	PL1845-2102	PL1845-2103
50 x 150	30	PL1751-3702	PL1751-3703	PL1745-3702	PL1745-3703
50 x 150	10	PL1751-3102	PL1751-3103	PL1745-3102	PL1745-3103
25 x 150	30	PL1251-3702	PL1251-3703	PL1245-3702	PL1245-3703
25 x 150	10	PL1251-3102	PL1251-3103	PL1245-3102	PL1245-3103
25 x 50	10	PL1251-1102	PL1251-1103	PL1245-1102	PL1245-1103
7.5 x 150	8	PL1151-3802	PL1151-3803		
7.5 x 50	8	PL1151-1802	PL1151-1803	PL1145-1802	PL1145-1803
4.6 x 250	30	PL1551-5702	PL1551-5703	PL1545-5702	PL1545-5703
4.6 x 250	10	PL1551-5102	PL1551-5103	PL1545-5102	PL1545-5103
4.6 x 150	30	PL1551-3702	PL1551-3703	PL1545-3702	PL1545-3703
4.6 x 150	10	PL1551-3102	PL1551-3103	PL1545-3102	PL1545-3103

PL-SAX and PL-SCX Bulk Media

Particle Size (µm)	Unit	PL-SAX 1000Å	PL-SAX 4000Å	PL-SCX 1000Å	PL-SCX 4000Å
30	1 kg	PL1451-6702	PL1451-6703	PL1445-6702	PL1445-6703
	100 g	PL1451-4702	PL1451-4703	PL1445-4702	PL1445-4703
10	1 kg	PL1451-6102	PL1451-6103	PL1445-6102	PL1445-6103
	100 g	PL1451-4102	PL1451-4103	PL1445-4102	PL1445-4103

High Efficiency Purification for Biomolecule Separations

- Small column sizes for high-speed media selection, method development and purification
- Comprehensive range of selectivities
- Packed columns and bulk media

Agilent offers a range of high-efficiency, small-particle polymeric HPLC materials. These are pre-packed preparative columns and bulk media for reverse phase, normal phase and ion exchange purification. A range of pore sizes is available that provides maximum capacity for all applications, from small molecules through biological macromolecules.

Biomolecule Separations

Sample	Separation	Column
Synthetic Peptides	Reverse Phase	VariTide RPC
		PLRP-S 100Å, 10 µm
		PLRP-S 300Å, 8 µm
Synthetic Peptides	Anion Exchange	PL-SAX 1000Å, 8 µm
Recombinant Peptides and Proteins	Reverse Phase	PLRP-S 100Å, 10 µm
		PLRP-S 300Å, 8 µm
		PLRP-S 1000Å, 8 µm
	Anion Exchange	PL-SAX 1000Å, 8 µm
	Cation Exchange	PL-SCX 1000Å, 8 µm
Macromolecular Plasmids	Reverse Phase	PLRP-S 4000Å, 8 µm
	Anion Exchange	PL-SAX 4000Å, 8 µm

High Efficiency Purification for Biomolecule Separations

Size (mm)	Particle Size (µm)	PLRP-S 100Å	PLRP-S 300Å	PL-SAX 1000Å	PL-SAX 4000Å	PL-SCX 1000Å	PL-SCX 4000Å	VariTide RPC
100 x 300	10			PL1851-2102	PL1851-2103	PL1845-2102	PL1845-2103	
100 x 300	8	PL1812-6800	PL1812-6801					
50 x 300	8	PL1712-6800	PL1712-6801					
25 x 300	8	PL1212-6800	PL1212-6801					
7.5 x 300	8	PL1112-6800	PL1112-6801	PL1112-6802				
7.5 x 150	8			PL1112-3802				
7.5 x 50	8			PL1112-1802	PL1112-1803			
21.2 x 250								PL1E12-5A05
10 x 250								PL1012-5A05
High Efficiency Bulk Media								
100 g	10	PL1412-4100	PL1412-4101	PL1451-4102	PL1451-4103	PL1445-4102	PL1445-4103	PL1412-4A05
1 kg	10	PL1412-6100	PL1412-6101	PL1451-6102	PL1451-6103	PL1445-6102	PL1445-6103	PL1412-6A05

Peptide Solutions

VariPep Peptide Solutions

VariPep is a cost-effective solution for the production of synthetic peptides. This portfolio of products lets you manage the cost and efficiency of high-volume synthetic peptide production, from μg to g scale. These products provide a solution for peptide houses that manufacture small quantities of hundreds/thousands of peptides where manufacturing time is the economic driving force. VariPep includes the following products:

- **StratoSpheres:** Highest quality supports for peptide synthesis
- **VariTide RPC:** A universal RP-HPLC column for synthetic peptide purification
- **VariPure IPE:** A unique material for ion-pair extraction

Tips & Tools

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StratoSpheres

- Very high yields maximize productivity
- Reduce cost of raw materials
- High reproducibility, batch after batch

From the extensive range of StratoSpheres resins, those designed specifically for solid phase synthesis of peptides have been selected for inclusion in the VariPep portfolio. StratoSpheres particles are manufactured using a proprietary technique, which ensures exceptional control and reproducibility of loading. This has the benefit of giving exceptional yields of peptide product and reducing raw material costs.

Resins are available for producing both peptide acids and peptide amides using Fmoc- and Bmoc-chemistries. To simplify the synthesis, some Stratospheres products can be purchased with the first amino acid pre-attached.

StratoSpheres

Description	Loading (mmol/g: μm)	Unit	Part No.
Peptide Acids			
Boc-chemistry, PL-CMS	1.0: 75-150	5 g	PL1461-1799*
		25 g	PL1461-3799*
Fmoc-chemistry, PL-Wang	0.9: 75-150	5 g	PL1463-1799*
		25 g	PL1463-3799*
Fmoc-chemistry (mild cleavage), PL Cl-Trt-Cl	1.4: 75-150	5 g	PL3473-1799
		25 g	PL3473-3799
Peptide Amides			
Boc-chemistry, PL-MBHA	1.1: 75-150	5 g	PL3484-1799*
		25 g	PL3484-3799*
Fmoc-chemistry, PL-Rink	0.7: 75-150	5 g	PL1467-1799*
		25 g	PL1467-3799*
Fmoc-chemistry (mild cleavage), PL-Sieber	0.6: 75-150	5 g	PL3483-1799
		25 g	PL3483-3799

*Also available with first amino acid attached

VariTide RPC Columns

- A single column to cover the full range of synthetic peptides
- Small particle size for maximum efficiency, even with 1 and 2 in. prep columns
- Bulk media to pack 1 and 2 in. prep columns for the purification of mg to g quantities

VariTide RPC columns and media are part of the VariPep Peptide Solution. This is the recommended option for cost-effective separation and purification of synthetic peptides using generic methods.

VariTide RPC Columns

Size (mm)	Part No.
21.2 x 250	PL1E12-5A05
10 x 250	PL1012-5A05
4.6 x 250	PL1512-5A05

VariTide RPC Bulk Media

Description	Part No.
100 g	PL1412-4A05
1 kg	PL1412-6A05

Crude peptide screen

Column: VariTide RPC
PL1512-5A05
4.6 x 250

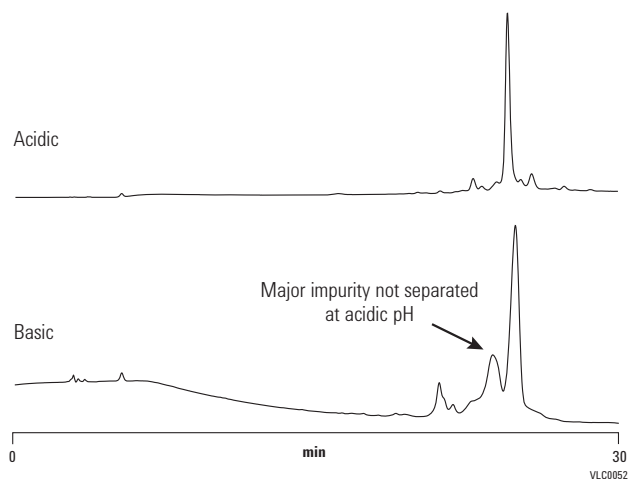
Mobile Phase: **Acidic**
A: 0.1% TFA in 95% water: 5% ACN
B: 0.1% TFA in 50% water: 50% ACN

Basic
A: 5% ACN, 95% 20 mM ammonium
carbonate pH 9.5
B: 50% ACN, 50% 20 mM ammonium
carbonate pH 9.5

Flow Rate: 1.0 mL/min (360 cm/h)

Gradient: 0-100% B in 30 min

Detector: UV, 220 nm



VariPure IPE

- Pre-packed for convenience
- Removal of ion-pairing agents for improved productivity
- High performance and economy for excellent efficiency

VariPure IPE is a polymer-supported quaternary-amine resin with a bicarbonate counter ion, designed for removing acidic ion-pair reagents, such as trifluoroacetic acid (TFA), formic acid or acetic acid. VariPure IPE is a high performance and economical acid removal material conveniently supplied as pre-packed SPE type devices. The particle size, capacity and device geometry are matched to provide sufficient residence time to achieve effective ion-air extraction under gravity flow. For acid labile peptides, removal of the ion-pairing agent prevents acid degradation of the peptide during post-HPLC work-up, and increases the yield of purified product.

VariPure IPE

Loading	Counter-ion Removal Capacity	Unit	Part No.
100 mg per 3 mL tube	~ 5 mL 0.1% TFA	50/pk	PL3540-D603VP
500 mg per 6 mL tube	~ 25 mL 0.1% TFA	50/pk	PL3540-C603VP
1 g per 20 mL tube	~ 50 mL 0.1% TFA	25/pk	PL3540-P603VP
25 g			PL3549-3603VP



Oligo Solutions

StratoSpheres DNA Synthesis Cartridges

- Greater yields of full length products than controlled-pore glass
- Inert support prevents side reactions and improves quality of the end product
- 1000Å pore size permits synthesis of longer oligonucleotide sequences, up to 70mer
- Certificate of Analysis offered for every batch

StratoSpheres DNA Synthesis Cartridges make it easy to obtain high-quality synthetic DNA oligonucleotides. The high-yielding polystyrene packing delivers more full-length product than conventional controlled-pore glass supports. In addition, the hydrophobic nature of the polystyrene promotes coupling and minimizes non-specific binding to maximize production efficiency. These high-throughput cartridges deliver very economical oligonucleotide synthesis, and provide the high performance expected from macroporous polystyrene supports. StratoSpheres DNA synthesis cartridges deliver maximum flexibility in high-throughput environments.

StratoSpheres DNA Cartridges

Description	Size (nmol)	Part No.
StratoSpheres DNA DMT bz dA	40	PL3554-1602dAbz
	200	PL3554-4602dAbz
StratoSpheres DNA DMT bz dC	40	PL3554-1602dCbz
	200	PL3554-4602dCbz
StratoSpheres DNA DMT ac dC	40	PL3554-1602dCac
	200	PL3554-4602dCac
StratoSpheres DNA DMT ibu dG	40	PL3554-1602dGibu
	200	PL3554-4602dGibu
StratoSpheres DNA DMT dmf dG	40	PL3554-1602dGdmf
	200	PL3554-4602dGdmf
StratoSpheres DNA DMT dT	40	PL3554-1602dT
	200	PL3554-4602dT



TOP Cartridges

- Superior yield and purity come from proprietary polymeric resins and optimized buffers
- Typical yield is more than 85% and typical purity is over 90%, eliminating the need for multiple sample-loading steps
- Agilent TOP cartridges use up to two thirds less reagent than products from other vendors

TOP, TOP-DNA and TOP-RNA cartridges provide a high-throughput, simple, cost-effective solution for DNA and RNA oligonucleotide purification. The TOP product range incorporates a unique 96-well plate with removable tubes, streamlined gravity flow or vacuum procedure, and proprietary polymeric resin. Agilent's innovative technology delivers superior yield and purity for standard oligos up to 1 μ mol synthesis scale and up to 150mer in length. Flexibility is assured from a choice of simple gravity flow (for walk-away and low initial setup cost) or vacuum procedure (for fast turnaround – less than 15 minutes for the entire purification process). Up to 10 minutes drying time between each step is permissible with no effect on purification results (drying time after the acetonitrile conditioning step should be kept to a minimum).

TOP-DNA Cartridges

- Fast throughput improves production efficiency
- Pre-HPLC "sample prep" ability maximizes utility
- Gravity (TOP) or vacuum flow (TOP-DNA) ensures flexibility

TOP-DNA is a high-throughput, simple, fast, cost-effective solution that purifies oligos up to 150-mer in length. Its high binding capacity can purify DNA oligos from 200 nmol to 1 μ mol synthesis scales. TOP-DNA can also be used for sample preparation before HPLC purification for very high quality oligos in large-scale analysis. The proprietary polymeric resin is compatible with direct loading of AMA deprotected oligo solutions.

Tips & Tools

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TOP-RNA Cartridges

- A complete solution for RNA oligo purification to enhance productivity
- High throughput and automation friendly, freeing up operator time
- Less reagent use reduces operating costs

With TOP-RNA you can purify short and long RNA oligos, siRNA to 21-mer and long RNA to 60-80 mer. The high binding capacity purifies RNA oligos up to 1 μmol . The proprietary polymeric resin and validated protocol allow deprotection of 2'-hydroxyl group without removal of the 5' trityl group.

TOP, TOP-DNA and TOP-RNA Cartridges

Description	Sorbent Mass (mg)	Volume (mL)	Unit	Part No.
TOP-RNA well plate tubes for 1 μmol scale	100	1.8	96/pk	7573915C
TOP-DNA well plate tubes for 1 μmol scale	150	1.8	96/pk	7572915C
TOP-DNA well plate tubes for 1 μmol scale	150	1.8	20 x 96/pk	7572915B
TOP well plate tubes for 50 nmol scale	25	1.8	96/pk	75719025
TOP well plate tubes for 200 nmol scale	50	1.8	96/pk	75719050
TOP well plate tubes for 200 nmol scale, high capacity	100	1.8	96/pk	7571901C
TOP well plate tubes for 200 nmol scale, vacuum compatible	150	1.8	96/pk	7561915C
TOP well plate tubes for 200 nmol scale, vacuum compatible	150	1.8	15 x 96/pk	7571915B
96-well collection plate		2.0	25/pk	WA77015200
96-well collection plate		750 μL	25/pk	WA77015750
96-well plate sealing mat			50/pk	5133005
Disposable waste tray			25/pk	5133001
TOP reusable base plate				75400001

LC AND LC/MS TROUBLESHOOTING

HPLC Troubleshooting		
Symptom Type	Possible Cause	Solution
Baseline disturbance at void time	Positive/negative – Difference in refractive index of injection solvent	Use mobile phase for sample solvent
Detector leaks	Plugged inlet frit	Replace seals/gaskets
Drifting baseline	Positive direction – Contaminant buildup/elution	Flush column, cleanup sample, use pure solvents
	Positive/negative – Difference in refractive index of injection solvent	Use mobile phase for sample solvent
	Negative direction (gradient) – Absorbance of "A" mobile phase solvent	Use non-absorbing or HPLC-grade or better solvent
	Positive direction (gradient) – Absorbance of "B" mobile phase solvent	Use non-absorbing or HPLC-grade or better solvent
	Random – Temperature changes	Insulate column and tubing
	Random – Temperature changes	Thermostat column and tubing
	Wavy or undulating – Temperature changes in room	Monitor room temperature and control
Ghost peaks	Peaks from previous injection	Flush column to remove contaminants
	Contamination	Sample cleanup or pre-fractionation
	Unknown interferences in samples	Sample cleanup or pre-fractionation
	Ion pair – Upset equilibrium	Prepare sample in actual mobile phase to minimize disturbance
	Peptide mapping – Oxidation of TFA	Prepare fresh daily; use anti-oxidant
	Reversed phase – Contaminated water	Check suitability of water by running different amount through reversed phase column and measure peak height with elution; use HPLC grade solvents
High column backpressure	Spikes – Bubbles in solvent	De-gas solvents
	Column blockage with irrev, adsorbed sample	Better sample cleanup; use guard column
	Mobile phase viscosity too high	Use lower viscosity solvents or higher temperature
	Particle size too small	Use larger d_p packing
	Plugged inlet frit	Replace column
Leak	Plugged inlet frit	Reverse solvent flow
	Subtle – White powder at fitting/loose fitting	Tighten fitting, cut tubing, or replace ferrule
Leak, injection valve	Catastrophic – Worn valve rotor	Replace rotor in valve
Leak, column or other fittings	Catastrophic – Loose fittings	Tighten or replace fitting
Leak, pump	Catastrophic – Pump seal failure	Replace pump seal

(Continued)

HPLC Troubleshooting

Symptom Type	Possible Cause	Solution
Negative peaks	RI detector – solute refractive index less than solvent	No problem; reverse polarity to make positive
	UV detector – solute absorbance less than mobile phase	Use mobile phase with lower UV absorbance; do not recycle solvent too long
Noisy baseline	Random – Contaminant buildup	Flush column; cleanup sample; use HPLC-grade solvent
	Continuous – Detector lamp problem	Replace UV lamp (lasts 1000 hrs)
	Occasional – External electrical interference	Use voltage stabilizer for LC system
	Sample volume too large	Injection volume should be 1/6 when mobile phase used for injection
Peak doubling	Injection solvent too strong	Use weaker injection solvent or mobile phase
	Blocked frit	Replace and use 0.5 µm porosity in-line filter
	Column void or channeling	Replace column; for some columns, fill in void with packing
	Unswept injector flowpath	Replace injector rotor
	Void at head of column	Replace column, top off column with packing
	Column overloaded with sample	Use higher capacity stationary phase Increase column diameter Decrease sample size
	Single peak – interfering components	Sample cleanup; prefractionation
Peak tailing	Beginning of peak doubling	See "peak doubling"
	Unswept dead volumes	Minimize number of connections Ensure injector seal is tight Ensure fittings are properly seated
	Basic compounds – Silanol interactions	Choose endcapped bonded phase Switch to polymeric phase
	Basic substances – Silanol interactions	Use stronger mobile phase or add competing base (e.g. TMA)
	Silica-based – Column degradation	Use speciality column; polymeric column or sterically protected

(Continued)

HPLC Troubleshooting		
Symptom Type	Possible Cause	Solution
Peaks are broad	Injection volume too large	Decrease solvent strength of injection solvent to focus solute
	Peak dispersion in injector valve	Introduce air bubble in front/back of sample to decrease dispersion
	Sampling rate of data system too slow	Increase frequency of sampling
	Slow detector time constant	Adjust time constant to match peak width
	Mobile phase viscosity too high	Increase column temperature
	Detector cell volume too large	Use smallest possible cell volume with no heat exchanger in system
	Injector volume too large	Decrease injection volume
	Long retention times	Use gradient elution or stronger mobile phase
Pressure fluctuation	Leaky check valve	Replace check valve
	Pump seal leaks	Replace pump seals
	Buildup of particulates	Filter sample; in-line filter; filter mobile phase
Pressure increasing	Buildup of particulates	Filter sample; in-line filter; filter mobile phase
	Water/organic systems – buffer precipitation	Test buffer-organic mixtures; ensure compatibility
Retention beyond total permeation volume	Size exclusion – Specific interactions	Add mobile phase modifiers or change solvent
Retention times changing	Column temperature varying	Thermostat column; insulate column; ensure lab temperature constant
	Equilibration time insufficient with gradient run or changes in isocratic mobile phase	Make sure at least 10 column volumes pass through column after solvent change or gradient conclusion
	Selective evaporation of mobile phase component	Less vigorous helium sparging; keep solvent reservoirs covered; prepare fresh mobile phase
	Buffer capacity insufficient	Use >20 mM concentration of buffer
	Inconsistent on-line mobile phase mixing	Ensure gradient system delivering constant composition; check vs. manual prep of mobile phase
	Contamination buildup	Occasionally flush column with strong solvent to remove contaminants
	First few injections – Adsorption on active sites	Condition column by initial injection of concentrated sample

(Continued)

HPLC Troubleshooting

Symptom Type	Possible Cause	Solution
Retention times decreasing	Flow rate increasing	Check pump to make sure correct; if not, reset
	Column overloaded with sample	Decrease sample size
	Loss of bonded stationary phase	Keep mobile phase pH between 2 and 8.5
Retention times increasing	Flow rate is slowing	Fix leaks in liquid lines, replace pump seals, check for pump cavitation or air bubbles
	Active sites on silica packing	Use mobile phase modifier
	Loss of bonded stationary phase	Keep mobile phase pH between 2 and 8.5
	Mobile phase composition changing	Make sure mobile phase container is covered
	Active sites on silica packing	Add competing base to mobile phase
	Active sites on silica packing	Use higher coverage packing for stationary phase
Sensitivity problem	Peaks are outside of linear range of detector	Dilute/concentrate to bring into linear region
	First few sample injections – Absorption of sample in loop or column	Condition loop/column with concentrated sample
	Autosampler flow lines blocked	Check flow and make sure no blockages
	Injector sample loop underfilled	Make sure that loop is overfilled with sample
	Sample-related losses during preparation	Use internal standard during sample prep; optimize sample prep method
Slow column equilibration times (ion pairing)	Equilibration time slow for long-chain ion pairing reagents	Use shorter alkyl chain ion-pair reagent

LC/MS Troubleshooting	
Symptom Type	Solution
No peaks	Spray from the nebulizer
	Make sure capillary voltage is set correctly
	Make sure LC/MSD is tuned correctly
	Make sure LC/MSD pressures are within normal ranges
	Check drying gas flow and temperature
Poor mass accuracy	Make sure fragmentor is set correctly
	Recalibrate the mass axis
Low signal	Make sure ions used for tuning span mass range of sample ions and show strong stable signals
	Check the solution chemistry; make sure solvent is appropriate for sample
	Make sure sample is fresh and has been stored correctly
	Make sure LC/MSD is tuned correctly
	Check the nebulizer condition
Unstable signal	Clean the capillary entrance
	Check the capillary for damage and contamination
	Make sure drying gas flow and temperature are correct for the solvent flow
	Make sure solvent is thoroughly degassed
	Make sure LC backpressure is steady; this indicates a steady solvent flow

(Continued)

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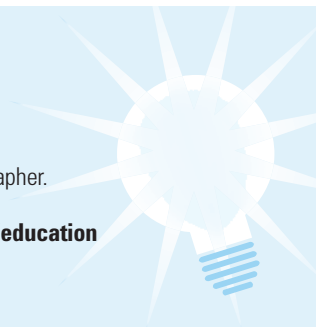
LC/MS Troubleshooting

Symptom Type	Solution
High spectral noise	Use appropriate mass filter values Check spray shape; nebulizer may be damaged or set incorrectly Make sure drying gas flow and temperature are correct for the solvent flow Make sure solvent is thoroughly degassed Make sure LC backpressure is steady; this indicates a steady solvent flow If you are using water as part of the mobile phase, make sure it is de-ionized (>18MW)
Droplets, not spray, exiting the nebulizer	Make sure nebulizing gas pressure is set high enough for the LC flow Check position of needle in nebulizer Stop solvent flow and remove nebulizer assembly Examine end of nebulizer for damage
No flow	Make sure LC is on and there is sufficient solvent in correct bottle Check for LC error messages Check for blockages Repair or replace any blocked components Check for leaks Make sure MS stream selector valve is set to LC to MSD
Undesired fragmentation	(APCI vs. Electrospray) APCI temperature is too high Fragmentor voltage is set too high

Tips & Tools

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Hi-Plex Retention Times

Compound	Retention (mins)					
	Ca (0.6 mL/min, 85 °C)	Ca (Duo) (0.4 mL/min, 85 °C)	K (0.6 mL/min, 85 °C)	Pb (0.6 mL/min, 70 °C)	H (0.6 mL/min, 70 °C)	Na (Octo) (0.6 mL/min, 70 °C)
Adonitol (Ribitol)	15.20	14.01	10.30	20.88	1.5	11
Arabinose	13.69	13.74	12.65	16.72	11.4	12.42
Erythritol	15.51	14.72	10.962	20.66	12.7	11.71
Fructose	13.49	13.29	11.55	19.33	10.6	11.59
Fucose	13.76	13.72	12.51	16.72	12.2	12.26
Galactose	12.32	12.41	11.5	15.29	10.7	11.28
Glucose	11.11	11.44	10.85	13.28	9.95	10.57
Glycerol	16.11	15.54	11.77	19.6	14.1	12.66
Lactose	9.68	9.77	8.6	12.07	8.5	8.58
Maltose	9.34	9.59	8.54	11.66	8.4	8.5
Maltotriose	8.46	8.76	7.55	11.09	7.7	7.61
Mannitol	17.43	15.05	9.96	30.66	11	10.64
Mannose	12.58	12.71	11.86	20.02	10.5	11.39
Raffinose	8.46	8.66	7.31	10.38	*8.2	7.38
Rhamnose	12.73	12.72	11.23	17.97	11.6	10.96
Sorbitol	21.47	17.19	10.31	—	11.1	11.16
Stachyose	7.82	8.16	6.77	9.84	7.4	6.83
Sucrose	9.25	9.51	8.24	10.95	*9.8	8.37
Xylose	12.12	12.47	11.76	14.44	10.6	11.53
Melezitose	8.29	8.56	7.22	9.86	*8.33	7.27
Xylitol	20.29	17.52	10.94	42.71	11.87	11.91
Dulcitol	19.68	16.56	10.14	45.92	11.03	10.98
Arabitol	17.5	15.62	10.52	30.54	11.7	11.34
Maltitol	12.74	11.41	8.19	27.05	8.78	8.66

* denotes partial hydrolysis.

By using Hi-Plex H columns at higher operating temperatures, closely eluting compounds can be resolved. Acid catalyzed hydrolysis of some oligosaccharides may occur.

Organic Acid H	Retention (mins)
Acetic acid	15.8
Citric acid	9.1
Formic acid	14.9
Fumaric acid	16.1
Lactic acid	13.8
Malic acid	10.6
Oxalic acid	7.2
Pyruvic acid	10.3
Succinic acid	13.0
Tartaric acid	9.6

Retention times (in minutes) were recorded under the following conditions:

Column: Hi-Plex H
PL1170-6830
7.7 x 300 mm, 8 µm

Mobile Phase: 0.005 M H₂SO₄

Flow Rate: 0.6 mL/min

Temperature: 55°C

Detector: UV, 210 nm

BioPharmaceutical Applications

NEW!**Consistent Ion-Exchange MAb Separation**

Column: Bio MAb, PEEK
5190-2411
2.1 x 250 mm, 5 μ m

Buffer: A: Sodium phosphate buffer, 20 mM
B: Buffer A + 400 mM NaCl

Gradient: 15-35% Buffer B from 0-30 min

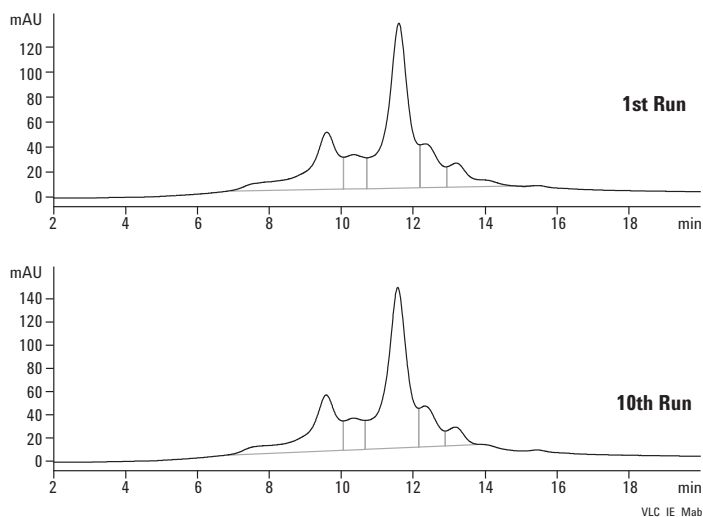
Flow Rate: 0.65 mL/min

Sample: CHO-humanized MAb, 1 mg/mL

Injection: 2.5 μ L

Detector: UV 220 nm

Temperature: Ambient

**NEW!****Intact MAb Monomer and Dimer Separation**

Column: Bio SEC-3, 300 \AA
5190-2511
7.8 x 300 mm, 3 μ m

Buffer: Sodium phosphate buffer, pH 7.0, 150 mM

Isocratic: 0-100% Buffer A from 0-30 min

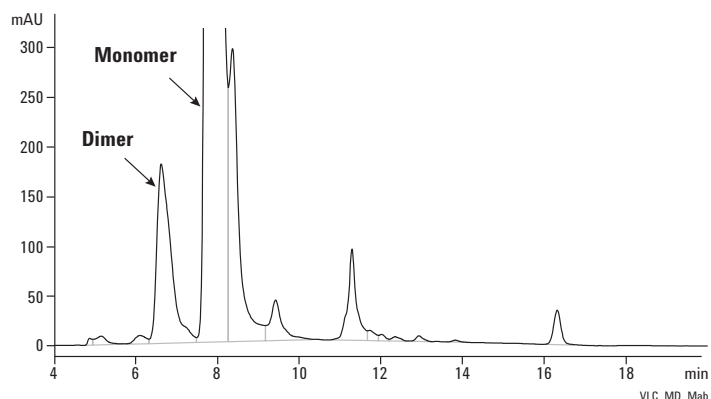
Flow Rate: 1.0 mL/min

Sample: CHO-humanized MAb, 5 mg/mL – intact

Injection: 5 μ L

Detector: UV 220 nm

Temperature: Ambient

**NEW!****MAb Separation of Heated, Stressed MAb**

Column: Bio SEC-3, 300 \AA
5190-2511
7.8 x 300 mm, 3 μ m

Buffer: Sodium phosphate buffer, pH 7.0,
150 mM +150 mM sodium sulfate

Isocratic: 0-100% Buffer A from 0-30 min

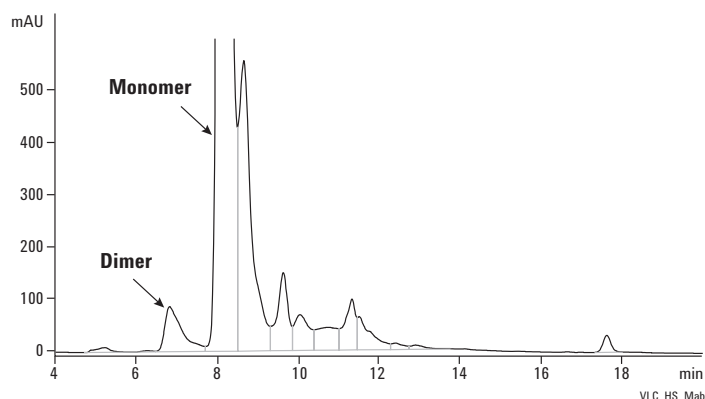
Flow Rate: 1.0 mL/min

Sample: CHO-humanized MAb, 5 mg/mL –
stressed at 60 $^{\circ}$ C

Injection: 5 μ L

Detector: UV 220 nm

Temperature: Ambient



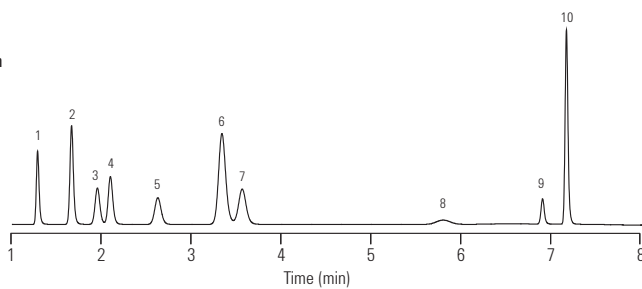
Nucleosides, Purines and Pyrimidines

Column: Eclipse Plus Phenyl Hexyl
959993-912
4.6 x 150 mm, 5 µm

Mobile Phase: 1% MeOH: 99% 20 mM Ammonium Acetate, pH 4.5

Flow Rate: 1 mL/min

Detector: UV 254 nm



1. Cytosine
2. Uracil
3. Cytidine
4. Guanine
5. Uridine
6. Adenine
7. Thymine
8. Guanosine
9. Thymidine
10. Adenosine

Amino Acid Standard Separation Eclipse Plus

Column: Eclipse Plus C18
959763-902
2.1 x 150 mm, 3.5 µm

Mobile Phase: A: 10 mM Na₂HPO₄, 10 mM Na₂B₄O₇, 0.5 mM NaN₃, pH 8.2
B: acetonitrile: methanol: water (45:45:10) (v/v/v)

Flow Rate: 0.42 mL/min

Temperature: 40°C

Detector: UV 338 nm, then switch to 280 nm at 15.7 min

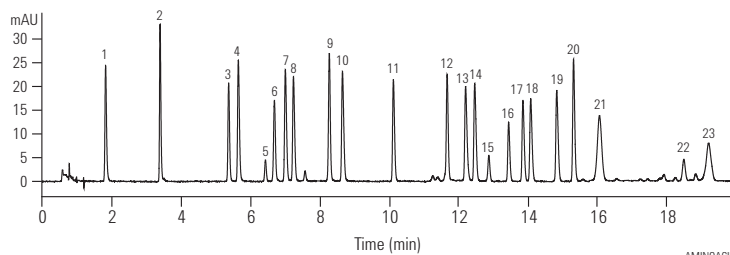
Sample: 900 µmol Amino Acids with extended Amino Acids and Internal Standards (500 µmol)

Derivatization: automated, online, OPA / FMOC

- | | | |
|--------|---------|---------|
| 1. ASP | 9. ARG | 17. PHE |
| 2. GLU | 10. ALA | 18. ILE |
| 3. ASN | 11. TYR | 19. LEU |
| 4. SER | 12. CY2 | 20. LYS |
| 5. GLN | 13. VAL | 21. HYP |
| 6. HIS | 14. MET | 22. SAR |
| 7. GLY | 15. NVA | 23. PRO |
| 8. THR | 16. TRP | |

Gradient

Time (min)	% B
0	2
0.5	2
20	57
20.1	100
23.5	100
23.6	2
25	stop



Antibodies: Fast Separation of IgM and IgG Antibodies

Column: ZORBAX GF-250
884973-701
4.6 x 250 mm, 4 µm

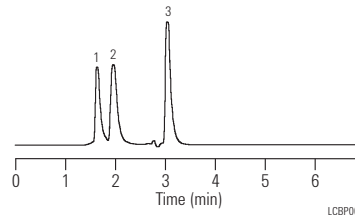
Mobile Phase: 200 mM Sodium Phosphate (pH 7), 0.01% Azide

Flow Rate: 0.94 mL/min

Temperature: Ambient

Detector: UV 230 nm

Sample: 2.5 µL (1mg/mL)



1. IgM, MOPC-104E
2. IgG2a, I HOPC-1
3. Buffer Solution

Glycosylated proteins: Large Molecules on Poroshell 300SB-C18 and 300SB-C8

Column A: Poroshell 300SB-C18
661750-902
1.0 x 75 mm, 5 µm

Column B: Poroshell 300SB-C8
661750-906
1.0 x 75 mm, 5 µm

Column C: ZORBAX 300SB-C18
865630-902
1.0 x 50 mm, 3.5 µm

Mobile Phase: A: 0.1% TFA in H₂O
B: 0.07% TFA in ACN

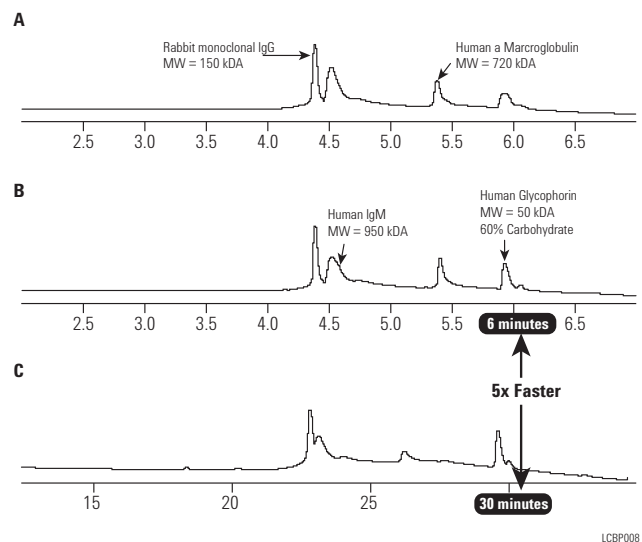
Flow Rate: A, B: 0.454 mL/min
C: 0.071 mL/min

Gradient: A, B: 0 min 5% B
10 min 100% B
C: 0 min 5% B
50 min 100% B

Temperature: 70°C

Detector: DAD 212 nm, 1.7 µL flow cell, <0.01 min peak width

Sample: Large Glycosylated Proteins



Courtesy of: Novartis Parma, Biotechnology, Basel, Dr. Kurt Forrer, Patrik Roethlisberger

HSA Tryptic Digest on ZORBAX Rapid Resolution HT 1.8 μm

Column A: ZORBAX SB-C18
883700-922
2.1 x 150 mm, 5 μm

Column B: ZORBAX SB-C18
822700-902
2.1 x 50 mm, 1.8 μm

Mobile Phase: A: Water w/0.1% TFA
B: ACN w/0.1% TFA

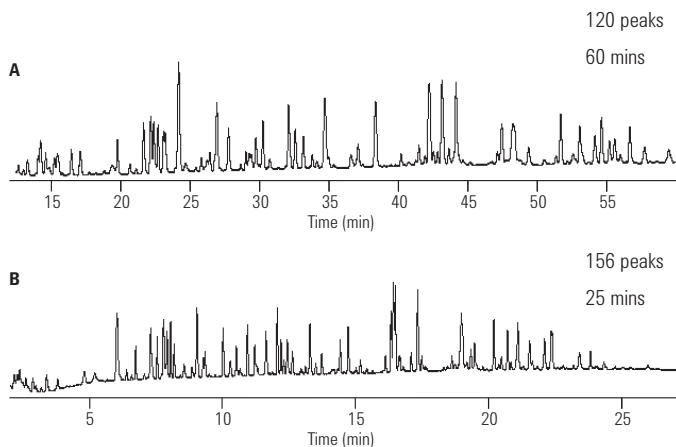
Flow Rate: A: 0.2 mL/min
B: 0.5mL/min

Gradient: A: 2 to 50% B in 70min
B: 2 to 50% B in 30min

Temperature: 50°C

Detector: UV 214 nm

Sample: HSA Tryptic Digest, 8 μL of 15 pmol / μL
(120 pmol on column)



LCBP013

Human Serum: Low Abundance Protein Isolation and Identification by LC/MS

Column: ZORBAX 300SB-C18
Trap: 0.3 x 5 mm, 5 μm , 5065-9913
Analytical: 0.3 x 150 mm, 5 μm , 5064-8263

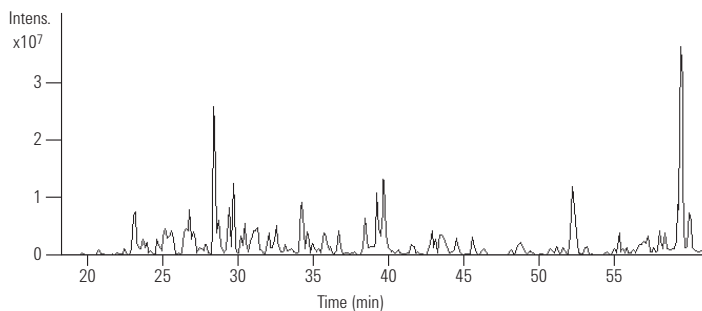
Mobile Phase: A: Water + 0.1% Formic acid
B: Acetonitrile + 0.1% Formic acid

Flow Rate: 6 $\mu\text{L}/\text{min}$

Gradient: 0 min 3% B
5 min 3% B (loading)
50 min 45% B
52 min 80% B
57 min 80% B
60 min 3% B

Sample: Band from 1-D in gel digest

Base Peak Chromatogram



LCBP014

Proteins Identified

1. Alpha-1-Antichymotrypsin
2. Antithrombin-III Precursor
3. Complement Factor B Precursor

Sample Preparation of Human Serum:
Major serum proteins removed using
Multiple Affinity Removal Column:
4.6 x 100 mm, P/N 5185-5985
Followed by 1-D gel digest

**Monoclonal IgG1 Chains:
Separation on Poroshell 300SB-C8**

Column: Poroshell 300SB-C8
660750-906
2.1 x 75 mm, 5 µm

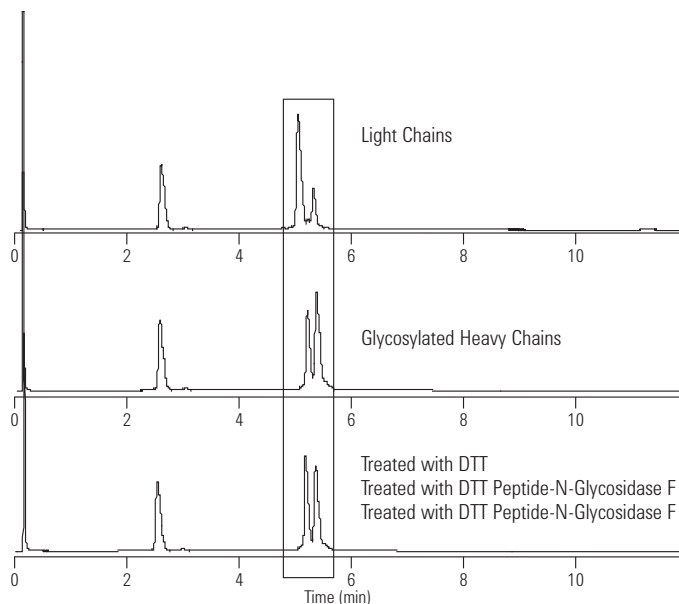
Mobile Phase: A: 90% water: 10% ACN +
3 mL/L of MW 300 PEG
B: 10% water: 90% ACN +
3 mL/L of MW 300 PEG

Flow Rate: 1.0 mL/min
Gradient: 0 min 25% B
10 min 40% B
10.1 min 25% B
12 min 25% B

Temperature: 70°C

Sample: Monoclonal IgG1

*Courtesy of: Novartis Pharma, Biotechnology, Basel,
Dr. Kurt Forrer, Patrik Roethlisberger*



LCBP015

**Use ZORBAX Extend-C18
for Alternate Selectivity at High pH**

Column: ZORBAX Extend-C18
773700-902
2.1 x 150 mm, 5 µm

Mobile Phase: A: 0.1% TFA in Water
B: 0.085% TFA in 80% ACN

A: 20 mM NH₄OH in Water
B: 20 mM NH₄OH in 80% ACN

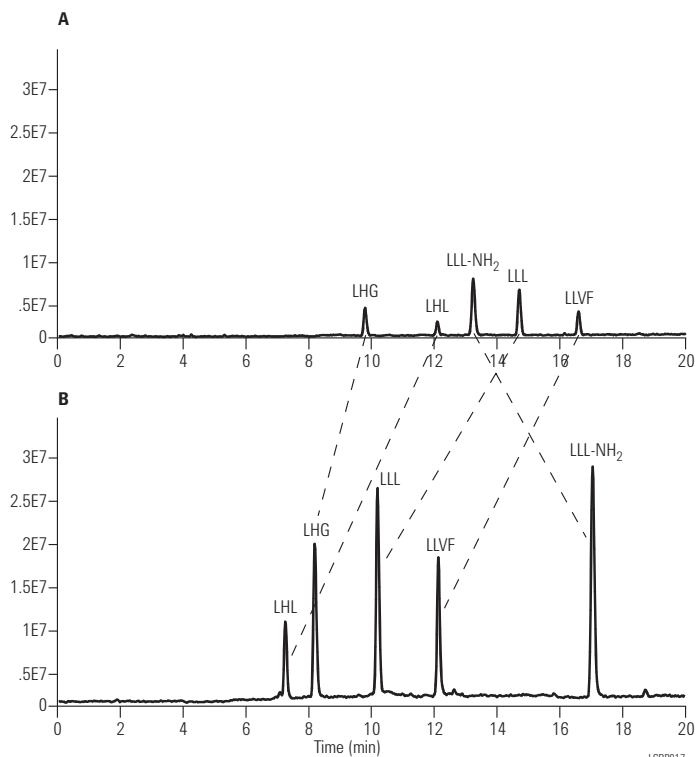
Flow Rate: 0.25 mL/min

Gradient: 5-60% B in 20 min

Temperature: 25°C

MS Conditions: Pos. Ion ESI-Vf 70V, Vcap 4.5 kV
N₂ – 35 psi, 12 L/min, 300°C
4 µL (50 ng each peptide)

The Extend column can be used for high pH separations of peptides. At high and low pH, very different selectivity can result. Just by changing pH, a complimentary method can be developed and it is possible to determine if all peaks are resolved. The Extend column can be used at high and low pH, so the complimentary separation can be investigated with one column. Better MS sensitivity for this sample is also achieved at high pH.



LCBP017

Nucleosides: Separation of Deoxy and Ribonucleosides

Column: ZORBAX SB-C3
883975-909
4.6 x 150 mm, 5 µm

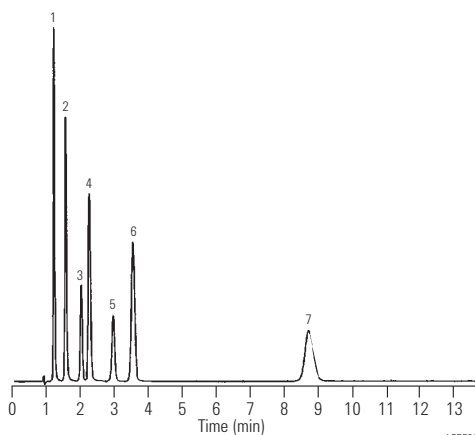
Mobile Phase: 4 mM Ammonium Phosphate
(pH 4.0 with Phosphoric Acid)

Flow Rate: 2.0 mL/min

Temperature: 35°C

Detector: UV 254 nm

Sample: 2 µL (1.6 µg each)



1. Cytidine
2. 2' Deoxycytidine
3. Inosine
4. Guanosine
5. 2' Deoxyinosine
6. 2' Deoxyguanosine
7. Adenosine

Nucleotides: Separation of Mononucleotides

Column: ZORBAX SAX
880952-703
4.6 x 250 mm, 5 µm

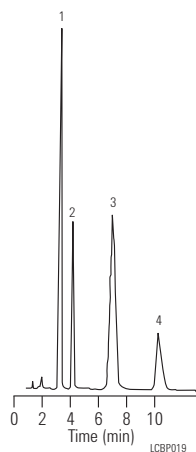
Mobile Phase: 0.1 M NH₄H₂PO₄

Flow Rate: 2.0 mL/min

Temperature: Ambient

Detector: UV 254 nm

Sample: Orotic Acid, UMP, GMP, XMP



1. Orotic Acid
2. UMP
3. GMP
4. XMP



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

**Separation of Basic Peptides
on Bonus-RP versus Traditional Alkyl Phase**

Column A: ZORBAX Bonus-RP
883668-901
4.6 x 150 mm, 5 µm

Column B: Alkyl C8

Mobile Phase: A: 0.010 M ammonium phosphate,
pH 7 / 0.050 M sodium perchlorate
B: 0.010 M ammonium phosphate / 0.050 M
sodium perchlorate in 50% ACN

Flow Rate: 1.0 mL/min

Gradient: 0-100% B in 50 min.

Temperature: 40°C

Detector: 215 nm

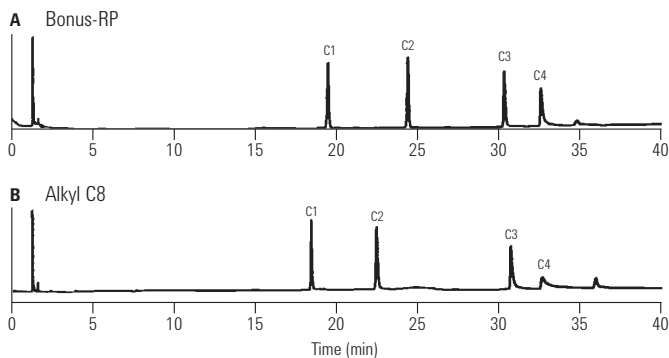
Sample: Basic 11-residue peptides
with net +1, +2, +3, +4
positive charges at neutral pH

C1: Ac-Gly-Gly-Gly-Leu-Gly-Gly-Ala-Gly-Gly-Leu-Lys-amide

C2: Ac-Lys-Tyr-Gly-Leu-Gly-Gly-Ala-Gly-Gly-Leu-Lys-amide

C3: Ac-Gly-Gly-Ala-Leu-Lys-Ala-Leu-Lys-Gly-Leu-Lys-amide

C4: Ac-Lys-Tyr-Ala-Leu-Lys-Ala-Leu-Lys-Gly-Leu-Lys-amide



LCBP020

Peptides: Effect of TFA Concentration

Column: ZORBAX 300SB-C8
883995-906
4.6 x 150 mm, 5 µm

Mobile Phase: A: Water and TFA
B: ACN and TFA

Flow Rate: 1.0 mL/min

Gradient: 0 min 0% B
30 min 30% B

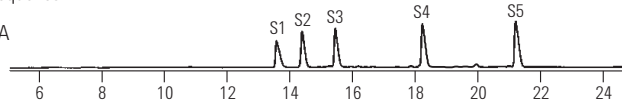
Temperature: 40°C

Detector: UV 254 nm

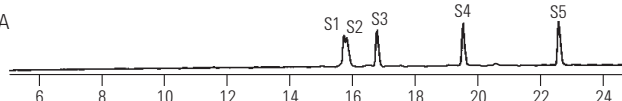
Sample: Peptide Standards S1-S5, decapeptides
differing slightly in hydrophobicity, 6 µL

Peptide Sequence

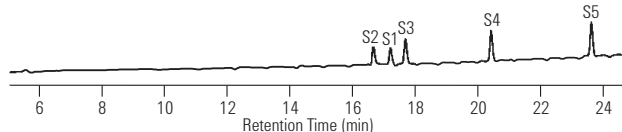
0.05% TFA



0.25% TFA



1.0% TFA



LCBP021

Exploiting chemical stability – TFA concentration

Column: PLRP-S 100Å
PL1512-5500
4.6 x 250 mm, 5 µm

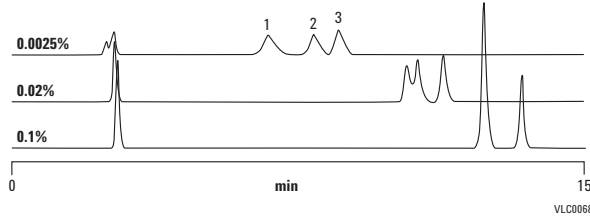
Mobile Phase: A: TFA (various %) in water
B: TFA (various %) in ACN

Gradient: Linear 12-40% B in 15 min

Flow Rate: 1.0 mL/min

Detector: ELS (neb=75°C, evap=85°C, gas=1.0 SLM)

1. Angiotensin III
2. Angiotensin II
3. Angiotensin I



Peptides: Separation of Antiotensins I, II, III with TFA and NH₄OH

Column: ZORBAX Extend-C18
773700-902
2.1 x 150 mm, 5 µm

Mobile Phase: A: Acidic Conditions
A: 0.1% TFA in water
B: 0.085% TFA in 80% ACN
B: Basic Conditions
A: 10 mM NH₄OH in water
B: 10 mM NH₄OH in 80% ACN

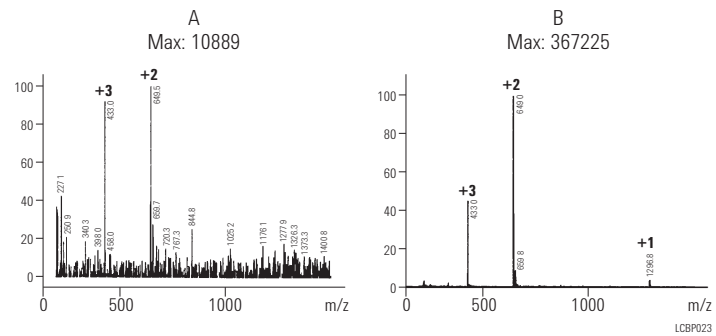
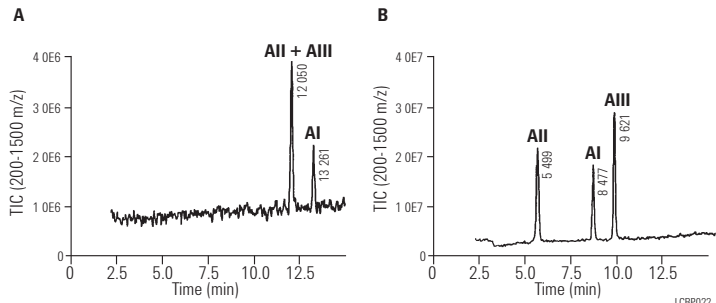
Flow Rate: 0.2 mL/min

Gradient: 15-50% B in 15 min

Temperature: 35°C

MS Conditions: Pos. Ion ESI - Vf 70V, Vcap 4.5 kV
N₂-35 psi, 12 L/min, 325°C

Sample: 2.5 µL sample (50 pmol each)



**Peptides/Proteins:
Equivalent Gradient Separations**

Column: ZORBAX 300SB-C8
883995-906
4.6 x 150 mm, 5 µm

Column: ZORBAX 300SB-C8
883750-906
2.1 x 150 mm, 5 µm

Mobile Phase: A: 95% Water: 5% ACN with 0.1% TFA
B: 5% Water: 95% ACN with 0.085% TFA

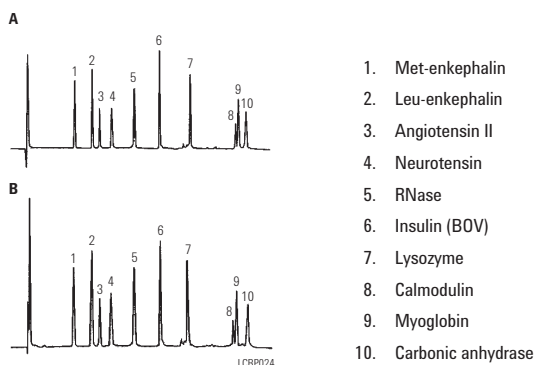
Flow Rate: A: Analytical
1 mL/min
B: Narrow Bore
0.2 mL/min

Gradient: 10-60% B in 30 min

Temperature: 35°C

Detector: UV 215 nm

Sample: 10 µL injection, Concentration 2-6 µg



**Peptides/Proteins: Effect of
Elevated Temperature**

Column: ZORBAX 300SB-C3
883995-909
4.6 x 150 mm, 5 µm

Mobile Phase: A: 5:95 ACN:Water
with 0.10% TFA (v/v%)
B: 95:5 ACN:Water
with 0.085% TFA (v/v%)

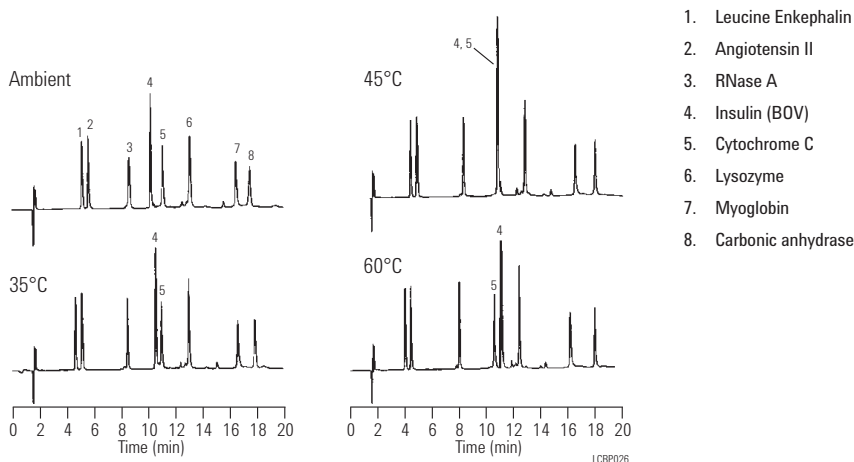
Flow Rate: 1.0 mL/min

Gradient: 15-53% in 20 min,
posttime 12 min

Temperature: Ambient – 60°C

Detector: UV 215 nm

Sample: Polypeptides



Separation of Polypeptides in Under 1 Minute

Column: Poroshell 300SB-C18
660750-902
2.1 x 75 mm, 5 µm

Mobile Phase: A: 0.1% TFA, H₂O
B: 0.07% TFA, ACN

Flow Rate: 3 mL/min.

Gradient: 0-100% B in 1.33 min

Temperature: 70°C

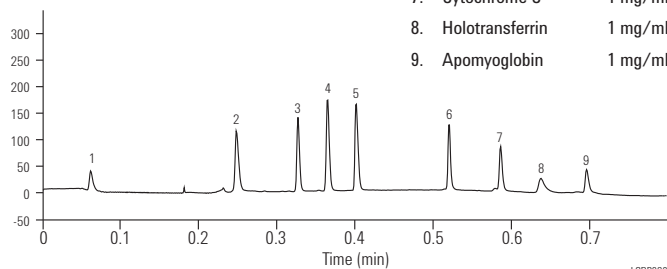
Detector: DAD 215/16 nm, ref = 310/10 nm

Sample: peptides/proteins, 0.5 µL

Mixer bypassed with P/N G1312-67301; Loop-bypass program

Sample (peptides/proteins)

- | | |
|--------------------|-------------|
| 1. gly-tyr | 0.125 mg/mL |
| 2. Val-tyr-val | 0.5 mg/mL |
| 3. Met-enkephalin | 0.5 mg/mL |
| 4. Leu-enkephalin | 0.5 mg/mL |
| 5. Angiotensin II | 0.5 mg/mL |
| 6. RNase A | 1 mg/mL |
| 7. Cytochrome C | 1 mg/mL |
| 8. Holotransferrin | 1 mg/mL |
| 9. Apomyoglobin | 1 mg/mL |



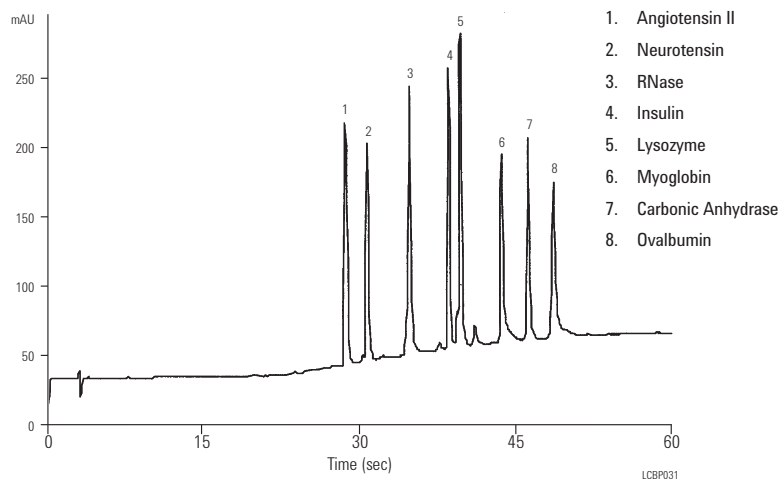
For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Fast, High-Resolution Separation of Peptides and Proteins with Poroshell 300SB-C18

Column: Poroshell 300SB-C18
660750-902
2.1 x 75 mm, 5 µm

Mobile Phase: A: 0.1% TFA
B: 0.07% TFA in ACN
Flow Rate: 3.0 mL/min (360 bar pressure)
Gradient: 5-100% B in 1.0 min
Temperature: 70°C
Detector: UV 215 nm

Spaces between solutes indicate good peak capacity for rapidly separating complex samples.

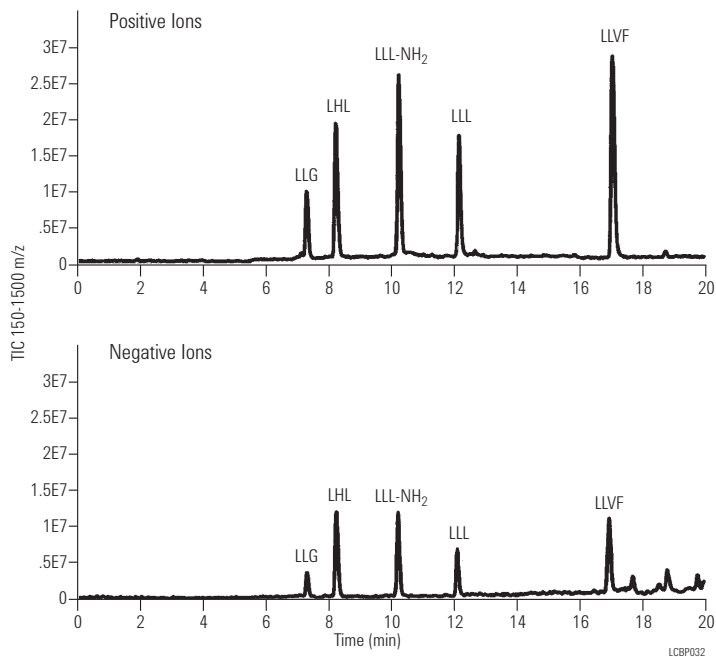


Peptide RP-HPLC/ESI-MS Using NH₄OH Mobile Phase Yields Both Positive and Negative Ion Spectra

Column: ZORBAX Extend-C18
773700-902
2.1 x 150 mm, 5 µm

Flow Rate: 0.25 mL/min
Gradient: 5-60% B in 20 min
Temperature: 25°C
MS Conditions: Pos. Ion ESI – Vf 70 V, Vcap 4.5 kV,
N₂– 35 psi, 12 L/min, 300°C
TIC 150-1500 m/z

Sample: 4 µL (50 ng each peptide)



Comparison of A β Peptide RP-HPLC Separations at Low and High pH

Column: ZORBAX Extend-C18
773700-902
2.1 x 150 mm, 5 μ m

Mobile Phase: A: 0.1% TFA in water
B: 0.085% TFA in 80% ACN

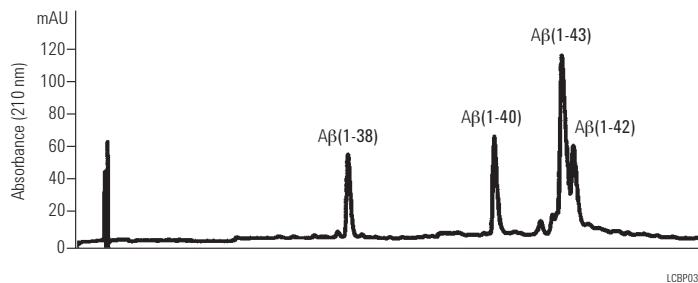
Flow Rate: 0.25 mL/min.

Gradient: 29-41% B in 30 min.

Temperature: 80°C

Detector: UV 210 nm

Sample: 5 μ L sample (100 pmol each)



Mobile Phase: A: 20 mM NH₄OH in water
B: 20 mM NH₄OH in 80% ACN

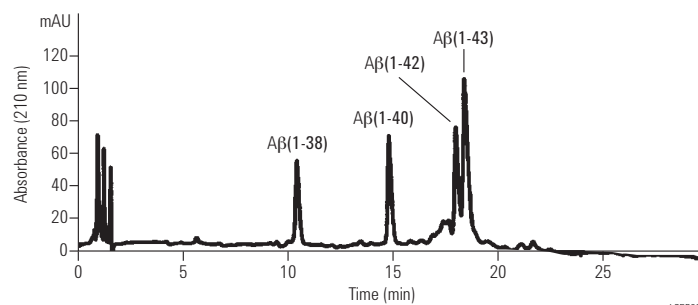
Flow Rate: 0.25 mL/min

Gradient: 26-38% B in 30 min

Temperature: 25°C

Detector: UV 210 nm

Sample: 5 μ L sample (100 pmol each)



Selectivity Comparison of TFA and NH₄OH for Peptide RP-HPLC\ESI-MS Analysis

Column: ZORBAX Extend-C18
773700-902
2.1 x 150 mm, 5 μ m

Mobile Phase: TFA Conditions:
A: 0.1% TFA in water
B: 0.085% TFA in 80% ACN
NH₄OH Conditions:
A: 20 mM NH₄OH in water
B: 20 mM NH₄OH in 80% ACN

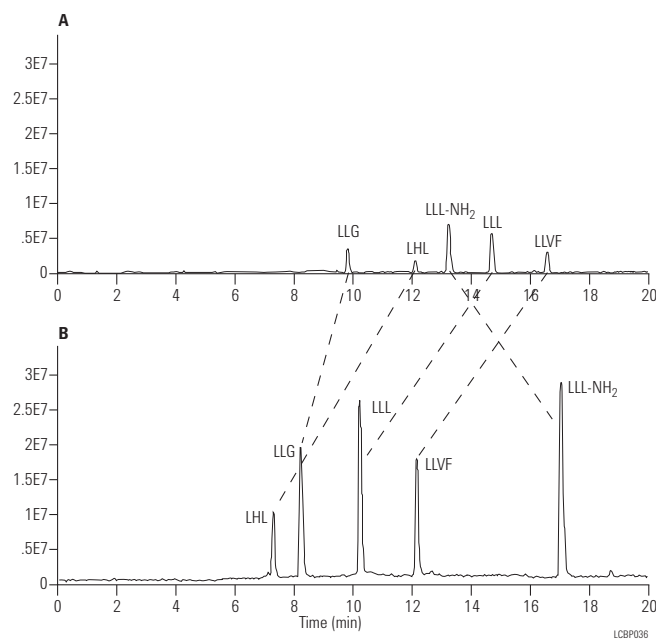
Flow Rate: 0.25 mL/min

Gradient: 5-60% B in 20 min

Temperature: 25°C

MS Conditions: Pos. Ion ESI – Vf 70V, Vcap 4.5 kV,
N₂ – 35 psi, 12 L/min., 300°C
TIC 150-1500 m/z

Sample: 4 μ L (50 ng each peptide)



Peptide Phosphorylation Sites LC and LC/MS using Capillary LC Columns

Column: ZORBAX 300SB-C18
5064-8268
0.5 x 150 mm, 3.5 μm

Mobile Phase: A: 0.1% formic acid in water
B: 0.1% formic acid in ACN

Flow Rate: 5.5 μL/min

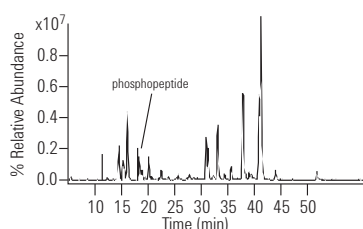
Gradient: 5-55% B in 50 min, to
85% B from 55-57 min

Detector: UV 206 nm

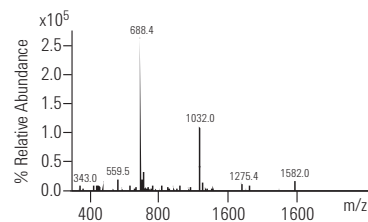
MS Conditions: LC/MS: Pos. Ion ESI with
LC/MSD trap
Vcap: 4000 V
Drying gas flow: 7L/min
Drying gas temperature: 250°C
Nebulizer: 15 psi
Capillary Exit Volt: 50 V Max
Accum Time: 300 ms
Total Averages: 3
Isolation Width: 3 m/z
Frag Amplitude: 1.0 V

Sample: Beta case in digest, 100 nL (4 pmol)

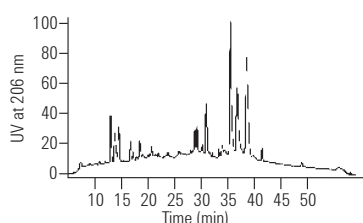
MS



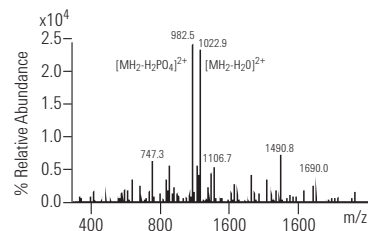
Full Scan MS



UV



MS/MS of [M+2H]²⁺ at m/z 1032



LCBP037

Proteins: Effect of Bonded Phase, RP

Column A: ZORBAX 300SB-C8
883995-906
4.6 x 150 mm, 5 μm

Column B: ZORBAX 300SB-CN
883995-905
4.6 x 150 mm, 5 μm

Mobile Phase: A: 0.1% TFA in Water,
B: 0.1% TFA in 50/50 ACN/Water

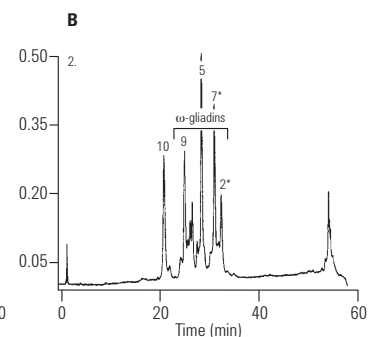
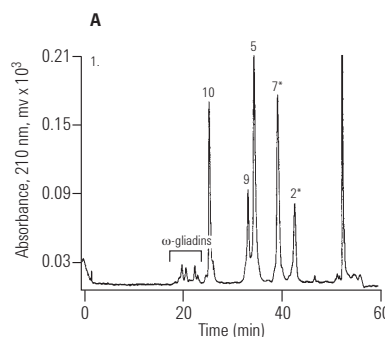
Flow Rate: 1.0 mL/min

Gradient: 1. 46-96% B in 60 min. 23-48% ACN
2. 50-86% B in 60 min. 25-43% ACN

Temperature: 50°C

Detector: UV 210 nm

Sample: Wheat proteins, including w-gliadins



LCBP038

Proteins: Effect of Bonded Phase

Column A: ZORBAX 300SB-C18
883995-902
4.6 x 150 mm, 5 µm

Column B: ZORBAX 300SB-C8
883995-906
4.6 x 150 mm, 5 µm

Column C: ZORBAX 300SB-C3
883995-909
4.6 x 150 mm, 5 µm

Column D: ZORBAX 300SB-CN
883995-905
4.6 x 150 mm, 5 µm

Mobile Phase: A: 0.1% TFA in H₂O
B: 0.09% TFA in 80% ACN/20% Water

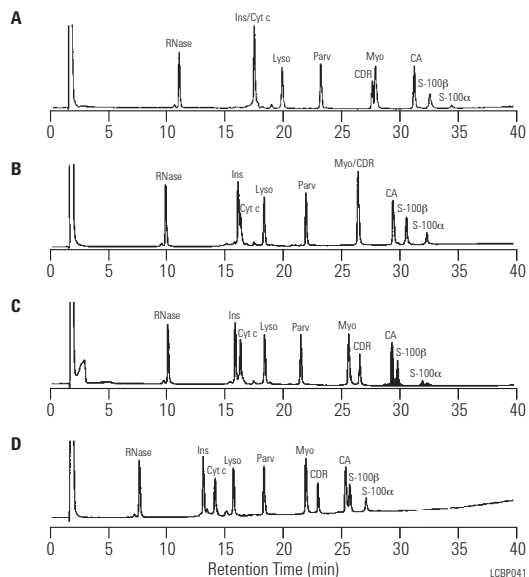
Flow Rate: 1.0 mL/min

Gradient: 25-70% B in 40 min

Temperature: 60°C

Detector: UV 210 nm

Sample: Polypeptides, 3 µg each



Standard proteins by reverse phase

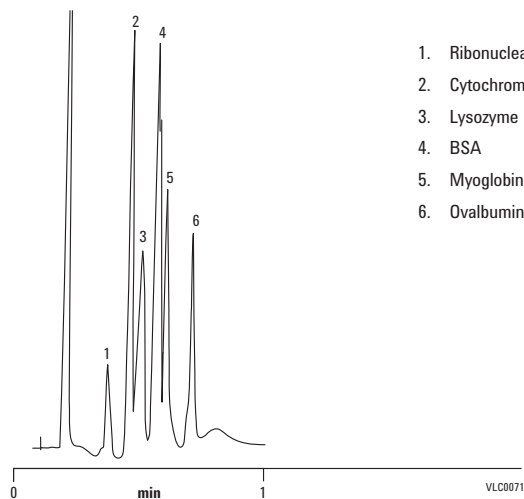
Column: PLRP-S 4000Å
PL1512-1803
4.6 x 50 mm, 8 µm

Mobile Phase: A: 0.1% TFA in 95% water : 5% ACN
B: 0.1% TFA in 5% water : 95% ACN

Gradient: Linear 18-60% B in 1 min

Flow Rate: 4.0 mL/min

Detector: UV, 280 nm



Standard ion-exchange protein separation

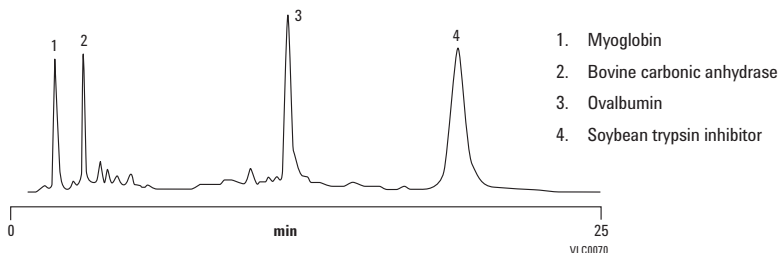
Column: PL-SAX 1000Å
 PL1551-1502
 4.6 x 50 mm, 5 µm

Mobile Phase: A: 10 mM Tris HCl pH 8
 B: A+0.35 M NaCl pH 8

Gradient: 0-100% B in 20 min

Flow Rate: 1.0 mL/min

Detector: UV, 220 nm


**Deoxynucleosides:
 Using Rapid Resolution 3.5 µm Columns**

Column A: ZORBAX SB-CN
 883975-905
 4.6 x 150 mm, 5 µm

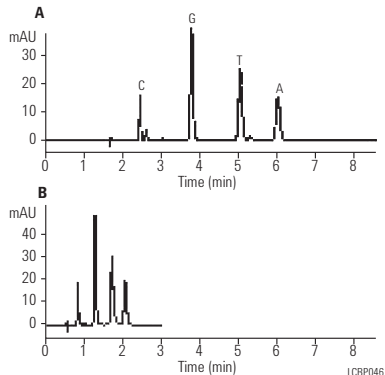
Column B: ZORBAX SB-CN
 835975-905
 4.6 x 50 mm, 3.5 µm

Mobile Phase: A: 0.1% TFA
 B: 90/10 v/v Methanol/Water (0.1% TFA)
 Isocratic, 97.5% A, 2.5% B

Flow Rate: 1.0 mL/min.

Temperature: 30°C

Detector: UV 254 nm



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

BSA Tryptic Digest on RRHT

Column: ZORBAX SB-C18
820700-902
2.1 x 150 mm, 1.8 μm

Mobile Phase: A: 0.1% TFA, 5% ACN
B: 0.08% TFA, 95% ACN

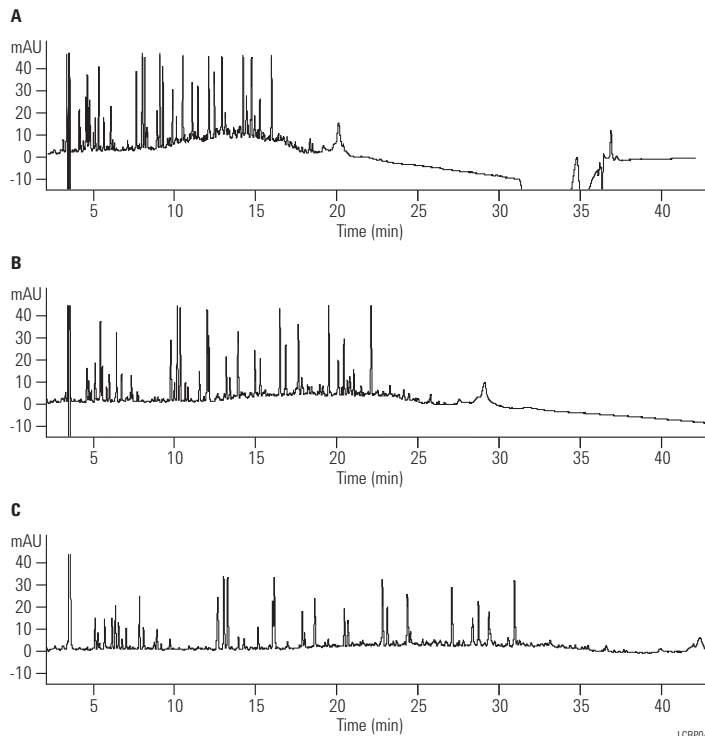
Flow Rate: 0.5 mL/min

Gradient: A: Time 0 %B 5, Time 30 %B 60
B: Time 0 %B 5, Time 45 %B 60
C: Time 0 %B 5, Time 67.5 %B 60

Temperature: 80°C

Detector: UV 214 nm

Sample: BSA Tryptic Digest



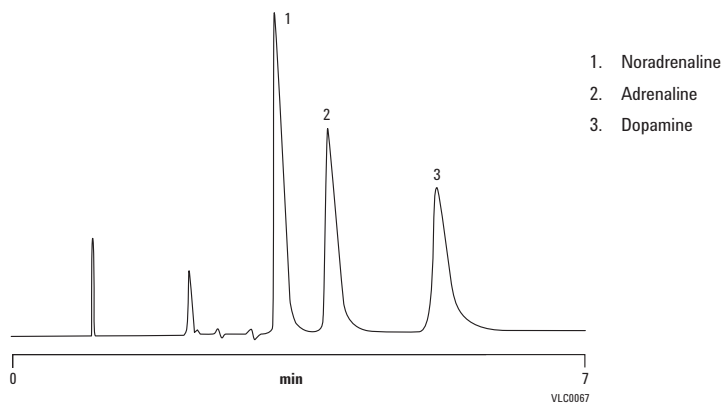
Catecholamines

Column: PLRP-S 100Å
PL1111-3500
4.6 x 150 mm, 5 μm

Mobile Phase: 95% 25 mM citric acid,
25 mM Na₂HPO₄, 1 mM heptane
sulfonic acid : 5% ACN, pH 2.85

Flow Rate: 1.0 mL/min

Detector: UV, 280 nm



Whey proteins in dairy samples – milk

Column: PLRP-S 300Å
PL1512-3801
4.6 x 150 mm, 8 µm

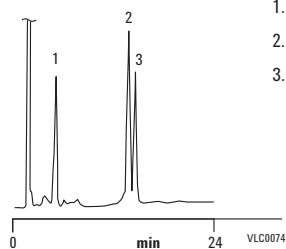
Mobile Phase: A: 0.1% TFA in 99% water : 1% ACN
B: 0.1% TFA in 1% water : 99% ACN

Gradient: 36-48% B, 0-24 min, 48-100% B, 24-30 min
100% B, 30-35 min, 100-36% B, 35-40 min

Flow Rate: 1.0 mL/min

Injection Volume: 10 µL

Detector: UV, 220 nm



1. α-Lactalbumin
2. β-Lactoglobulin (B chain)
3. β-Lactoglobulin (A chain)

Temperature as a tool to enhance mass transfer and improve resolution of oligonucleotides in ion pair reverse phase HPLC

Column: PLRP-S 100Å
PL1512-1300
4.6 x 50 mm, 3 µm

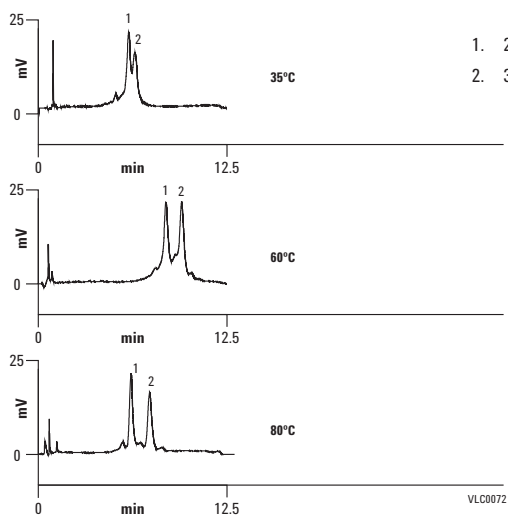
Mobile Phase: A: 100 mM TEAA
B: 100 mM TEAA in 25% ACN

Gradient: 5% change in buffer B over 5 min

Flow Rate: 1.0 mL/min

Temperature: 35°C, 60°C,
or 80°C

Detector: UV, 254 nm



1. 29 mer
2. 30 mer

Hydrophilic Purine/Pyrimidine Separation

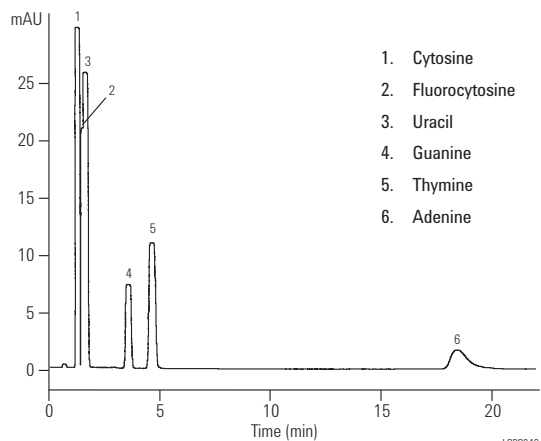
Column: ZORBAX SB-Aq
883975-914
4.6 x 150 mm, 5 µm

Mobile Phase: 50 mM NaOAc, pH 4.6

Flow Rate: 2.0 mL/min

Temperature: 35°C

Detector: UV 254 nm



1. Cytosine
2. Fluorocytosine
3. Uracil
4. Guanine
5. Thymine
6. Adenine

Chemical/Industrial Applications

Analysis of Biocides in Hand Sanitizer

Column: Eclipse Plus C18
959757-902
2.1 x 50 mm, 1.8 µm

Mobile Phase: A: H₂O (0.5% TFA)
B: ACN (0.04% TFA)

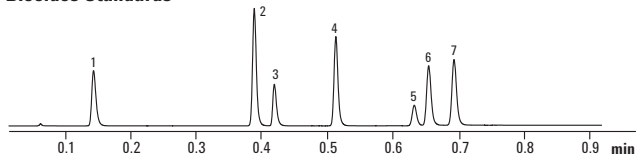
Flow Rate: 1.7 mL/min

Gradient: Time 0.0 95/5 A/B DAD: 275 nm (0 min)
Time 1.0 55/45 A/B 225 nm (0.46 min)
Time 1.1 0/100 A/B 255 nm (0.67 min)

Sample: 1 µL injection of 50 ppm std.

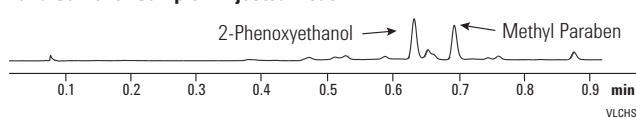
Temperature: 30°C

Biocides Standards



1. Kathon 1A
2. Kathon 1B
3. Carbendazim
4. 1,2-Benzisothiazol-3(2H)-one
5. 2-Phenoxyethanol
6. Benzoic Acid
7. Methyl Paraben

Hand Sanitizer Sample - Injected Neat



Triton X-114: Decreasing Run-time by Changing Bonded Phase

Column A: ZORBAX SB-C3
883975-909
4.6 x 150 mm, 5 µm

Column B: ZORBAX SB-C18
883975-902
4.6 x 150 mm, 5 µm

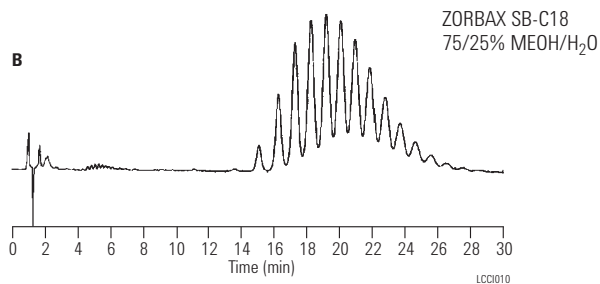
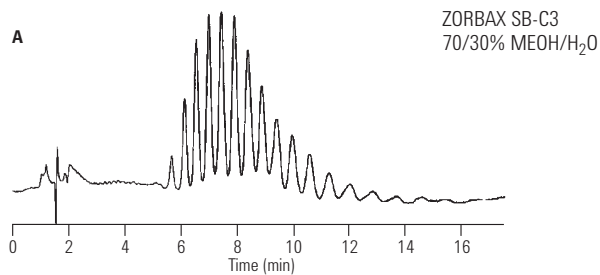
Mobile Phase: MeOH and H₂O (as indicated)

Flow Rate: 1.0 mL/min

Temperature: 50°C

Detector: UV 225 nm

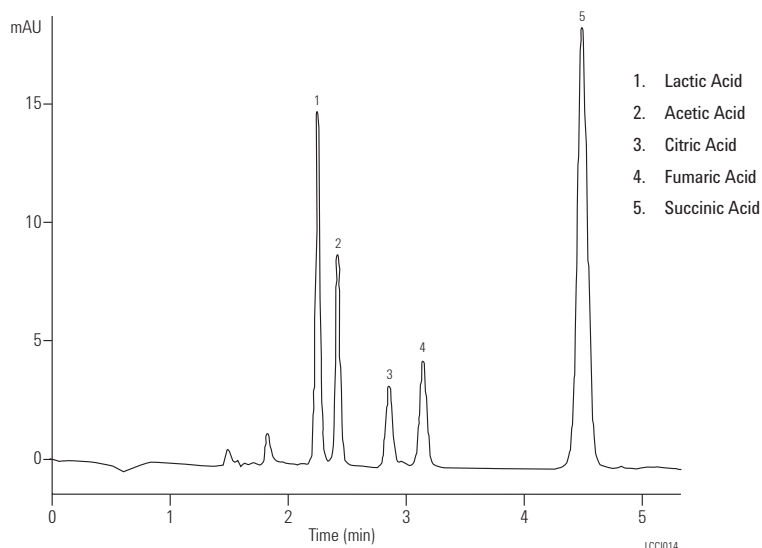
Sample: Triton X-114



Organic Acids Separated on ZORBAX SB-Aq

Column: ZORBAX SB-Aq
883975-914
4.6 x 150 mm, 5 µm

Mobile Phase: 99% 20 mM NaH₂PO₄, pH2, 1% ACN
 Flow Rate: 1.0 mL/min
 Temperature: 35°C
 Detector: UV 210 nm

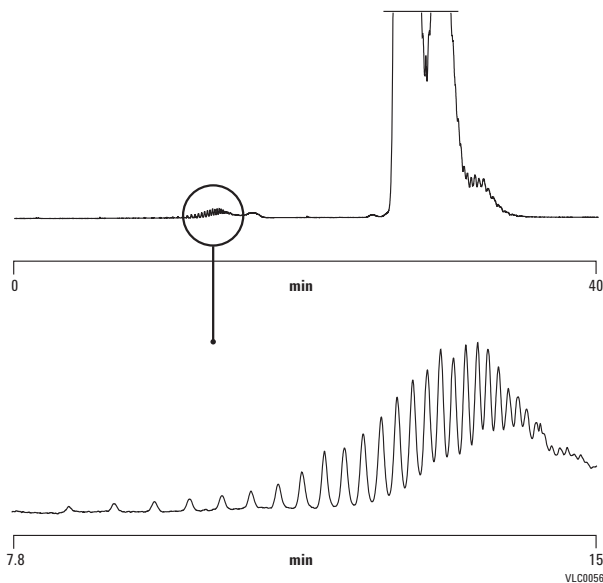


Brij 35

Column: PLRP-S 100Å
PL1111-3500
4.6 x 150 mm, 5 µm

Mobile Phase: A: Water
 B: ACN

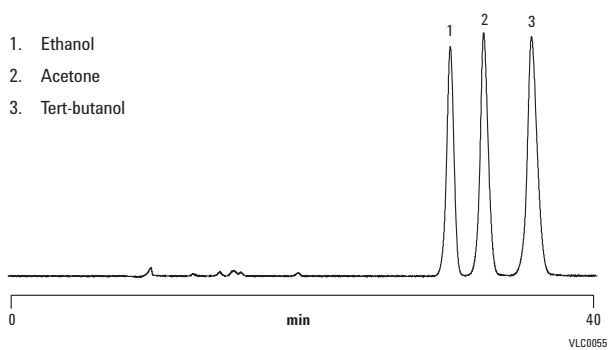
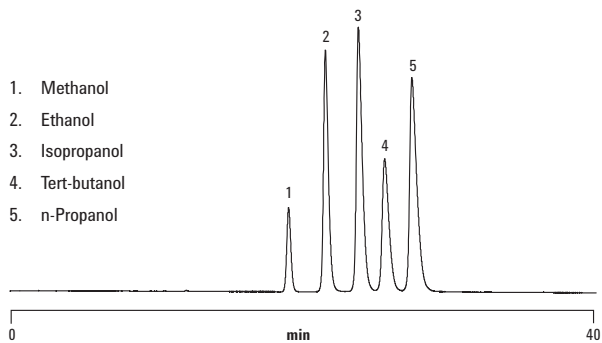
Gradient: 0-100% B in 40 min
 Flow Rate: 0.8 mL/min
 Injection Volume: 10 µL
 Sample Conc: 1 mg/mL
 Detector: ELS (neb=50°C, evap=70°C, gas=1.5 SLM)



Alcohols and Aliphatic Compounds

Column: Hi-Plex H
 PL1170-6830
 7.7 x 300 mm, 8 µm

Mobile Phase: Water
Flow Rate: 0.6 mL/min
Temperature: 40°C
Detector: 356-LC RI



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Environmental Applications

NEW!

Comparison of Phenols Separation with Poroshell 120

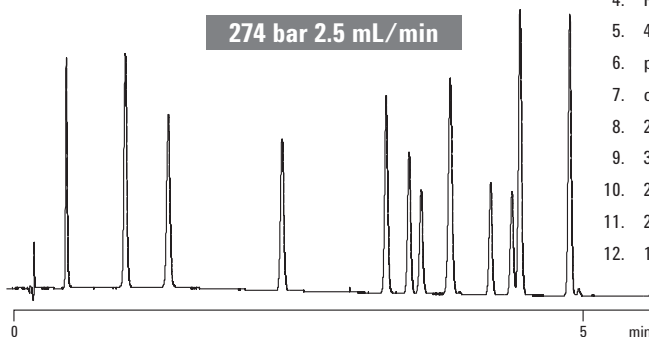
Column: Poroshell 120 EC-C18
699975-902
4.6 x 50 mm, 2.7 µm

Mobile Phase: A: Water with 0.1% Formic Acid
B: Acetonitrile

Gradient:

Time	%B
0.8	5%
6.8	60%

1200 SL controlled temperature at 25°C 2 mm flow cell



1. Hydroquinone
2. Resourcinol
3. Catechol
4. Phenol
5. 4-Nitrophenol
6. p-cresol
7. o-cresol
8. 2-Nitrophenol
9. 3,4 di methyl phenol
10. 2,3 di methyl phenol
11. 2,5 di methyl phenol
12. 1-napthol

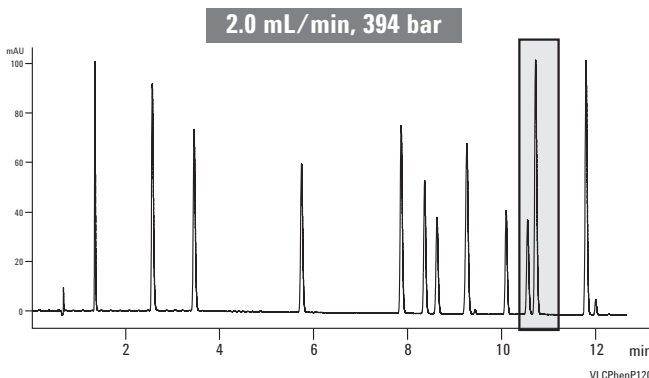
Column: Poroshell 120 EC-C18
695975-902
4.6 x 100 mm, 2.7 µm

Mobile Phase: A: Water with 0.1% Formic Acid
B: Acetonitrile

Gradient:

Time	%B
2.0	5%
17	60%

1200 RRLC SL controlled temperature at 25°C 2 mm flow cell



VLCPhenP120

NEW!

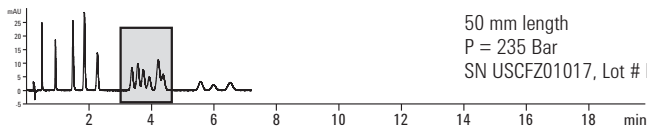
Comparison of EPA 8330 Separation on Poroshell 120 Columns

Column: Poroshell 120 EC-C18, 2.7 µm

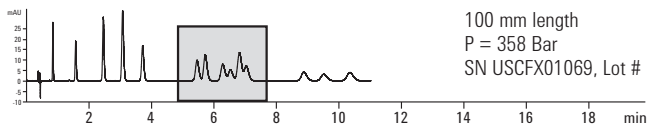
Mobile Phase: 25% Methanol: 75% Water

Flow Rate: 1 mL/min

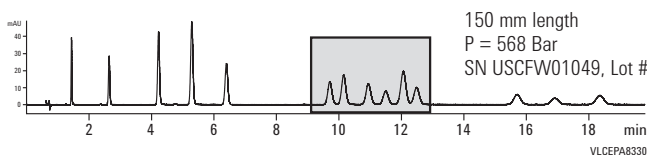
Temperature: 44°C



50 mm length
P = 235 Bar
SN USCFZ01017, Lot # B10016



100 mm length
P = 358 Bar
SN USCFX01069, Lot # B10034



150 mm length
P = 568 Bar
SN USCWF01049, Lot # B10022

VLCPEA8330

DNPH: Derivatized Aldehydes Obtained from Air

Column: ZORBAX ODS
884950-543
4.6 x 250 mm, 5 µm

Mobile Phase: A: 100% Water
B: 100% ACN

Flow Rate: 1.0 mL/min

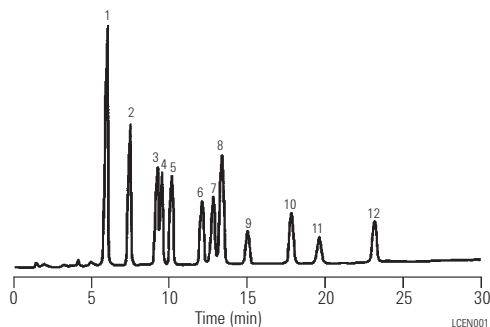
Gradient: 60-75% B in 30 min;
Wash: From 75-100% B in 5 min,
after 5 min return to 60% B

Temperature: 35°C

Detector: UV 230 nm

Sample: DNPH Derivatized Aldehydes

- | | |
|---------------------------|---|
| 1. Formaldehyde - DNPH | 7. 2-Butanone (MEK) - DNPH |
| 2. Acetaldehyde - DNPH | 8. Methacrolein - DNPH n-Butyraldehyde - DNPH |
| 3. Acetone - DNPH | 9. Benzaldehyde - DNPH |
| 4. Acrolein - DNPH | 10. Valeraldehyde - DNPH |
| 5. Propionaldehyde - DNPH | 11. m-Tolualdehyde - DNPH |
| 6. Crotonaldehyde - DNPH | 12. Hexaldehyde - DNPH |



Amitrol in Water by LC/MS, 0.05 ppb

Column: ZORBAX SB-C18
863954-302
3.0 x 150 mm, 3.5 µm

Mobile Phase: A: 10 mM ammonium acetate
B: MeOH

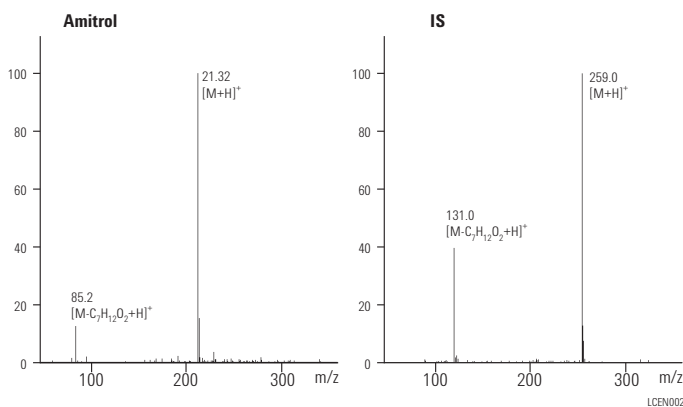
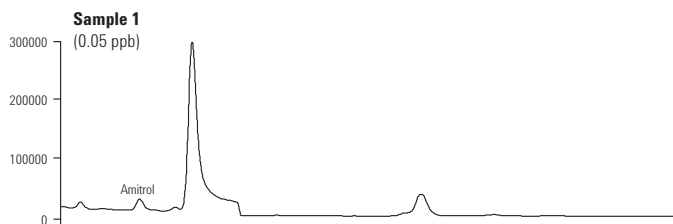
Flow Rate: 0.4 mL/min

Gradient: 0 min, 65% B; 10 min, 65% B;
15 min, 100% B; 20 min, 65% B

Temperature: 30°C

MS Conditions: Ionization Mode: APCI, positive polarity
SIM parameters: Ion: 213 Amitrol
Ion: 259 IS
Fragmentor: 100 V
SIM Resolution: Low
Vaporizer: 325°C
Drying Gas (N₂): 5.0 L/min
Gas Temperature: 350°C
Nebulizer pressure: 60 psig
Vcap: 4000 V
Corona: 4.0 uA

Sample: Amitrol in water, 100 µL



Anilines, Substituted: Rapid Separation

Column: ZORBAX Rx/SB-C8
866953-906
4.6 x 75 mm, 3.5 μm

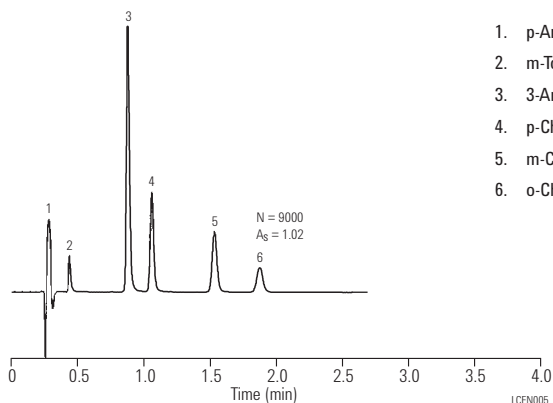
Mobile Phase: 20% ACN/80% 25 mM phosphate buffer, pH 2.5

Flow Rate: 3.0 mL/min

Temperature: 60°C

Detector: UV 254 nm

Sample: Anilines



1. p-Anisidine
2. m-Toluidine
3. 3-Amino-benzonitrile
4. p-Chloroaniline
5. m-Chloroaniline
6. o-Chloroaniline

Explosives and Related Compounds: Qualitative and Quantitative Analysis

Column A: ZORBAX SB-C18
883700-922
2.1 x 150 mm, 5 μm

Column B: ZORBAX SB-CN
883700-905
2.1 x 150 mm, 5 μm

Mobile Phase: A = ACN + 5% H₂O + 5 mM CF₃COONH₄
B = H₂O + 5% ACN + 5 mM CF₃COONH₄, pH 2.7 (CF₃COOH)

Flow Rate: 0.23 mL/min

Gradient: A:
0 min 80% B
2 min 80% B
10 min 70% B
20 min 65% B
25 min 60% B
35 min 30% B
40 min 30% B
42 min 80% B

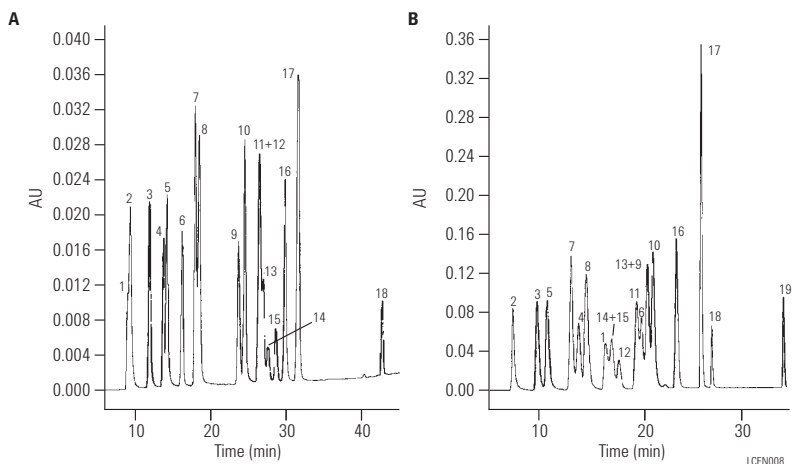
B:
0 min 80% B
1 min 80% B
15 min 70% B
30 min 20% B
35 min 20% B
37 min 80% B

Temperature: 18°C

Detector: UV 210, 240, 360 nm, wavelength switching for each compound

Sample: 10 μL of 19 explosive compounds in ACN/H₂O (20/80)

1. Picric acid
2. 4-Amino-2-nitrotoluene
3. 2-Amino-6-nitrotoluene
4. RDX
5. 2-Amino-4-nitrotoluene
6. HMX
7. 1,3-Dinitrobenzene
8. 1,3,5-Trinitrobenzene
9. 2-Amino-4,6-dinitrotoluene
10. 2,4-Dinitrotoluene
11. 4-Amino-4,6-dinitrotoluene
12. 2-Nitrotoluene
13. 2,6-Dinitrotoluene
14. 4-Nitrotoluene
15. 3-Nitrotoluene
16. 2,4,6-Trinitrotoluene
17. Tetryl
18. Diphenylamine
19. Hexyl



Explosives from Soil Extract

Column: ZORBAX SB-C18
880975-302
3.0 x 250 mm, 5 µm

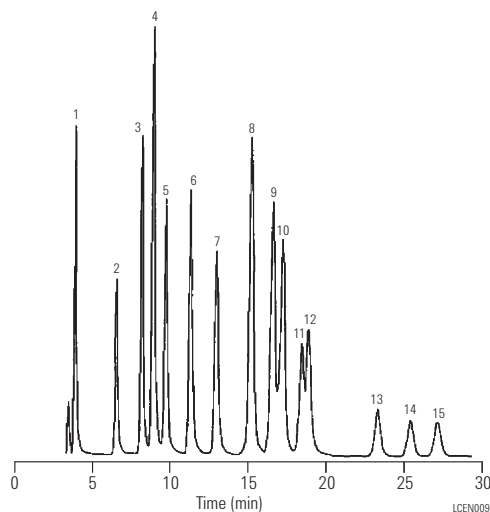
Mobile Phase: Methanol/Water (50/50) (v/v)

Flow Rate: 0.3 mL/min

Temperature: Ambient

Detector: UV 230 nm

Sample: 10 µL Explosives Mix



1. Octogen (HMX)
2. Hexogen (RDX)
3. 2-Amino-6-nitrotoluene
4. 1,3,5-Trinitrobenzene
5. 2-Amino-4-nitrotoluene
6. 1,3-Dinitrobenzene
7. Tetryl
8. 2,4,6-Trinitrotoluene
9. 4-Amino-2,6-dinitrotoluene
10. 2-Amino-4,6-dinitrotoluene
11. 2,6-Dinitrotoluene
12. 2,4-Dinitrotoluene
13. 2-Nitrotoluene
14. 4-Nitrotoluene
15. 3-Nitrotoluene

Herbicides on Different Bonded Phases

Column A: ZORBAX SB-CN
883975-905
4.6 x 150 mm, 5 µm

Column B: ZORBAX SB-Phenyl
883975-912
4.6 x 150 mm, 5 µm

Column C: ZORBAX SB-C8
883975-906
4.6 x 150 mm, 5 µm

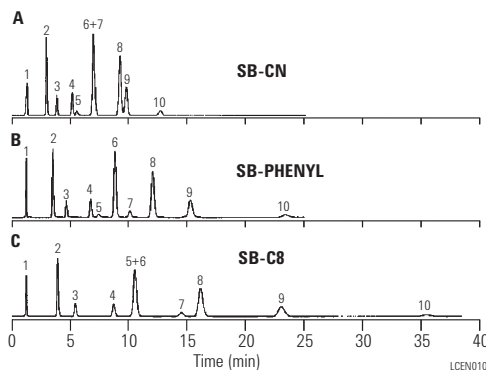
Mobile Phase: 35% ACN, 65% Water

Flow Rate: 1.0 mL/min

Temperature: Ambient

Detector: UV 254 nm

Sample: Herbicides



1. Bentazon
2. Tebuthiuron
3. Simazine
4. Atrazine
5. Prometon
6. Diuron
7. Propazine
8. Propanil
9. Prometryne
10. Metolachlor

Herbicide/Pesticide Standards: Effect of Bonded Phase

Column: Eclipse XDB-C8
993967-906
4.6 x 150 mm, 5 µm

Mobile Phase: Water/Acetonitrile

Flow Rate: 1.0 mL/min

Gradient: 20-60% in 15 min.

Temperature: 50°C
40°C
30°C
20°C

Detector: DAD 240/30

Sample: Herbicide & Pesticide Standards

Column: Eclipse XDB-C18
993967-902
4.6 x 150 mm, 5 µm

Mobile Phase: Water/Acetonitrile

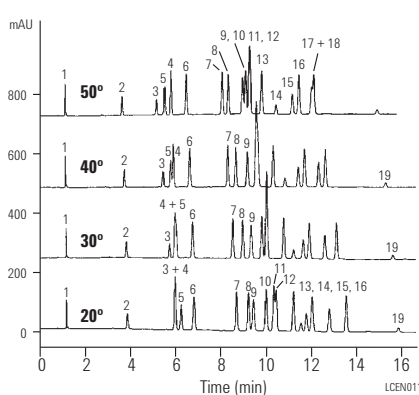
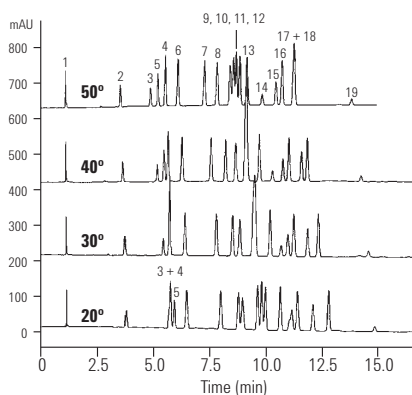
Flow Rate: 1.0 mL/min

Gradient: 20-60% in 15 min.

Temperature: 50°C
40°C
30°C
20°C

Detector: DAD 240/30

Sample: Herbicide & Pesticide Standards



1. Desethylidisopropylatrazine
2. Desethylatrazine
3. Benzthiazuron
4. Hexazinon
5. Metoxuron
6. Simazine
7. Methabenzthiazuron
8. Simazine
9. Atrazine
10. Isoproturon
11. Diuron
12. Monlinuron
13. Metobromuron
14. Metazachlor
15. Propazine
16. Sebutylazine
17. Terbutylazine
18. Linuron
19. Metolachlor



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Separation of EPA 610 PAH Mix on 3.0 x 250 mm, 5 µm Eclipse PAH Column

Column: Eclipse PAH
959990-318
3.0 x 250 mm, 5 µm

Mobile Phase: A: Water
B: Acetonitrile
Initial %B = 40

Flow Rate: 0.85 mL/min

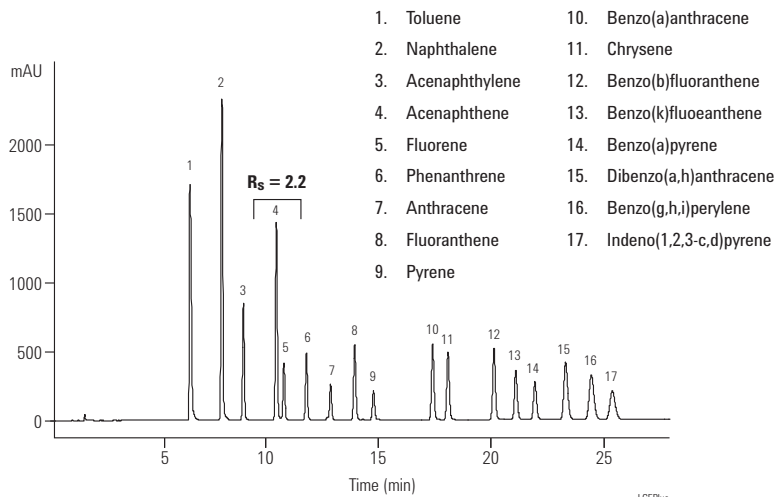
Gradient:

Time (Min)	%B
0.00	45
17.5	100
24.0	100
25.5	40
27.5	40

Stop Time = 25.0

Temperature: 25° C

Detector: 220.4 nm No Ref.; Stop time = 26.0 min



Polycyclic aromatic hydrocarbons according to EPA Method 610

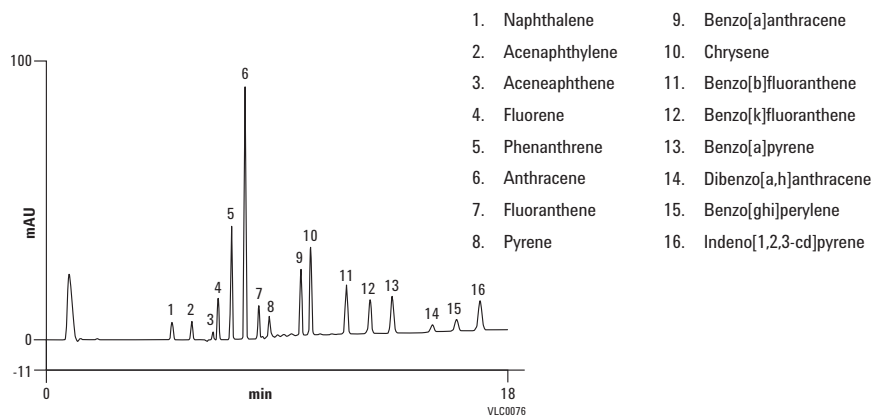
Column: Pursuit PAH
A7001100X046
4.6 x 100 mm, 3 µm

Sample: NIST 16473 Standard

Mobile Phase: A: ACN:water, 25:75
B: ACN

Flow Rate: 2.0 mL/min

Detector: UV, 254 nm



Separation of 20 PAHs on Eclipse PAH

Column: Eclipse PAH
959964-918
4.6 x 100 mm, 1.8 μm

Mobile Phase: A: Water
B: Acetonitrile

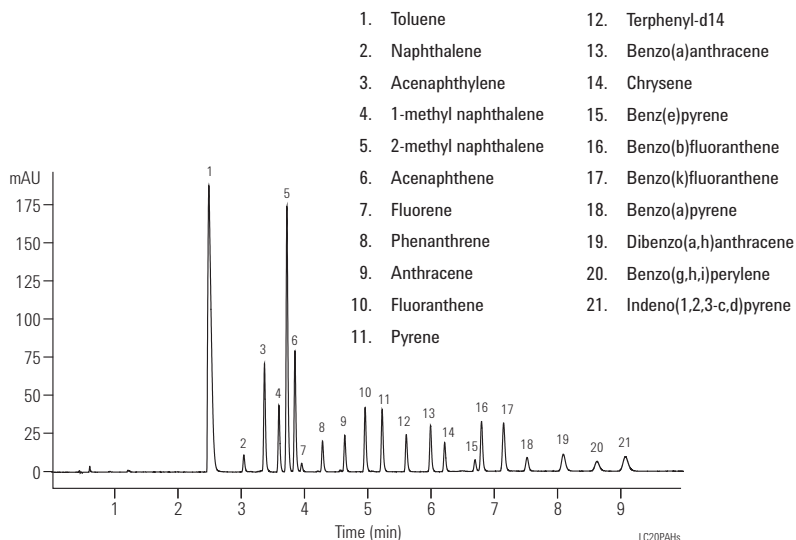
Flow Rate: 1.8 mL/min

Gradient:

Time (Min)	% B
0	40
6	100
9.5	100
10	40
Stop Time = 12	

Temperature: 25°C

Detector: 230.8 nm No Ref.; Data rate 0.2 s, micro flow cell



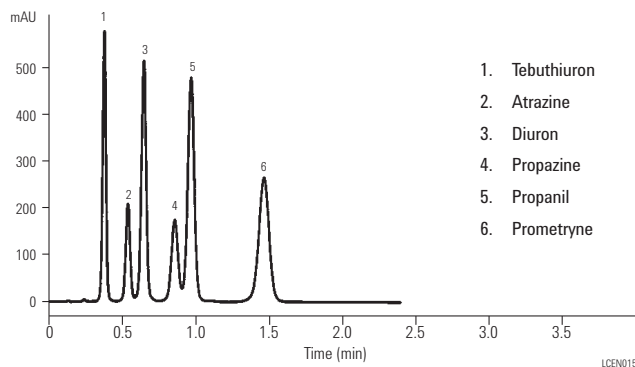
Herbicides: Rapid Separation

Column: Eclipse XDB-C18
933975-902
4.6 x 30 mm, 3.5 μm

Mobile Phase: MeOH:H₂O (60:40)

Flow Rate: 2 mL/min

Temperature: Ambient



Phenoxyacid herbicides

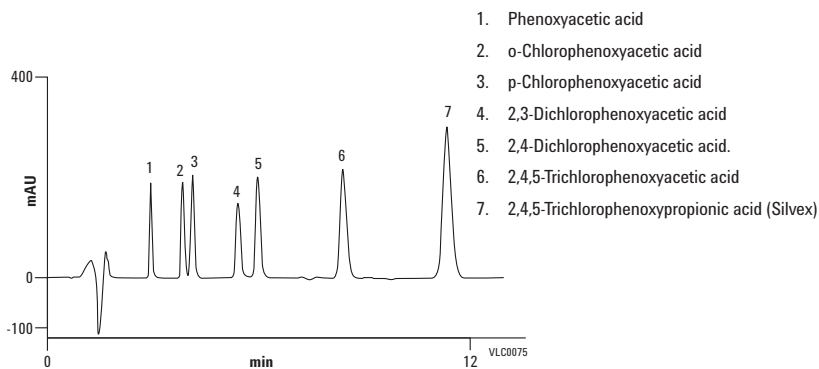
Column: Pursuit XRs C8
A6010150X046
4.6 x 150 mm, 5 μm

Mobile Phase: MeCN:water+0.1%
HCOOH, 50:50

Flow Rate: 1.0 mL/min

Temperature: Ambient

Detector: UV, 220 nm



Triazine Pesticides on Bonus-RP and Alkyl C8 Phase

Column: ZORBAX Bonus-RP
883668-901
4.6 x 150 mm, 5 µm

Mobile Phase: MeOH: 0.1% TFA (70:30)*

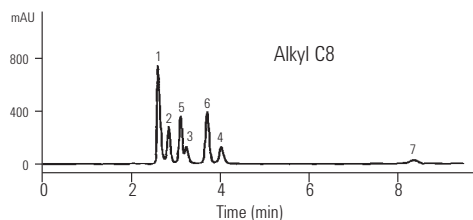
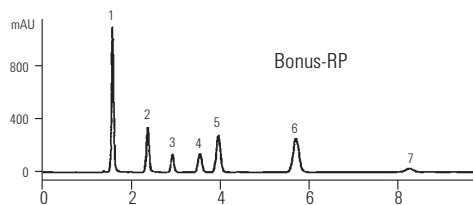
Flow Rate: 1.0 mL/min

Temperature: Ambient

Detector: 254 nm

Sample: Triazine pesticides, 2 µL

1. Prometryne
2. Tebuthion
3. Atrazine
4. Propazine
5. Diuron
6. Propanil
7. Dacthal



* For low pH work with Bonus-RP, a TFA mobile phase is often preferred over phosphate, and is compatible with LC/MS.

LCEN017

Phenols, Substituted

Column: ZORBAX SB-C18
883975-902
4.6 x 150 mm, 5 µm

Mobile Phase: 20% ACN/80% 0.01 M H₃PO₄
to 45% ACN in 7.5 min.

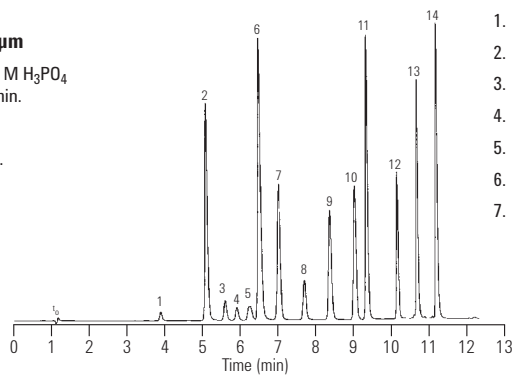
Flow Rate: 1.5 mL/min

Gradient: 80% ACN in 2.0 min.

Temperature: 35°C

Detector: UV 254 nm

Sample: Phenols



- | | |
|----------------------|--------------------------------|
| 1. Phenol | 8. 2,4-Nimethylphenol |
| 2. 4-Nitrophenol | 9. 4-Chloro-3-methylphenol |
| 3. m-Cresol | 10. 2,4-Dichlorophenol |
| 4. o-Cresol | 11. 2-Methyl-4,6-dinitrophenol |
| 5. 2-Chlorophenol | 12. 2,4,6-Trichlorophenol |
| 6. 2,4-Dinitrophenol | 13. 2,3,4,6-Tetrachlorophenol |
| 7. 2-Nitrophenol | 14. Pentachlorophenol |

LCEN020

**Plant Hormones:
Rapid Gradient Elution Separation**

Column: ZORBAX Rx/SB-C8
866953-906
4.6 x 75 mm, 3.5 µm

Mobile Phase: A: Water with 0.1% TFA
B: Acetonitrile with 0.1% TFA

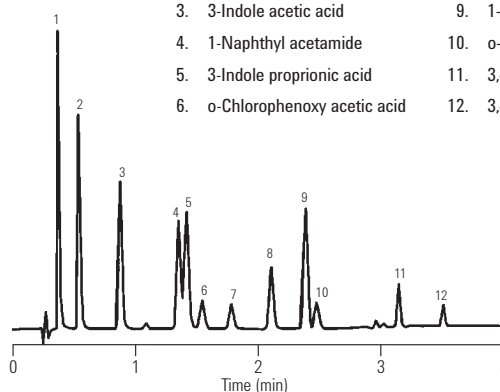
Flow Rate: 3.0 mL/min

Temperature: 60°C

Detector: UV 245 nm

Sample: Plant hormones

- | | |
|--------------------------------|---|
| 1. Kinetin | 7. p-Chlorophenoxy acetic acid |
| 2. n-6-Benzyl adenine | 8. 3-Indole butyric acid |
| 3. 3-Indole acetic acid | 9. 1-Naphthyl acetic acid |
| 4. 1-Naphthyl acetamide | 10. o-Chlorophenoxy propionic acid |
| 5. 3-Indole propionic acid | 11. 3,4,5-Trichlorophenoxy acetic acid |
| 6. o-Chlorophenoxy acetic acid | 12. 3,4,5-Trichlorophenoxy propionic acid |



LCEN022

VX Nerve Agent Metabolites by LC/MS-IS Standard (C13 labeled)

Column: ZORBAX NH2
860700-708
2.1 x 50 mm, 5 µm

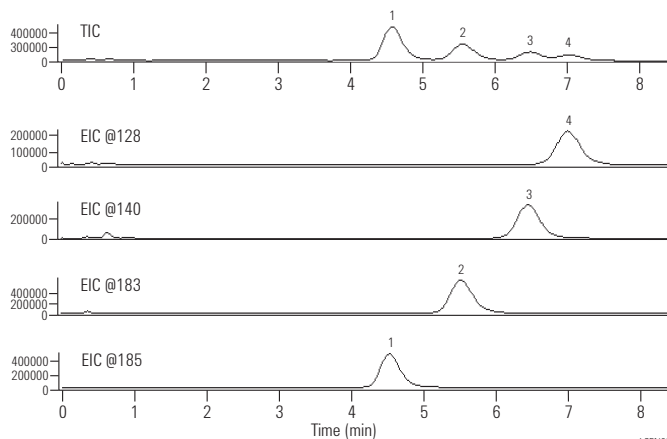
Mobile Phase: 1:1 (20 mM Ammonium Acetate pH 4.5/Acetonitrile)

Flow Rate: 0.5 mL/min, 1 µL injection (prepared std in ACN)

Temperature: 35°C

Detector: ESI-Negative Ion, Gas Flow 12 L/min, Nebulizer 60 psi

Sample	MW
1. Cyclohexyl methylphosphonic acid	178
2. Pinacolyl methylphosphonic acid	180
3. Isopropyl methylphosphonic acid	138
4. Ethyl methylphosphonic acid	124



LCEN025

Food and Consumer Product Applications

Separation of Azo Dyes on Eclipse Plus Phenyl-Hexyl

Column: Eclipse Plus Phenyl Hexyl
959996-912
4.6 x 100 mm, 5 µm

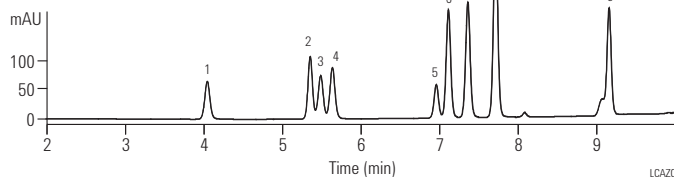
Mobile Phase: A: 10 mM Ammonium Acetate, pH 4.7
B: MeOH

Flow Rate: 1.5 mL/min

Gradient: **Time (Min):** %B:
0 25
5 50

Detector: UV 254 nm

- | | |
|------------------|-----------------------|
| 1. Aniline | 6. o-Tolidine |
| 2. o-Toluidine | 7. Dimethoxybenzidine |
| 3. Anisidine | 8. Naphthylamine |
| 4. Benzidine | 9. Dichlorobenzidine |
| 5. Chloroaniline | |



Anthocyanins from Blueberries: High-Efficiency High-Speed Separation

Column A: ZORBAX SB-C18
880975-902
4.6 x 250 mm, 5 µm

Column B: ZORBAX SB-C18
863953-902
4.6 x 150 mm, 3.5 µm

Column C: ZORBAX SB-C18
866953-902
4.6 x 75 mm, 3.5 µm

Mobile Phase: A: 3% Phosphoric acid
B: 100% MeOH

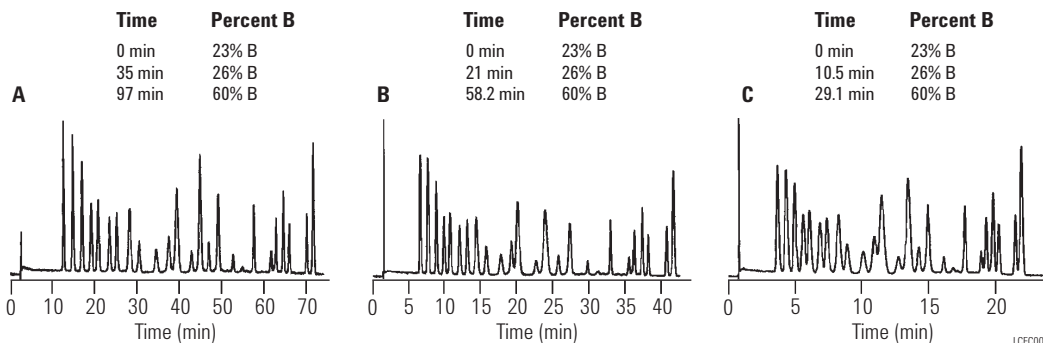
Flow Rate: 1.0 mL/min

Gradient: As shown

Temperature: 30°C

Detector: UV 525 nm

Sample: Natural Anthocyanins



Aromatics II

Column: Eclipse XDB-Phenyl
963967-912
4.6 x 150 mm, 3.5 µm

Mobile Phase: H₂O: MeOH, 40:60

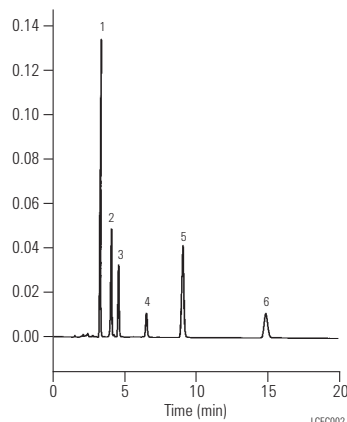
Flow Rate: 1.0 mL/min

Temperature: 35°C

Detector: 254 nm

Publication: FD13

Sample: Aromatic Sample



1. Acetophenone
2. Cinnamaldehyde
3. Eugenol
4. Cinnamaldehyde Impurity
5. Ethyl cinnamate
6. p-Cymene

Aspartame: Metabolites and Applications

Column: ZORBAX SB-C18
866953-902
4.6 x 75 mm, 3.5 µm

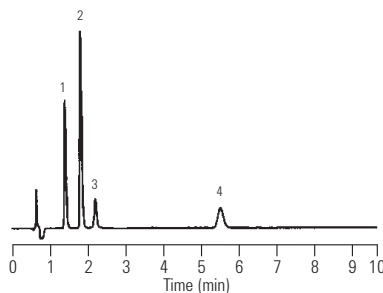
Mobile Phase: 85/15, 0.1% TFA/ACN

Flow Rate: 1.0 mL/min

Temperature: 35°C

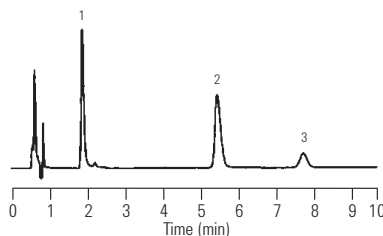
Detector: UV 210 nm

Sample: Aspartame



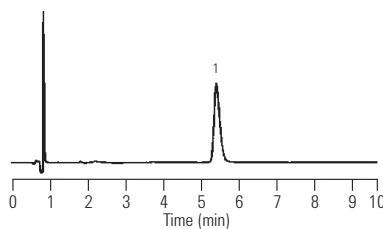
Aspartame and Its Metabolites

1. Phenylalanine
2. 5-benzyl-3,6-dioxo-2-piperazineacetic acid
3. Aspartic acid-phenylalanine dipeptide
4. Aspartame



Diet Coke

1. Caffeine
2. Aspartame
3. Unknown



Equal Sweetener

1. Aspartame

Carbohydrates: Carbohydrate Standards

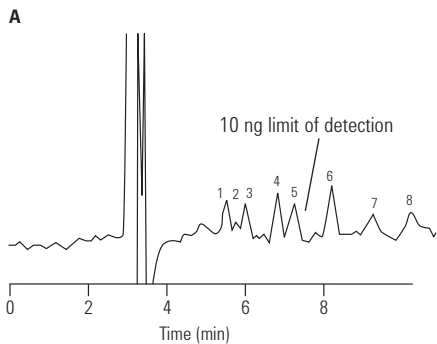
Column: ZORBAX Carbohydrate Analysis
843300-908
4.6 x 150 mm, 5 µm

Mobile Phase: 63% CH₃CN/H₂O
Flow Rate: 0.5 mL/min.

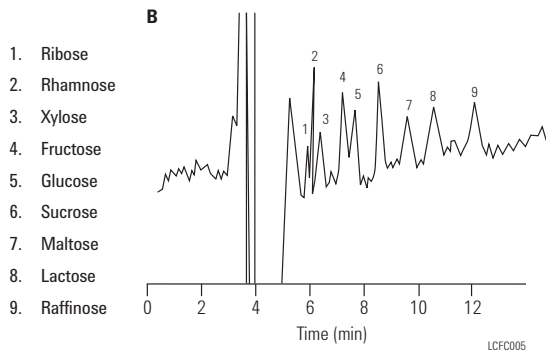
Detector: Agilent RID

Sample: Carbohydrate standard:
A: 25 ng/L, 1 µL injected
B: 500 µg/L, 50 µL injected

Carbohydrates: Separation Showing High Sensitivity



Sensitivity of High Injection Volume (50 µL)



Carbohydrates: Effect of Mobile Phase Strength

Column: ZORBAX NH2
880952-708
4.6 x 250 mm, 5 µm

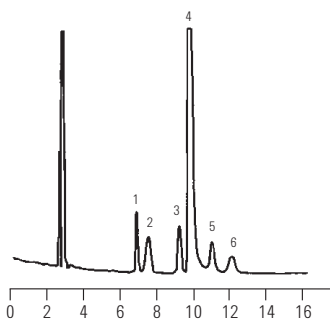
Mobile Phase: ACN/Water, as indicated
Flow Rate: 1.0 mL/min

Temperature: Ambient

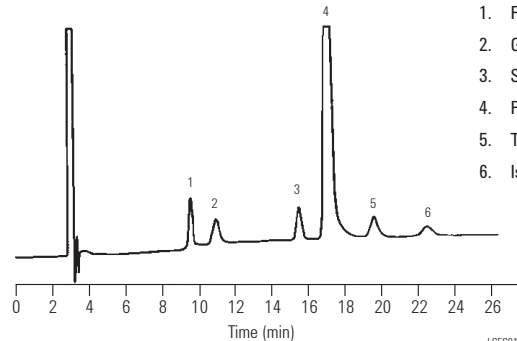
Detector: RI

Sample: Mono- and Disaccharides

ACN/H₂O: 70/30



ACN/H₂O: 75/25



1. Fructose
2. Glucose
3. Saccharose
4. Palatinose
5. Trehalulose
6. Isomaltose

Carbohydrates in Colas

Column: ZORBAX Carbohydrate Analysis
843300-908
4.6 x 150 mm, 5 µm

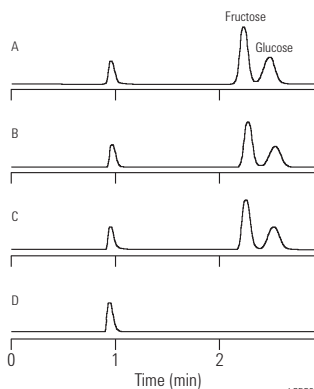
Mobile Phase: 75% ACN:25% H₂O

Flow Rate: 2.0 mL/min

Temperature: 30°C

Detector: RID

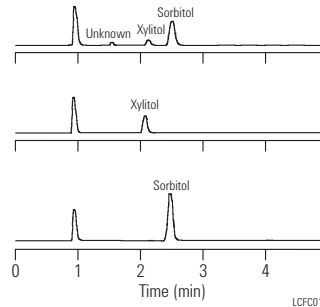
Sample: No dilution
A: COLA, Fountain
B: COLA, Can, Brand A
C: COLA, Brand B
D: COLA, Brand B, diet



Carbohydrates: Sugar Alcohols

Column: ZORBAX Carbohydrate Analysis
843300-908
4.6 x 150 mm, 5 µm

Mobile Phase: 75% ACN:25% H₂O
Flow Rate: 2.0 mL/min
Temperature: 30°C
Detector: RID
Sample: Chewing gum, sugar-free

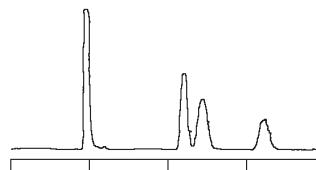


LCFC014

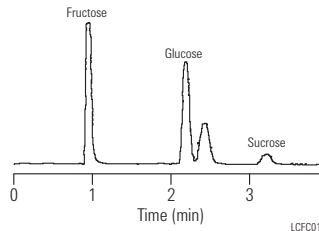
Carbohydrates in Juices

Column: ZORBAX Carbohydrate Analysis
843300-908
4.6 x 150 mm, 5 µm

Mobile Phase: 75% ACN/25% H₂O
Flow Rate: 2.0 mL/min
Temperature: 30°C
Detector: RID
Sample: diluted to 0.1X in 50:50 ACN:H₂O



Apple Drink
36.8% Fructose
24.9% Sucrose
38.3% Glucose



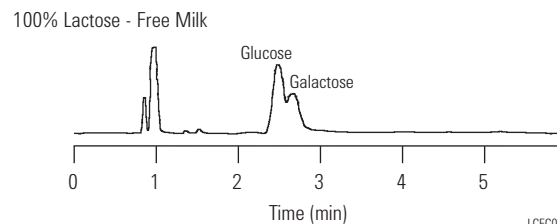
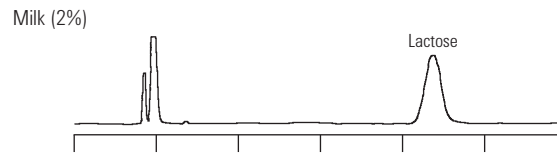
Apple Juice
58.7% Fructose
9.9% Sucrose
33.4% Glucose

LCFC016

Carbohydrates in Milk

Column: ZORBAX Carbohydrate Analysis
843300-908
4.6 x 150 mm, 5 µm

Mobile Phase: 75% ACN/25% H₂O
Flow Rate: 2.0 mL/min
Temperature: 30°C
Detector: RID
Sample: Partitioned between MeCl₂: H₂O



LCFC015

Flavoring Agents

Column: ZORBAX SB-Phenyl
860975-912
2.1 x 50 mm, 5 µm

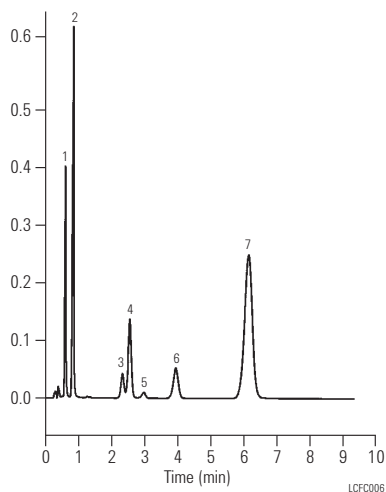
Mobile Phase: 0.3% TFA: ACN, 65:35

Flow Rate: 0.3 mL/min.

Temperature: Ambient

Detector: UV 254 nm

Sample: Cool Mint Listerine Sample



1. Unknown
2. Benzoic acid
3. Methyl salicylate
4. Carvone
5. Unknown
6. Thymol
7. Anethole

Food Colors, FD&C

Column: ZORBAX Eclipse XDB-C18
935967-902
4.6 x 50 mm, 3.5 µm

Mobile Phase: A: 0.1% TF A, pH to 4.4 with TEA, B: MeOH

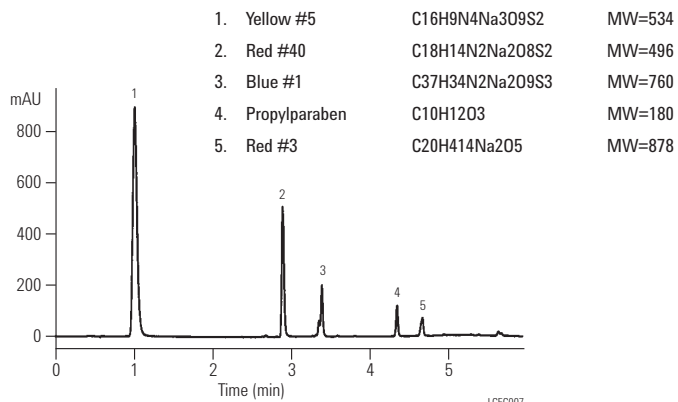
Flow Rate: 1.0 mL/min

Gradient: 17 to 100% B/4 min

Temperature: Ambient

Detector: UV 254 nm

Publication: LI FD16



- | | | |
|------------------|-----------------|--------|
| 1. Yellow #5 | C16H9N4Na3O9S2 | MW=534 |
| 2. Red #40 | C18H14N2Na2O8S2 | MW=496 |
| 3. Blue #1 | C37H34N2Na2O9S3 | MW=760 |
| 4. Propylparaben | C10H12O3 | MW=180 |
| 5. Red #3 | C20H414Na2O5 | MW=878 |

Neutraceuticals: Extract from Green Tea

Column: ZORBAX SB-C8
 863953-906
 4.6 x 150 mm, 3.5 µm

Mobile Phase: 75% 0.1% Trifluoroacetic acid: 25% Methanol

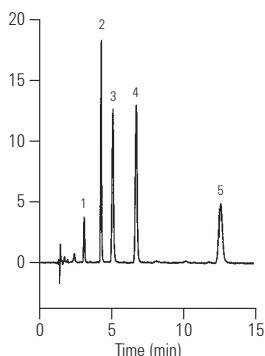
Injection: 1 mL/min

Temperature: 40°C

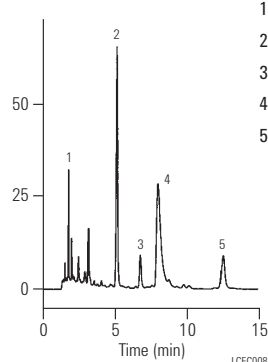
Detector: UV 280 nm

Sample: Green tea extract, 5 µL

Catechin Mixture



Green Tea Extract



1. Epigallocatechin
2. Epicatechin
3. Epigallocatechin gallate
4. Catechol
5. Epicatechin gallate

LCFC008

Tocopherols by LC/MS with APPI

Column: Eclipse XDB-C18
 993967-302
 3.0 x 150 mm, 5 µm

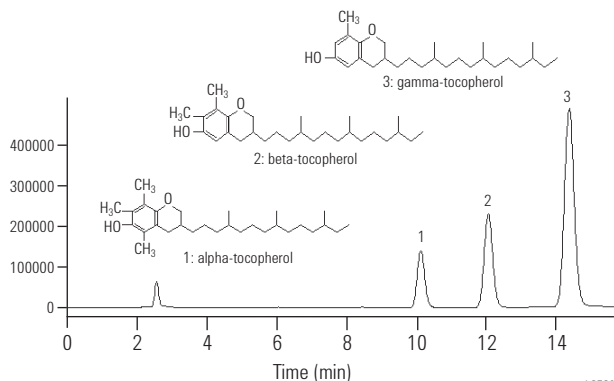
Mobile Phase: 97% MeOH: 3% 10 mM CH₃COONH₄

Flow Rate: 0.5 mL/min

Temperature: 40°C

MS Conditions: MS: Agilent 1100MSD SL
 Ionization: APPI (Positive)
 Scan range: m/z 100-500
 Vcap: 1500 V
 SIM ion: base peak
 Drying gas: 7 L/min at 350°C
 Nebulizer gas: 60 psi
 Vaporizer temp: 350°C
 Fragmentor: 140 V
 EM gain: 4

Sample Volume: 10 µL



LCFC011

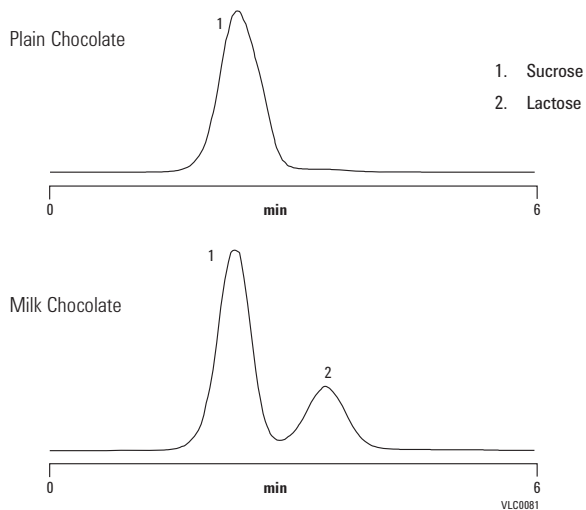


For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Sugars in plain and milk chocolate

Column: Hi-Plex Pb
PL1170-6820
7.7 x 300 mm, 8 µm

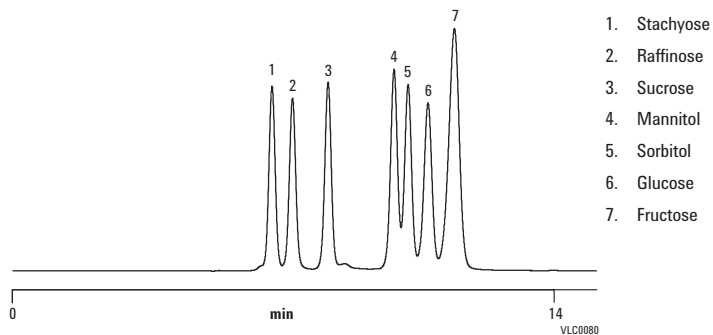
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Temperature: 80°C
Detector: RI



Sugars

Column: Hi-Plex K
PL1170-6860
7.7 x 300 mm, 8 µm

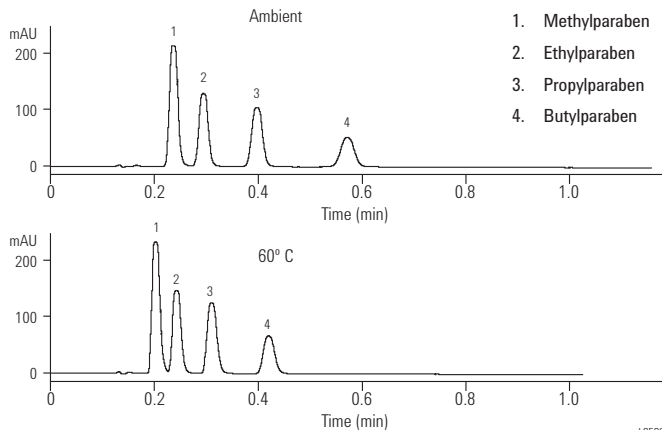
Sample: Sugars mixture (all 10 mg/mL), 20 µL injection
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Temperature: 85°C
Detector: 356-LC RI



Parabens: High Speed Separation

Column: ZORBAX SB-C18 Rapid Resolution
Cartridge
833975-902
4.6 x 30 mm, 3.5 µm

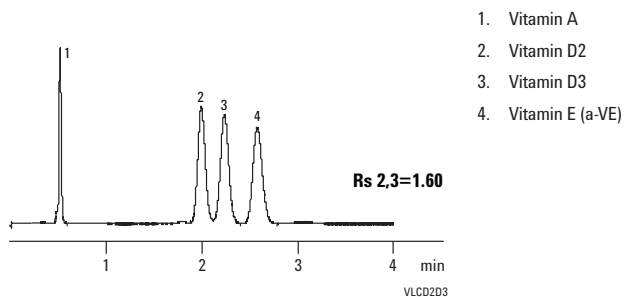
Mobile Phase: 0.1% H₃PO₄: ACN, (50:50)
Flow Rate: 2 mL/min
Temperature: top: ambient, bottom: 60°C
Detector: UV 254 nm with standard flow cell (13 µL)
Sample: Parabens, 1 µL



Separation of Vitamin D2/D3

Column: Eclipse PAH
959941-918
4.6 x 50 mm, 1.8 μm

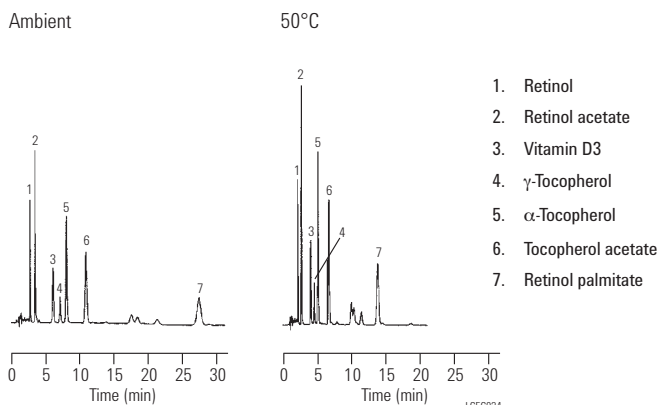
Mobile Phase: 92% MeOH, 8% water
Flow Rate: 2 mL/min
Temperature: 40°C
Detector: 325 nm for VA/280 nm for VD and VE



Fat-Soluble Vitamins on ZORBAX Eclipse XDB-C8

Column: Eclipse XDB-C8
993967-906
4.6 x 150 mm, 5 μm

Mobile Phase: 5/95 Water/MeOH
Flow Rate: 1.0 mL/min
Temperature: A: Ambient
B: 50°C
Detector: UV 280 nm
Sample: Fat Soluble Vitamins



Water-Soluble Vitamins

Column: ZORBAX SB-C8
883975-906
4.6 x 150 mm, 5 µm

Mobile Phase: A: 50 mM Sodium Phosphate, pH 2.5/MeOH (90/10)
B: 50 mM Sodium Phosphate, pH 2.5/MeOH (10/90)

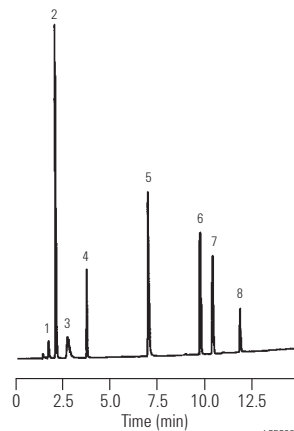
Flow Rate: 1.0 mL/min

Gradient: 0-70% B in 18 min

Temperature: Ambient

Detector: UV 245 nm

Sample: Water soluble vitamins



1. B₁-Thiamine
2. Vitamin C
3. B₃-Niacin
4. B₆-Pyridoxine
5. Pantothenic acid
6. Folic acid
7. B₁₂-Cyanocobalamin
8. B₂-Riboflavin

Water-Soluble Vitamins: High Speed Separation using Ion-Pairing

Column: ZORBAX Rx/SB-C8
866953-906
4.6 x 75 mm, 3.5 µm

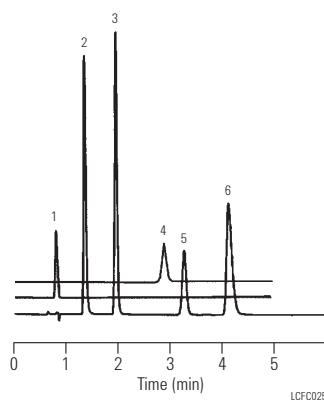
Mobile Phase: 10 mM Hexane Sulfonate with 0.1% Phosphoric Acid: MeOH (74:26)

Flow Rate: 1.0 mL/min

Temperature: Ambient

Detector: UV 245 nm

Sample: Water soluble vitamins



1. Vitamin C
2. B₃-Niacin
3. B₆-Pyridoxine
4. Folic acid
5. B₂-Riboflavin
6. B₁-Thiamine



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

**Water-Soluble Vitamins
using the USP 23 Method**

Column: ZORBAX SB-C18
880975-902
4.6 x 250 mm, 5 µm

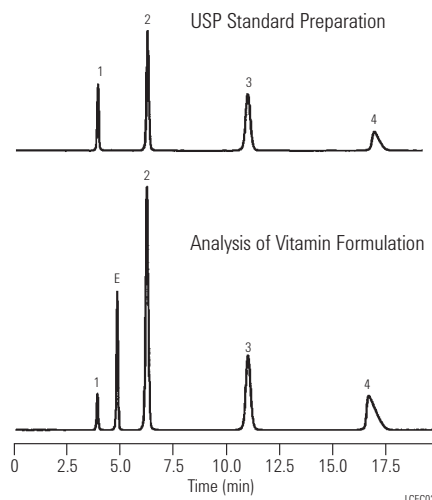
Mobile Phase: 7.2 mM Hexane Sulfonate/MeOH/Acetic Acid
(73/27/1) (ratio to 101)

Flow Rate: 1.0 mL/min

Temperature: 30° C

Detector: UV 280 nm

Sample: Water soluble vitamins



- 1. B₃-Niacin
- 2. B₆-Pyridoxine
- 3. B₂-Riboflavin
- 4. B₁-Thiamine
- E. Excipient

**Water Soluble B Vitamins
Separated on ZORBAX SB-Aq**

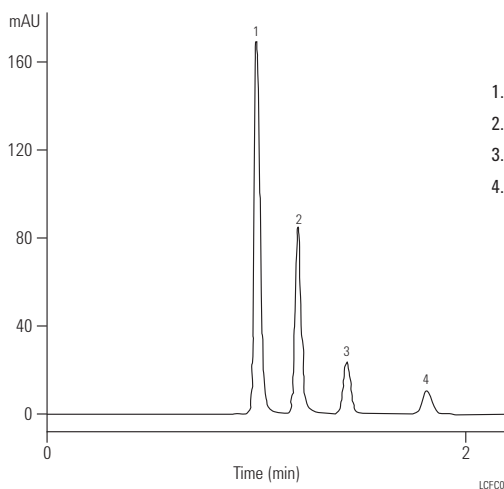
Column: ZORBAX SB-Aq
883975-914
4.6 x 150 mm, 5 µm

Mobile Phase: 5% MeOH/95% TFA (0.1%)

Flow Rate: 2.0 mL/min

Temperature: 35° C

Detector: UV 254 nm



- 1. Thiamine
- 2. Nicotinic Acid
- 3. Pyridoxine
- 4. Niacinamide

Sunscreen Ingredients: Perform conventional, fast and ultra-fast separations on the same column family

Column A: Eclipse XDB-C18
993967-902
4.6 x 150 mm, 5 μ m
6 μ L inj

Column B: Eclipse XDB-C18
961967-902
4.6 x 100 mm, 3.5 μ m
4 μ L inj

Column C: Eclipse XDB-C18
927975-902
4.6 x 50 mm, 1.8 μ m
2 μ L inj

Mobile Phase: A: 15% water
B: 85% MeOH

Flow Rate: 1.0 mL/min

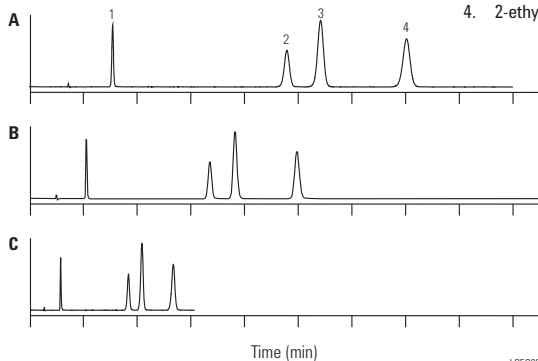
Temperature: Ambient

Detector: UV 254 nm

Publication: 5989-4721EN

Sample: Sunscreens

1. 2-hydroxy-4-methoxybenzophenone
2. Padimate O
3. 2-ethylhexyl trans-4-methoxycinnamate
4. 2-ethylhexyl salicylate



LCFC029

Fast Vitamin E Analysis on Rapid Resolution HT

Column A: Eclipse XDB-C18
927975-902
4.6 x 50 mm, 1.8 μ m

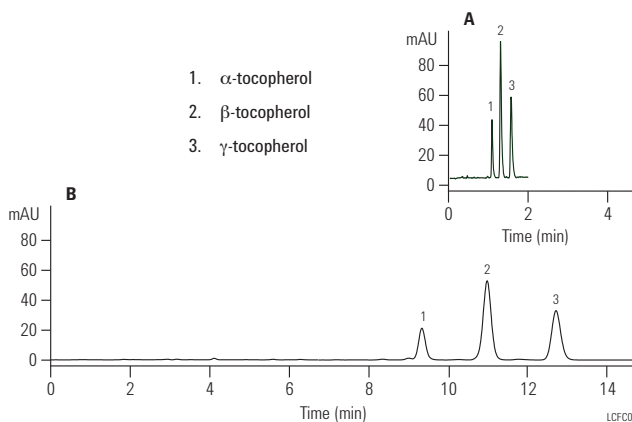
Column B: Eclipse XDB-C18
993967-902
4.6 x 150 mm, 5 μ m

Mobile Phase: A: 5% water
B: 95% MeOH

Flow Rate: 3 mL/min, 1 mL/min

Temperature: Ambient

1. α -tocopherol
2. β -tocopherol
3. γ -tocopherol



LCFC030

Theobromine in Beverages

Column: ZORBAX SB-C18
827975-901
4.6 x 50 mm, 1.8 µm

Mobile Phase: A: 92% 0.1% formic acid
B: 8% 0.1% formic acid in ACN

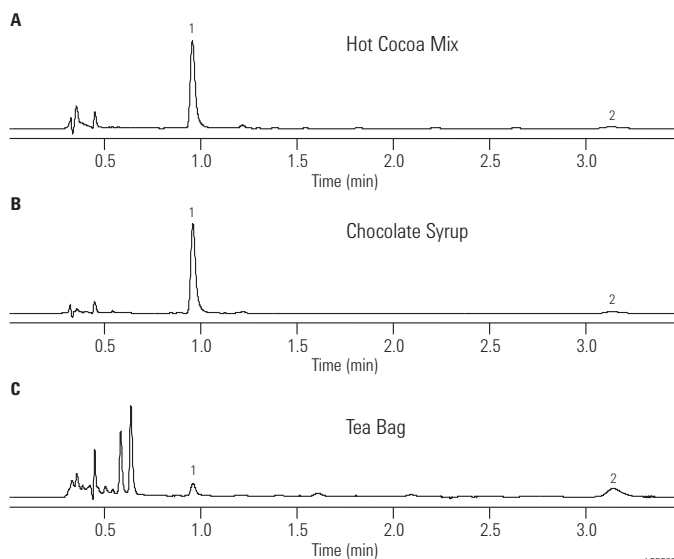
Flow Rate: 1.5 mL/min

Temperature: Ambient

Detector: UV 254 nm, flow cell 2 µL, 3 mm flow path

Sample: Theobromine

- 1. Theobromine
- 2. Caffeine



Kava kava analysis

Column: Pursuit UPS^{2.4} C18
A8100050X020H
2 x 50 mm, 2.4 µm

Mobile Phase: A: 0.5% formic acid in water
B: 0.5% formic acid in MeOH

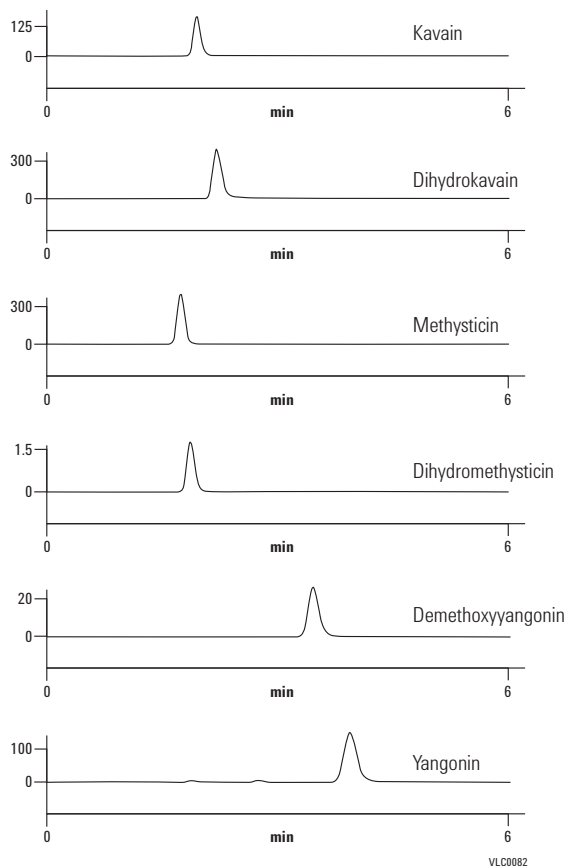
Gradient: 50% B isocratic

Flow Rate: 0.5 mL/min

Col Temp: 30°C

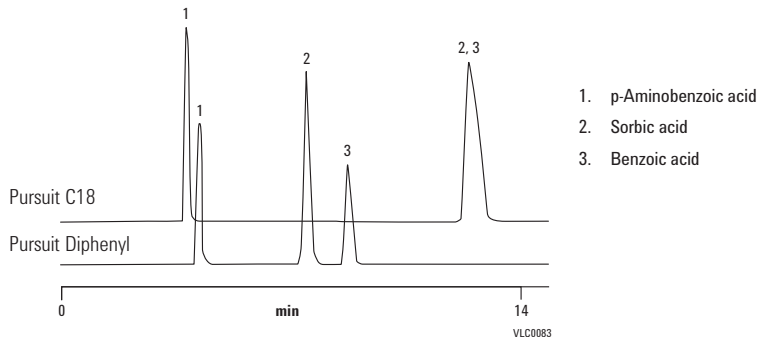
Sample Temp: Ambient

Detector: 320-MS



Benzoic acid/sorbic acid

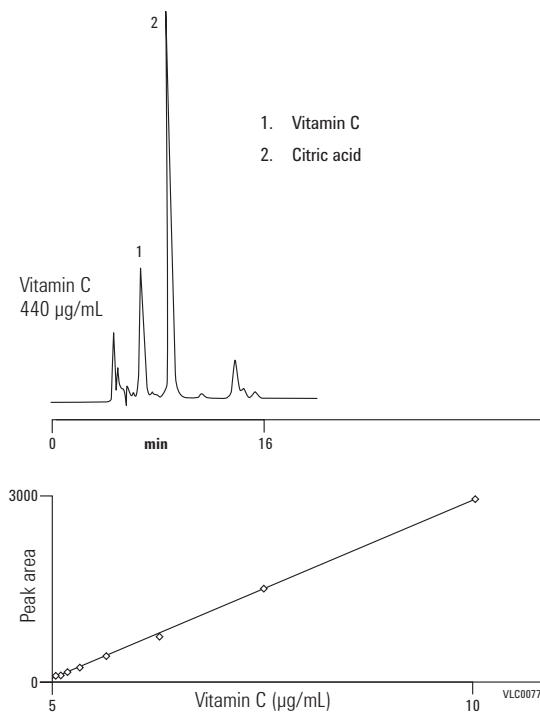
Mobile Phase: 0.1% formic acid in water:
0.1% formic acid in MeCN, 80:20
Flow Rate: 0.7 mL/min
Detector: UV, 254 nm



Quantification and qualification of vitamin C and citric acid in fresh grapefruit juice

Column: PLRP-S 100Å
PL1512-5500
4.6 x 250 mm, 5 µm

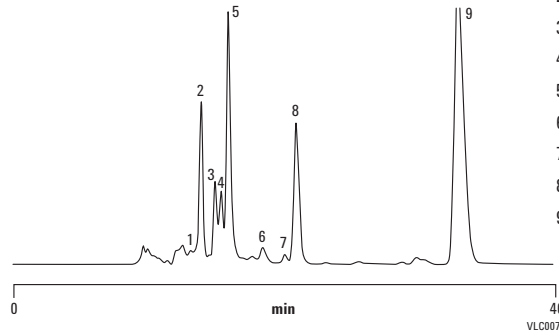
Sample: Diluted 1:50 in eluent
Mobile Phase: 0.2M NaH₂PO₄, pH 2.14
Flow Rate: 0.5 mL/min
Detector: UV, 220 nm



Rose wine

Column: Hi-Plex H
 PL1170-6830
 7.7 x 300 mm, 8 µm

Mobile Phase: 0.004M H₂SO₄
 Flow Rate: 0.4 mL/min
 Pressure: 13 bar
 Temperature: 75°C
 Detector: 356-LC refractive index detector

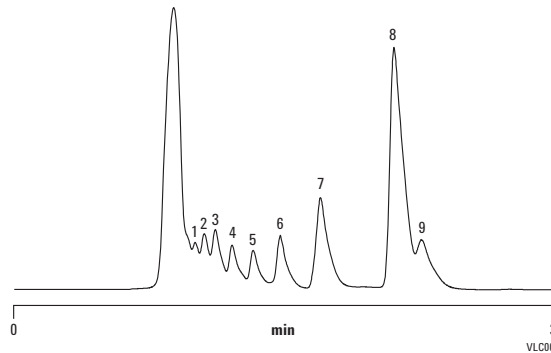


1. Citric acid
2. Tartaric acid
3. Glucose
4. Malic acid
5. Fructose
6. Succinic acid
7. Lactic acid
8. Glycerol
9. Ethanol

Sports drink

Column: Hi-Plex Na
 PL1171-6140
 7.7 x 300 mm, 10 µm

Sample: High energy orange flavor non-carbonated sports drink
 Mobile Phase: Water
 Flow Rate: 0.3 mL/min
 Temperature: 80°C
 Detector: RI

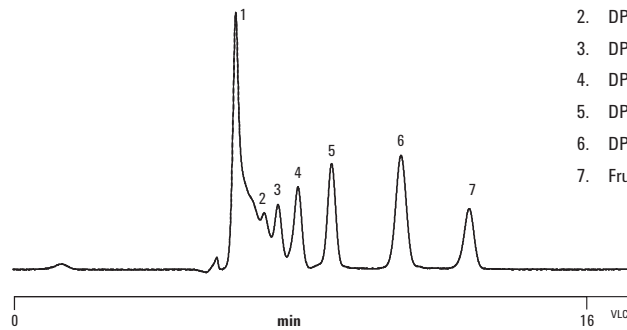


1. Dp8
2. Dp7
3. Dp6
4. Dp5
5. Dp4
6. Dp3
7. Dp2
8. Dp1 (Glucose)
9. Fructose

Oligosaccharides

Column: Hi-Plex Ca (Duo)
 PL1F70-6850
 6.5 x 300 mm, 8 µm

Mobile Phase: DI water
 Flow Rate: 0.5 mL/min
 Temperature: 90°C
 Detector: 356-LC RI



1. Higher MW sugars
2. DP5
3. DP4
4. DP3
5. DP2
6. DP1
7. Fructose

Pharmaceutical Applications

Fast Analysis 11 Common Compounds Found in Analgesics

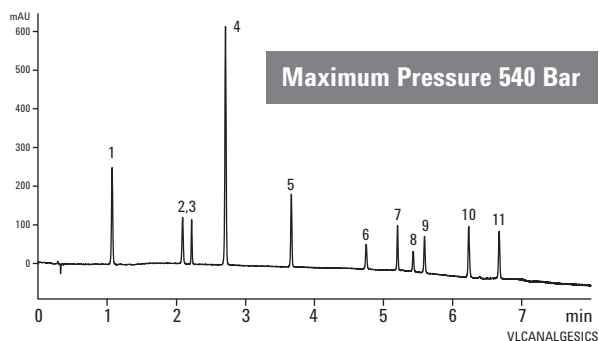
Column: Poroshell 120 EC-C18
695975-902
4.6 x 100 mm, 2.7 μ m

Mobile Phase: A : Water + 0.1% formic acid
B: ACN

Flow Rate: 3.5 mL/min

Temperature: 40°C

Detector: DAD 254 nm



1. Acetaminophen
2. Caffeine
3. 2-Acetamidophenol
4. Acetamide
5. Phenacetin
6. Sulindac
7. Piroxicam
8. Tolmetin
9. Ketoprofen
10. Diflusal
11. Diclofenac

NEW!**Faster Analysis of USP Method for Simvastatin Tablet with Poroshell 120**

Column A: Eclipse Plus C18
959990-902
4.6 x 250 mm, 5 μ m

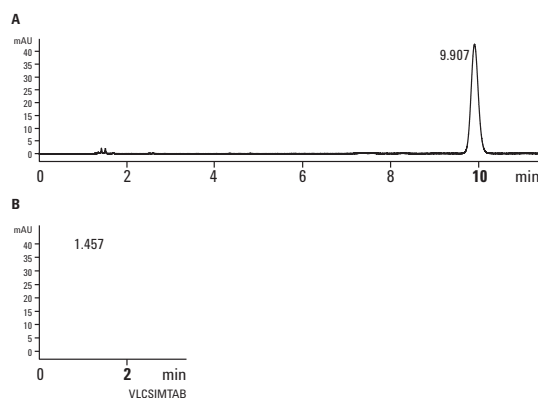
Column B: Poroshell 120 EC-C18
697975-902
4.6 x 75 mm, 2.7 μ m

Mobile Phase: 65% CH₃CN,
35% 3.9 g/L NaH₂PO₄ (pH 4.5)

Flow Rate: 1.5 mL/min for 5 μ m column
2.8 mL/min for 2.7 μ m Poroshell 120 column

Temperature: 45°C

Detector: DAD Sig = 238, 8
Ref = 360, 100 nm



	USP Requirement	5 μm (1.5 mL/min)	2.7 μm (2.8 mL/min)
T_R	N/A	9.907	1.457
k'	> 3.0	5.962	5.122
N	> 4500	16939	14439
T_f	< 2.0	1.09	1.10

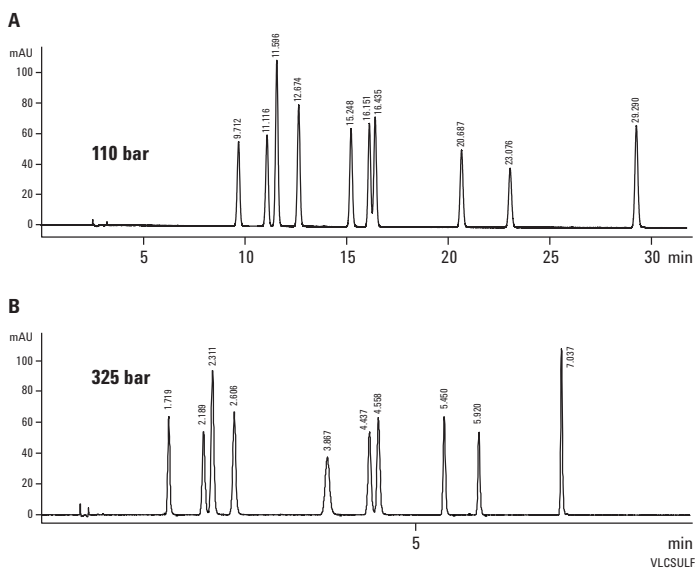
NEW!

Faster Separation of Sulfa Drugs with Poroshell 120

Column A:	Eclipse Plus C18	Time	%B
	959990-902	0	8
	4.6 x 250 mm, 5 µm	33	33
		35	33
Column B:	Poroshell 120 EC-C18	Time	%B
	695975-902	0	8
	4.6 x 100 mm, 2.7 µm	12	33
		13.2	33

Mobile Phase: A: 0.1% formic acid in Water
B: 0.1% formic acid in ACN

Flow Rate: 1 mL/min



Separation of Pharmaceutical Cardiac Drugs on Eclipse Plus C18

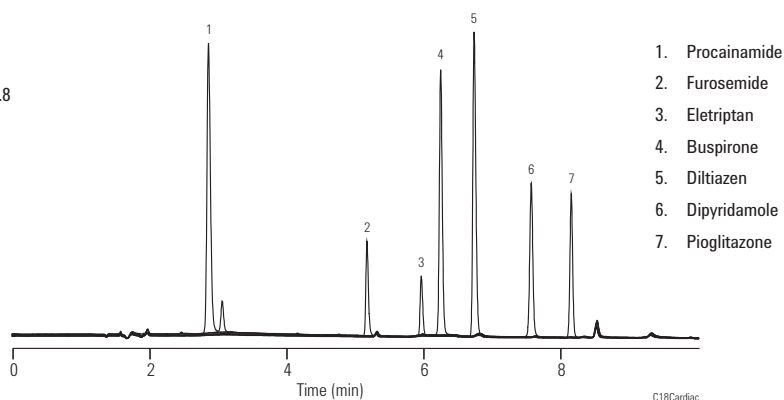
Column: Eclipse Plus C18
959996-902
4.6 x 100 mm, 5 µm

Mobile Phase: A: 20 mM Ammonium Acetate, pH 4.8
B: ACN

Flow Rate: 1 mL/min

Gradient: 10-90% in 10 min

Detector: UV 254 nm



Fast and Ultra-Fast Analysis of Basic Compounds on Eclipse Plus

Column: Eclipse Plus C18
959941-902
4.6 x 50 mm, 1.8 μ m

Mobile Phase: A: 50% 8 mM K_2HPO_4 , pH 7
B: 50% ACN

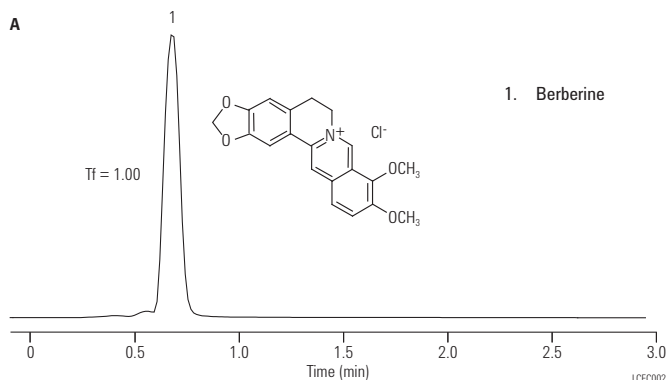
Flow Rate: 1.0 mL/min

Temperature: Ambient

Detector: UV 254 nm

Publication: 5989-4934EN

Sample: Berberine, 0.4 mg/mL, 2 μ L



Xanthines: Higher Resolution, Same Selectivity with RRHT

Column A: ZORBAX SB-C18
846975-902
4.6 x 50 mm, 5 μ m

Column B: ZORBAX SB-C18
827975-901
4.6 x 50 mm, 1.8 μ m

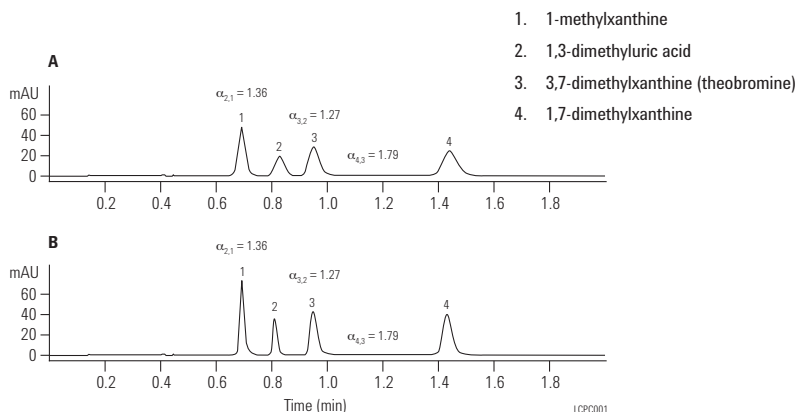
Mobile Phase: A: 92% 0.1% formic acid
B: 8% 0.1% formic acid in ACN

Flow Rate: 1.5 mL/min

Temperature: Ambient

Detector: UV 254 nm

Sample: Xanthines



Antihistamines: Fast Separations on RRHT Extend-C18

Column A: ZORBAX Extend-C18
773450-902
4.6 x 150 mm, 5 μ m

Column B: ZORBAX Extend-C18
727975-902
4.6 x 50 mm, 1.8 μ m

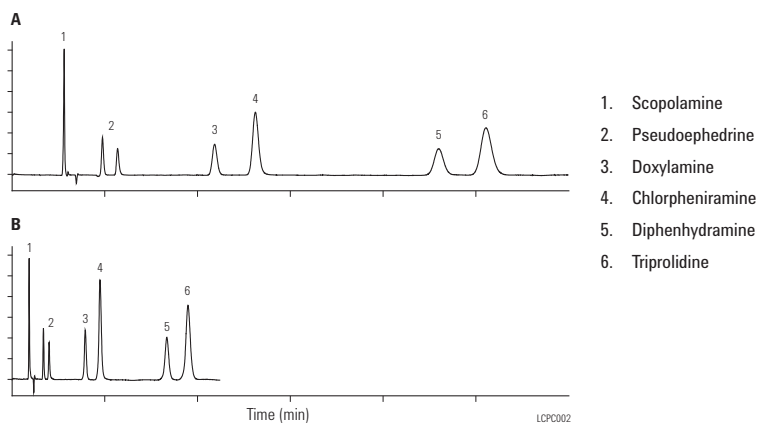
Mobile Phase: A: 30% 50 mM pyrrolidine buffer
B: 70% MeOH

Flow Rate: 1.0 mL/min

Temperature: Ambient

Detector: UV 220 nm

Sample: Antihistamines



Ibuprofen: Optimizing Selectivity with RRHT Columns

Column A: SB-C8
827975-906
4.6 x 50 mm, 1.8 μ m

Column B: Eclipse XDB-C8
927975-906
4.6 x 50 mm, 1.8 μ m

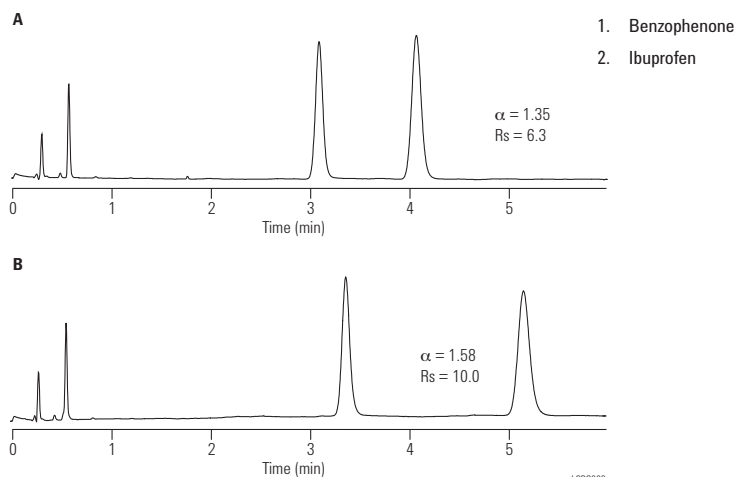
Mobile Phase: A: 63% water
B: 37% acetonitrile + 1.8 mL H₃PO₄

Flow Rate: 2.0 mL/min

Temperature: Ambient

Detector: UV 254 nm

Sample: Ibuprofen Oral Suspension

**Analgesics**

Column: Pursuit XRs Diphenyl
A6020150X046
4.6 x 150 mm, 5 μ m

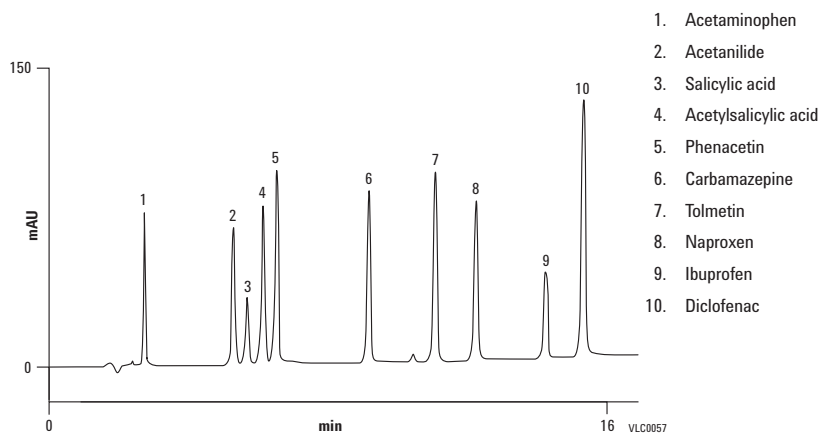
Mobile Phase: A: Water+0.1% HCOOH
B: MeCN+0.1% HCCOH

Gradient: 25-80% B in 20 min

Flow Rate: 1.0 mL/min

Temperature: Ambient

Detector: UV, 254 nm



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Anesthetics, Local: Bonded Phase Selectivity

Column A: ZORBAX SB-C18
883975-902
4.6 x 150 mm, 5 µm

Column B: ZORBAX SB-C8
883975-906
4.6 x 150 mm, 5 µm

Column C: ZORBAX SB-C3
883975-909
4.6 x 150 mm, 5 µm

Column D: ZORBAX SB-Phenyl
883975-912
4.6 x 150 mm, 5 µm

Column E: ZORBAX SB-CN
883975-905
4.6 x 150 mm, 5 µm

Mobile Phase: A: 50 mM NaH₂PO₄ pH 2.5 in 95% H₂O/5% ACN
B: 50 mM NaH₂PO₄ pH 2.5 in 47% H₂O/53% ACN

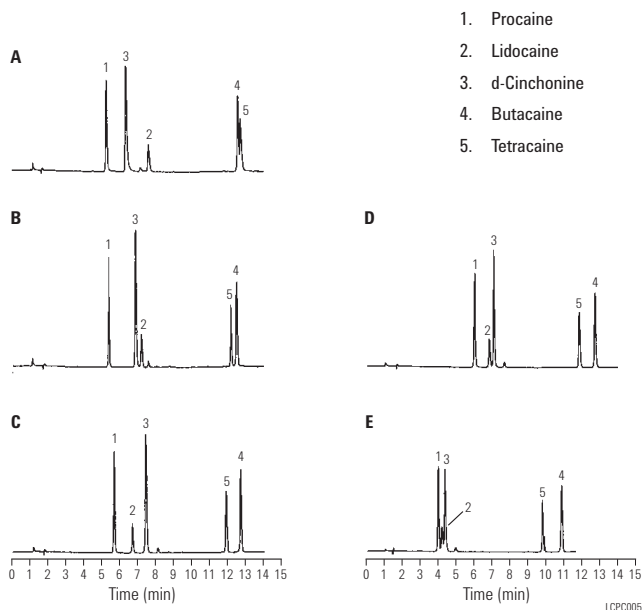
Flow Rate: 1.5 mL/min

Gradient: 0-100% B in 18.8 min

Temperature: 26°C

Detector: UV 254 nm

Sample: 10 µL, 10 µg/mL



Local anesthetics

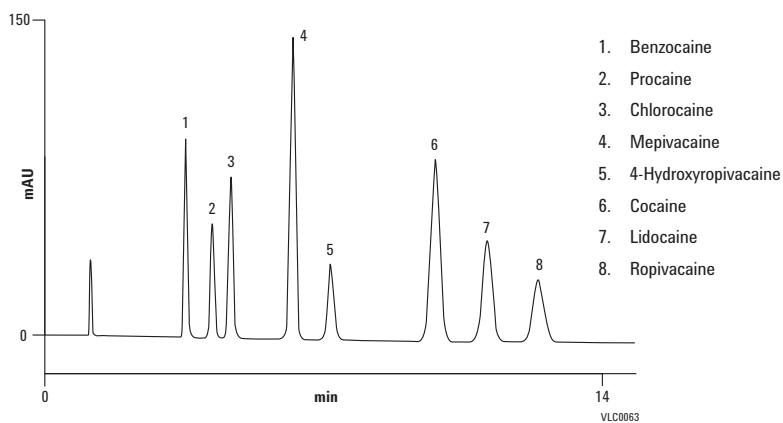
Column: Pursuit XR_s C8
A6010150X046
4.6 x 150 mm, 5 µm

Mobile Phase: MeOH:5 mM NH₄CO₃ 65:35, pH 10

Flow Rate: 1.0 mL/min

Temperature: Ambient

Detector: UV, 210 nm



Antibiotics: High Speed Separation

Column: ZORBAX Rx/SB-C8
866953-906
4.6 x 75 mm, 3.5 µm

Mobile Phase: 8.0% acetonitrile/92% 0.1% aqueous TFA

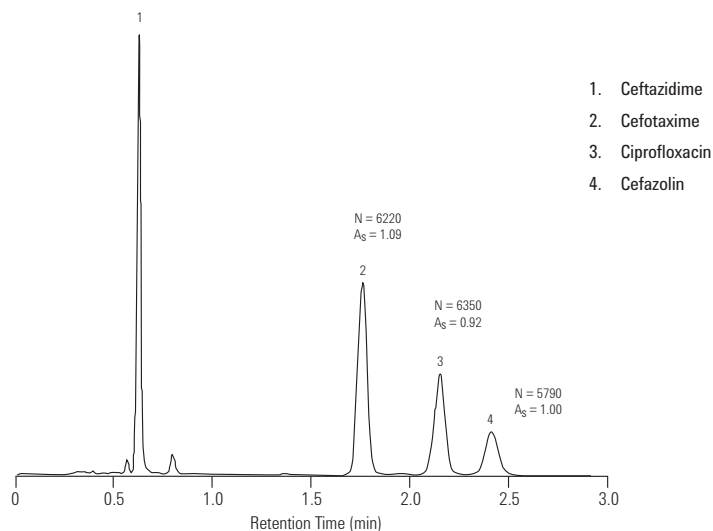
Flow Rate: 3.0 mL/min

Gradient: 45-70% B in 35 min

Temperature: 60°C

Detector: UV 260 nm

Sample: 1 µL containing 0.40, 0.36, 0.10 and 0.37 µg ea. of 1-4 resp.



- 1. Cefazidime
- 2. Cefotaxime
- 3. Ciprofloxacin
- 4. Cefazolin

LCPC007

Antibiotics: Lincomycin and Clindamycin by LC-APCI-MS LC-TIC

Column: ZORBAX SB-C18 cartridge
823700-902
2.1 x 30 mm, 1.8 µm

Mobile Phase: Gradient: 15-50% B in 1 min, hold for 1.5 min.
A: 0.2% formic acid pH 2.8
B: ACN + 0.2% formic acid

Flow Rate: 0.5 mL/min

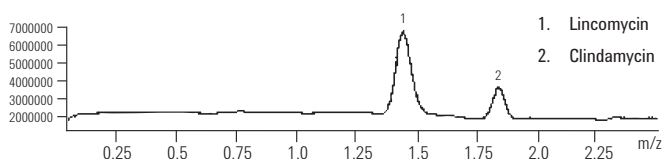
Gradient: Post time: 1.5 min

Temperature: Ambient

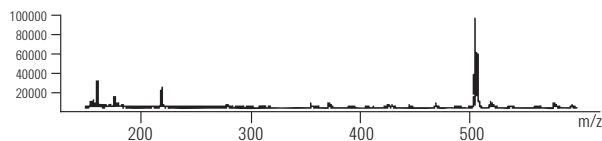
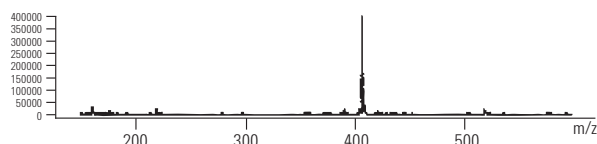
Detector: APCI, Positive ion

MS Conditions: Peak width: 0.10 min
Scan: 150-600 Da, step 0.1
Fragmentor: 70
Gas Temp: 350°C
Vaporizer: 350°C
Drying gas: 12 L/min
Nebulizer pres: 50 psi
Vcap: +3000 V
Corona: 4.0 µA

Sample: Antibiotics, 1 µL



- 1. Lincomycin
- 2. Clindamycin



LCPC008

Antifungal Medications

Column: ZORBAX Bonus-RP
883668-901
4.6 x 150 mm, 5 µm

Mobile Phase: 35% 25 mM NaH₂PO₄,
Dibasic (pH 6.5 with H₃PO₄); 65% ACN

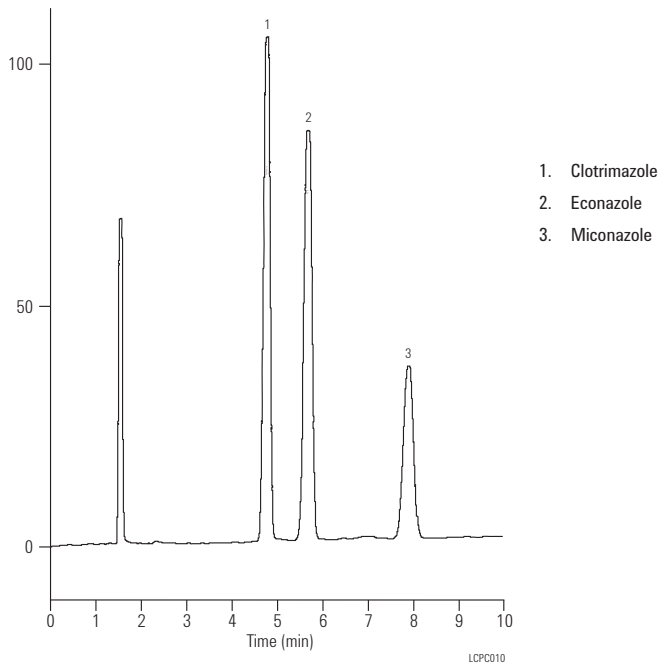
Flow Rate: 1 mL/min

Temperature: Ambient

Detector: UV 220 nm

Publication: LI PH46

Sample: Antifungals, 2 µL



Antifungals

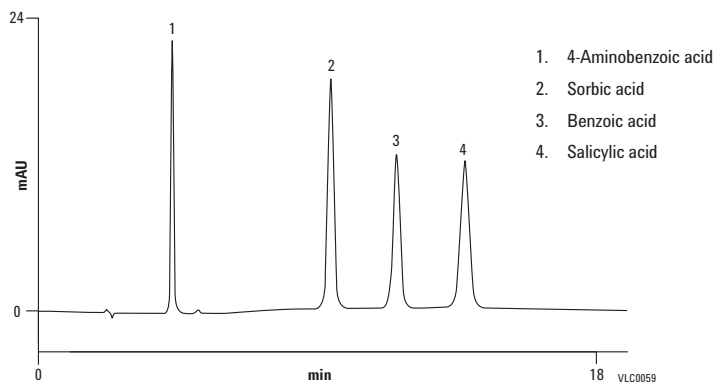
Column: Pursuit XRs Diphenyl
A6020150X046
4.6 x 150 mm, 5 µm

Mobile Phase: Water+0.1% HCOOH:
MeCN+0.1% HCOOH, 80:20

Flow Rate: 1.0 mL/min

Temperature: Ambient

Detector: UV, 254 nm



**Analgesics: Non-steroidal Anti-inflammatory
Drugs: Narrow Bore Separation**

Column: Eclipse XDB-C8
993700-906
2.1 x 150 mm, 5 μ m

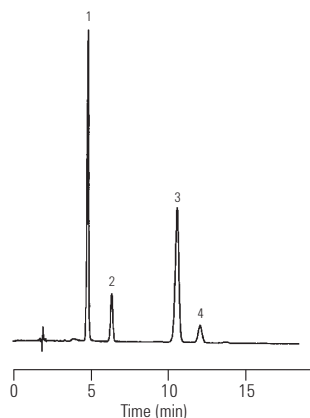
Mobile Phase: 50/50, 25 mM Sodium Phosphate
(pH 7.0 with Phosphoric Acid), MeOH

Flow Rate: 0.2 mL/min

Temperature: 35°C

Detector: UV 254 nm

Sample: 2 μ L, 10 ug/mL



NSAID	pK _a
1. Phenacetin	2.2
2. Tolmetin	3.5
3. Phenylbutazone	4.4
4. Fenoprofen	4.5

**Separation of Small Molecule Anorectics on
Bonus-RP and Traditional Alkyl Phase**

Column A: ZORBAX Bonus-RP
883668-901
4.6 x 150 mm, 5 μ m

Column B: Traditional Alkyl C8 Phase

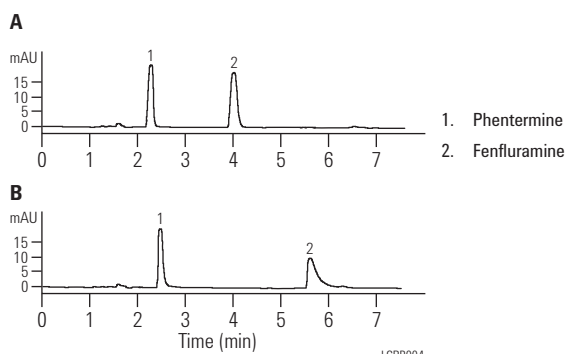
Mobile Phase: 25 mM K₂HPO₄, pH 7.2/MeOH: ACN
(50:50), 45/55

Flow Rate: 1 mL/min.

Temperature: Ambient

Detector: UV 254 nm

Sample: Anorectics "Fen-phen", 5 μ L


Aromatic Acids/Benzoic Acids—Selectivity Differences

Column A: ZORBAX SB-C8
880975-906
4.6 x 250 mm, 5 μ m

Column B: ZORBAX SB-Phenyl
880975-912
4.6 x 250 mm, 5 μ m

Column C: ZORBAX SB-CN
880975-905
4.6 x 250 mm, 5 μ m

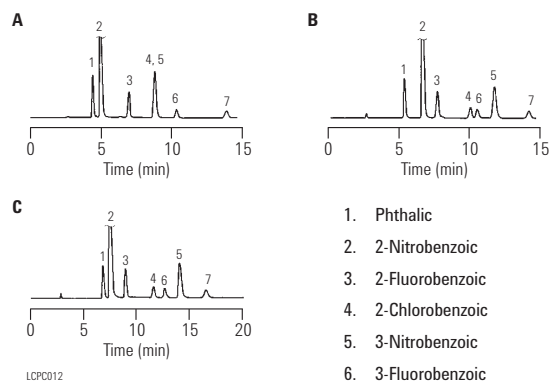
Mobile Phase: 30-45% methanol (above) in 25 mM Na Phosphate, pH 2.5
A: 45% Methanol
B: 40% Methanol
C: 30% Methanol

Flow Rate: 1.0 mL/min

Temperature: 35°C

Detector: UV 254 nm

Sample: Benzoic acids



Catecholamines/Biogenic Amines: Rapid Separation using Ion Pair Reagents

Column: ZORBAX Rx/SB-C8
866953-906
4.6 x 75 mm, 3.5 µm

Mobile Phase: 0.14 M sodium phosphate,
20 mM EDT A,
0.75 mM octyl sulfonate,
9% methanol pH 3.5

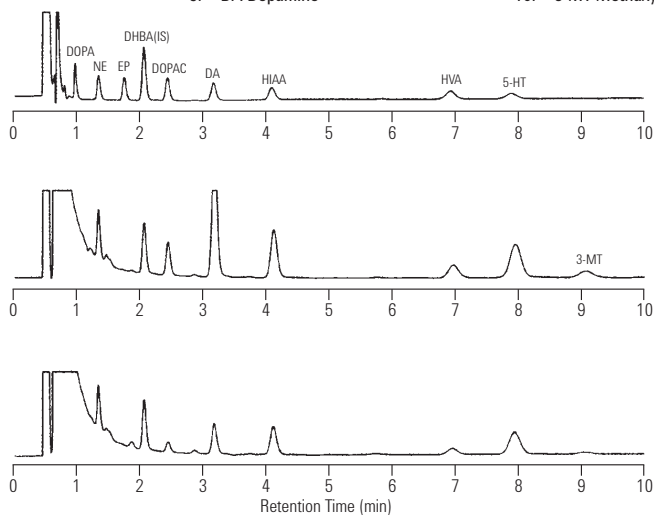
Flow Rate: 1.5 mL/min

Temperature: 26°C

Detector: 0.75 V vs Ag/AgCl with electro-
chemical detection

Sample: 10 µg/mL each standard; volume
20 µL (2 g tissue sample)
A. Standards (2pmol; DHBA 5pmol)
B. Mouse Satrium
C. Mouse Neocortex

- | | |
|--------------------------------------|----------------------------------|
| 1. DOPA-Dihydroxyphenylalanine | 6. HIAA-Hydroxyindoleacetic acid |
| 2. DHBA-Dihydroxybenzyl amine | 7. EP-Epinephrine |
| 3. DOPAC-Dihydroxyphenyl acetic acid | 8. HVA-Homovanillic acid |
| 4. NE-Norepinephrine | 9. 5-HT-Hydroxytryptamine |
| 5. DA-Dopamine | 10. 3-MT-Methoxytyrosine |



Chiral Ethiazide (Diuretic Drug) Separation on Ultron ES-OVM

Column: Ultron ES-OVM Chiral
702111651
4.6 x 150 mm, 5 µm

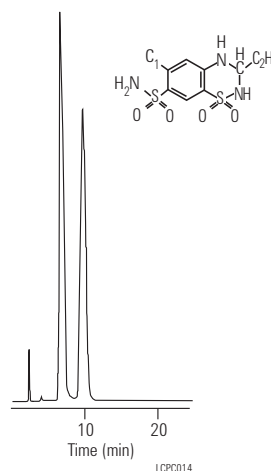
Mobile Phase: 20 mM KH₂PO₄ (pH 4.6)

Flow Rate: 1.0 mL/min

Temperature: 25° C

Detector: UV 220 nm

Sample: 20 µL containing 0.35 µg Ethiazide



Chiral Separation of Fluoxetine Enantiomers (Prozac) using Ultron ES-OVM

Column: Ultron ES-OVM Chiral
702111651
4.6 x 150 mm, 5 µm

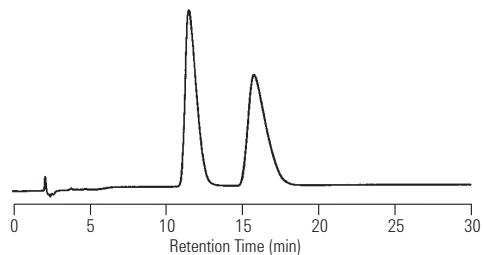
Mobile Phase: 25/75 (v/v) EtOH / 20 mM KH₂PO₄, pH 5.5
(adjusted with NaOH)

Flow Rate: 0.8 mL/min

Temperature: Ambient

Detector: UV 225 nm

Sample: Mixture Fluoxetine (Prozac) enantiomers



LCPC015

Courtesy of D.S. Ristry and V.S. Sharp, Eli Lilly and Co.

Goldenseal and Related Alkaloids on a Rapid Resolution Eclipse XDB-C18 Column

Column: Eclipse XDB-C18
963967-902
4.6 x 150 mm, 3.5 µm

Mobile Phase: 68% 30 mM ammonium acetate, 14 mM TEA, pH ~4.85
32% Acetonitrile

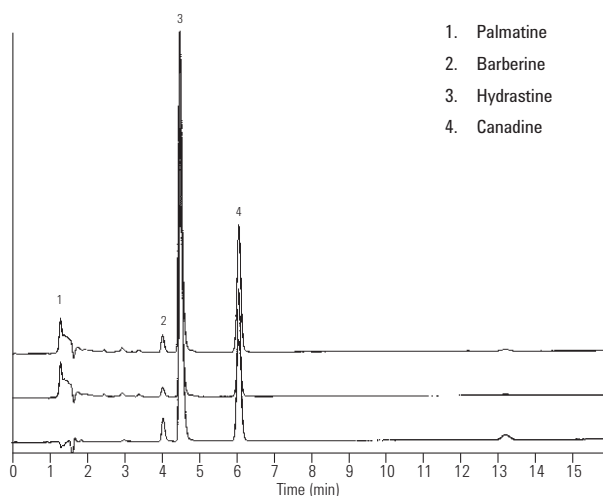
Flow Rate: 1.0 mL/min

Temperature: 30°C

Detector: 230 nm

Sample: Goldenseal and related Alkaloids

Alkaloids, such as the active components in Goldenseal and other related plants, are quickly and accurately separated using isocratic conditions on an Eclipse XDB-C18 Rapid Resolution column.



1. Palmatine
2. Barberine
3. Hydrastine
4. Canadine

LCPC016

Components of Green Tea Separated on a Rapid Resolution StableBond SB-C8 Column

Column: ZORBAX SB-C8
863953-906
4.6 x 150 mm, 3.5 µm

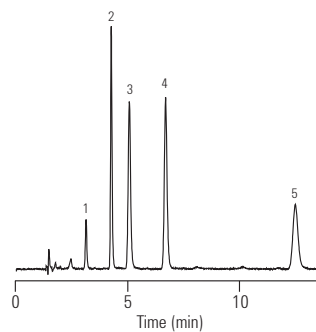
Mobile Phase: 75% 0.1% TFA : 25% MeOH

Flow Rate: 1.0 mL/min

Temperature: 40°C

Detector: 280 nm

Sample: Green tea



1. Epigallocatechin
2. Epicatechin
3. Epigallocatechin gallate
4. Catechol
5. Epicatechin gallate

LCPC018

Nutraceuticals, such as the components of green tea, are quickly separated on a StableBond SB-C8 Rapid Resolution column.

Chiral Separation of Hexobarbital

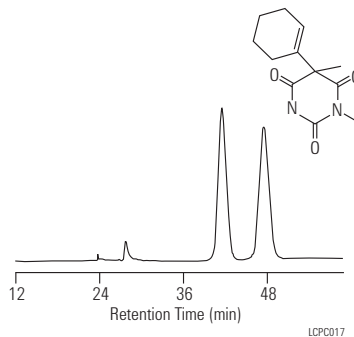
Column: Chiradex
79925CB-584
4.0 x 250 mm, 5 µm

Mobile Phase: Methanol/water, 20:80

Flow Rate: 1.0 mL/min

Detector: UV 220 nm

Sample: Hexobarbital



Chiral Separation of S- and R-Norfluoxetine using Ultron ES-Pepsin

Column: Ultron ES-OVM Chiral
724111653
4.6 x 250 mm, 10 µm

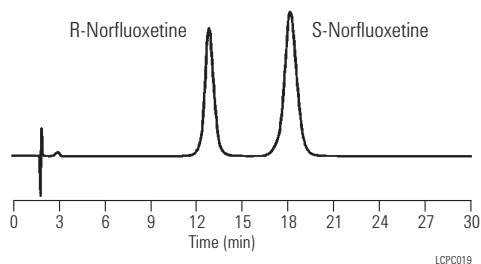
Mobile Phase: 6/94 (v/v) MeOH / 20 mM KH₂PO₄

Flow Rate: 1.0 mL/min

Temperature: Ambient

Detector: UV 225 nm

Sample: 50 µg/mL of 2:3 mixture R : S-Norfluoxetine



Courtesy of D.S. Ristry and V.S. Sharp, Eli Lilly and Co.

Chiral Separation of Salbutamol on Ultron ES-Pepsin

Column: Ultron ES-Pepsin
822111631A
4.6 x 150 mm, 5 µm

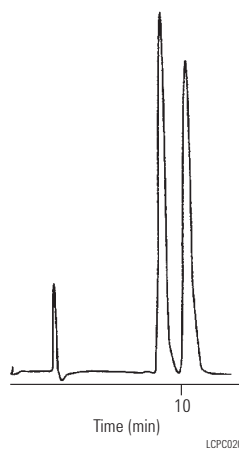
Mobile Phase: 20 mM phosphate buffer, pH 6.0

Flow Rate: 1.0 mL/min

Temperature: 25° C

Detector: UV 220 nm

Sample: 20 µL containing 0.35 µg Salbutamol Mixture



Chiral Separation of Tolperison Enantiomers on Ultron ES-OVM

Column: Ultron ES-OVM Chiral
702111651
4.6 x 150 mm, 5 µm

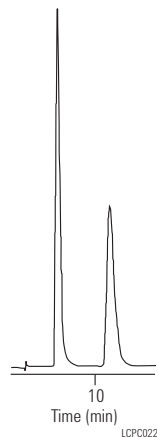
Mobile Phase: 20 mM KH₂PO₄ (pH 5.5), C₂H₅OH (100/4 v/v)

Flow Rate: 1.0 mL/min

Temperature: Ambient

Detector: UV 220 nm, 0.04 AUFS

Sample: Tolperison, 5 µL

**Chiral Separation of Atenolol on Ultron ES-Pepsin**

Column: Ultron ES-Pepsin
822111631A
4.6 x 150 mm, 5 µm

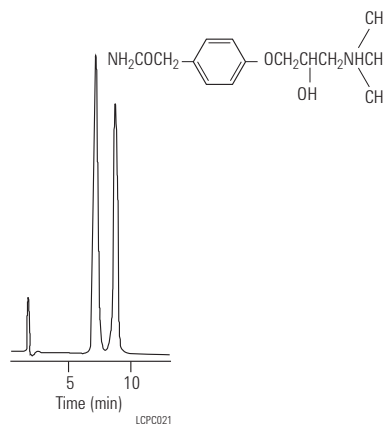
Mobile Phase: 20 mM phosphate buffer, pH 6.0/Ethanol (99/1)

Flow Rate: 1.0 mL/min

Temperature: 25° C

Detector: UV 220 nm, 0.04 AUFS

Sample: 1.5 µL, 0.25 mg/mL, Atenolol Racemic Mixture

**Cocaine and Metabolites**

Column: ZORBAX Rx-SIL
883975-901
4.6 x 150 mm, 5 µm

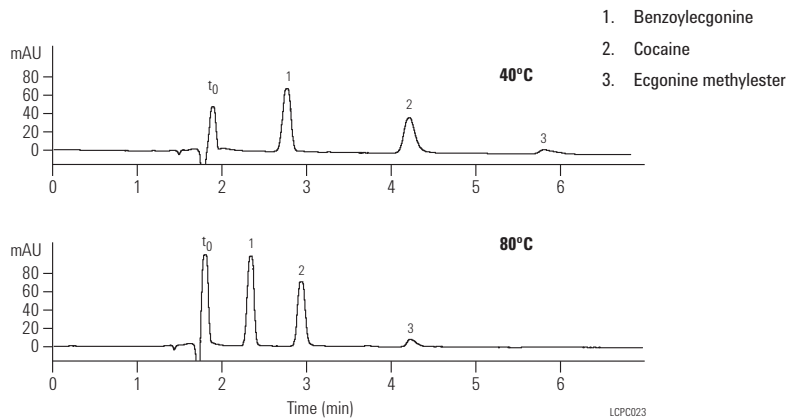
Mobile Phase: MeOH: NH₄ Acetate, 25 mM,
pH 6 (70:30)

Flow Rate: 1.0 mL/min

Temperature: 40 and 80°C

Detector: UV 210 nm

Publication: LI PH42



Aspirin and Cough Remedy on ZORBAX Eclipse XDB-C8

Column: Eclipse XDB-C8
993967-906
4.6 x 150 mm, 5 µm

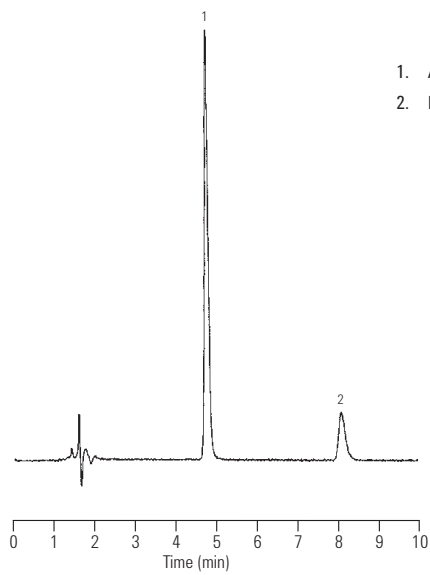
Mobile Phase: (75:25) 25 mM Na₂HPO₄ (pH 3.0): ACN

Flow Rate: 1.0 mL/min

Temperature: 40°C

Detector: UV 254 nm

Sample: 5 µL, 10 µg/mL



Cough Formula Mixture: Fast and Efficient Separation

Column A: ZORBAX SB-CN
866953-905
4.6 x 75 mm, 3.5 µm

Column B: ZORBAX SB-CN
883975-905
4.6 x 150 mm, 5 µm

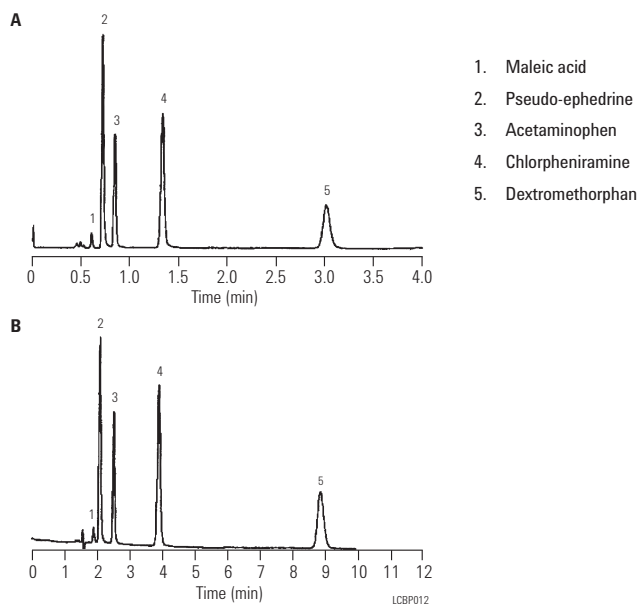
Mobile Phase: 20/80, Acetonitrile/150 mM NaCitrate,
pH 2.6

Flow Rate: 1.5 mL/min, 1.0 mL/min

Temperature: 35°C

Detector: UV 270 nm

Sample: 2 µL, Cough Formula



Guaifenesin: USP Analysis of Guaifenesin

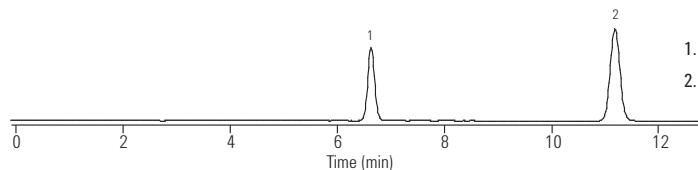
Mobile Phase: 40% Methanol:60% Water:1.5% Glacial Acetic Acid

Flow Rate: 1.0 mL/min

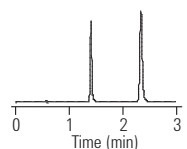
Temperature: 25°C

Sample: Guaifenesin
A: 8 µL
B: 2 mL

Column:	Eclipse XDB-C18 990967-902 4.6 x 250 mm, 5 µm	Peak	TR	N	Rs
		1	6.63	12,737	0
		2	11.19	18,552	15.8



- 1. Guaifenesin: 0.04 mg/mL
- 2. Benzoic Acid: 0.10 mg/mL



Column:	Eclipse XDB-C18 922975-902 4.6 x 50 mm, 1.8 µm	Peak	TR	N	Rs
		1	1.4	11,421	0
		2	2.33	12,909	12.3

LCPC025

Minimum Resolution Required = 3.0

Metronidazole: Updating USP Methods

Column A: ZORBAX C8
883952-706
4.6 x 150 mm, 5 µm

Column B: Eclipse XDB-C8
993967-906
4.6 x 150 mm, 5 µm

Column C: Eclipse XDB-C8
963967-906
4.6 x 150 mm, 3.5 µm

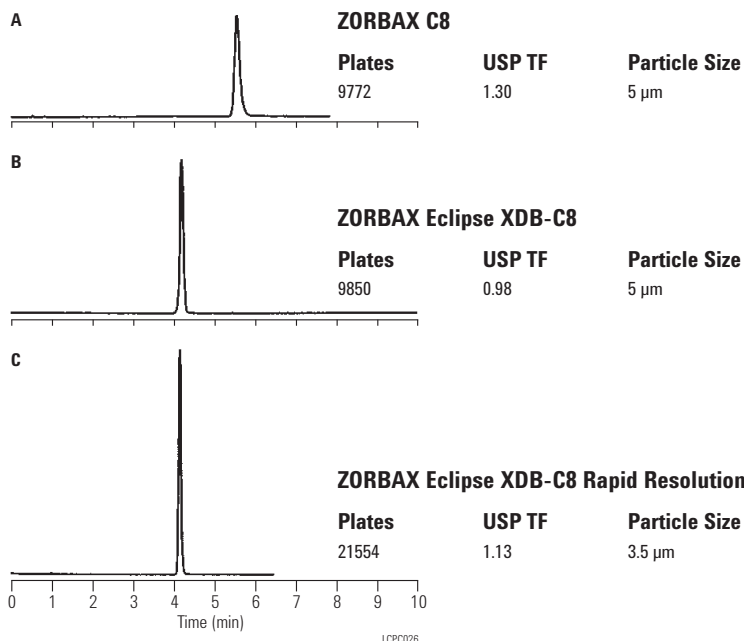
Mobile Phase: 80/20, Water/Methanol

Flow Rate: 1.0 mL/min

Temperature: Ambient

Detector: UV 254 nm

Sample: Metronidazole



LCPC026

Morphine and Metabolites: Extracted Blood Plasma Sample Separation

Column: ZORBAX SB-C18
863953-902
4.6 x 150 mm, 3.5 µm

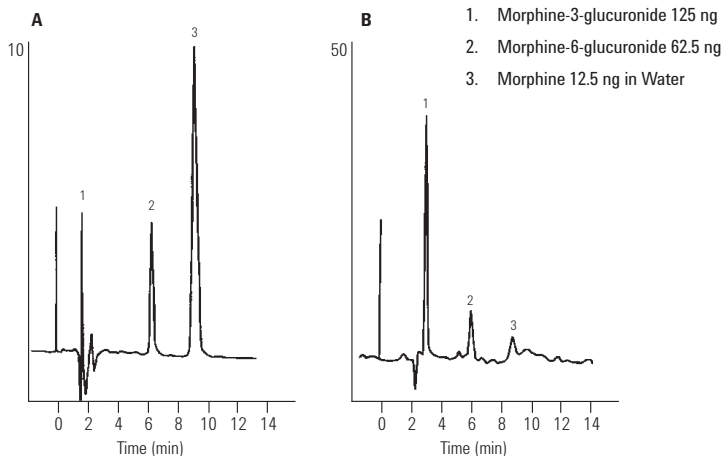
Mobile Phase: 97/3/70 mM KH₂PO₄ + 1 mM EDTA/ACN,
pH 4.5

Flow Rate: 1.5 mL/min

Temperature: Ambient

Detector: A: Electrochemical, 720 mV
B: Fluorescence, Ex = 285 nm, Em = 352 nm

Sample: 50 µL
Morphine-3-glucuronide 125 ng
Morphine-6-glucuronide 62.5 ng
Morphine 12.5 ng in Water



Courtesy of J. Visser, Center for Pharmacy,
Univ. Groningen, The Netherlands.

LCPC027

Opiates (Drugs of Abuse) by LC/MS

Column: ZORBAX SB-AQ
830990-914
2.1 x 150 mm, 3.5 µm

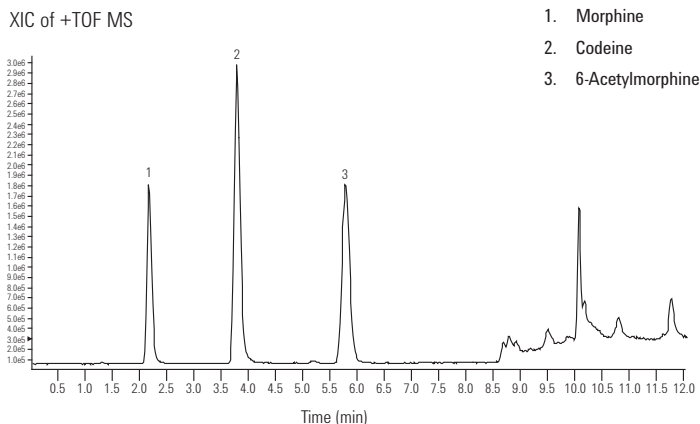
Mobile Phase: A: Acetonitrile with 0.1% formic acid
B: Water with 0.1% formic acid

Flow Rate: 0.25 mL/min

Gradient: 0 min 10% B
5 min 35% B
5.1 min 100% B

MS Conditions: Time of Flight (TOF)
Standard with calibrant delivery system
providing constant low flow of ~2 µM purine
and HP-921 calibrant to dual ESI for
continuous auto-calibration

Sample: Opiates



LCPC028



For a comprehensive listing of chromatograms searchable by compound name, visit our
online Chromatogram Library at www.agilent.com/chem/library

Neutraceuticals: Hypericin Separation in St. John's Wort

Column: Eclipse XDB-C8
993967-906
4.6 x 150 mm, 5 µm

Mobile Phase: 23% 25 mM Na₂HPO₄,
Dibasic (pH 7.0 with H₃PO₄): 77% MeOH

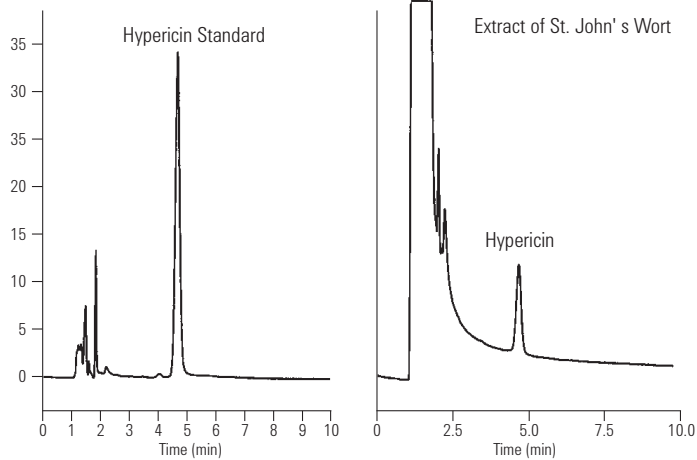
Flow Rate: 1.0 mL/min

Temperature: 35°C

Detector: 254 nm

Publication: LI PH47

Sample: Neutraceuticals



LPC029

Pharmaceuticals: Rapid, High Sensitivity LC and LC/MS of 11 Drugs

Column: Eclipse XDB-C18
925700-902
2.1 x 50 mm, 1.8 µm

Mobile Phase: A: 10 mM NH₄ Formate (pH=3.6)
B: ACN with 10 mM NH₄ Formate

Flow Rate: 0.6 mL/min

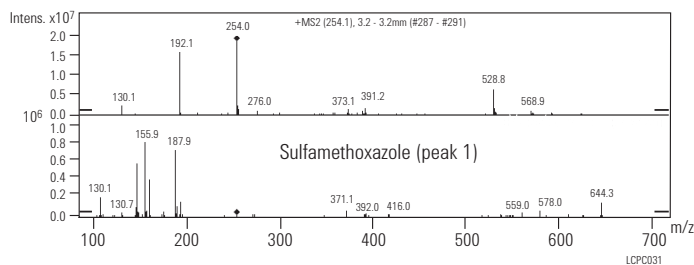
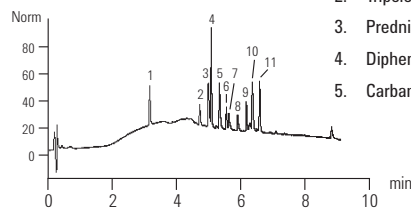
Gradient: 5% B to 70% B in 7.5 min,
to 95% B in 8.5 min

Temperature: 65°C

Detector: UV 230 nm and MSD Trap SL

MS Conditions: Pos. Dry Gas: 345°C
Neb.: 45 psi
HV Cap: 3500 V
Range: 100-700
Average: 5 Spectra
ICC: 30000
Charge Con: On
Smart Par. Settings: Tar Mas: 250 m/z
Comp. Stab.: 100%
Trap Drive: 100%
Frag. Options: Smart Frag: On
Frag. Width: 10 m/z

- | | |
|---------------------|---------------------|
| 1. Sulfamethoxazole | 6. Promethazine |
| 2. Tripeleminamine | 7. Protriptyline |
| 3. Prednisolone | 8. Imipramine |
| 4. Diphenhydramine | 9. Trimipramine |
| 5. Carbamazepine | 10. Perphenazine |
| | 11. Triflupromazine |



LPC031

Hormones/Steroids on ZORBAX Rapid Resolution HT SB-C18

Column: ZORBAX SB-C18 RRHT cartridge
823975-902
4.6 x 30 mm, 1.8 µm

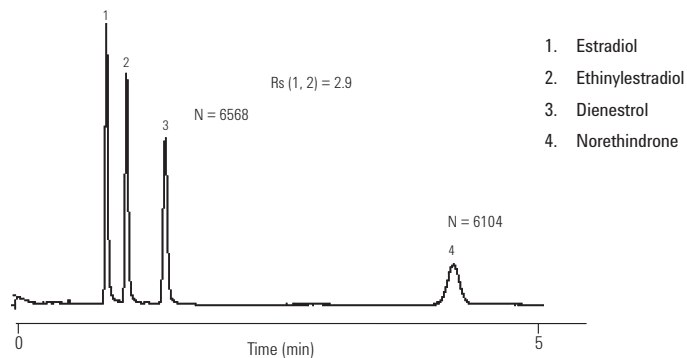
Mobile Phase: 50% 20 mM NaH₂PO₄, pH 2.8: 50% ACN

Flow Rate: 1.0 mL/min

Temperature: RT

Detector: UV 230 nm

Sample: Hormones/Steroids



1. Estradiol
2. Ethinylestradiol
3. Dienestrol
4. Norethindrone

LCPC034

Steroids: Separation on Eclipse XDB-CN

Column: Eclipse XDB-CN
993967-905
4.6 x 150 mm, 5 µm

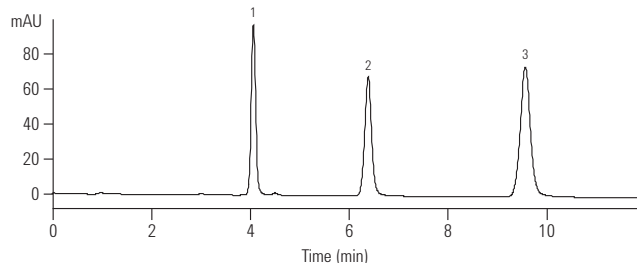
Mobile Phase: 40:60 ACN:Water

Flow Rate: 1.0 mL/min

Temperature: 25°C

Detector: UV 205 nm

Sample: 1. Norethindrone 0.514 mg/mL
2. Progesterone 0.407 mg/mL
3. Mestranol 0.057 mg/mL



LCPC036

Steroids

Column A: Eclipse XDB-Phenyl
963967-912
4.6 x 150 mm, 3.5 µm

Column B: Eclipse XDB-C18
993967-902
4.6 x 150 mm, 5 µm

Mobile Phase: H₂O : ACN, 60:40

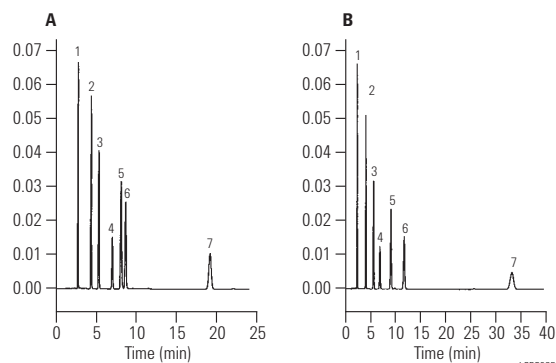
Flow Rate: 1.0 mL/min

Temperature: 35°C

Detector: 254 nm

Publication: LI PH36

Sample: Steroid Sample
1. Prednisolone
2. Corticosterone
3. 11 -hydroxyprogesterone
4. Cortisone acetate
5. Deoxycorticosterone
6. 17 hydroxyprogesterone
7. Progesterone



LCPC035

Triamcinolone - USP Analysis of Triamcinolone

Column: Eclipse XDB-C18
923975-902
4.6 x 30 mm, 1.8 μ m

Mobile Phase: 47% Methanol:53% Water

Flow Rate: 1.5 mL/min

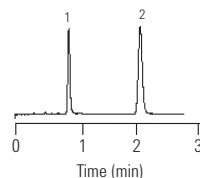
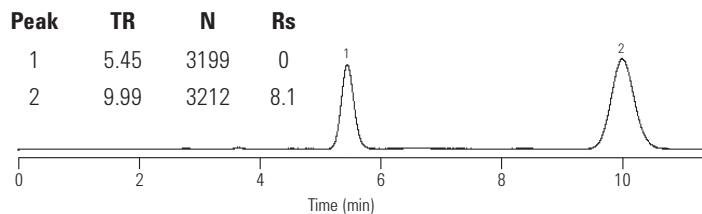
Temperature: 25°C

Sample: Triamcinolone, 1 μ L

1. Triamcinolone: 0.2 mg/mL

2. Hydrocortisone: 0.3 mg/mL

Minimum Resolution Required = 3.0



Peak	TR	N	Rs
1	0.89	3256	0
2	2.07	4851	11.8

LCPC038

Separation of Highly Basic Antidepressants above their pKa in Free Base Form (pKa 9.5-9.7)

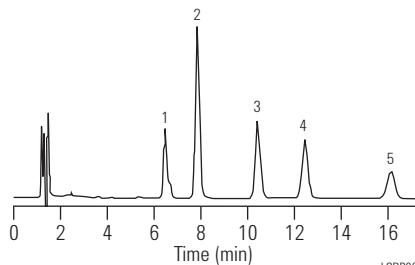
Column: ZORBAX Extend-C18
773450-902
4.6 x 150 mm, 5 μ m

Mobile Phase: 75% Methanol / 25% 50 mM Pyrrolidine Buffer, pH 11.5

Flow Rate: 0.5 mL/min.

Temperature: 40°C

Detector: UV 215 nm



1. Doxepin
2. Imipramine
3. Nortriptyline
4. Amitriptyline
5. Trimipramine

LCBP007



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Antidepressants, Tricyclic: Comparative Separation

Column A: ZORBAX Bonus-RP
883668-901
4.6 x 150 mm, 5 µm

Column B: Brand A Polar-linked C8

Column C: Brand B Polar-linked C18

Mobile Phase: ACN: 20 mM Na Citrate, pH 6 (60:40)

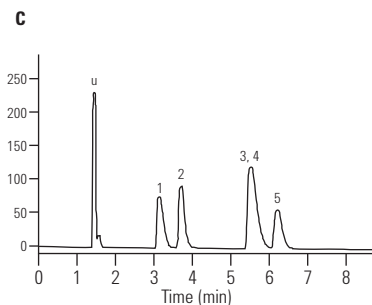
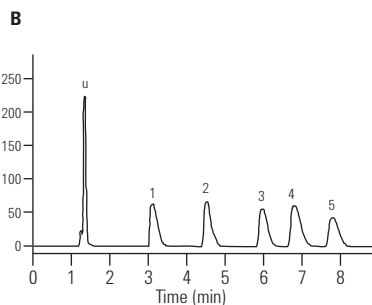
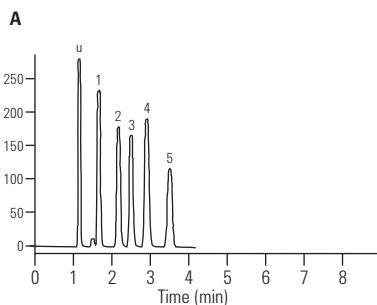
Flow Rate: 1.0 mL/min.

Temperature: Ambient

Detector: UV 254 nm

Sample: Tricyclic antidepressants (u= uracil)

1. Propranolol
2. Doxepin
3. Nortriptyline
4. Amitriptyline
5. Trimipramine



LCBP011

Tricyclic Antidepressants

Column: Eclipse XDB-C8
993967-906
4.6 x 150 mm, 5 µm

Mobile Phase: 38/62 THF/25 mM Potassium Phosphate, pH7

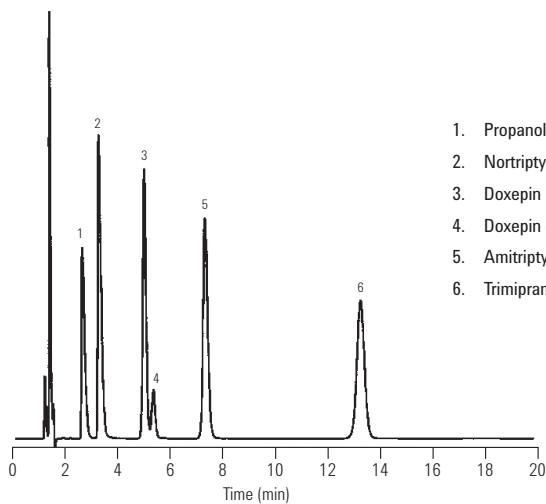
Flow Rate: 1.0 mL/min

Temperature: 23°C

Detector: UV 254 nm

Sample: 10 µL, Antidepressant Mix, 10 µg/mL

1. Propranolol
2. Nortriptyline
3. Doxepin
4. Doxepin dimer
5. Amitriptyline
6. Trimipramine



LCPC039

**Tricyclic Antidepressants and Metabolites:
Effect of Pore Size**

Column A: ZORBAX SB-C18
863953-902
4.6 x 150 mm, 3.5 μm

Column B: ZORBAX 300SB-C18
883995-902
4.6 x 150 mm, 5 μm

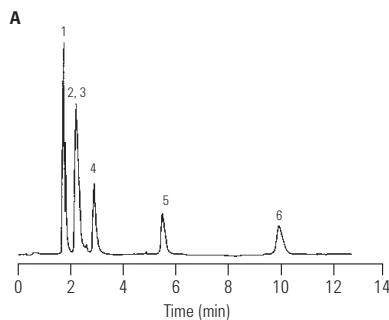
Mobile Phase: 40/60, 25 mM Phosphate Buffer,
10 mM Triethylamine, pH6.2/ACN

Flow Rate: 1.2 mL/min

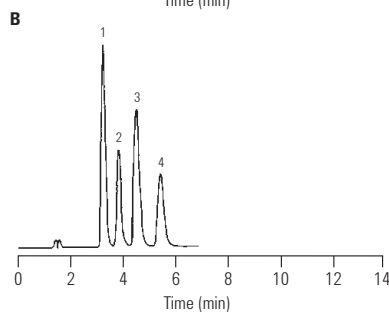
Temperature: Ambient

Detector: UV 254 nm

Sample: 10 μL, Antidepressant Mix, 10 μg/mL



1. trans- 10-OH - Nortriptyline
2. trans- 10-OH - Amitriptyline
3. cis- 10-OH - Nortriptyline
4. cis- 10-OH - Amitriptyline
5. Nortriptyline
6. Amitriptyline



LCPC040

Ulcer Treatment Drugs at Intermediate pH

Column: ZORBAX Bonus-RP
883668-901
4.6 x 150 mm, 5 μm

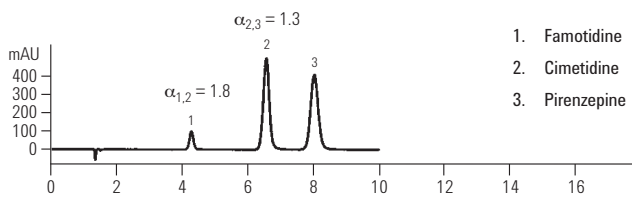
Mobile Phase: Na citrate, 20 mM, pH 6.1: MeOH, (80:20)

Flow Rate: 1.0 mL/min

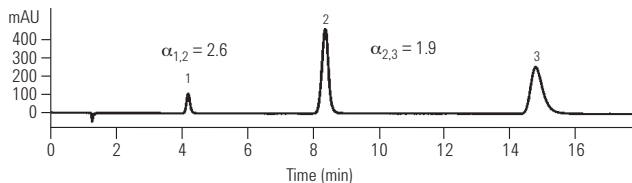
Temperature: Ambient

Detector: UV 220 nm

Sample: Ulcer treatment drugs



1. Famotidine
2. Cimetidine
3. Pirenzepine



LCPC042

Urine, LSD Analysis by LC/MS

Column: Eclipse XDB-C8
960967-906
2.1 x 50 mm, 5 µm

Mobile Phase: 15 : 85, ACN : 10 mM Ammonium Formate, pH 3.7

Flow Rate: 0.3 mL/min

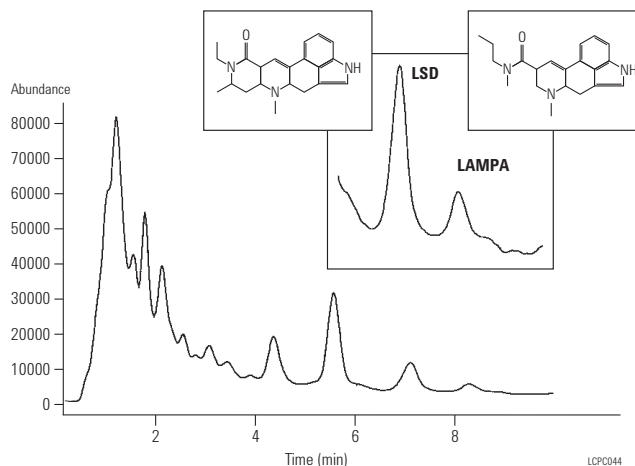
Temperature: 30° C

Detector: MS

MS Conditions: SIM mode, Ions : 324.2, 223.1, 208.1
Fragmentor (dynamically ramped) 100V
at 324.2, 148V at 223.1, 170V at 208.1

Publication: LI PH35

Sample: LSD



Hughes, J.M., C.A. Miller and S.M. Fischer, "Development of a Method for the Forensic Analysis of LSD in Urine", presented at the ASMS, Palm Springs, June 1997.

Benzodiazepines in urine

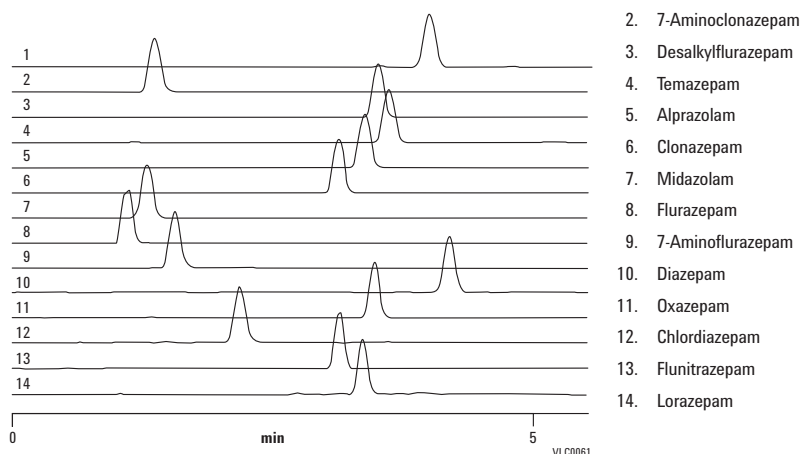
Column: Pursuit PAH
A7001100X046
4.6 x 100 mm, 3 µm

Mobile Phase: A: 0.1% formic acid
B: MeOH

Gradient: Hold 60% B for 1 min,
60-80% B in 1 min,
hold at 80% B for 2.5 min

Flow Rate: 0.2 mL/min

Sample Conc: Urine 100 ng/mL



For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

USP Method: Glyburide and Internal Standard, Progesterone

Column: Eclipse XDB-C8
990967-906
4.6 x 250 mm, 5 µm

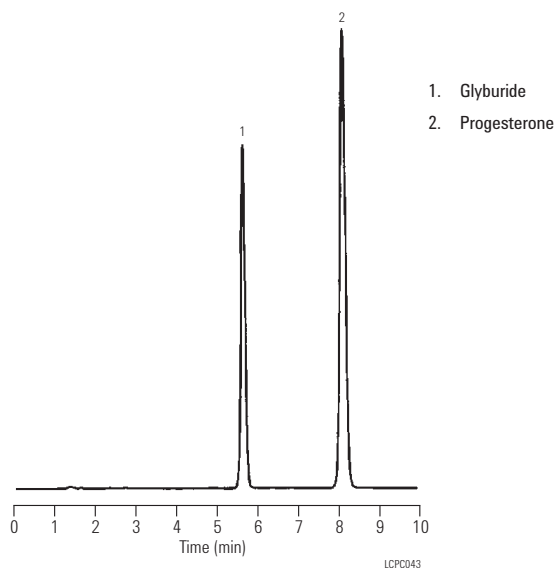
Mobile Phase: 45/55, 50 mM Ammonium Phosphate/ACN, Final pH 5.35

Flow Rate: 1.5 mL/min

Temperature: Ambient

Detector: UV 254 nm

Sample: 5 µL, 10 µg/mL each of standard

**Dexamethasone, USP Method: Rapid Analysis**

Column A: ZORBAX SB-C8
880975-906
4.6 x 250 mm, 5 µm

Column B: ZORBAX Rx/SB-C8
866953-906
4.6 x 75 mm, 3.5 µm

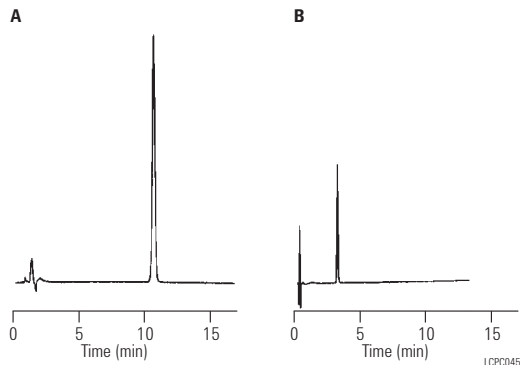
Mobile Phase: A = Water, B = ACN; Isocratic 30% B

Flow Rate: 2.0 mL/min

Temperature: Ambient

Detector: UV 254 nm

Sample: Dexamethasone
10 µL and 5 µL, 10 µg/mL

**USP analysis of tetracyclines**

Column: PLRP-S 100Å
PL1512-5500
4.6 x 250 mm, 5 µm

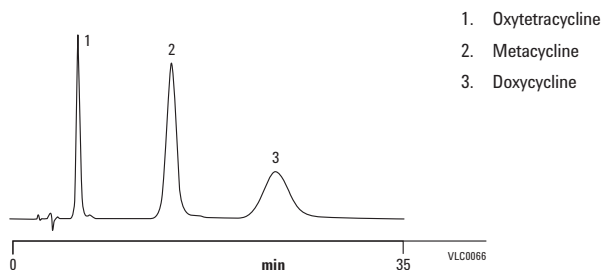
Sample: 20 mg tetracycline in 25 mL 0.01M HCl

Mobile Phase: 60 g 2-Methyl-2-propanol + 200 mL UHP water + 400 mL 0.2 M K₂HPO₄ at pH 8 + 50 mL 10 g/L tetrabutylammonium hydrogen sulphate at pH 8 + 10 mL 40 g/L sodium edetate at pH 8, made up to 1000 mL with water (adjust pH with dilute NaOH)

Flow Rate: 1.0 mL/min

Temperature: 60 °C

Detector: UV, 254 nm



Warfarin: USP Chromatographic Purity Method Using Eclipse XDB-CN

Column: Eclipse XDB-CN
993967-905
4.6 x 150 mm, 5 µm

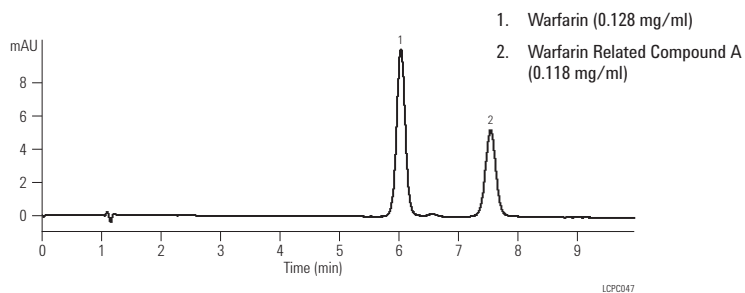
Mobile Phase: 32:68:1 Acetonitrile:Water:Glacial Acetic Acid

Flow Rate: 1.5 mL/min

Temperature: 25°C

Detector: UV 260 nm

Sample: Warfarin, 2 µL



Ten Cardiac Drugs on Rapid Resolution HT SB-C18

Column: SB-C18
829975-902
4.6 x 150 mm, 1.8 µm

Mobile Phase: A: 0.1% TFA, 5% ACN
B: 0.08% TFA, 95% ACN

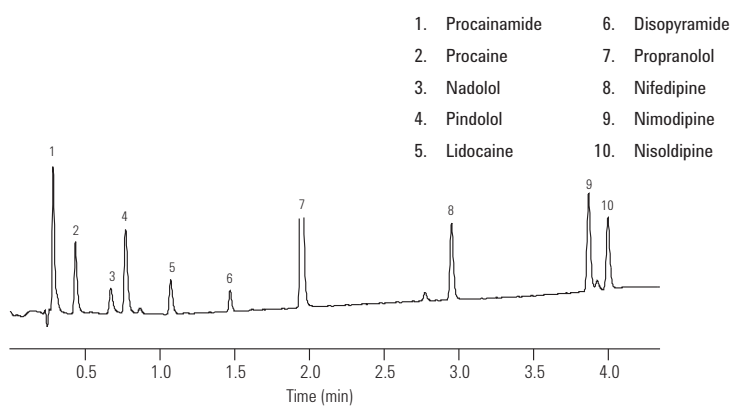
Flow Rate: 2 mL/min

Gradient: 0.0 min 12.5% B
10.5 min 60% B
12.0 min 60% B

Temperature: 70°C

Detector: UV 230 nm

Sample: Cardiac Drugs



Sulfonamides – Fast Analysis with RRHT Columns

Column: SB-C18
824700-902
2.1 x 30 mm, 1.8 µm

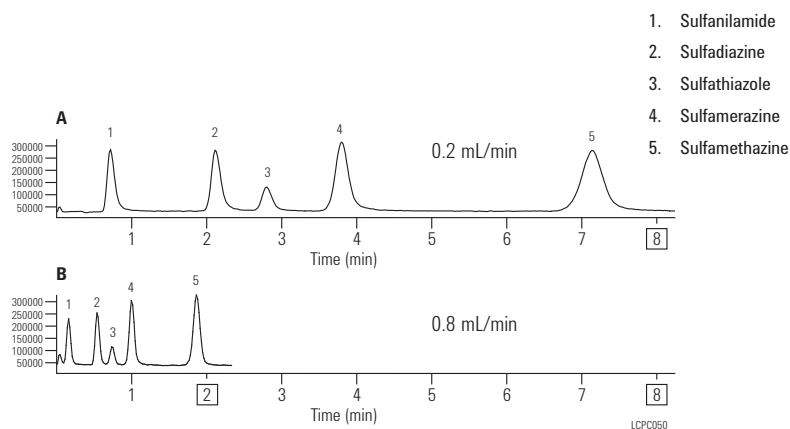
Mobile Phase: A: 90% 0.1% formic acid
B: 10% 0.1% formic acid in MeOH

Flow Rate: A: 0.2 mL/min
B: 0.8 mL/min

Temperature: 35°C

Detector: TIC, Single Quad

Sample: Sulfonamides



Sulfa drugs

Column: Pursuit XRs Ultra^{2.8} C8
A7511100X020
2 x 100 mm, 2.8 µm

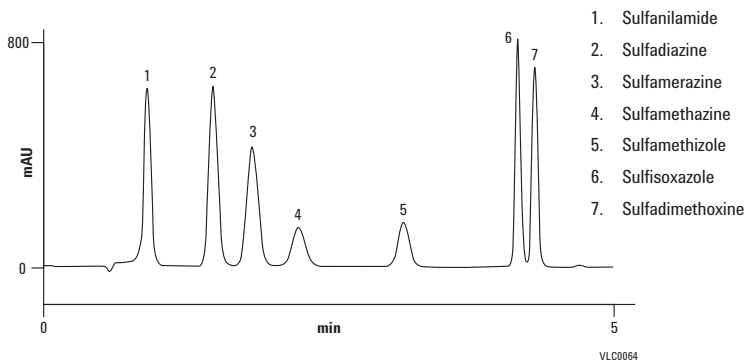
Mobile Phase: A: Water+0.1% TFA
B: MeCN+0.1% TFA

Gradient: 10% B for 10 min,
ramp to 45% B in 1 min and hold for 1 min,
return to 10% B in 1 min and hold for 1 min

Flow Rate: 0.65 mL/min

Temperature: Ambient

Detector: UV, 254 nm

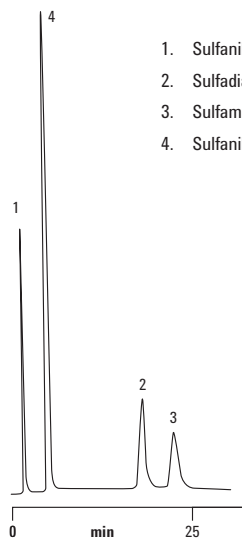
**Sulfa drugs**

Column: PLRP-S 100Å
PL1111-3500
4.6 x 150 mm, 5 µm

Mobile Phase: Potassium sulfate:
ACN 7:1, pH 2.2

Flow Rate: 1.0 mL/min

Detector: UV, 254 nm

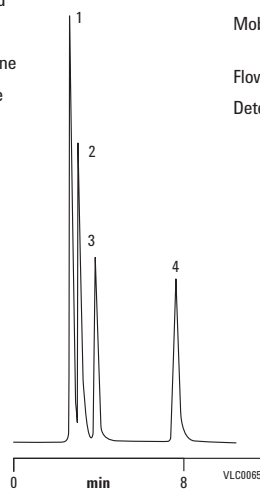


Column: PLRP-S 100Å
PL1111-3500
4.6 x 150 mm, 5 µm

Mobile Phase: Disodium tetraborate: ACN 6:1,
pH 9.3

Flow Rate: 1.0 mL/min

Detector: UV, 254 nm



Fast Analysis of Pindolol

Column A: ZORBAX SB-CN
863953-905
4.6 x 150 mm, 3.5 μ m

Column B: ZORBAX SB-CN
827975-905
4.6 x 50 mm, 1.8 μ m

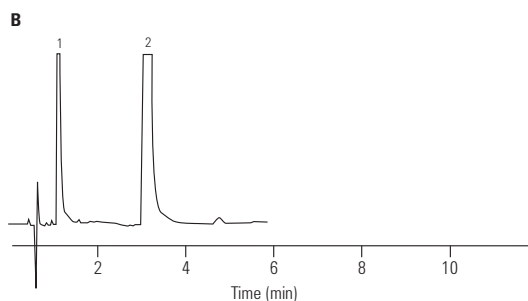
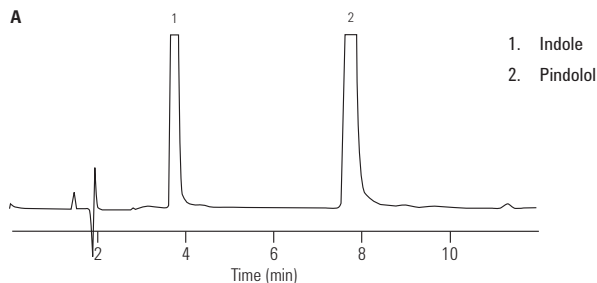
Mobile Phase: A: 70% 50 mM NaAcetate
B: 30% ACN

Flow Rate: 1 mL/min

Temperature: Ambient

Detector: UV 219 nm

Sample: Pindolol, 2 μ L



LCPC051

Lamotrigine

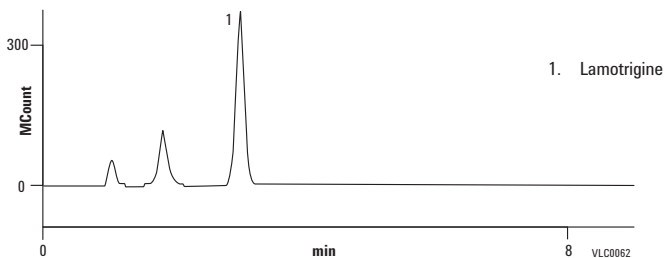
Column: Pursuit XRs Ultra^{2.8} C8
A7511100X020
2 x 100 mm, 2.8 μ m

Mobile Phase: ACN:water, 25:90 for 1 min

Flow Rate: 0.2 mL/min

Injection Volume: 5 μ L, 50% MeOH

Detector: MS



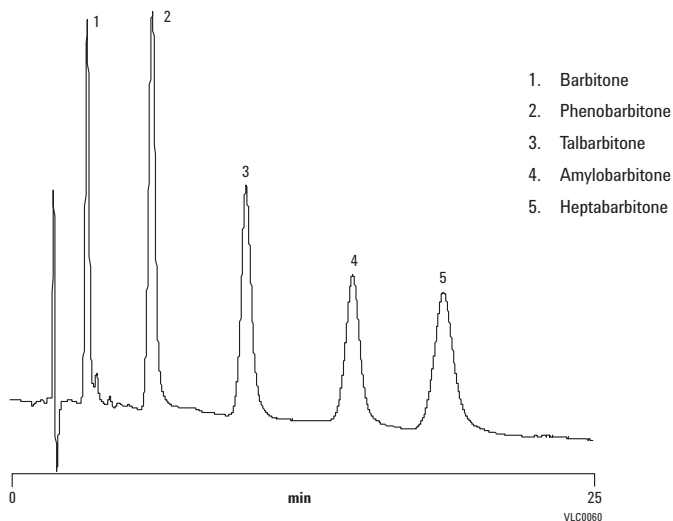
For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library

Barbiturates

Column: PLRP-S 100Å
PL1512-5500
4.6 x 250 mm, 5 µm

Mobile Phase: Water
Flow Rate: 1.0 mL/min
Temperature: 200°C
Detector: UV, 220 nm

Courtesy: Smith, RM, Burgess, RJ, Cheinthaovorn, O and Stuttard, JR (1999) Superheated water: a new look at chromatographic eluents for reversed-phase liquid chromatography. LCGC Europe, January 1999, 30-36. Used with permission

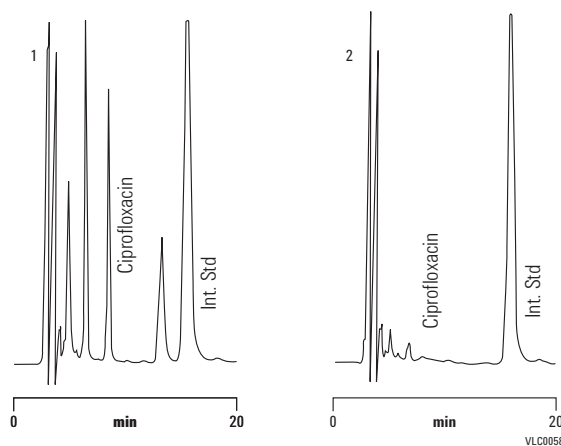
**Analysis of ciprofloxacin and ciprofloxacin metabolites**

Column: PLRP-S 100Å
PL1111-3500
4.6 x 150 mm, 5 µm

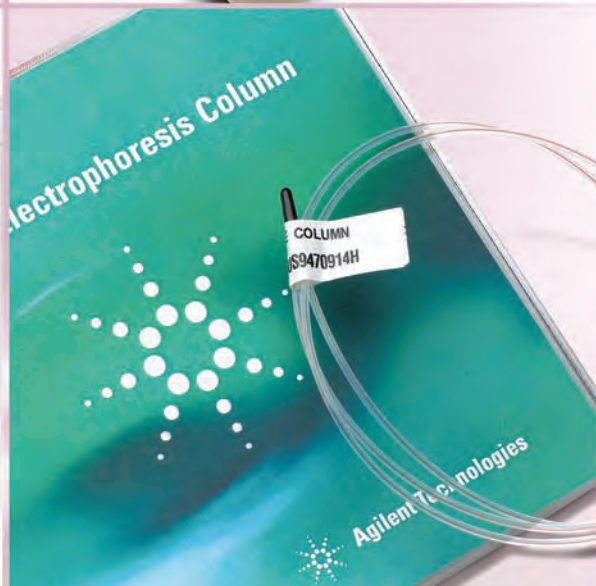
Mobile Phase: 74% 20 mM TCA:22%
ACN:4% MeOH adjusted to pH 3
Flow Rate: 1.0 mL/min
Detector: UV, 277 nm

Krol GJ, Noe, AJ and Beerman, D (1986) Liquid chromatographic analysis of ciprofloxacin and ciprofloxacin metabolites in body fluids. Journal of Liquid Chromatography, 9(13), 2897-2919. Reprinted with permission of the publisher (Taylor & Francis Group, www.informaworld.com)

- Blank urine sample containing known concentrations of internal standard, ciprofloxacin and its metabolites
- Blank urine sample containing only internal standard



ELECTROPHORESIS



In this Chapter

CE and CE/MS

1130 CE Solutions Kits

1137 CE and CE/MS Capillaries

1151 Instrument Parts and Supplies

1161 Troubleshooting



■ CE AND CE/MS

CE Solutions Kits



Agilent continues to introduce new CE solutions kits designed to simplify many of your applications:

- Inorganic anions
- Cations
- Organic acids
- Forensic anions
- μ Page

These kits include all you need to begin your CE analyses, including buffers, capillaries, conditioning solutions, test samples, methods and detailed descriptions. Each kit is designed to take advantage of the automation of the Agilent CE system to make your time in the laboratory more efficient. All kits are prepared using the same quality procedures as our buffers and are thoroughly tested and supported.

While the kits have been optimized for use with the Agilent CE system, they may be used with virtually any commercial or home-built CE system.

Inorganic Anion Solutions Kit

The Inorganic Anion Solutions Kit contains all components needed for the analysis of common inorganic anions such as chloride, bromide, iodide, fluoride, sulfate, and phosphate. Applications include the analysis of inorganic ions in:

- Ultra pure water
- Waste water
- High purity chemicals
- Drug formulations
- Pulp and paper solutions
- Semiconductor solutions

Using an indirect UV detection system optimized for small anions, analyses are sensitive and rapid, and provide an alternative to traditional ion chromatography. The kit contains buffer, capillaries, test mixture, and instructions.



0.1 N sodium hydroxide, 5062-8575



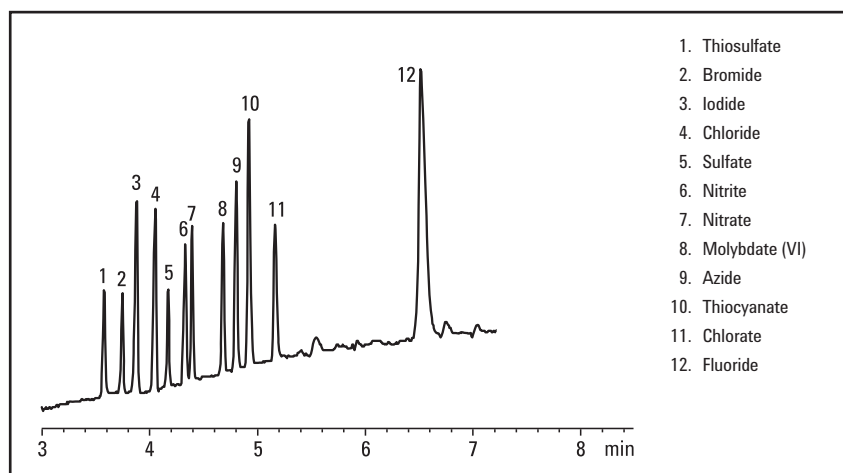
Inorganic anion test mixture, 5062-8524

Inorganic Anion Solutions Kit

Description	Unit	Part No.
Inorganic Anion Solutions Kit		5063-6511
Inorganic anion buffer	250 mL	8500-6797
Ultra pure CE water	500 mL	5062-8578
0.1 N sodium hydroxide	250 mL	5062-8575
1.0 N sodium hydroxide	250 mL	5062-8576
Bare fused-silica capillary, 50 µm ID, 72 cm long	2/pk	G1600-62211
Inorganic anion test mixture	10 mL	5062-8524

Includes 1000 ppm each of fluoride, chloride, bromide, nitrite, sulfate and 3000 ppm phosphate

Note: The following part should be ordered separately for use with the Agilent CE System:
 Alignment interface for standard 50 µm ID capillary (P/N G1600-60210) for 1600 HP³D CE
 Alignment interface for standard 50 µm ID capillary (P/N G7100-60210) for 7100 CE



Separation of common anions

Cation Solutions Kit

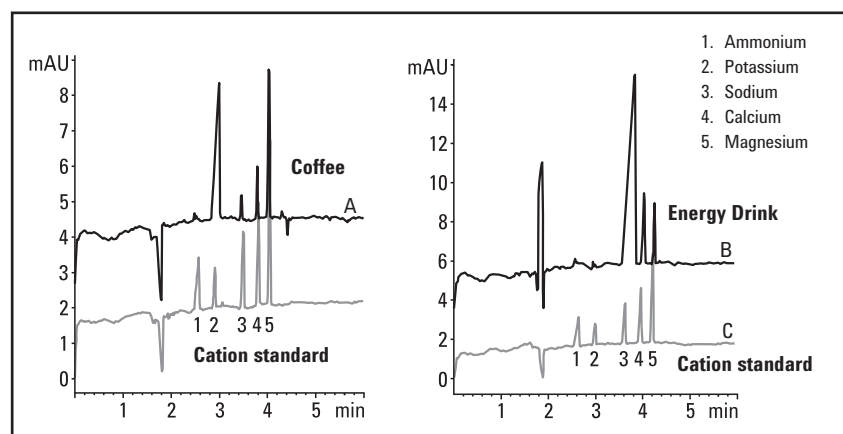
The Cation Solutions Kit provides everything you need for the analysis of inorganic and low-molecular-mass organic cations. It is specially designed for the separation of alkali metal ions, alkaline-earth metal ions and alkyl amines in a wide range of matrices.

Each kit contains a cation buffer, bare fused silica capillaries, cation standard, CE grade water and a detailed description of the analysis method and most common applications, including detection limits and reproducibility data. The Cation Solutions Kit and the separation methods were developed to fit perfectly with the Agilent CE system and to support its high automation capabilities. The methods are very easy to perform and provide accurate and quantitative analyses.

Cation Solutions Kit

Component	Unit	Part No.
Cation Solutions Kit		5064-8206
Cation buffer	250 mL	5064-8203
Ultra pure CE water	500 mL	5062-8578
Bare fused silica capillary, extended light path bubble factor (3), 50 µm ID, 56 cm long	2/pk	G1600-61232
Cation test mixture	25 mL	5064-8205

Note: The following part should be ordered separately for use with the Agilent CE System:
Alignment interface for 50 µm ID extended light path capillary (P/N G1600-60230) for 1600 HP3D CE
Alignment interface for 50 µm ID extended light path capillary (P/N G7100-60230) for 7100 CE



Cations in coffee and energy drinks

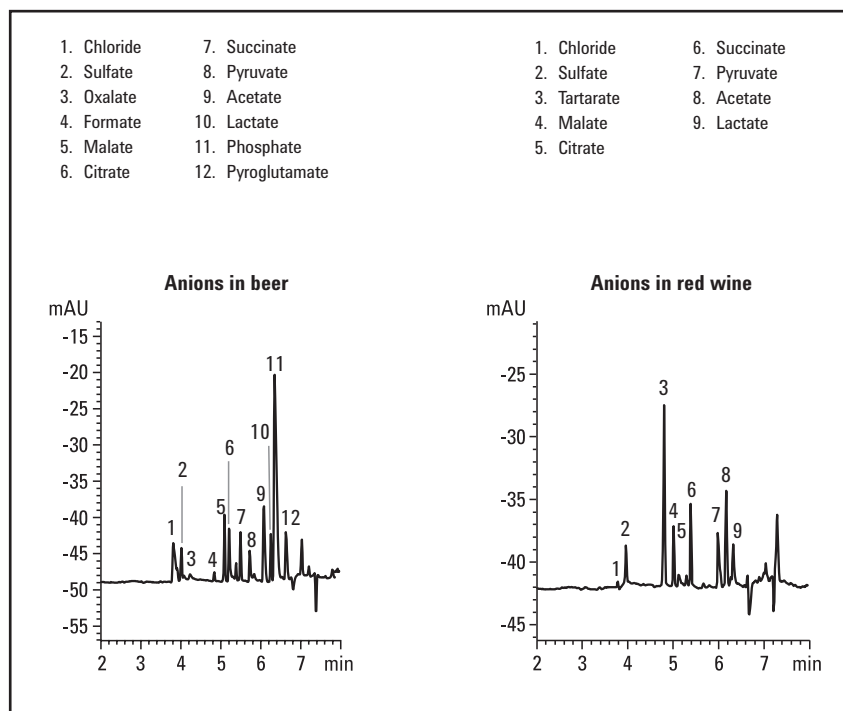
Organic Acids Solutions Kit

The Organic Acids Solution Kit is ideal for the analysis of short alkyl chain carboxylic acids. Employing an indirect UV detection agent optimized for organic acids, the methodology is simple, sensitive, and provides accurate quantitative analysis. Suited for the analysis of organic acids in a wide range of matrices, it is especially useful for determination of organic acids in beverages and food.

Organic Acids Solutions Kit

Description	Unit	Part No.
Organic Acids Solution Kit		5063-6510
Organic acids buffer	250 mL	8500-6785
Ultra pure CE water	500 mL	5062-8578
1.0 N sodium hydroxide	250 mL	5062-8576
Bare fused-silica capillary, 75 µm ID, 72 cm long	2/pk	G1600-62311
Organic acids test mixture	20 mL	8500-6900
Includes 1000 ppm each of malate, succinate, and lactate		

Note: The following part should be ordered separately for use with the Agilent CE System:
 Alignment interface for 75 µm ID capillary (P/N G1600-60310) for 1600 HP3D CE
 Alignment interface for 75 µm ID capillary (P/N G7100-60310) for 7100 CE



Organic acids in beer and red wine

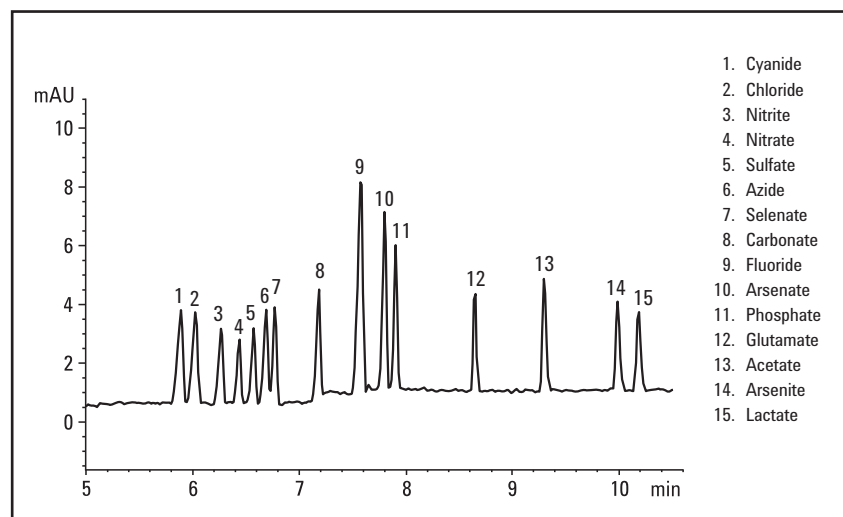
Forensic Anions Solutions Kit

This highly focused kit was developed specifically for the analysis of poisonous compounds, such as cyanide, azide, selenate, arsenate, and arsenite. In cases of poisoning, analytical tools are needed to determine the identity of toxins quickly and accurately. A rapid determination of anionic toxins in adulterated foods and beverages is possible using CE with indirect UV detection. Forensic and other anions can be detected within 15 minutes with minimal sample preparation.

Forensic Anions Solutions Kit

Description	Unit	Part No.
Forensic Anions Solutions Kit	5 x 50 mL	5064-8208
Basic anion buffer	50 mL	5064-8209
Ultra pure CE water	500 mL	5062-8578
Bare fused-silica capillary, 50 µm ID, 104 cm long	2/pk	G1600-64211
Inorganic anion test mixture	10 mL	5062-8524
Includes 1000 ppm each of fluoride, chloride, bromide, nitrite, sulfate and 3000 ppm phosphate		

Note: The following part should be ordered separately for use with the Agilent CE System:
 Alignment interface for standard 50 µm ID capillary (P/N G1600-60210) for 1600 HP3D CE
 Alignment interface for standard 50 µm ID capillary (P/N G7100-60210) for 7100 CE



Analysis of an anion standard with the Forensic Anions Solutions Kit

μPAGE Solution Kits

μPAGE poly-acrylamide gel-filled capillaries are the most direct vehicles to transfer all of your applications from slab gel to CE, utilizing the automation, high speed, high resolution, and quantitative advantages of CE. The capillaries are ideal for high resolution separations of oligonucleotides, single-stranded and double-stranded DNA fragments, polymerase chain reaction (PCR) products, sequencing reaction products and oligosaccharides.

μPAGE capillaries are available in three different pore sizes. The size of the molecular sieving pores is controlled by the monomer concentration (%T) and the degree of polymer cross-linking (%C). Gels with higher %T and %C values have smaller pores and are, therefore, more effective at resolving smaller molecules. μPAGE-10 (10%T, 0%C) capillaries provide high resolution capabilities for separation of antisense therapeutic agents, primers and probes, as well as nucleotides.

μPAGE-5 (5%T, 5%C) allows single base resolution of oligonucleotides [pd(A)] ranging from 20 to 150 bases.

For your convenience, μPAGE capillaries and μPAGE buffers can be purchased together or separately. To achieve the highest reproducibility and provide optimal longevity, use μPAGE buffer with μPAGE capillaries.

μPAGE Starter Kits

Includes 3 μPAGE capillaries, 75 cm total length, 50 cm effective length, oligonucleotide standard and μPAGE buffer

Kit as defined by type of μPAGE capillary	ID (μm)	Part No.
μPAGE-10 (10%T, 0%C) μPAGE pd(A) ₂₅₋₃₀ oligonucleotide standard for μPAGE-10 kit μPAGE buffer, 2 x 237 mL	100	192-1311
μPAGE-5 (5%T, 5%C) μPAGE pd(A) _{25-30, 40-60} oligonucleotide standard for μPAGE-3 and μPAGE-5 kits μPAGE buffer, 2 x 237 mL	75	192-5211
μPAGE-3 (3%T, 3%C) μPAGE pd(A) _{25-30, 40-60} oligonucleotide standard for μPAGE-3 and μPAGE-5 kits μPAGE buffer, 2 x 237 mL	75	192-3211

μPAGE Basic Kits

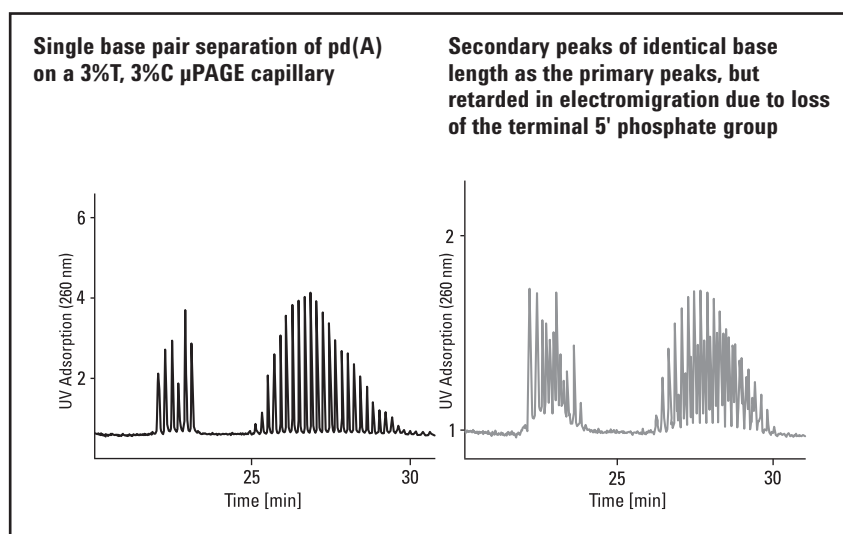
Includes 3 μPAGE capillaries, 75 cm total length, 50 cm effective length

Kit as defined by type of μPAGE capillary	ID (μm)	Part No.
μPAGE-10 (10%T, 0%C) μPAGE pd(A) ₂₅₋₃₀ oligonucleotide standard for μPAGE-10 kit	100	191-1311
μPAGE-5 (5%T, 5%C) μPAGE pd(A) _{25-30, 40-60} oligonucleotide standard for μPAGE-3 and μPAGE-5 kits	75	191-5211
μPAGE-3 (3%T, 3%C) μPAGE pd(A) _{25-30, 40-60} oligonucleotide standard for μPAGE-3 and μPAGE-5 kits	75	191-3211

Note: The μPAGE capillaries are not pre-aligned for the G1600A CE and G7100 CE systems. To cut them to the correct length, use the CE column cutter (P/N 5183-4669). To create detection window, use the Window Etching Tool (P/N 590-3003).

μPAGE Buffer Solutions and Oligo Standards

Kit as defined by type of μPAGE capillary	Part No.
μPAGE tris-borate and urea buffer for μPAGE-10, 4 x 237 mL	590-4005
μPAGE tris-borate and urea buffer for μPAGE-3 and μPAGE-5, 4 x 237 mL	590-4001
μPAGE pd(A) _{25-30, 40-60} oligonucleotide standard for μPAGE-3 and μPAGE-5, 3 x 50 μL	590-4000

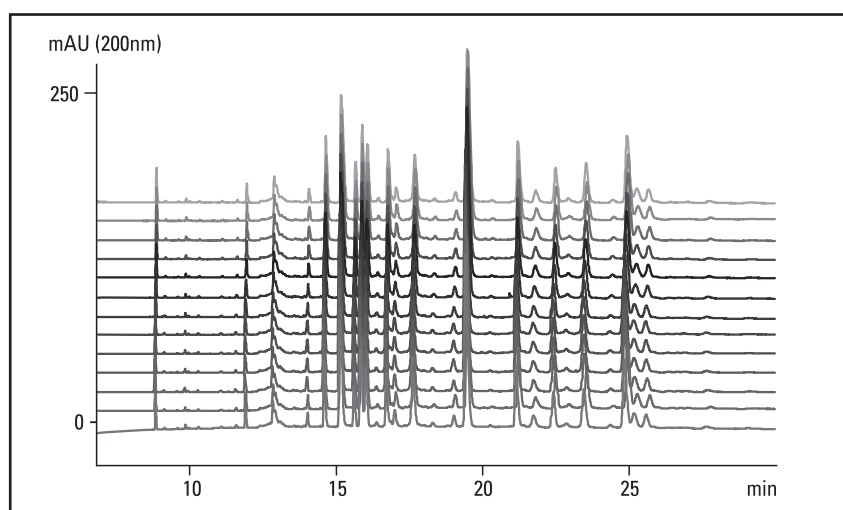


Oligonucleotide samples with or without terminal 5 phosphate group

CE and CE/MS Capillaries

Standard Bare Fused-Silica Capillaries

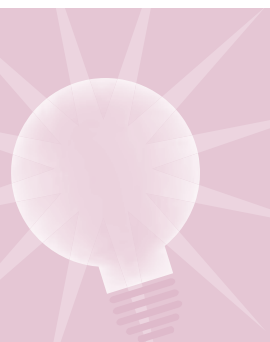
Fused-silica capillaries are the heart of CE. Pre-aligned capillaries from Agilent Technologies are designed and optimized for ease of use and reliability. All capillary ends are cut to a smooth, mirror-like finish. In addition, the polyimide outer coating is removed from the ends. These processes ensure minimal sample adsorption and help maintain sharp peak shapes. All capillaries have a pre-made detection "window" and a built-in alignment stopper that allows rapid and precise insertion in the alignment interface.



CZE of a tryptic digest of recombinant human growth hormone using a standard fused-silica capillary with 75 μm internal diameter

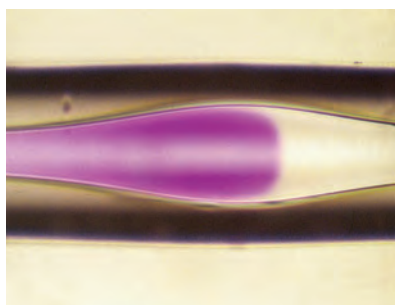
Tips & Tools

Different inner diameters of capillaries need to use different alignment interfaces to guarantee optimal detection. The color coding of the capillary and the alignment interface allow you to easily match the correct interface with the capillary.



Standard Bare Fused-Silica Capillaries, 2/pk

ID (μm)	Total Length (cm)	Effective Length (cm)	Color Code	Part No.
50	33	24.5	Green	G1600-63211
	48.5	40	Green	G1600-60211
	64.5	56	Green	G1600-61211
	80.5	72	Green	G1600-62211
	112.5	104	Green	G1600-64211
75	33	24.5	Blue	G1600-63311
	48.5	40	Blue	G1600-60311
	64.5	56	Blue	G1600-61311
	80.5	72	Blue	G1600-62311
	112.5	104	Blue	G1600-64311
100	33	24.5	Gray	G1600-63411
	48.5	40	Gray	G1600-60411
	64.5	56	Gray	G1600-61411
	80.5	72	Gray	G1600-62411
	112.5	104	Gray	G1600-64411



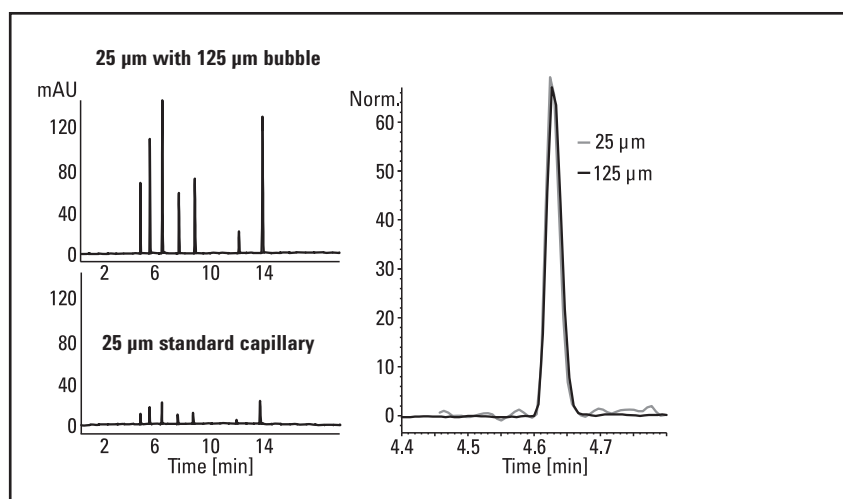
Electroosmotic flow maintains the "plug" flow in the bubble. Optical slits matched to the zone geometry maintain resolution.

Extended Light Path (Bubble Cell) Bare Fused-Silica Capillaries

Use Agilent Technologies extended light path capillaries ("bubble" cell capillaries) to improve sensitivity 3- to 5-fold over standard capillaries. With extended light path capillaries, the inner diameter is increased only at the detection window, offering the sensitivity of a wide inner diameter capillary and the low current generation of a narrow one.

Resolution is not sacrificed when used with matching optical alignment interfaces from Agilent.

Through a computer-controlled proprietary process, the diameter is increased three to five times, with a manufacturing precision better than 3%. Take advantage of this process to extend the detection pathlength of 25 μm ID capillaries to 125 μm , 50 μm to 150 μm , and 75 μm to 200 μm .



Analysis of cold medicine ingredients in a standard capillary (25 μm ID) and an Agilent Extended Light Path Capillary

Extended Light Path (Bubble Cell) Bare Fused-Silica Capillaries, 2/pk

ID (μm)	Total Length (cm)	Effective Length (cm)	Bubble Factor	Optical Path Length (μm)	Color Code	Part No.
25	48.5	40	5	125	Black	G1600-60132
	64.5	56	5	125	Black	G1600-61132
	80.5	72	5	125	Black	G1600-62132
50	43.5	35	3	150	Red	G1600-60232
	48.5	40	3	150	Red	G1600-60232
	64.5	56	3	150	Red	G1600-61232
	80.5	72	3	150	Red	G1600-62232
	112.5	104	3	150	Red	G1600-64232
75	48.5	40	2.7	200	Yellow	G1600-60332
	64.5	56	2.7	200	Yellow	G1600-61332
	80.5	72	2.7	200	Yellow	G1600-62332
	112.5	104	2.7	200	Yellow	G1600-64332

Tips & Tools

Use narrow 25 and 50 μm ID "bubble" cell capillaries for highly conductive buffers without sacrificing sensitivity.



Universal Bare Fused-Silica Capillaries

Universal Bare Fused-Silica Capillaries have a window, 75 cm effective length and 363 μm OD, fitting into any CE instrument. To cut them to the correct length we recommend using the CE column cutter (P/N 5183-4669).

Universal Bare Fused-Silica Capillaries

ID (μm)	Total Length (cm)	Effective Length (cm)	Part No.
20	100	75	190-0431
50	100	75	190-0131
75	100	75	190-0231
100	100	75	190-0331

Bulk Fused-Silica Capillaries

ID (μm)	Total Length (m)	Part No.
20	5	160-2660-5
50	5	160-2650-5
75	5	160-2644-5

Polyvinyl Alcohol (PVA) Coated Capillaries

PVA coated capillaries contain a permanently adsorbed layer of polyvinyl alcohol. This coating minimizes hydrophobic and electrostatic solute/wall interactions and eliminates electroosmotic flow (EOF). Using a proprietary deposition process, the PVA coating is stable over a wide pH range, even under basic conditions from 2.5 to 9.5. This stability allows the use of many common CE buffers. Because the silica surface is covered, many proteins and amines can be analyzed without the peak tailing found with uncoated capillaries. In addition, since EOF is eliminated, cumbersome washing procedures are unnecessary and migration time reproducibility may be improved.

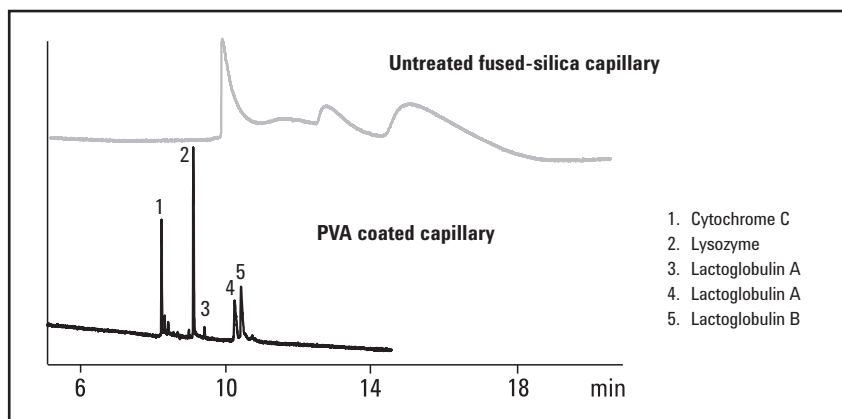
Each batch of PVA coated capillaries is rigorously tested by Agilent Technologies and includes a representative electropherogram to assure quality.

The color coding of the capillary (alignment stopper) and the alignment interfaces allow you to easily combine the correct interface with the capillary. Capillaries for non-Agilent CE systems have removable alignment stoppers without color code.

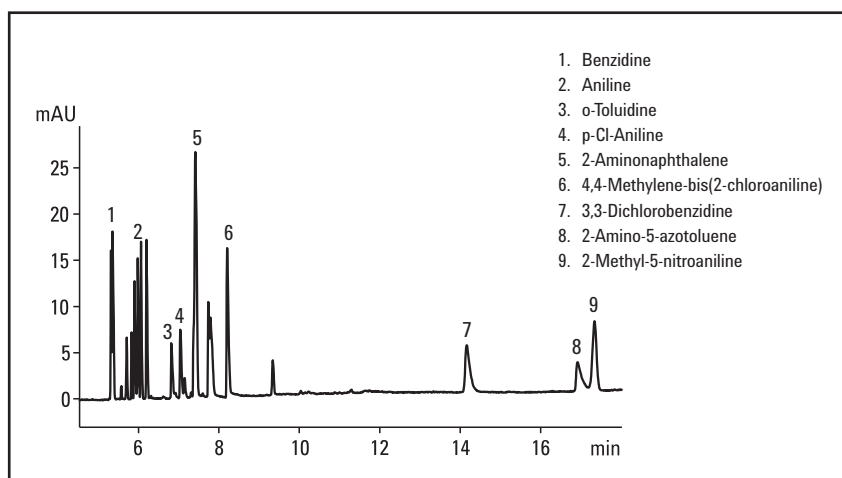
PVA coated capillaries can be used for a variety of applications, including protein analysis at physiological pH, isoelectric focusing, and small anion analysis without the need for flow-reversal agents in the buffer.

PVA coating is available in standard capillaries, or in Agilent Extended Light Path Capillaries ("bubble" cell capillaries) for high sensitivity applications. Both capillary types are available in longer lengths for use in non-Agilent systems.

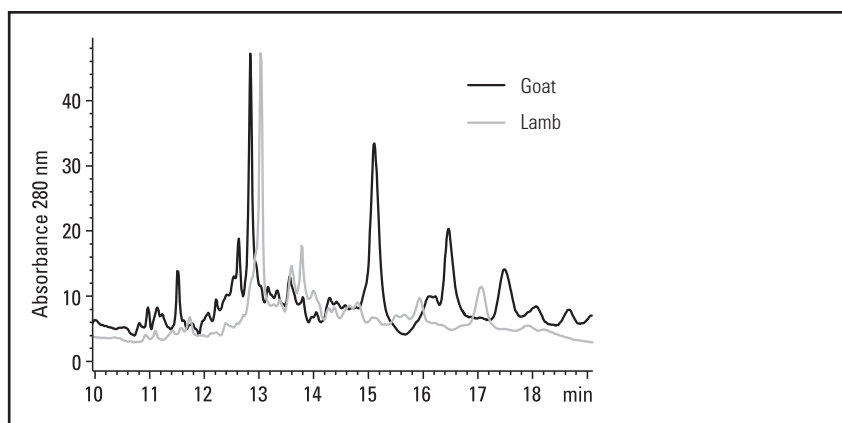
PVA is also available for use with the High Sensitivity Detection Cell for even further improved HPLC-like sensitivity. In addition, PVA coated capillaries are offered for CE-MS applications. The capillaries are provided with a normally positioned detection window to allow tandem UV-Vis and MS detection for improved sample identification.



Use of PVA coated capillaries to reduce protein adsorption



CZE analysis of basic amines using PVA coated capillaries (decomposition products of azo dyes)



Analysis of meat proteins by c-IEF using PVA capillaries

PVA Coated Capillaries for Agilent CE Systems*

ID (μm)	Total Length (cm)	Effective Length (cm)	Bubble Factor	Optical Path Length (μm)	Color Code	Part No.
50	64.5	56	0	50	Green	G1600-61219
	64.5	56	3	150	Red	G1600-61239
	125	21.5	0	50	Green	G1600-67219
75	64.5	56	0	1200		G1600-68319
	125	21.5	0	75	Blue	G1600-67319
100	48.5	40	0	100	Gray	G1600-60419
	64.5	56	0	100	Gray	G1600-61419

*Not compatible with borate buffers

Note: PVA coated capillaries for CE/MS have a blue alignment stopper matching the blue color code of the alignment interface for MS-UV detection. The alignment stopper of the 50 μm ID PVA capillary for CE/MS has a black dot for easy identification.

PVA Coated Capillaries for Non-Agilent CE Systems*

ID (μm)	Total Length (cm)	Effective Length (cm)	Bubble Factor	Optical Path Length (μm)	Part No.
50	71	60	0	50	G160U-61219
	71	60	3	150	G160U-61239
100	56	45	0	100	G160U-60419
	71	60	0	100	G160U-61419

*Not compatible with borate buffers

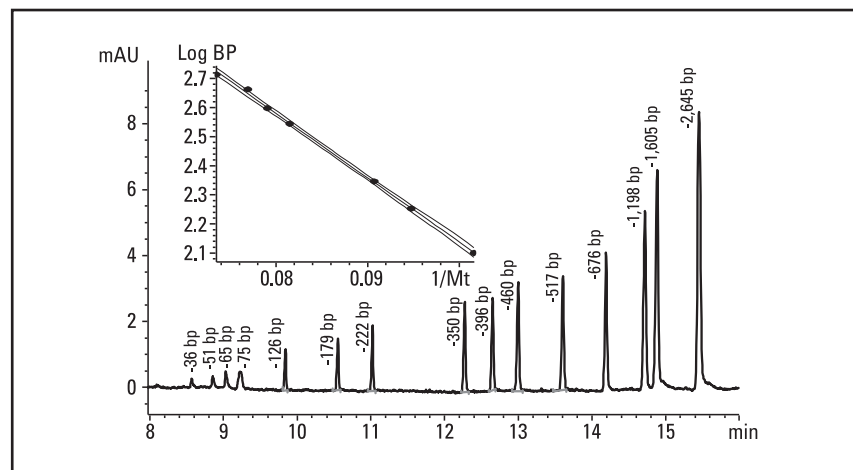
Note: When extended pathlength capillaries are used in non-Agilent systems, loss of resolution may be found if the axial slit width is not reduced. In Agilent systems, the alignment interface contains properly matched slits to maintain resolution.

CEP Coated Capillaries

CEP coated capillaries contain a permanently bonded polymer coating. This CEP coating shields the silanol functionality of the capillary surface and helps prevent sample adsorption. Additionally, EOF is nearly eliminated, making the capillary ideal for applications such as DNA separations with sieving polymer buffers.

Elimination of EOF also simplifies analysis of anions and organic acids by direct UV detection. Without EOF reduction, highly mobile ions such as nitrate can migrate in the opposite direction to the slower, longer chain acids.

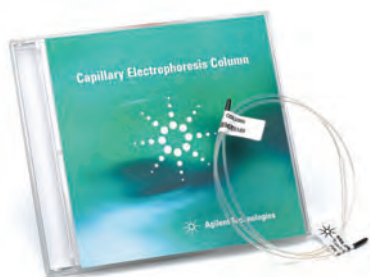
The CEP coated capillary is stable from pH 2 to 8. It can be used with borate buffers, offering a different surface functionality to help alleviate sample adsorption. Each batch of CEP coated capillaries is rigidly tested by Agilent Technologies and each capillary includes a representative electropherogram to assure quality.



Restriction fragment separation (36–2645 bp)

CEP Coated Capillaries, 2/pk

ID (μm)	Total Length (cm)	Effective Length (cm)	Bubble Factor	Optical Path Length (μm)	Part No.
75	80.5	72	0	75	G1600-62318



Cross-linked and Bonded μ SIL Capillaries

μ SIL-FC and μ SIL-DNA Capillaries with Windows

A series of coated capillaries specifically designed for CE, which are prepared by cross-linking and bonding a novel, proprietary fluorocarbon (FC) polymer. μ SIL-FC capillaries are chemically inert, hydrophobic, and stable from pH 2.5-10.

These capillaries are a must-have for cIEF, protein, peptide and carbohydrate separations, as well as replaceable gel CE applications such as oligonucleotides, DNA fragments, and PCR product separations.

μ SIL-DNA capillaries are also coated with an FC polymer but have a 75 μ m ID to accommodate the viscosity of entangled polymer solutions. All μ SIL capillaries are batch tested to ensure the highest performance and reproducibility.



μ SIL-WAX Capillaries with Windows

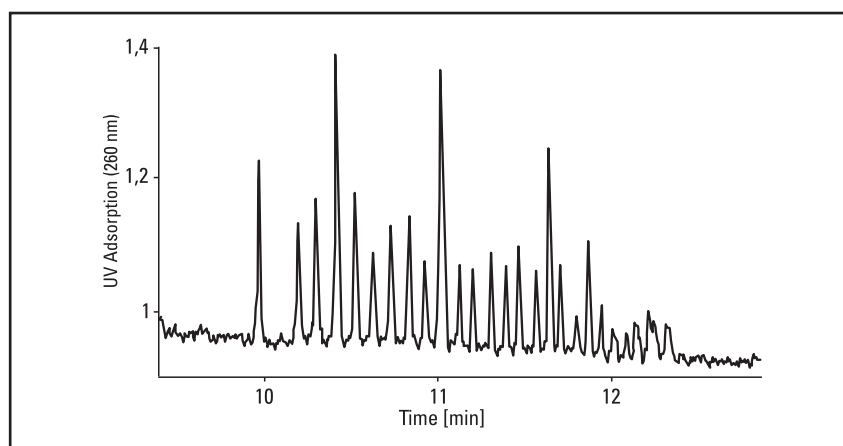
μ SIL-WAX features a modified, polyethylene oxide, hydrophilic coating made through a special cross-linking and bonding process. The coating effectively masks active silanol sites, offering exceptional efficiency, resolution, peak shape and reproducibility. The highly stable coating and near-zero EOF of μ SIL-WAX makes the capillary ideal for CE-MS, and protein and peptide separations from pH 2-5.

Capillary	ID (μ m)	Total Length (cm)	Effective Length (cm)	Film Thickness (μ m)	Unit	Part No.
μ SIL-FC	50	80	50	0.075	3/pk	194-8111
μ SIL-DNA	75	65	50	0.075	2/pk	199-2602
μ SIL-WAX	50	100	75	0.1	2/pk	196-7203
μ SIL-WAX	100	100	75	0.1	2/pk	197-7202

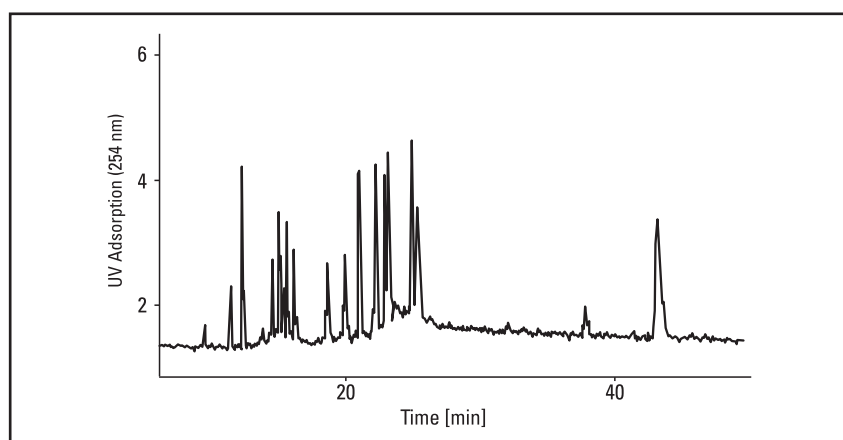
Bulk μ SIL-DB Capillaries

μ SIL-DB coated capillaries are available as μ SIL-DB-1 and μ SIL-DB-17. In combination with a cellulose based buffer system, μ SIL-DB coated capillaries have been widely used in cIEF applications, PCR product and DNA fragment separation, and many other CE applications which require reduced EOF.

Capillary	ID (mm)	Length (m)	Film Thickness (μ m)	Part No.
DB-1	0.05	10	0.05	126-1012
DB-1	0.20	10	0.05	126-1013
DB-1	0.10	10	0.10	127-100A
DB-17	0.10	10	0.05	126-1713
DB-17	0.10	10	0.10	127-1712
DB-17	0.20	10	0.10	127-1713



Analysis of Allelic ladder with μ SIL-DNA



Analysis of Myoglobin tryptic digest using μ SIL-WAX

Capillary Electrochromatography (CEC) Capillaries

Capillary electrochromatography is a hybrid of CE and LC and can be performed in the Agilent CE system. Using CE capillaries packed with LC stationary phases, CEC offers the loadability and selectivity of LC and the high efficiency of CE.

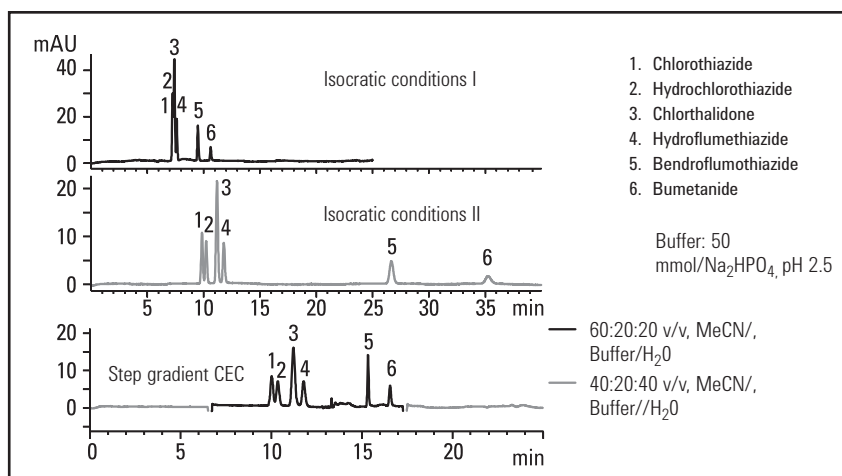
Using the high pressure capabilities of the Agilent CE system, both ends of the CEC capillary can be pressurized. This process prevents outgassing upon application of high voltage and significantly extends capillary lifetime.

Use CEC to improve resolution of solutes, which are difficult to resolve by HPLC, for hydrophobic solutes which cannot be solubilized in MEKC buffers, or for reduced sample and solvent consumption compared to HPLC.

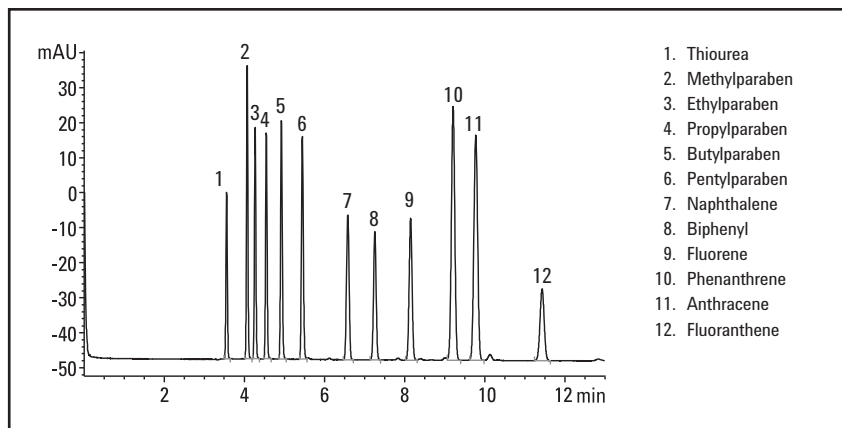
Standard Packed CEC Capillaries, 2/pk

Description	ID (μm)	Total Length (cm)	Effective Length		Color Code*	Part No.
			(cm)	(cm)		
C18, 3 μm	100	33.5	25		Gray	5063-6512
	100	48.5	40		Gray	5063-6513
C8, 3 μm	100	33.5	25		Gray	5063-6535
	100	48.5	40		Gray	5063-6540
Phenyl, 3 μm	100	33.5	25		Gray	5063-6536
	100	48.5	40		Gray	5063-6541

*The color coding of the capillary (alignment stopper) and the interface allows you to easily combine the correct alignment interface with the capillary.



Capillary Electrochromatography of diuretic test mixture (courtesy of Dr. Melvin Euerby, Astra Charnwood, UK)



Capillary Electrochromatography of parabenes and aromatics

Tips & Tools

CEC capillaries require an Agilent CE system with external gas supply capabilities.

Alignment Interfaces and Capillary Cassette

Agilent Technologies alignment interfaces are an integral part of the Agilent diode-array detection (DAD) system. These interfaces contain optical slits which are precisely matched to the capillary inner diameter for optimized sensitivity and linear detection range.

In combination with the capillary cassette, alignment interfaces simplify capillary exchange, protect the fragile detection window and ensure exact alignment of the window in the detector. Quick-change cassette allows capillary exchange in less than one minute.

Note: The color code of the alignment interface must match the color code of the capillary's built-in alignment stopper.



Alignment interface for standard capillary,
G1600-60310



Capillary cassette, G7100-60002

Alignment Interfaces

Description	ID (µm)	Color Code	Corresponding Capillary	G7100 CE Part No.	G1600 CE Part No.
Alignment interface for standard capillary	50	Green	Green	G7100-60210	G1600-60210
	75	Blue	Blue	G7100-60310	G1600-60310
	100	Gray	Gray		
	150	Brown	Brown		
Alignment interface for Agilent Extended Light Path capillaries	25	Black	Black	G7100-60150	G1600-60150
	50	Red	Red	G7100-60230	G1600-60230
	75	Yellow	Yellow	G7100-60330	G1600-60330
CE/MS alignment interface for 360 µm OD capillaries, nonmetallic		Blue	Blue Gray	G7100-60400	

Note: 75, 100 and 150 µm ID standard capillaries use the same interface (color blue).

PVA coated 50 and 75 µm ID capillary for CE/MS use the same nonmetallic interface with color code blue for use with standard and extended light path capillaries, and the high sensitivity detector cell.

Capillary cassette

Description	G7100 CE Part No.	G1600 CE Part No.
Capillary cassette	G7100-60002	G1600-60002

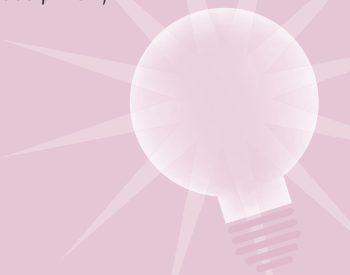
Note: Only use G7100-60002 cassette in G7100 and G1600-60002 cassette in G1600. Never mix cassettes.

Optical filter for DAD

Description	G7100 CE Part No.	G1600 CE Part No.
Optical filter for DAD 260 nm, for DNA analysis with polyacrylamide filled capillaries and oligonucleotide analysis	G7100-62700	G1600-62700

Tips & Tools

Cassette and interfaces accept all commercially available capillaries (~365 µm OD).



Instrument Parts and Supplies

High Sensitivity Detection Cell



High Sensitivity Detection Cell

The Agilent high sensitivity detection cell – a technological leap which extends sensitivity by an order of magnitude – provides a solution to sensitivity limitations often encountered in CE. This improvement will substantially increase the utility of CE for impurity analysis of chiral drugs, biologicals, and compounds of environmental interest, among others.

The high linear range allows quantification of both <0.1% impurities and the main component in one run. This is useful for all impurity determinations and is especially useful for determining chiral excess.

The high sensitivity detection cell for the Agilent CE system not only improves detection sensitivity more than 10-fold over standard capillaries, but also extends linearity beyond 2000 mAU and provides unsurpassed spectral fidelity. These improvements are a result of a proprietary micromachined design which increases the detection pathlength from 75 μm to 1200 μm while dramatically reducing stray light.

The high sensitivity detection cell has a design comprised of a fused-silica cell body and removable capillaries. The light path through the cell is made from black fused-silica which significantly minimizes stray light and defines the aperture for the diode-array spectrometer. In addition, the reflective interior functions as a "lightpipe," ensuring almost 100% transmission of light which entered the cell. These properties result in enhanced linearity and unsurpassed spectral fidelity with the diode-array detector.

Characteristics of the Agilent High Sensitivity Detection Cell

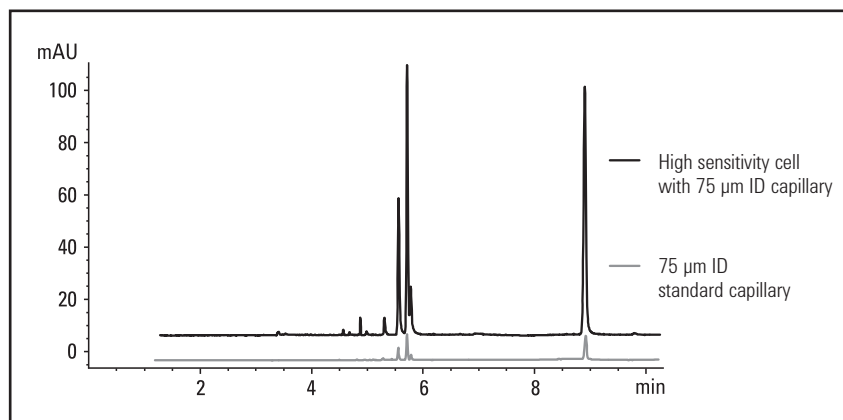
- Up to 10-fold increase in signal-to-noise
- Detector linearity beyond 2000 mAU for accurate quantitative analysis
- Decoupled design allows replaceable capillaries and reduced cost operation
- Special capillary geometry ensures maintenance of peak symmetry
- Full diode-array spectral capabilities
- Design fits all Agilent CE instruments

High Sensitivity Detection Cell

Description	G7100 CE Part No.	G1600 CE Part No.
High sensitivity cell kit Includes detection cell, 75 µm ID inlet capillary (72 cm) and outlet capillary (8.5 cm) pair, capillary cassette, fittings (3 fitting screws with seals, 2 fitting caps), cleaning solution, CE Partner CD-ROM	G7100-68723	G1600-68723
CE cell fitting kit Includes 3 fitting screws, 2 fitting caps		G1600-63200
Replacement detection cell		G1600-60027
Cell cleaning fluid, 1 L		5062-8529

Capillary Kits for High Sensitivity Detection Cell

Description	Effective Length (cm)	G1600 CE Part No.
75 µm capillary kit with 8.5 cm outlet	56	G1600-68716
	72	G1600-68715
	88	G1600-68714
PVA coated 75 µm capillary kit with 8.5 cm outlet	56	G1600-68319



Agilent high sensitivity detection cell vs. 75 µm standard capillary for the CZE separation of naphthalene sulfonic acids

CE/MS Accessories

The CE/MS Adapter Kit simplifies coupling the Agilent CE system with MS systems equipped with an electrospray ionization (ESI) source. Integral to this kit is the CE/MS cassette, which completely thermostats the capillary until it exits the CE system. The cassette offers multiple capillary paths that vary the capillary length. A method development configuration uses online diode array detection and MS. For rapid or routine MS analysis, the detector can be bypassed to decrease the total capillary length and reduce analysis time. The CE/MS adapter kit can be used with the complete Agilent 6000 Series mass spectrometers, or virtually any electrospray-MS platform.

The CE-MS cassette completely thermostats the capillary until it exits the CE system. Methods development configuration uses online diode array detection (DAD) and MS. For rapid or routine MS analysis the DAD can be by-passed to decrease the total capillary length and reduce analysis time.

The CE-ESI-MS Nebulizer Kit includes the electrospray needle and splitter assembly, which allows the direct connection of the CE instrument with Agilent and other electrospray MS systems. The CE-ESI-MS Nebulizer Kit needs the CE-MS Adapter Kit to fully support CE/MS coupling.

CE with tandem UV-Vis and MS detection allows the analysis of complex mixtures. Analyte mixtures are separated and the components detected via UV-Vis absorption, allowing preliminary identification based on peak elution time and UV-Vis spectra, or both, when compared to a standard. Online coupling to electrospray-ionization mass spectrometry (ESI-MS) then reveals unambiguous information on the solute's molecular weight, and possibly structure.

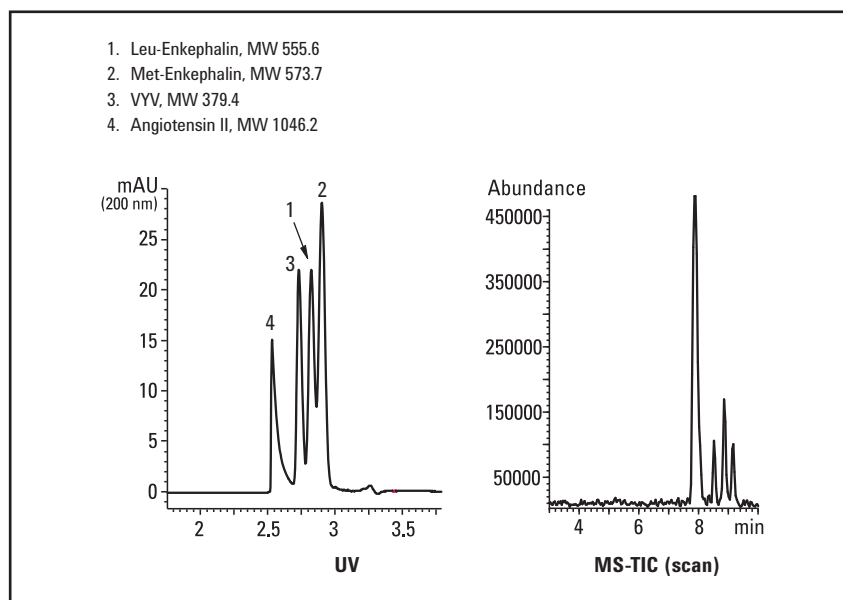


Interfacing the capillary requires an electrospray needle which is not included in this kit but in the CE-ESI-MS Nebulizer Kit. For coupling with non-Agilent MS please contact the MS vendor.

CE/MS Adapter Kit

Description	Part No.
CE/MS Adapter Kit	G1603A
For interfacing the Agilent CE system with a mass spectrometer Includes parts below, which can be ordered separately*	
CE/MS interface cassette, metallic, for G1600 and G7100 CE	G1600-60013
CE/MS alignment interface for 360 µm OD capillaries, nonmetallic, for G1600 CE	G1600-60400
CE/MS alignment interface for 360 µm OD capillaries, nonmetallic, for G7100 CE	G7100-60400
Bare fused-silica, 50 µm ID, 125 cm long, 2/pk	G1600-67311

*Interfacing the capillary requires an electrospray needle which is not included in this kit



CE/MS of 4-component peptide mixture (210 fmol)

CE/MS Sprayer Kit

Description	Unit	Part No.
CE/MS Sprayer Kit Includes CE/MS test sample (5 g quinine sulfate dihydrate) and the parts listed below		G1607A
ES needle assembly		G1607-60041
CE-ESI sprayer		G1607-60001
Splitter assembly		G1607-60000
PEEK ferrule, 360 µm for CE/MS Sprayer		5022-2141
Nut, fingertight fitting and ferrule	2/pk	0100-1543
Flex loc element	2/pk	1520-0401
Gasket	1/pk	G1607-20030
Ion kit (ammonium acetate)	5 x 5 mL	8500-4410

CE/MS Capillaries

Description	Color Code	Unit	Part No.
Bare fused-silica, 50 µm ID, 125 cm long	Green	2/pk	G1600-67311
PVA coated capillary, 50 µm ID, 125 cm long	Green	1/pk	G1600-67219
PVA coated capillary, 75 µm ID, 125 cm long	Blue	1/pk	G1600-67319

CE Standards & Reagents

Premade buffers help eliminate the time-consuming buffer preparation process. All Agilent buffers and reagents are designed to meet the stringent demands of CE. Manufactured under GLP/GMP conditions in ISO9001 facilities, each is shipped with assay information and verification of purity. Chemicals are all electrophoresis grade, with nearly all ionic and organic impurities removed. Solutions are prepared under Class 10 clean room conditions and prefiltered through 0.2 μm filters to ensure removal of particulates. Superior quality control ensures reproducible results bottle-to-bottle and batch-to-batch.

In addition to a set of kit buffers, which are specially designed for dedicated applications, Agilent offers a series of basic CZE buffers covering a broad pH range. The product portfolio also includes special buffers for protein analysis and for Micellar Electrokinetic Chromatography (MEKC). Cleaning and conditioning solutions complete the offering.



Ultra pure CE water, 5062-8578

Ultra Pure CE Water

Description	Volume (mL)	Part No.
Ultra pure CE water	500	5062-8578



50 mM sodium phosphate buffer, pH 2.5, 5062-8571

Capillary Conditioning Solutions

Description	Volume (mL)	Part No.
0.1 N sodium hydroxide	250	5062-8575
1.0 N sodium hydroxide	250	5062-8576
0.1 N phosphoric acid	250	5062-8577

CZE Buffers for Charged Analytes

Description	Volume (mL)	Part No.
50 mM sodium phosphate buffer, pH 2.5	250	5062-8571
50 mM sodium phosphate buffer, pH 7.0	250	5062-8572
50 mM sodium tetraborate buffer, pH 9.3	250	5062-8573
20 mM sodium tetraborate buffer, pH 9.3	100	8500-6782

CZE Buffers for Proteins

Description	Volume (mL)	Part No.
50 mM phosphate, 0.05% hydroxyethyl cellulose buffer, pH 2.5	250	8500-6786
150 mM phosphate, 200 mM ammonium sulfate buffer, pH 7.0	250	8500-6787

MEKC Buffers for Neutral and Charged Analytes

Description	Volume (mL)	Part No.
50 mM sodium tetraborate, 100 mM sodium dodecyl sulfate buffer, pH 9.3*	250	5062-8574

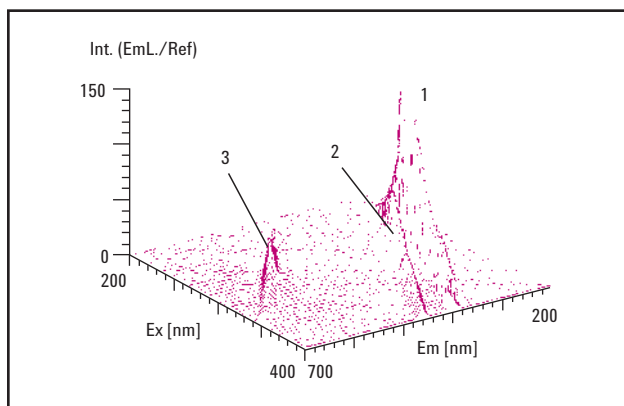
*Dilute with 50 mM sodium tetraborate, pH 9.3 (P/N 5062-8573) to reduce SDS concentration without affecting the tetraborate composition or pH

Plating Bath Analysis Buffer

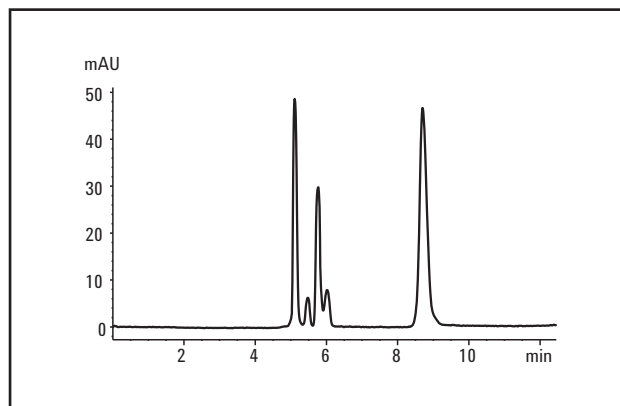
Description	Volume (mL)	Part No.
Plating bath analysis buffer	250	5064-8236

μPAGE Buffer Solutions and Oligo Standards

Description	Part No.
μPAGE tris-borate and urea buffer for μPAGE-10, 4 x 237 mL	590-4005
μPAGE tris-borate and urea buffer for μPAGE-3 and μPAGE-5, 4 x 237 mL	590-4001
μPAGE pd(A) _{25-30, 40-60} oligonucleotide standard for μPAGE-3 and μPAGE-5, 3 x 50 μL	590-4000



The total fluorimetry spectrum of the 50 mM borate buffer pH 9.2 verifies that the solution is free of fluorescence-active impurities (1 and 2 = Rayleigh stray light of zero and first order, 3 = Raman stray light).



CZE analysis of a peptide mixture using pre-made 50 mM sodium phosphate buffer, pH 2.5

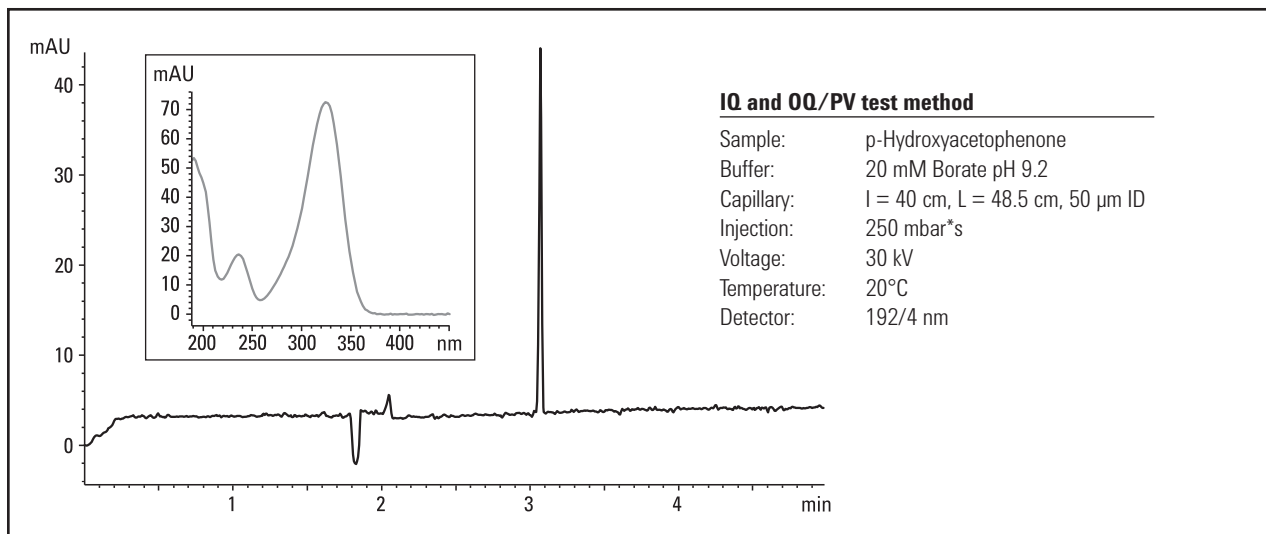
CE System Start-up and Test Kits

Chemical test kits and validation packages are available to help comply with regulatory and quality standards. The Installation Qualification (IQ) Chemical Kit and Hardware Start-Up Kits, which are shipped with new instruments, are useful for rapidly verifying system functionality. For rigorous testing, the Operational Qualification (OQ)/Performance Verification (PV) Kit can be used to verify DAD noise, drift, linearity, wavelength accuracy and replenishment functionality. The OQ/PV kit is only part of the validation services available from Agilent Technologies. When implemented by qualified Agilent personnel, our service packages can be used to help validate your Agilent CE system.



CE System Start-up and Test Kits

Description	Part No.
CE Installation Qualification (IQ) Kit Includes buffer (20 mM borate, pH 9.3, 100 mL), test sample (4-(hydroxy)-acetophenone, 2 mL), capillary conditioning solution (0.1 N sodium hydroxide, 100 mL)	5063-6514
CE Operational Qualification Performance Verification (OQ/PV) Chemical Kit Includes buffer (20 mM borate, pH 9.3, 100 mL), test samples (0.1, 0.5, 1.0, and 5.0 mM 4-(hydroxy)-acetophenone, 2 mL ea.), capillary conditioning solution (0.1 N sodium hydroxide, 100 mL), test capillary (L 48.5 cm, I 40 cm, ID 50 µm), diskette with methods, sequence, spectral library. Note: Method is supported for G1600 only.	5063-6515
CE OQ/PV Chemicals Only Kit Includes buffer (20 mM borate, pH 9.3, 100 mL), test samples (0.1, 0.5, 1.0, and 5.0 mM 4-(hydroxy)-acetophenone, 2 mL)	5063-6520



Instrument Parts and Supplies



Snap caps, polyurethane, 5181-1512, 5042-6491

Electrode assembly, standard (for G1600 only),
G1600-60007

Electrode O-ring, silicone, 5062-8544



Electrolyte bottle, 500 mL, 9300-1748



Filter frit adapters, 5062-8517

Air filter, 5 μ m, 3150-0619

Pre-puncher, G1600-67201

Screws for pre-puncher/insulation plate holding,
G1600-62402

Vials and Caps for CE

Description	Unit	Part No.
Crimp/snap top vial, 1 mL, Polypropylene, crimp/snap top	100/pk	5182-0567
Clear, wide opening crimp/snap top vial, 2 mL	100/pk	5182-9697
Clear, wide opening crimp/snap top glass vial, 2 mL	500/pk	5183-4623
Amber, wide opening crimp/snap top vial, write-on spot, 2 mL	100/pk	5183-4619
Crimp/snap top vial, 250 μ L	1000/pk	9301-0978
Snap caps PEO (polyethylene olefin for chemical resistance)	100/pk	5181-1507
Snap caps PEO (polyethylene olefin for chemical resistance)	500/pk	5181-1513
Snap caps PUR (polyurethane for resealing)*	100/pk	5181-1512
Snap caps PUR (polyurethane for resealing)*	500/pk	5042-6491

*PUR caps are recommended to help prevent sample or buffer evaporation even after multiple injections

Instrument Supplies

Description	Unit	Part No.
Long life HiS Deuterium lamp (8-pin) with RFID tag		5190-0917
Deuterium lamp		2140-0585
Electrode assembly, standard (for G1600 only)		G1600-60007
Electrode assembly, short (for G1600 only)		G1600-60033
Electrode assembly, standard (for G7100 only)		G7100-60007
Electrode assembly, short (for G7100 only)		G7100-60033
Electrode O-ring, silicone	5/pk	5062-8544
Electrolyte bottle, 500 mL		9300-1748
Electrolyte bottle, 100 mL		5042-6478
Electrolyte bottle cap		9300-1747
Bottle sealing O-ring		0905-1163
Glass filter, solvent inlet, 20 μ m		5041-2168
Filter frit adapter, 3 mm	4/pk	5062-8517
Bottle cap plug		G1600-23223
Air filter, 5 μ m		3150-0619
Pre-puncher		G1600-67201
Screws for pre-puncher/insulation plate holding	10/pk	G1600-62402



CE column cutter, 5183-4669

Accessories

Description	Part No.
CE accessory kit	G7100-68705
Includes electrode tool, screwdriver, fuses, air filter, glass frit, vials and caps alignment interfaces (red and green) standard and 50 µm ID capillaries: L 64.5 cm, Standard: L 64.5 cm, Extended Light Path: L 48.5 cm	
Rack for 12 mm, 2 mL vials, holds 50 vials per rack, 5/pk	9301-0722
CE column cutter	5183-4669
Diamond blade replacement kit for CE column cutter	5183-4670
Capillary tubing cutter, 4/pk	5181-8836



Window etching tool, 590-3003

Window Etching Tool

The window etching tool is designed for fast, convenient and reproducible preparation of detection windows on fused-silica capillaries. The polyimide coating is removed without destroying the inner polymeric coating. The tool contains three glass blocks with fine grooves, precisely controlling the size of the windows.

Description	Part No.
Window etching tool, 3/pk	590-3003

Troubleshooting

Basic Capillary Electrophoresis Troubleshooting

Symptom	Possible Cause	Solution(s)
Unstable Current		
Variable or no current	Air bubble formed in capillary	Flush capillary, ramp voltage to limit initial heating, and/or degas buffers.
	Clogged capillary	Flush capillary with absorbing solution (such as NaOH). A "step" on the baseline should be observed when viewing the online signal at 200 nm. If still plugged, flush manually with syringe or high pressure gas.
	Broken capillary	Replace capillary.
	No or incorrect solution in buffer vials	Fill/change buffer vials.
	Large volume injection	Normal situation. Current should stabilize during analysis.
Unstable Baseline		
Spikes in baseline	Precipitates in buffer	Filter buffer through 0.2 or 0.45 µm filter.
	Micro air bubbles in buffer	Degas buffer by ultrasonication or vacuum.
	Precipitation of sample	Verify that sample components are sufficiently soluble in buffer.
Noisy baseline	Optical slit in capillary interface is occluded	Clean slit with methanol or water. View under magnifier.
	Aging deuterium lamp	Use DAD test to measure lamp output and time-on. Replace if necessary.
	Data acquisition rate too high	Determine peak width and decrease acquisition rate if appropriate.
	Improper reference wavelength	Acquire UV spectrum during analysis. Use lowest wavelength possible without impinging where sample absorbs. Also use wide bandwidth.
	Buffer absorbs at detection wavelength	Use minimally UV-absorbing buffers such as phosphate and borate, especially below 210 nm.
Drifting baseline	Improper capillary alignment	Re-seat capillary cartridge in detector block.
	Unequilibrated temperature	Allow 10-20 minutes for equilibration after opening top cover.
	Lamp recently ignited	Allow 15-30 minutes for equilibration after igniting lamp.

(Continued)

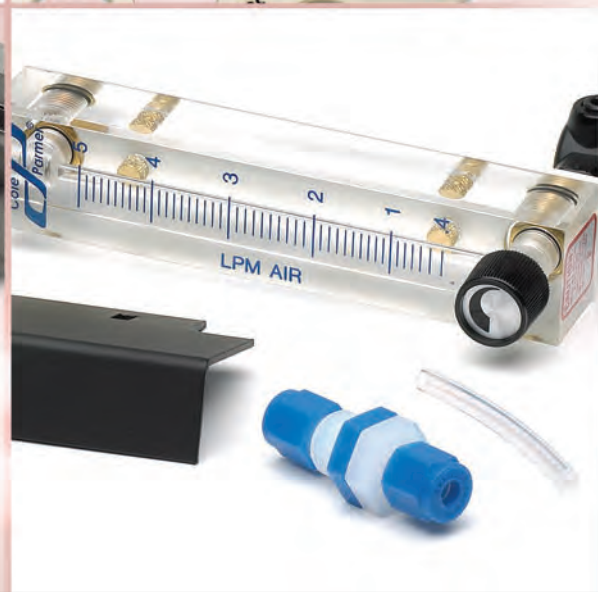
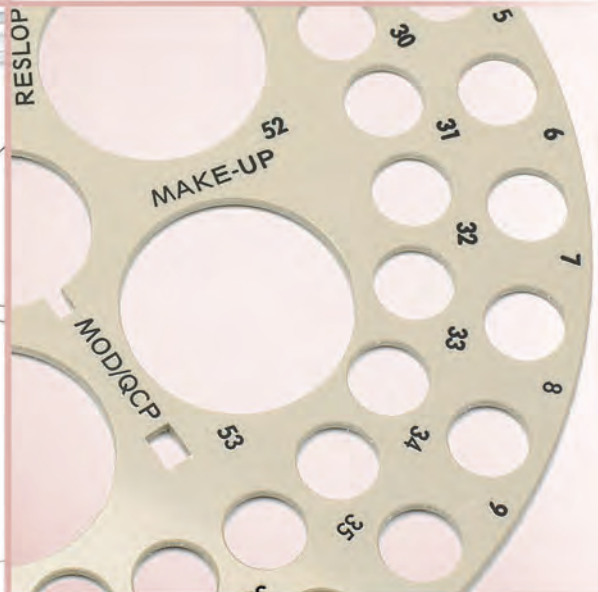
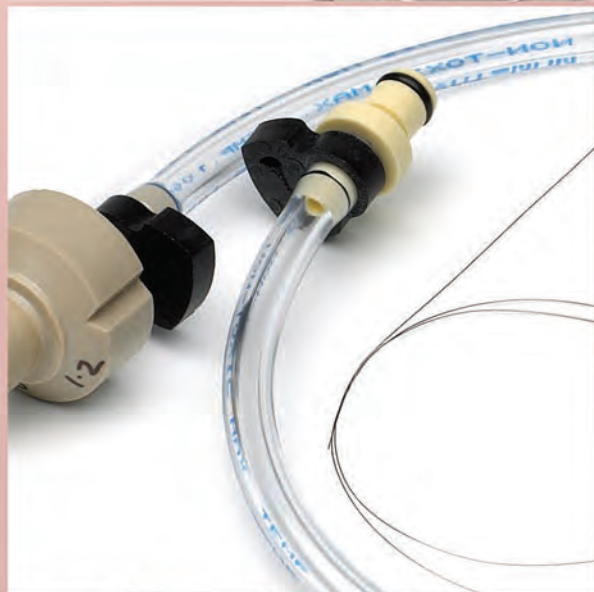
Basic Capillary Electrophoresis Troubleshooting		
Symptom	Possible Cause	Solution(s)
Poor Peak Efficiency		
Broad peaks	Sample overloading	Decrease sample injection or concentration.
	Excessive Joule heating	Reduce voltage, buffer conductivity, or capillary ID.
Skewed peaks	Mismatched sample buffer ion mobilities	Match mobilities or increase difference between buffer and sample conductivity.
	Sample overloading	Decrease sample injection or concentration.
Tailing peaks	Adsorption to capillary wall	Use pH extremes, high buffer concentrations, polymer additives, or coated capillary.
Poor Migration Time Reproducibility		
Adsorption to capillary walls	Changes in EOF caused by buffer (especially phosphates and detergents) or sample adsorption	Condition capillary and allow sufficient equilibration time. Replace capillary.
Hysteresis of wall charge	Caused by conditioning capillary at high (or low) pH and employing a low (or high) pH running buffer	Avoid pH differences. Allow sufficient equilibration time.
Changes in buffer composition	pH changes due to electrolysis	Replenish buffer.
	Buffer evaporation	Tightly cap buffer vials and reduce carousel temperature.
	Conditioning solution waste flushed into outlet reservoir	Use separate vial to collect waste.
	Conditioning solution carried over into buffer vial	First dip capillary in separate buffer or water vial.
Buffer reservoirs not level	Generation of laminar flow	Level liquid in reservoirs. If not replenishing buffer, do not use inlet vial for flushing capillary.
Different silanol content of capillary batches	Different wall charge and variations in EOF	Measure EOF and normalize.
Temperature changes	Changes in viscosity and EOF	Use system with capillary thermostating.

(Continued)

Basic Capillary Electrophoresis Troubleshooting

Symptom	Possible Cause	Solution(s)
Poor Peak Area Reproducibility		
Sudden application of high voltage	Heating, thermal expansion of buffer, and expulsion of sample	Ramp separation voltage or inject buffer plug after sample.
Sample evaporation	Increasing sample concentration and peak area	Cap vials and/or reduce temperature of sample carousel.
Instrumental limitations	System rise time significant proportion of injection time	Increase injection time.
Sample carry-over	Extraneous injection	Use capillary with flat, smooth injection end. Remove polyimide from end of capillary.
Zero-injection caused by simply dipping the capillary in the sample	Extraneous injection	Cannot be totally eliminated. Increase injection amount to minimize effect.
Sample adsorption to capillary walls	Distorted peak shape (tailing) Non-eluting sample	Change buffer pH. Increase buffer concentration. Use additive such as cellulose or coated capillary.
Low signal-to-noise ratio	Integration errors	Optimize integration parameters. Increase sample concentration. Use peak height.
Temperature changes of capillary environment	Changes in viscosity and injection amount	Use system with capillary thermostating.

ATOMIC SPECTROSCOPY



In this Chapter

Atomic Absorption

- 1166** Hollow Cathode Lamps
- 1172** Graphite Furnace Parts and Supplies
- 1175** Programmable Sampler
Dispenser Supplies
- 1180** Burners and Nebulizers
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- 1185** Hydride Modules

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ICP-MS

- 1200** ICP-MS Maintenance Schedule
- 1201** Gas Line Supplies
- 1203** Sample Introduction Supplies
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- 1215** Autosampler Supplies
- 1217** Peripherals Supplies

Atomic Spectroscopy Standards

- 1220** AA and ICP-OES Standards
- 1221** ICP-MS Standards



■ ATOMIC ABSORPTION



Fast Sequential Atomic Absorption Spectrometer



Hollow cathode lamp

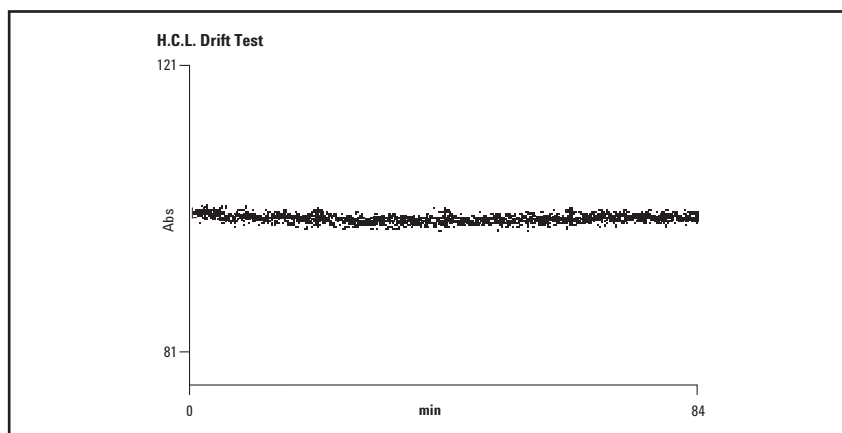
Agilent provides a comprehensive range of consumables for Atomic Absorption, designed to maintain the high performance of your AA instrument. In addition, Agilent continues to research and manufacture an extensive range of single-element and solid-cathode multi-element lamps, plus high-intensity UltraAA lamps for superior cost-effective performance.

Hollow Cathode Lamps

Hollow cathode lamps provide optimum signal-to-noise performance, permitting determinations at even lower levels with the most demanding applications. We manufacture our lamps and instruments in the same factory, so they are optimized to deliver the best performance from your AA. Our lamps provide high spectral purity because of purified materials, extended processing cycle and factory lamp conditioning procedures. These ensure minimal lamp warm-up time and good stability during operation.

Economical operation is assured by the long lamp life, guaranteed to 5000 mA hours but typically exceeding 8000 mA hours, over and above our factory reconditioning and testing service.

Consistent performance is also assured. All lamps are tested to confirm that the emission intensity exceeds a minimum level. No lamp leaves our factory without having satisfied our demanding test standards. These tests ensure that you receive quality lamps that can provide optimum signal-to-noise and stable performance throughout the life of the lamp.



The trace shows the variation in emission intensity from a lamp over 1 hour 24 minutes. The steady trace demonstrates the superb stability and low drift achieved when using our hollow cathode lamps (after a suitable warm-up period).

High Intensity UltrAA Coded Single Element Lamps

- Emission intensity is increased by 3-5 times, for lower noise
- Sensitivity is increased by up to 40%, due to the sharper emission profile, allowing determinations at even lower levels
- Element coded for automatic lamp recognition, preventing errors if the wrong lamp position is entered

UltrAA lamps are high-intensity, boosted discharge hollow cathode lamps. They use the standard lamp current, but apply an additional boost discharge within the lamp to increase the emission intensity. The boost current is supplied from a secondary control module (either integrated into the instrument or supplied from an external module).

UltrAA lamps are manufactured from the purest cathode materials, and every lamp is AQ/QC tested to guarantee performance and reliability. These lamps are coded for automatic lamp recognition (except for 50/55 AA, SpectrAA-50/55 and SpectrAA-5 models), eliminating the risk of time-consuming errors when reprogramming the lamp position.

High Intensity UltrAA Coded Single Element Lamps

Element	Part No.
Antimony – Sb	5610108000
Arsenic – As	5610108100
Bismuth – Bi	5610134200
Boron – B	5610135700
Cobalt – Co	5610134100
Germanium – Ge	5610134300
Gold – Au	5610109000
Iron – Fe	5610108600
Lead – Pb	5610108200
Manganese – Mn	5610133700
Nickel – Ni	5610108500
Palladium – Pd	5610135800
Platinum – Pt	5610135900
Selenium – Se	5610108300
Silicon – Si	5610133400
Tellurium – Te	5610134000
Thallium – Tl	5610108400
Tin – Sn	5610133900

High Intensity UltrAA Coded Multi-Element Lamps

- Unique combinations of compatible elements extend the versatility and performance of any AA spectrometer
- Save time by avoiding the need to warm up a new lamp
- Same excellent performance as provided by Agilent single element lamps

High Intensity UltrAA Coded Multi-Element Lamps

Element	Part No.
Aluminum/Calcium/Magnesium – Al/Ca/Mg	5610133600
Cobalt/Chromium/Copper/Iron/Manganese/Nickel	5610134500
Cobalt/Molybdenum/Lead/Zinc – Co/Mo/Pb/Zn	5610135200
Copper/Iron/Manganese/Zinc – Cu/Fe/Mn/Zn	5610135000
Copper/ Iron/Silicon/Zinc – Cu/Fe/Si/Zn	5610135100
Copper/Zinc – Cu/Zn	5610134600
Silver/Cadmium/Lead/ Zinc – Ag/Cd/Pb/Zn	5610108900
Silver/Chromium/Copper/Iron/Nickel – Ag/Cr/Cu/Fe/Ni	5610134900

High Intensity UltrAA Uncoded Multi-Element Lamps

Element	Part No.
Arsenic/Copper/Iron – As/Cu/Fe	5610135300
Nickel/Selenium – Ni/Se	5610135400

Background Correction Lamps

Deuterium background correction lamps provide accurate and fast correction over the widest possible absorbance range and are QC-selected for optimum lifetime.

Background Correction Lamps

Element	Part No.
Deuterium background correction lamp for AA systems	5610021800

Coded Single Element Lamps

- High performance – manufactured from the purest cathode materials
- Improved productivity – coded lamps make AA easier and more flexible
- Safe operation – lamps are non-hazardous, and non-reactive if unbroken

Coded Single Element Lamps

Element	Part No.	Element	Part No.
Aluminum – Al	5610100100	Neodymium – Nd	5610103600
Antimony – Sb	5610100200	Nickel – Ni	5610103700
Arsenic – As	5610100300	Niobium – Nb	5610103800
Barium – Ba	5610100400	Osmium – Os	5610103900
Beryllium – Be	5610100500	Palladium – Pd	5610104000
Bismuth – Bi	5610100600	Phosphorus – P	5610107700
Boron – B	5610100700	Platinum – Pt	5610104100
Cadmium – Cd	5610100800	Potassium – K	5610104200
Calcium – Ca	5610101000	Praseodymium – Pr	5610104300
Cerium – Ce	5610101100	Rhenium – Re	5610104400
Cesium – Cs	5610100900	Rhodium – Rh	5610104500
Chromium – Cr	5610101200	Rubidium – Rb	5610104600
Cobalt – Co	5610101300	Ruthenium – Ru	5610104700
Copper – Cu	5610101400	Samarium – Sa	5610104800
Dysprosium – Dy	5610101500	Scandium – Sc	5610104900
Erbium – Er	5610101600	Selenium – Se	5610105000
Europium – Eu	5610101700	Silicon – Si	5610105100
Gadolinium – Gd	5610101800	Silver – Ag	5610105200
Gallium – Ga	5610101900	Sodium – Na	5610105300
Germanium – Ge	5610102000	Strontium – Sr	5610105400
Gold – Au	5610102100	Tantalum – Ta	5610105500
Hafnium – Hf	5610102200	Tellurium – Te	5610105600
Holmium – Ho	5610102300	Terbium – Tb	5610105700
Indium – In	5610102500	Thallium – Tl	5610105800
Iridium – Ir	5610102600	Thulium – Tm	5610106000
Iron – Fe	5610102700	Tin – Sn	5610106100
Lanthanum – La	5610102800	Titanium – Ti	5610106200
Lead – Pb	5610102900	Tungsten – W	5610106300
Lithium – Li	5610103000	Vanadium – V	5610106500
Lutetium – Lu	5610103100	Ytterbium – Yb	5610106600
Magnesium – Mg	5610103200	Yttrium – Y	5610106700
Manganese – Mn	5610103300	Zinc – Zn	5610106800
Mercury – Hg	5610103400	Zirconium – Zr	5610106900
Molybdenum – Mo	5610103500		

Uncoded Single Element Lamps

Element	Part No.	Element	Part No.
Aluminum – Al	5610122000	Neodymium – Nd	5610125500
Antimony – Sb	5610122100	Nickel – Ni	5610125600
Arsenic – As	5610122200	Niobium – Nb	5610125700
Barium – Ba	5610122300	Osmium – Os	5610125800
Beryllium – Be	5610122400	Palladium – Pd	5610125900
Bismuth – Bi	5610122500	Phosphorus – P	5610126000
Boron – B	5610122600	Platinum – Pt	5610126100
Cadmium – Cd	5610122700	Potassium – K	5610126200
Calcium – Ca	5610122900	Praseodymium – Pr	5610126300
Cerium – Ce	5610123000	Rhenium – Re	5610126400
Cesium – Cs	5610122800	Rhodium – Rh	5610126500
Chromium – Cr	5610123100	Rubidium – Rb	5610126600
Cobalt – Co	5610123200	Ruthenium – Ru	5610126700
Copper – Cu	5610123300	Samarium – Sa	5610126800
Dysprosium – Dy	5610123400	Scandium – Sc	5610126900
Erbium – Er	5610123500	Selenium – Se	5610127000
Europium – Eu	5610123600	Silicon – Si	5610127100
Gadolinium – Gd	5610123700	Silver – Ag	5610127200
Gallium – Ga	5610123800	Sodium – Na	5610127300
Germanium – Ge	5610123900	Strontium – Sr	5610127400
Gold – Au	5610124000	Tantalum – Ta	5610127500
Hafnium – Hf	5610124100	Tellurium – Te	5610127600
Holmium – Ho	5610124200	Terbium – Tb	5610127700
Indium – In	5610124400	Thallium – Tl	5610127800
Iridium – Ir	5610124500	Thulium – Tm	5610128000
Iron – Fe	5610124600	Tin – Sn	5610128100
Lanthanum – La	5610124700	Titanium – Ti	5610128200
Lead – Pb	5610124800	Tungsten – W	5610128300
Lithium – Li	5610124900	Vanadium – V	5610128500
Lutetium – Lu	5610125000	Ytterbium – Yb	5610128600
Magnesium – Mg	5610125100	Yttrium – Y	5610128700
Manganese – Mn	5610125200	Zinc – Zn	5610128800
Mercury – Hg	5610125300	Zirconium – Zr	5610128900
Molybdenum – Mo	5610125400		

Coded Multi-Element Lamps

- Primary lines checked to avoid and minimize spectral interferences
- Save time by avoiding the need to warm up a new lamp
- Same excellent performance as provided by Agilent single element lamps

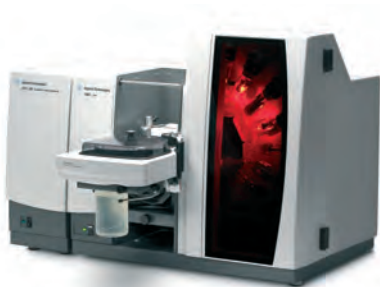
If secondary lines are needed, UltraAA high intensity lamps can help minimize interferences.

Coded Multi-Element Lamps

Element	Part No.
Aluminum/Calcium/Magnesium – Al/Ca/Mg	5610108800
Calcium/Magnesium – Ca/Mg	5610107100
Cobalt/Chromium/Copper/Iron/Manganese/Nickel – Co/Cr/Cu/Fe/Mn/Ni	5610107600
Cobalt/Molybdenum/Lead/Zinc – Co/Mo/Pb/Zn	5610109800
Copper/Iron/Manganese/Zinc – Cu/Fe/Mn/Zn	5610109600
Copper/Iron/Silicon/Zinc – Cu/Fe/Si/Zn	5610109700
Copper/Zinc – Cu/Zn	5610119200
Silver/Cadmium/Lead/Zinc – Ag/Cd/Pb/Zn	5610108700
Silver/Chromium/Copper/Iron/Nickel – Ag/Cr/Cu/Fe/Ni	5610109500
Sodium/Potassium – Na/K	5610107000

Uncoded Multi-Element Lamps

Element	Part No.
Barium/Chromium – Ba/Cr	5610133500
Calcium/Magnesium – Ca/Mg	5610129100
Cobalt/Chromium/Copper/Iron/Manganese/Nickel – Co/Cr/Cu/Fe/Mn/Ni	5610129200
Copper/Zinc – Cu/Zn	5610129300
Sodium/Potassium – Na/K	5610129000



280Z Atomic Absorption Spectrometer



Graphite shroud for GTA 120, 6310003100

Graphite Furnace Parts and Supplies

Graphite Furnace Operating Kits

Maximize your uptime by keeping one of these kits handy.

Kits for GTA 120 Furnace System

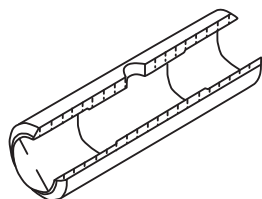
Description			Part No.
GTA 120 Deuterium furnace operating supplies kit			190067900
GTA 120 Zeeman furnace operating supplies kit			190068000
Kit Contents	Kit Quantity	Unit	Part No.
Graphite electrodes For GTA 120	2	2/pk	6310003400
Graphite electrodes For GTA 120 Zeeman	2	2/pk	6310003500
Graphite shroud			6310003100
Notched partitioned tube for fork	5	10/pk	6310002300
Forked pyrolytic graphite platforms	5	10/pk	6310002400
Syringe, 100 μ L			4710003200
Capillary assembly		5/pk	9910115100
Glass beakers, 25 mL		5/pk	6610008200
Sample vials, 2 mL, conical polyethylene	2	1000/pk	9910028200

Kits for GTA 110 Furnace System

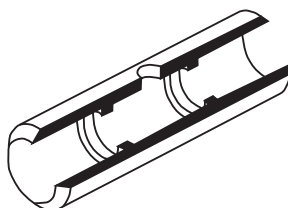
Description			Part No.
GTA 110 Deuterium furnace operating supplies kit			190024900
GTA 110 Zeeman furnace operating supplies kit			190025000
Kit Contents	Kit Quantity	Unit	Part No.
Graphite electrodes For GTA-95/96/97/100/110	2	2/pk	6310001600
Graphite electrodes For GTA-96/100/110 Zeeman	2	2/pk	6310001700
Notched partitioned tube for fork	5	10/pk	6310002300
Forked pyrolytic graphite platforms	5	10/pk	6310002400
Syringe, 100 μ L			4710002300
Plunger for 100 μ L syringe, PTFE tipped			4710003100
Capillary assembly		5/pk	9910032300
Glass beakers, 25 mL		5/pk	6610008200
Sample vials, 2 mL, conical polyethylene	2	1000/pk	9910028200



Omega platform tubes, 6310003700



Plateau tubes, 6310001100



Partitioned tubes, 6310001200

Graphite Tubes and Platforms

- High purity graphite reduces spurious absorption from trace contaminants and improves signal-to-noise
- Every tube is hand-checked for reproducible and reliable results
- Perform fewer repeats and increase productivity

Graphite tubes are quality tested to ensure each batch passes our demanding performance specifications for contamination, sensitivity, precision, electrical resistance and lifetime.

Omega platform tubes combine ease-of-use with perfect atomization: the integrated platform ensures the perfect thermal profile to produce dense atom clouds for good signal-to-noise ratios and the best detection limits. Platforms prevent premature atomization of volatile elements such as lead, selenium and arsenic. Omega tubes with an integrated platform can be used straightaway, while notched platforms provide continuity with older methods.

Use partitioned tubes for general purpose work or multiple elements.

Graphite Tubes and Platforms

Description	Unit	Part No.
Omega platform tubes, pyrolytically coated	10/pk	6310003700
Solid pyrolytic graphite platforms Only for plateau tubes, 6310001100	10/pk	6310001300
Plateau tubes, pyrolytically coated Only for pyrolytic platforms, 6310001300	10/pk	6310001100
Partitioned tubes, pyrolytically coated	10/pk	6310001200



Graphite electrodes for GTA 120, 6310003400



Graphite electrodes, 6310001600



Graphite shroud for GTA 120, 6310003100



Graphite shroud for GTA 120 Zeeman, 6310003600



Electrode extractor tool, 9910031200

Graphite Electrodes

- Spare electrodes maximize uptime
- Good electrical contact ensures optimum performance and maximize tube life

Graphite Electrodes

Description	Unit	Part No.
Graphite electrodes for GTA 120	2/pk	6310003400
Graphite electrodes for GTA 120 Zeeman	2/pk	6310003500
Graphite electrodes for GTA-95/96/97/100/110	2/pk	6310001600
Graphite electrodes for GTA-96/100/110 Zeeman	2/pk	6310001700

Graphite Shrouds

Graphite Shrouds

Description	Part No.
Graphite shroud for GTA 120	6310003100
Graphite shroud for GTA 120 Zeeman	6310003600
Graphite shroud for GTA-95/96/97/100/110	6310001800
Graphite shroud for GTA-96/100/110 Zeeman	6310001900

Graphite Furnace Tools

Graphite Furnace Tools

Description	Part No.
Electrode extractor tool for GTA-96/97/100/110/120, 2 draw bars	9910031200
Shroud removal tool for GTA-96/97/100/110/120	9910033300
Electrode extractor tool for GTA-96/100/110/120 Zeeman, 2 draw bars	9910049300
Shroud removal tool for GTA-96/100/110/120 Zeeman	9910050400



Sample vials, 2 mL, 9910028200



Plastic beakers, 9910115600



Glass beakers, 6610008200



Carousel adaptors, 9910054200



Replacement carousel plate, 5410029700



High capacity carousel kit, 9910113100

Programmable Sampler Dispenser Supplies

Spares and Consumables for Graphite Furnace AAS

Description	Use With	Part No.
Sample vials, 1.1 mL, polyethylene, 2000/pk	PSD 120 high capacity sample carousel	6610025900
Sample vials, 2 mL, conical polyethylene, 1000/pk		9910028200
Glass beakers, 25 mL, 5/pk	PSD-95/96/97/100	6610008200
Plastic beakers, 10 mL, 5/pk	PSD 120 high capacity carousel	9910115600
Rinse bottle, Nalgene, 1 L	PSD-97/100/120	6610012100
Cap for rinse bottle	PSD-97/100/120	1610094600
Capillary assembly, 5/pk	PSD 120	9910115100
	PSD-95/96/97/100	9910032300
Carousel adaptors, 5/pk Allows use of 2 mL sample vials in the central carousel locations	PSD-96/97/100	9910054200
Syringe, 100 μ L	PSD 120	4710003200
	PSD-95/96/97/100	4710002300
Plunger for 100 μ L syringe, PTFE tipped		4710003100
Replacement carousel plate	PSD 100/120	5410029700
Replacement carousel plate for 130 sample carousel	PSD 120	5410046300
Capillary viewing mirror	GTA 110/120	9910091200
Capillary viewing mirror kit	GTA-96/97/100	9910032700

Optional Accessories for Graphite Furnace AAS

Description	Use With	Part No.
GTA viewing and fume extraction accessory Mounts on sample compartment to remove fumes from the GTA workhead and improves viewing of the tube for easier alignment; connects to a 150 mm (6 in.) or 125 mm (5 in.) exhaust duct	GTA 120	210190000
High capacity carousel kit Includes carousel disk (130 samples), 1.1 mL vials (2000/pk) and five containers for bulk solutions	GTA 120	9910113100
Bubble-free syringe update kit	PSD-97/100	9910116800

Burners and Nebulizers

Burners

The Mark 7 burner fits all current AA instruments and the earlier SpectrAA series instruments and is compatible with the Mark V, VI and 7 spray chambers.



Mark 7 air/acetylene burner, 210164000

Burners

Description	Part No.
Mark 7 air/acetylene burner	210164000
Mark 7 nitrous oxide/acetylene burner	210164100
Burner cleaner strips, 100/pk	9910053900



Capillary spares kit, 9910024500

Nebulizers and Nebulizer Maintenance

Description	Use With	Part No.
Barrel nebulizer, adjustable	Mark V and VI spray chambers	9910043500
Barrel nebulizer, high vacuum	Mark V and VI spray chambers	9910043700
Spare tantalum venturi kit	Mark V and VI spray chambers	9910024400
Pt/Ir capillary spares kit, high vacuum and non high vacuum		9910024500
High solids capillary tubing, 3 m		9910024800
High vacuum capillary tubing, 3/pk		9910044000
Nebulizer capillary kit	Mark 7 spray chamber	9910093000
Nebulizer cleaning wire, 3 x 0.9 m lengths		9910024700
Nebulizer O-ring kit		9910035200



High solids capillary tubing, 9910024800

Mark 7 Flame Atomization System Operating Kit

Typical operation supplies required for moderate use of Flame Atomic Absorption Spectrometer Systems with Mark 7 spray chamber.

Mark 7 Flame Atomization System Operating Kit

Description	Unit	Part No.
Mark 7 operating supplies kit		190034100
Kit Contents		
Venturi nebulizer		1610117390
Nebulizer capillary kit		9910093000
Nebulizer block, including integrated nebulizer		9910093100
Glass impact beads	5/pk	9910025700
High solids capillary tubing, 3 m		9910024800
O-ring kit for aqueous samples		9910093400
Mixing paddles, fluorinated	5/pk	9910093600
Burner cleaner strips	100/pk	9910053900

Mark 7 Spray Chambers

- Fit organic resistant O-rings to ensure organic compatibility
- Simple-to-use twist and lock assembly makes for easy cleaning and routine maintenance
- Flexible operation with the capability to tune performance using the externally adjustable impact bead, fit mixing paddles for better precision, or both

This spray chamber has inert construction making it suitable for use with aqueous and organic solutions.

Mark 7 Spray Chambers



Complete Mark 7 spray chamber assembly,
110634490

Description	Part No.
Nebulizer capillary kit	9910093000
Glass impact beads, 5/pk	9910025700
Mixing paddles, fluorinated, 5/pk	9910093600
O-ring kit for aqueous samples	9910093400
O-ring kit for organic samples	9910093500
Nebulizer block, including integrated nebulizer	9910093100
Kit, fluorinated liquid trap, float and magnet	9910105800
Drain tubing for aqueous solutions per meter, 2 m length required	3710009200
Pressure relief bung, fluorinated	1610118800
Spray chamber body, fluorinated	6210092000
Venturi extraction tool	7210027700
Nebulizer capillary extraction tool	7210027600
Complete Mark 7 spray chamber assembly	110634490

Mark VI Flame Atomization System Operating Kit

Typical operation supplies required for moderate use of Flame Atomic Absorption Spectrometer Systems with the Mark VI spray chamber (with aqueous supplies).

Mark VI Flame Atomization System Operating Kit

Description	Unit	Part No.
Mark VI operating supplies kit		190024800
Kit Contents		
Spare tantalum venturi kit		9910024400
Pt/Ir capillary spares kit, high vacuum and non high vacuum		9910024500
Barrel nebulizer, high vacuum		9910043700
Nebulizer O-ring kit		9910035200
High vacuum capillary tubing	3/pk	9910044000
O-ring/gasket kit		9910026500
Mixing paddles	5/pk	9910063600
Burner cleaner strips	100/pk	9910053900



Liquid trap and float assembly, 110315690



Liquid trap and float assembly, 9910061600



Nebulizer bung assembly, 9910063200



Glass impact beads, 9910025700



PTFE impact beads, 9910053300

Mark VI Spray Chambers

The Mark VI spray chamber was used with older model instruments. It has many of the design features and benefits of the Mark 7 design. There are two versions – the standard version for normal aqueous samples and the universal version for use with organic samples.

Mark VI Spray Chambers

Description	Part No.
O-ring/gasket kit	9910026500
Mixing paddles, 5/pk	9910063600
Liquid trap and float assembly	110315690
Drain tubing for aqueous solutions per meter, 2 m length required	3710009200
Nebulizer bung assembly Requires nebulizer	110351990
Complete Mark VI spray chamber assembly Requires nebulizer	110351790

Mark VI Universal Spray Chamber

Description	Part No.
O-ring/gasket kit	9910045700
Mixing paddles, 5/pk	9910063600
Liquid trap and float assembly	9910061600
Nebulizer bung assembly Requires nebulizer	9910063200
Pressure relief bung	9910063100
Drain tubing for organic solvents, nitrile rubber per meter, 2 m length required	3710011700
Complete universal spray chamber and liquid trap assembly Requires nebulizer	9910061100

Impact Beads

Description	Use With	Unit	Part No.
Glass impact beads	Mark V/VI/7 spray chambers	5/pk	9910025700
Glass impact beads	Mark IV spray chamber	5/pk	9910021300
PTFE impact beads	Mark V/VI/7 spray chambers	5/pk	9910053300



Fast Sequential Atomic Absorption Spectrometer

SPS 3 Autosampler Supplies

- Fast spectroscopy autosampler for high throughput analytical laboratories
- Productivity boosting features decrease analysis times
- Customizable to improve quality of results and reduce running costs

SPS 3 Start-up and Operating Supplies Kit

Description	Kit Quantity	Unit	Part No.
SPS 3 start-up and operating supplies kit			190065400
Kit Contents			
0.8 mm ID inert probe, PTFE sleeved			9910111900
Pump tubing, 3-bridged, gray/gray	2	12/pk	3710049000
Silicon tubing, 1 mm ID, per m			3710026400
Nalgene tubing, per m	2		3710031500
Nebulizer capillary tubing, per m	2		2410020500
Rinse reservoir, 12 L			6610011800
Polypropylene tubes, 16 mm OD		1000/pk	190049700
Sample rack for 30 mm OD tubes, 21 positions	3		6610026600
Polypropylene sample tubes, 50 mL		500/pk	190065200

Optional Accessories for SPS 3

Description	Comments	Part No.
Autosampler cover, transparent	Prevents contamination of samples and standards from dust and drafts Has provision for optional purge connection and/or exhaust outlet to enable removal of corrosive or solvent fumes	910245400
Internal purge kit	Includes all components required to purge inside of cover with inert gas Includes flow meter, regulator, tubing and instructions	9910120200
Exhaust port connection	Installs on rear panel of cover and allows safe removal of corrosive or solvent fumes; suitable for connection to 2 in. (50 mm) diameter exhaust ducting	9910130600



Internal purge kit, 9910120200



Glass test tubes, 18 mm OD, 190049800

Test Tubes

Description	Unit	Part No.
Polypropylene tubes, 16 mm OD	125/pk	3710051100
	1000/pk	190049700
Glass test tubes, 18 mm OD	500/pk	190049800

Digestion Caps

Description	Unit	Part No.
Centrifuge tubes, screw capped, 30 mm OD, 50 mL polyethylene	500/pk	190047900

Probes

Description	Part No.
0.8 mm ID inert probe, PTFE sleeved For use with AA instruments (without diluter)	9910111900
1.0 mm ID inert probe, PTFE sleeved For use with diluter	9910112000
1.3 mm ID inert probe, PTFE sleeved	9910130900



Sample rack, 6610026400



Rack overlay kit, 6610026100

Racks

Description	Part No.
Sample Racks	
Sample rack for 13 mm OD tubes, 90 positions	6610026400
Sample rack for 16 mm OD tubes, 60 positions	6610025400
Sample rack for 20 mm OD tubes, 40 positions	6610025500
Sample rack for 25 mm OD tubes, 24 positions	6610026500
Sample rack for 30 mm OD tubes, 21 positions	6610026600
Spare Standards Racks	
Sample rack for 16 mm OD tubes, 11 positions	810166900
Sample rack for 29 mm OD tubes, 6 positions	810167000
Rack Overlays for Sample Racks	
Rack overlay kit for 16 mm OD tube rack Allows 60 tubes (13 mm OD) to be used in rack	6610026100
Rack overlay kit for 20 mm OD tube rack Allows 40 tubes (18 mm OD) to be used in rack	6610026000



Rinse reservoir, 6610011800

Diluter Spares

Description	Part No.
Syringe-to-valve tube kit	9910062700
Replacement tubing kit for auto diluter, screw fittings Includes all tubing and connectors	9910083100
Rinse reservoir, 12 L	6610011800

Diluter Maintenance Supplies

Description	Part No.
Syringe, 20 mL	4710003000
Syringe-to-valve tube kit	9910062700
Replacement tubing kit for auto diluter, bung fittings Includes all tubing and connectors	9910059100
Replacement tubing kit for auto diluter, screw fittings Includes all tubing and connectors	9910083100

Tubing

Description	Use With	Part No.
Nalgene tubing, per m	For outlet rinse vessel	3710031500
Pump tubing, 3-bridged, gray/gray, 12/pk	For AA and ICP-OES instruments	3710049000
Pump tubing, 3-bridged, purple/black, 12/pk	For UV-Vis instruments	3710052000
Silicon tubing, 1 mm ID, per m	For connecting RSA to autosampler and/or flow cells	3710026400
Replacement spill tray		6610025100



Replacement spill tray, 6610025100



Constant pressure head bottle, rectangular,
110533590

SIPS 10/20 Supplies

The Sample Introduction Pump System (SIPS) is an innovative sample introduction and dilution system for flame AA that eliminates the task of manual preparation of multiple calibration standards, providing fast, accurate on-line dilution of over range samples.

SIPS 10/20 Maintenance Supplies

Description	Part No.
SIPS 10/20 pump tubing, 6/pk	9910075900
Tubing kit, to connect mariotte bottle to tee piece	9910076100
Constant pressure head bottle, rectangular, 1 L	110766690
Constant pressure head bottle, rectangular, 500 mL	110533590
Pump bands, 10/pk	9910077600
SIPS 10 2-way tee piece assembly	110651090
SIPS 20 3-way tee piece assembly	110585790

Hydride Modules

The Vapor Generation Accessory (VGA 77) is ideal for parts per billion determination of Hg and the hydride-forming elements.



Flow through mercury absorption cell, 9910040700



Tubing and connector kit, 9910061900



Tubing, VGA-76/77, 3710026390

Hydride Modules

Description	Part No.
AA hydride module VGA 77	9910062100
ICP hydride module VGA 77P	9910062200

Absorption Cells

Description	Use With	Part No.
Flow through mercury absorption cell, single cell	VGA-76/77	9910040700
Hydride absorption cells, quartz	VGA-76/77	9910040000

Tubing

Description	Use With	Part No.
Peristaltic pump tubing, black/black, 12/pk	VGA-76/77	3710027200
Sample pump tubing, purple/black, 12/pk	VGA-76/77	3710027300
Tubing and connector kit	VGA 77	9910061900
Tubing kit	VGA 77	9910083400
Tubing	VGA-76/77	3710026390
Gas-liquid separator to absorption cell		
Tubing and connector kit	VGA-76	9910039900

Gas-liquid Separators

Description	Use With	Part No.
Gas-liquid separator	VGA 77 for AA	9910071100
	VGA 77P for ICP	9910062000
	VGA-76	9910040200

VGA-76/77 Maintenance Supplies

Description	Part No.
Pump tube beds kit	9910050700
VGA cell support for Mark 7 burner	110654990
VGA cell support for Mark VI burner	110375990



715 Series ICP-OES Spectrometer

ICP-OES

Agilent's ICP-OES series are compatible with a range of accessories and supplies designed to extend the capabilities of the instruments.

Spray Chambers and Brackets

- Single-pass glass cyclonic spray chamber for good signal-to-noise performance with excellent washout
- Double-pass glass cyclonic spray chamber provides improved plasma stability with organic and high TDS samples
- Sturman-Masters spray chamber is inert and minimizes interferences and improves stability with high TDS samples

Sample Compartment Kits

Description	Part No.
Sample compartment O-ring kit Includes all O-rings for spray chamber area, demountable torch and ASA	9910057200
Sample compartment/torch box tube connection kit Includes all tubing for spray chamber area and spare nipples for drain (excluding pump tubing)	9910057100

Spray Chambers and Brackets

Description	Use With	Part No.
Single-pass glass cyclonic spray chamber for axial ICP-OES Needs mounting bracket		2010081700
Double-pass glass cyclonic spray chamber, suitable for all ICP-OES Needs mounting bracket		7910043700
Cooled double-pass glass cyclonic action spray chamber with cooling gallery Includes mounting bracket for Liberty Series I/II, Vista and 700 Series ICP-OES instruments; requires, but does not include, a refrigerated water cooler for subambient operation	Ideal for use with highly volatile organic solvents	9910070400
Sturman-Masters spray chamber, white	Samples dissolved in hydrofluoric acid (HF) or when using the V-groove nebulizer for fusions or slurries	110593190
Bracket for mounting glass cyclonic spray chambers	715/725/735 radial, Vista-PRO radial and early axial, Vista-MPX radial and Liberty Series II radial and early axial models	110611700
	710/720/730 axial, Vista-PRO axial, Vista-MPX axial and Liberty Series II axial models	110665200
Bracket for mounting Sturman-Masters spray chamber	715/725/735 radial, Vista-PRO radial and early axial, Vista-MPX radial models and Liberty Series II radial and early axial models	410298400
	710/720/730 axial, Vista-PRO axial, Vista-MPX axial and Liberty Series II axial models	410328600



Bracket for mounting glass cyclonic spray chambers, 110611700



Bracket for mounting Sturman-Masters spray chamber, 410298400



Bracket for mounting Sturman-Masters spray chamber, 410328600

Nebulizers and Accessories

- Manufactured to fine tolerances for reproducible and stable sample uptake
- Tight specifications deliver fine droplets for best signal intensity and optimum signal-to-noise
- Fewer repeats means less downtime and improved productivity

Nebulizers and Accessories

Description	Application	Part No.
Concentric glass nebulizer (Seaspray) Includes sample and gas inlet fittings	Routine analysis of samples to 20% total dissolved solids (TDS)	2010096400
K-style (Conikal) concentric glass nebulizer Includes sample and gas inlet fittings	Routine analysis of samples to 5% TDS	2010106800
Micro-concentric glass nebulizer (MicroMist), 0.4 mL/min uptake Includes sample and gas inlet fittings	Small sample volumes	2010102100
Inert V-groove nebulizer kit for use with Sturman-Masters spray chamber Includes tubing and fittings	Samples with hydrofluoric acid, fusions, slurries or >20% TDS	9910057400
Concentric glass slurry nebulizer	Slurry samples with particles to 150 µm, or >20% TDS	2010097600
High flow concentric glass slurry nebulizer for Liberty Series II axial systems	Slurry samples or those >20% TDS	2010097700
High flow K-style (Conikal) concentric glass nebulizer for Liberty Series II axial systems Includes sample and gas inlet fittings	Routine analysis of samples to 5% TDS	2010081600
Sample inlet (EzyFit) fitting for concentric glass nebulizer on axial ICP-OES, 0.75 mm ID x 1.3 mm OD capillary tubing, 10/pk		9910107700
Sample inlet (EzyFit) fitting for concentric glass nebulizer on radial ICP-OES, 0.75 mm ID x 1.6 mm OD capillary tubing, 10/pk	Suitable for SVS1 accessory	1610136400
Gas inlet connector (EzyLok) for concentric glass nebulizer		9910127800
Y piece connector for online addition of internal standard/ionization buffer		1610132400
Nebulizer bung O-ring kit, 7/32 in. ID x 11/32 in. OD		6910008200
Nalgene tubing, per m, 1/8 in. ID x 1/4 in. OD	Connects argon supply to nebulizer	3710031500



Y piece connector,
1610132400



High flow K-style (Conikal) concentric glass
nebulizer, 2010081600



Gas inlet connector (EzyLok),
9910127800



Inert V-groove nebulizer kit,
9910057400

Torches

- Light easily and stay lit, reducing downtime
- Even and stable plasma delivers reproducible results
- Guard your instrument warranty to protect your investment

One Piece Axial Torches

Description	Application	Part No.
Low flow quartz torch with 2.4 mm ID injector tube	Routine analysis of aqueous samples <10% TDS	2010090400
Low flow quartz torch with 0.8 mm ID injector tube	Routine analysis of volatile organic solvents, e.g. gasoline	2010104700
Low flow quartz torch with 1.4 mm ID injector tube	Routine analysis of organic solvents, e.g. kerosene, xylene and white spirit	2010104800
High solids torch with patented injector design, 2.4 mm ID	Routine analysis of samples to 25% TDS	2010094800
Extended high solids torch standard length axial torch with patented injector design, 2.4 mm ID	Routine analysis of samples to 25% TDS	2010104600
Sheath gas high solids torch with patented injector design, 2.4 mm ID Used with the AGM-1 oxygen addition accessory (10055900) for better performance than the extended high solids torch	Routine analysis of samples to 25% TDS	2010122400

One Piece Radial Torches

Description	Application	Part No.
Low flow quartz torch with 1.4 mm ID injector tube	Routine analysis of aqueous samples <10% TDS	2010069690
Low flow quartz torch with 1.4 mm ID injector tube, annealed for greater strength	Routine analysis of organic solvents, e.g. kerosene, xylene and white spirit	2010117400
High solids torch with patented injector design, 1.8 mm ID	Routine analysis of samples to 25% TDS	2010117500



Sheath gas high solids torch, 2010122400



Spare quartz torch bonnet, 2010070790



Torch alignment tool, 7210020700



Spare semi-demountable quartz torch body, 2010072900



Injector holder kit, 9910057300

Torch Spares

Description	Part No.
Spare quartz torch bonnet for radial ICP-OES	2010070790
Torch alignment tool for radial ICP-OES	7210020700
GazFit fittings for one-piece and semi-demountable ICP-OES torches, 4/pk	9910107100
Transfer tube FEP cyclone spray chamber for radial ICP	7910051290
Transfer tube FEP Sturman-Masters spray chamber for radial ICP	7910051490
Transfer tube FEP for axial ICP	7910051590
Silicon tubing, 3/16 in. ID x 5/16 in. OD, per m	2410023800

Cones for Axial ICP-OES

Description	Part No.
Finger nut for cone	1510220200
Pre-optics cone for Vista/700 Series axial ICP-OES	3610007300
Pre-optics cone for Liberty Series axial ICP-OES	3610006200
Esteele cleaning powder	8110002800
For cleaning interface cone on axially-viewed ICP-OES	

Semi-demountable Torches

Description	Application	Part No.
Semi-demountable inert axial torch assembly kit	Samples with free HF when used with an inert alumina injector (2410067590); for volatile organic solvents, use narrow bore 0.8 mm ID quartz injector (2010077500)	9910084700
Semi-demountable inert radial torch assembly kit	Samples with free HF when used with an inert alumina injector (2410067590); for volatile organic solvents, use narrow bore 0.8 mm ID quartz injector (2010077500)	9910056800

Spares for Semi-demountable Torches

Description	Part No.
Spare semi-demountable quartz torch body for axial ICP-OES	2010083400
Spare semi-demountable quartz torch body for radial ICP-OES	2010072900
Injector holder kit	9910057300
Includes O-rings	
Alumina injector tube, 1.8 mm	2410067590
Quartz injector tube, 1.4 mm	9910057000
Quartz injector tube, 0.8 mm	2010077500

Tubing

Peristaltic Pump Tubing

- PVC Solva (solvent flex) for common organic solvents such as kerosene, xylene and white spirit
- Marprene tubing for ketone-based solvents such as MIBK and DIBK
- Viton tubing for longer operating life with strong acids and most organics

PVC Tubing for Aqueous Samples

Description	Part No.
Peristaltic pump tubing, orange/white	3710046900
Peristaltic pump tubing, black/black	3710027200
Peristaltic pump tubing, white/white	3710034400
Peristaltic pump tubing, gray/gray	3710034500
Peristaltic pump tubing, blue/blue	3710034600
Replacement Tubing for Aqueous Samples	
Tubing, spray chamber to torch, per m	3710033400
Tubing, spray chamber to peri-pump waste line (Sturman-Masters spray chamber), per m	3710033900
Tubing, spray chamber to peri-pump waste line (glass cyclonic spray chamber), per m	3710024600
Nebulizer capillary tubing, per m	2410020500

PVC Solva Tubing for Low Volatile Organic Samples

Description	Part No.
Peristaltic pump tubing, black/black	3710034800
Peristaltic pump tubing, white/white	3710035000
Peristaltic pump tubing, gray/gray	3710035200
Peristaltic pump tubing, purple/black	3710047000
Replacement Tubing for Low Volatile Organic Samples	
Tubing, spray chamber to torch, per m	3710037800
Tubing, spray chamber to peri-pump waste line (Sturman-Masters spray chamber), per m	3710035300
Tubing, spray chamber to peri-pump waste line (glass cyclonic spray chamber), per m	3710035400
Nebulizer capillary tubing, per m	2410020500

Marprene Tubing for Ketone-Based Organic Samples

Description	Part No.
Peristaltic pump tubing, orange/yellow	3710044000
Peristaltic pump tubing, black/black	3710044100
Peristaltic pump tubing, white/white	3710044200
Peristaltic pump tubing, gray/gray	3710044300
Peristaltic pump tubing, blue/blue	3710044400

Replacement Tubing for Ketone-Based Organic Samples

Tubing, spray chamber to torch, per m	3710037800
Tubing, spray chamber to peri-pump waste line (Sturman-Masters spray chamber), per m	3710035300
Tubing, spray chamber to peri-pump waste line (glass cyclonic spray chamber), per m	3710035400
Nebulizer capillary tubing, per m	2410020500

Viton Tubing for Aromatic Organic Samples

Description	Part No.
Peristaltic pump tubing, orange/yellow	3710043500
Peristaltic pump tubing, black/black	3710043600
Peristaltic pump tubing, white/white	3710043700
Peristaltic pump tubing, gray/gray	3710043800
Peristaltic pump tubing, blue/blue	3710043900

Internal Standard Kit

The Internal Standard Kit includes the following:

- Standard PVC pump tubing
- EzyFit connectors
- Five Y pieces
- Connecting tubing

Internal Standard Kit

Description	Part No.
Internal standard kit 1 with black/black pump tubing	9910124000
Internal standard kit 2 with orange/white pump tubing	9910124100

Tubing Kits

Aqueous Samples and High Dissolved Solids

The ICP-OES tubing kit for aqueous samples and high dissolved solids includes:

- Standard PVC pump tubing (one each blue/blue and white/white)
- FEP transfer tube (spray chamber to torch)
- Drain tubing
- Tubing for waste line
- EzyFit connectors
- Nebulizer capillary tubing
- Connectors
- Connecting tubing

Aqueous Samples and High Dissolved Solids

Description	Use With	Part No.
Aqueous tubing kit 1 – axial	Seaspray/K-style nebulizers and double- or single-pass cyclonic spray chamber	9910123600
Aqueous tubing kit 1 – radial	Seaspray/K-style nebulizers and double- or single-pass cyclonic spray chamber	9910123700
Aqueous tubing kit 2 – axial	V-groove nebulizer and Sturman-Masters spray chamber	9910123800
Aqueous tubing kit 2 – radial	V-groove nebulizer and Sturman-Masters spray chamber	9910123900

Low Volatile Organic Solvents

The ICP-OES tubing kit for low volatile organic solvents includes:

- PVC Solva pump tubing (one each black/black and white/white)
- FEP transfer tube (spray chamber to torch)
- Drain tubing
- Tubing for waste line
- EzyFit connectors
- Nebulizer capillary tubing
- Connectors
- Connecting tubing

Low Volatile Organic Solvents

Description	Use With	Part No.
Organics tubing kit 1 – axial	Seaspray nebulizer and double-pass cyclonic spray chamber	9910124200
Organics tubing kit 1 – radial	Seaspray nebulizer and double-pass cyclonic spray chamber	9910124300
Organics tubing kit 2 – axial	V-groove nebulizer and Sturman-Masters spray chamber	9910124400
Organics tubing kit 2 – radial	V-groove nebulizer and Sturman-Masters spray chamber	9910124500

Aromatic Organic Solvents

The ICP-OES tubing kit for aromatic organic solvents includes:

- Viton pump tubing (one each black/black and white/white)
- FEP transfer tube (spray chamber to torch)
- Drain tubing
- Tubing for waste line
- EzyFit connectors
- Nebulizer capillary tubing
- Connectors
- Connecting tubing

Aromatic Organic Solvents

Description	Use With	Part No.
Organics tubing kit 3 – axial	Seaspray nebulizer and double-pass cyclonic spray chamber	9910124600
Organics tubing kit 3 – radial	Seaspray nebulizer and double-pass cyclonic spray chamber	9910124700
Organics tubing kit 4 – axial	V-groove nebulizer and Sturman-Masters spray chamber	9910124800
Organics tubing kit 4 – radial	V-groove nebulizer and Sturman-Masters spray chamber	9910124900

Ketone-Based Organic Solvents

The ICP-OES tubing kit for ketone-based organic solvents includes:

- Marprene pump tubing (one each black/black and white/white)
- FEP transfer tube (spray chamber to torch)
- Drain tubing
- Tubing for waste line
- EzyFit connectors
- Nebulizer capillary tubing
- Connectors
- Connecting tubing

Ketone-Based Organic Solvents

Description	Use With	Part No.
Organics tubing kit 5 – axial	Seaspray nebulizer and double-pass cyclonic spray chamber	9910125000
Organics tubing kit 5 – radial	Seaspray nebulizer and double-pass cyclonic spray chamber	9910125100
Organics tubing kit 6 – axial	V-groove nebulizer and Sturman-Masters spray chamber	9910125200
Organics tubing kit 6 – radial	V-groove nebulizer and Sturman-Masters spray chamber	9910125300

Volatile Organic Samples

The ICP-OES tubing kit for volatile organic samples includes:

- Viton pump tubing (one each black/black and white/white)
- FEP transfer tube (spray chamber to torch)
- Drain tubing
- Tubing for waste line
- EzyFit connectors
- Nebulizer capillary tubing
- Connectors
- Connecting tubing

Volatile Organic Samples

Description	Use With	Part No.
Volatile organics tubing kit – axial	Seaspray nebulizer, cooled spray chamber and full length torch	9910125400
Volatile organics tubing kit – radial	Seaspray nebulizer, cooled spray chamber and annealed (organics) torch or semi-demountable torch	9910125500

Applications Kits

High Dissolved Solids

The application kits for high dissolved solids include:

- Nebulizer
- Spray chamber
- Mounting bracket
- Patented high-solids torch (unless otherwise stated)
- Argon saturator accessory
- All necessary tubing

High Dissolved Solids

Description	Nebulizer, Spray Chamber	Part No.
High solids kit 1 – axial	Seaspray nebulizer, double-pass glass cyclonic spray chamber	9910125600
High solids kit 1 – radial	Seaspray nebulizer, double-pass glass cyclonic spray chamber	9910125700
High solids kit 2 – axial	V-groove nebulizer, Sturman-Masters spray chamber	9910125800
High solids kit 2 – radial	V-groove nebulizer, Sturman-Masters spray chamber	9910125900

Inert Sample Introduction Systems

The inert sample introduction systems kit is for solutions with free HF and includes:

- V-groove nebulizer
- Double-pass Sturman-Masters spray chamber
- Mounting bracket
- Semi-demountable torch with 1.8 mm ID alumina injector
- All necessary tubing

Inert Sample Introduction Systems

Description	Nebulizer, Spray Chamber	Part No.
Inert kit – axial	V-groove nebulizer, Sturman-Masters spray chamber	9910126000
Inert kit – radial	V-groove nebulizer, Sturman-Masters spray chamber	9910126100
Inert kit – radial	Excludes spray chamber and mounting bracket	9910126200

Ketone-Based Organic Solvents

The application kits for ketone-based organic solvents include:

- Nebulizer
- Spray chamber
- Mounting bracket
- One-piece torch with 1.4 mm ID injector
- All necessary solvent flexible PVC tubing

AGM 1 oxygen accessory (P/N 10055900) is recommended when analyzing organic solvents on axial ICP-OES.

Ketone-Based Organic Solvents

Description	Nebulizer, Spray Chamber	Part No.
Organics kit 5 – axial	Glass concentric (Conikal) nebulizer, double-pass glass cyclonic spray chamber	9910127100
Organics kit 5 – radial	Glass concentric (Conikal) nebulizer, double-pass glass cyclonic spray chamber, annealed torch	9910127200
Organics kit 6 – axial	V-groove nebulizer, double-pass Sturman-Masters spray chamber	9910127300
Organics kit 6 – radial	V-groove nebulizer, double-pass Sturman-Masters spray chamber, annealed torch	9910127400

Volatile Organics

The volatile organics kit reduces vapor pressure that can destabilize the plasma and lead to signal loss. The kit includes:

- Glass concentric (Conikal) nebulizer
- Water-cooled spray chamber
- Mounting bracket
- One-piece torch with 0.8 mm ID injector
- All necessary Viton and solvent flexible PVC tubing

AGM 1 oxygen accessory (P/N 10055900) is recommended when analyzing volatile organic solvents. Cooled spray chamber requires a refrigerated, recirculating water cooler able to cool fluid down to -10°C. For analysis of volatile organic solvents such as gasoline and naphtha.

Volatile Organics

Description	Nebulizer, Spray Chamber	Part No.
Volatile organics kit – axial	Glass concentric (Conikal) nebulizer, water-cooled spray chamber	9910127500
Volatile organics kit – radial	Glass concentric (Conikal) nebulizer, water-cooled spray chamber, annealed torch	9910127600

Common Organic Solvents

The application kits for common organic solvents include:

- Nebulizer
- Spray chamber
- Mounting bracket
- One-piece torch with 1.4 mm ID injector
- All necessary Marprene and solvent flexible PVC tubing

AGM 1 oxygen accessory (P/N 10055900) is recommended when analyzing organic solvents on axial ICP-OES.

Common Organic Solvents

Description	Application	Nebulizer, Spray Chamber	Part No.
Organics kit 1 – axial	Common, low volatility organic solvents, e.g. kerosene, xylene and white spirit	Glass concentric (Conikal) nebulizer, double-pass glass cyclonic spray chamber	9910126300
Organics kit 1 – radial	Common, low volatility organic solvents, e.g. kerosene, xylene and white spirit	Glass concentric (Conikal) nebulizer, double-pass glass cyclonic spray chamber, annealed torch	9910126400
Organics kit 2 – axial	High particulate samples dissolved in common, low volatility organic solvents, e.g. kerosene, xylene and white spirit	V-groove nebulizer, double-pass Sturman-Masters spray chamber	9910126500
Organics kit 2 – radial	High particulate samples dissolved in common, low volatility organic solvents, e.g. kerosene, xylene and white spirit	V-groove nebulizer, double-pass Sturman-Masters spray chamber, annealed torch	9910126600



■ ICP-MS

As ICP-MS has evolved to become the premier technique for trace metals analysis, Agilent has been at the forefront of development and design, introducing many important innovations. With the 7700 Series ICP-MS, Agilent continues to revolutionize the ICP-MS landscape by increasing performance, reducing interferences and improving productivity – all while making the technology easier to use, maintain and service.

ICP-MS Maintenance Schedule		
Item	Actions/Comments	Typical Schedule
Argon gas	Check argon gas pressure and volume	Daily
Drain vessel	Check, empty if required	
Peristaltic pump tubing	Check for damage/deterioration	
Sampling cone, skimmer cone	Check orifice for foreign matter, deformation and enlargement Clean if required	Weekly
Foreline pump (rotary pump)	Check oil level and color Check mist filter for presence of oil	Monthly
Nebulizer	Run nebulizer test, take appropriate action as indicated	
Shield contact	Clean	
Cooling water	Check water level and condition	
Extraction/Omega lenses	Clean	
Other ion lenses	Clean	6 Months
Foreline pump (rotary pump)	Change oil	
Rotary pump oil mist filter	Check/replace mist filter	Annually
Penning gauge (7500 Series)	Clean and replace when necessary	
Water strainer	Check and clean	
Octopole	Clean	
Sample introduction area, e.g. spray chamber, end cap	Clean	
Torch	Clean and replace when necessary	Periodically
Electron multiplier	Evaluate and replace when necessary	
Plasma gas, auxiliary gas tubing	Check and replace when necessary	
Argon gas filter	Replace 2 years after installation	
Graphite gasket	Replace when surface or shape is damaged	

Gas Line Supplies

Gas Line Supplies

Description	Specifications	Use	Unit	7700 Part No.	7500 Part No.
Plasma/aux tubing with inner sleeve	0.2 m		2/pk	G3280-67023	
Connectors for plasma/aux gas lines, PTFE	6 mm and 4 mm	For gas line connection to torch	1/ea	G1820-65027	G1820-65027
Inner sleeve for carrier/aux/blend gas line	CTFE	For gas line connection to connector	5/pk		5042-0922
Inner sleeve for plasma gas line	CTFE	For gas line connection to connector	5/pk		5042-0923
Carrier/make-up/dilution gas tubing				G3280-67022	
Gas connector for dilution gas port		For dilution gas line connection to dilution port		0100-2583	
Argon gas tubing kit	1/4 in. OD, 5 m, inner sleeve, connector	For external line			G1820-65023
Tubing for carrier/blend gas, PTFE	3 mm ID, 4 mm OD, 35 cm	For gas line connection to nebulizer	2/pk		G1833-65414
Plasma and auxiliary gas line tubing	3.17 mm ID, 6.35 mm OD, 35 cm (plasma) 2.38 mm ID, 3.96 mm OD, 35 cm (aux)	For gas line connection to torch	2/pk		G3270-65021
Argon humidifier				G3270-80029	G3270-80029
Ar gas filter				G1820-80341	G1820-80341
Ar clean gas filter		For semicon applications		5064-8092	5064-8092
Ar gas tubing kit for 7700x/e		For external line		G3280-60160	
Ar gas tubing kit for 7700s		For external line		G3280-60163	
Stainless steel tubing	1/8 in. OD, 6 m	For external cell gas line		G3270-65035	G3270-65035

Ultra Clean ICP-MS Traps

Description	Part No.
Triple filter cartridge for Super Clean Gas Purification systems, baseplate type	5182-9705
Replacement O-rings for gas filters, 8/pk, four each of two sizes	5182-3423

Gas Regulators – US only

Description	Part No.
Regulator for Helium gas	0101-1398
Regulator for Hydrogen gas	0101-1399
Regulator for Argon gas	0101-1400
Regulator for NH ₃ /He gas	5188-5374

Gas Line Connectors for 7500 Series

Description	Specifications	Use	7500 Part No.
Connector for end cap and gas line		For gas line connection to nebulizer	5063-5263
Connectors for plasma/aux gas lines, PTFE	6 mm and 4 mm	For gas line connection to torch	G1820-65027
Connector for carrier gas line, PTFE	4 mm tubing, includes ferrule and O-ring	For gas line connection to Babington Nebulizer	G1820-65214
Connector for carrier gas line, polypropylene	4 mm tubing, includes ferrule and O-ring	For gas line connection to Concentric Nebulizer	G1820-65052
Connector for blend gas line, polypropylene, 2/pk	4 mm tubing	For gas line connection to Crossflow/ Babington Nebulizer	G1820-65119
Connector for makeup gas line, polypropylene	4 mm tubing, Luer type	For gas line connection to Crossflow/ Babington Nebulizer	G1833-65477
Union fitting	4 mm tubing	For PFA Concentric Nebulizer	5064-8078



Connectors for plasma/aux,
G1820-65027



Polypropylene connector,
G1820-65052



PTFE connector, G1820-65214



Connector for blend gas line,
G1820-65119

Sample Introduction Supplies

Sample Line Supplies

Description	Specifications	Use	Unit	7700 Part No.	7500 Part No.
Peri-pump sample tubing, Tygon	1.02 mm ID, 40 cm	Standard for sample introduction	12/pk	G1833-65569	G1833-65569
Peri-pump tubing for ISTD, flared end, 2 stopper, blue/orange	0.25 mm ID	Standard for 7700 Series	12/pk	G3280-67047	G3280-67047
Peri-pump tubing for ISTD, flared end, 2 stopper, red/orange	0.19 mm ID	Standard for 7500 Series	12/pk	G3280-67008	G3280-67008
Peri-pump tubing, Fluran, 3 stopper, yellow/blue	1.52 mm ID	For xylene analysis	12/pk	5042-4799	5042-4799
Peri-pump tubing, silicone	1.02 mm ID, 16 in. L		6/pk	G1820-65217	G1820-65217
Peri-pump ISTD tubing, Tygon	0.19 mm ID, 40 cm		12/pk		G1833-65571
Peri-pump drain tubing, Ismaprene	1.52 mm ID, 0.75 wall, 40 cm		12/pk		G1820-65216
Peri-pump drain tubing, Ismaprene, stronger stops	1.52 mm ID, 0.75 wall, 40 cm		12/pk	G1833-65570	G1833-65570
Sample tubing, PFA	0.5 mm ID, 1.6 mm OD, 5 m			G1820-65105	G1820-65105
	0.2 mm ID, 1.6 mm OD, 70 cm		3/pk	G1833-65573	G1833-65573
	0.15 mm ID, 1.6 mm OD, 70 cm		3/pk	G1833-65572	G1833-65572
Sample tubing with PEEK guide, PFA	0.3 mm ID, 1.6 mm OD, 70 cm		5/pk	G1820-65531	G1820-65531
	0.2 mm ID, 1.6 mm OD, 70 cm		5/pk	G1820-65527	G1820-65527
	0.15 mm ID, 1.6 mm OD, 70 cm		5/pk	G1820-65526	G1820-65526
ISTD tubing, PFA	0.3 mm ID, 1.6 mm OD, 3 m	For online ISTD addition		G1820-65478	G1820-65478
Online ISTD addition kit				G3280-60590	G1833-65071
Plastic tubing cutter				8710-1930	8710-1930
Sample tray				G3280-40103	
Plug for cross joint			3/pk	G3138-65129	G3138-65129
PTFE nut for cross joint		For 1.6 mm OD tubing	10/pk	5064-8023	5064-8023
Front and back ferrule		For 1.6 mm OD tubing	10/pk	5064-8024	5064-8024



Sample tubing, PFA, G1820-65105



Peri-pump sample tubing, Tygon, G1833-65569

Nebulizers and Supplies

Description	Specifications	Use	Unit	7700 Part No.	7500 Part No.
MicroMist Nebulizer	Borosilicate glass	Standard on 7700x/e and 7500cx/ce. When ordered for the 7500a, the spray chamber end cap (G1833-65475) is also required.		G3266-65003	G3266-65003
Sample tubing	0.25 mm ID, 700 mm, with connector	For MicroMist Nebulizer	10/pk	G3266-80010	G3266-80010
Sample tubing	0.5 mm ID, 700 mm, with connector	For MicroMist Nebulizer	10/pk	G3266-80011	G3266-80011
Carrier gas connector		For MicroMist Nebulizer		G3266-80015	G3266-80015
Nebulizer cleaner		For MicroMist Nebulizer		G3266-80020	G3266-80020
MicroFlow Nebulizer	PFA, 200 µL/min			G3139-65100	G3139-65100
MicroFlow Nebulizer with I-AS probe	PFA, 200 µL/min	Standard on 7700s and 7500s		G3139-65102	G3139-65102
MicroFlow Nebulizer	PFA, 20-50 µL/min			G3139-65106	G3139-65106
MicroFlow Nebulizer with I-AS probe	PFA, 20-50 µL/min			G3139-65108	G3139-65108
Carrier gas line connector		For MicroFlow Nebulizer	2/pk	G1833-65583	G1833-65583
Mira Mist Nebulizer	PTFE			G3161-80000	G3161-80000
Mira Mist Nebulizer	PEEK	For high solids applications such as environmental, geological, etc. Not for semiconductor use since it does not self aspirate. When ordered for the 7500a, the spray chamber end cap (G1833-65475) is also required (included with 7500cx/cs).		G3161-80001	G3161-80001
Babington Nebulizer	Includes Viton O-ring, PTFE sample tubing, and connector	Use to introduce samples with high matrix and high total salts. Clean when contaminated or when orifices are clogged.			G1820-60453
End cap for Babington Nebulizer, polypropylene	Includes Viton O-rings	Replace when memory effects do not disappear after cleaning. Insert nebulizer in middle of end cap all the way through. Attach end cap to spray chamber with "TOP" mark facing up.			G1833-65476
Babington Nebulizer removal tool					G1820-65345

(Continued)



MicroMist Nebulizer, G3266-65003

Nebulizers and Supplies

Description	Specifications	Use	Unit	7700 Part No.	7500 Part No.
Concentric Nebulizer, Pyrex	Use with P/N G1820-65052 Argon gas connector, P/N G1820-60160 Connector kit, P/N G1820-65121 end cap	Use with clean samples only. Not resistant to hydrochloric acid. Clean with a 5% HNO ₃ (v/v) bath; do not use ultrasonic bath.		G1820-65030	G1820-65030
Concentric Nebulizer, quartz	Use with P/N G1820-65337 Quartz spray chamber, P/N G1820-80237 Quartz connecting pipe	Recommended for trace analysis of clean samples. Lower contamination level than Pyrex. Clean using 5% HNO ₃ (v/v) bath; do not use ultrasonic bath.		G1820-65138	G1820-65138
Connector for carrier gas line, polypropylene	4 mm tubing, includes ferrule and O-ring	For gas line connection to Concentric Nebulizer		G1820-65052	G1820-65052
Sample tubing with connector, PTFE	Tool included	For Babington Nebulizer, replace when heavily contaminated by high matrix samples.			G1820-65276
Sample line connector	Includes Viton O-ring	Connects Concentric Nebulizer with sample line. Port with large hole connects to nebulizer; smaller port connects with sample tubing.		G1820-60160	G1820-60160
Union fitting	4 mm tubing	For PFA Concentric Nebulizer		5064-8078	5064-8078
Ferrule and Viton O-ring kit for carrier gas line connector		For Babington/Concentric Nebulizer		G1820-65533	G1820-65533
End cap for Concentric Nebulizer, PTFE	Includes Viton O-rings	Connects the Concentric Nebulizer (Pyrex or Quartz) with the spray chamber. For MicroMist, MicroFlow, and other concentric nebulizers.			G1833-65475
O-rings for Babington Nebulizer, Viton		Used to create seal between Babington Nebulizer and end cap.	4/pk		G1820-65199
O-ring kit for Concentric Nebulizer, Viton	2 sizes, 10 each		20/pk	G1820-65491	G1820-65491
O-rings for Concentric Nebulizer, for organic solvents (3 types)			4/pk	G1820-65520	G1820-65520
O-rings for end cap, Viton		Use for the end cap of the Babington Nebulizer, Cross Flow Nebulizer and Concentric Nebulizer.	5/pk		G1820-65198
O-rings for end cap, for organic solvents			2/pk		G1820-65518
CrossFlow Nebulizer	Includes bushing, carrier gas line connector, blend gas line connector, sample tubing, and gas line tubings with inner sleeves	Standard nebulizer for the inert kit. Resistant to hydrofluoric acid. Set carrier gas pressure to 500 kPa (5 kg/cm ²). Clean with 5% HNO ₃ (v/v) bath. Replace when memory effects remain after cleaning.			G1833-65462

PFA Inert Sample Introduction Kit Supplies

Description	7700 Part No.	7500 Part No.
PFA inert kit, sapphire, 2.5 mm ID Torch included	G4912-68000	
PFA inert kit, platinum, 2.5 mm ID Torch included	G4912-68001	
PFA inert kit, sapphire, 1.5 mm ID Torch included	G4912-68002	
PFA inert kit, platinum, 1.5 mm ID Torch included	G4912-68003	
Inert sample introduction kit, sapphire, 2.5 mm ID Torch not included		G3285-80014
Inert sample introduction kit, platinum, 2.5 mm ID Torch not included		G3285-80015
Inert sample introduction kit, sapphire, 1.5 mm ID Torch not included with O ₂ port		G3285-80016
Inert sample introduction kit, platinum, 1.5 mm ID Torch not included with O ₂ port		G3285-80017
End cap	G3285-80020	G3285-80020
Spray chamber	G3285-80021	G3285-80021
Drain tube	G4912-80014	G3285-80022
Long connector tube	G3285-80024	G3285-80024
Connector tube with gas port	G4912-80016	G3285-80023
O-ring for injection assembly, 10/pk	G3285-80085	G3285-80085
Sapphire injector for PFA, 2.5 mm ID	G3285-80034	G3285-80034
Platinum injector for PFA, 2.5 mm ID	G3285-80035	G3285-80035
Sapphire injector, 1.5 mm ID	G4912-80010	
Sapphire injector with O ₂ port for PFA, 1.5 mm ID		G3285-80036
Platinum injector, 1.5 mm ID	G4912-80011	G3285-80037
Torch	G4912-80012	G3285-80050

PP Inert Sample Introduction Kit Supplies

Description	7500 Part No.
Spray chamber, polypropylene (sapphire tube)	G1833-65463
Inert torch, quartz, without injector	G1833-65422
Platinum injector for inert torch, 2.0 mm ID	G1833-65409
Platinum injector for inert torch, 2.5 mm ID	G1833-65415
Platinum injector for inert torch, 1.5 mm ID	G1833-65416



Connector rod, dilution, G3270-80024

HMI Kit Supplies for 7500 Series

Description	Part No.
Plug for make-up gas connector (for 7700e)	G3270-20067
Inner sleeve	5022-1703
Gas connector	5042-4774
End cap assembly	G3270-60207
Torch, 2.5 mm, 2 projections	G3270-67002
Connector rod, dilution	G3270-80024
Connector rod, straight	G3270-80025
Connector rod, oxygen	G3270-80026

Spray Chambers

Description	Use	Unit	7700 Part No.	7500 Part No.
Spray chamber, quartz	Standard for 7700 Series and 7500 Series		G3280-80008	G3280-80008
End cap for spray chamber			G3280-60008	
Connector for gas line at end cap			5042-4775	
Plug for make-up gas connector (for 7700e)			G3270-20067	
End cap nut for nebulizer connection			0535-1082	
Drain tubing assembly			G3280-60555	
Drain tubing	Tubing between peri-pump tubing and drain tank		G1820-65515	G1820-65515
Drain tank, polyethylene, 4L			5042-4769	5042-4769
Drain tank with PVC connector, 1 L			G1820-65016	G1820-65016
Drain tank for organic solvents			G1820-65505	G1820-65505
Drain tubing kit Includes 2 connectors, 1 bushing, 1 tubing (4 mm ID, 12 cm)	Tubing between spray chamber and peri-pump tubing		G1833-65411	G1833-65411
Bushing at spray chamber drain, Viton		5/pk		G1820-65482
Bushing at spray chamber drain, for organic solvents	For use with organic solvents			G1820-65504
Connector for spray chamber drainage, polypropylene				G1820-65503
Spray chamber	For ultra trace B analysis		G3280-80503	G3270-80300
Connector, quartz	Between spray chamber and torch			G1833-65426
Connector, polypropylene	Between spray chamber and torch			G1833-65464
T-connector for optional gas introduction, quartz	Between spray chamber and torch			G1833-65427
O-rings for polypropylene connector, Viton		10/pk		G1833-65480
Clamps	Used to hold connectors	2/pk		G1833-65430
Tygon tubing, 3 m	For drain to drain tank		G3280-60077	G3280-60077



Spray chamber, quartz, G3280-80008

Torch and Components

Description	Specifications	Use	7700 Part No.	7500 Part No.
Torch, quartz	2.5 mm ID	Standard for 7700 Series and 7500 Series Not suitable for samples containing hydrofluoric acid. Must be completely dried before installing and igniting the plasma. Replace if chipped, cracked, or distorted.	G3280-80001	G3270-67002
Torch, quartz	1.5 mm ID, taper type	Not suitable for samples containing hydrofluoric acid. Must be completely dried before installing and igniting the plasma. Replace if chipped, cracked, or distorted.	G3280-80004	G1833-65424
Torch, quartz	1.0 mm ID, taper type	Not suitable for samples containing hydrofluoric acid. Must be completely dried before installing and igniting the plasma. Replace if chipped, cracked, or distorted.	G3280-80005	G1833-65425
Shield plate, long life		Use with the bonnet.	G1833-65419	G1833-65419
Bonnet (quartz ring for shield torch)		Use with shield plate (P/N G1833-65406 or P/N G1833-65419) for Shield Torch system. Replace if bonnet is cracked or damaged.	G1833-65421	G1833-65421
RF coil			G3280-60022	G1833-65432
Alignment plate for RF coil			G1833-66011	G1833-66011
Connector rod, dilution			G3270-80024	G3270-80024
Connector rod, straight			G3270-80025	G3270-80025
Clamps, 2/pk		Used to hold connectors	G1833-65430	G1833-65430

See PFA Inert Sample Introduction Kit Supplies table for the torch for inert kit



Torch, quartz, G3280-80001



Bonnet for Shield Torch, G1833-65421

Interface Cone Guide for Agilent 7700 Series

Description	Part No.	7700x/e	7700s
Sampling cone			
Nickel sampling cone	G3280-67040	Std	◆
Platinum sampling cone	G3280-67036	◆	Std
Nickel plated sampling cone	G3280-67061	◆	◆
Platinum sampling cone, 18 mm insert	G3280-67056	◆	◆
Skimmer cone			
Nickel skimmer cone	G3280-67041	Std	
Platinum skimmer cone	G3280-67060	◆	
Platinum skimmer cone, nickel base	G3280-67063	◆	
Platinum skimmer cone, copper base	G3280-67064		Std
Nickel skimmer cone	G3280-67066		◆
Platinum skimmer cone, nickel base	G3280-67065		◆
Copper skimmer cone	G3280-67067		◆
Skimmer base			
Skimmer base, stainless steel	G3280-60608	Std	
Skimmer base, brass	G3280-60621	◆	
Skimmer base, brass	G1833-65590		Std
Skimmer base, stainless steel	G1833-65591		◆
Skimmer base (offset), brass, for special application	G3280-60381		◆

Key

- ◆ : Compatible Part
- Std: Fitted as standard when instrument shipped from factory

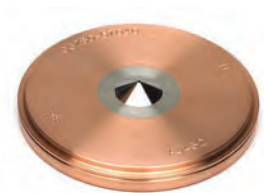
Notes:

- 18 mm Pt cone insert is recommended for measuring H_2SO_4 above 2%
- Pt T-mode cones are not available
- T-mode is not used with ORS models



Interface Cones and Ion Lenses

Interface Cone Guide for Agilent 7500 Series								
Description	Part No.	7500a	7500i	7500s	7500c	7500ce/cx	7500cs	T-mode
Sampling cone								
Nickel sampling cone	G1820-65238	Std	Std	◆	Std	Std	◆	
Platinum sampling cone, 10 mm insert	G1820-65239	◆	◆	Std	◆	◆	Std	
Platinum sampling cone, 18 mm insert	G1820-65360	◆	◆	◆	◆	◆	◆	
Nickel sampling cone for T-mode	G1820-65480	T-mode	T-mode	T-mode				◆
Skimmer cone								
Nickel skimmer cone	G1820-65050	Std	Std	◆				
Nickel skimmer cone	G3270-65024					Std		
Nickel skimmer cone	G1833-65497				Std		◆	
Platinum skimmer cone	G1820-65237	◆	◆	Std				
Platinum skimmer cone	G1833-65092				◆			
Platinum skimmer cone	G1833-65132					◆	Std	
Platinum skimmer cone (Ni base)	G3270-60106						◆	
Copper skimmer cone	G3270-60643						◆	
Nickel skimmer cone for T-mode	G1820-65481	T-mode	T-mode	T-mode				◆
Skimmer base								
Stainless steel base for nickel skimmer	G1833-65407	Std	Std	◆				◆
Stainless steel base for nickel skimmer	G1833-65591					Std	◆	
Stainless steel base for nickel skimmer	G1833-65498				Std			
Brass base for platinum skimmer	G1833-65408	◆	◆	Std				
Brass base for platinum skimmer	G1833-65505				◆			
Brass base for platinum skimmer	G1833-65590					◆	Std	



Sampling cone, nickel, G3280-67040



Skimmer cone, nickel, G3280-67041

Sampling and Skimmer Cone Supplies

Description	7700 Part No.	7500 Part No.
Interface wrench for sampling cone	G3280-01507	G1833-65405
Retaining ring for sampling cone	G3280-20504	
Graphite gasket for sampling cone, 3/pk	G3280-67009	
Interface wrench for skimmer cone removal	G3280-60502	G1833-65079
Screws for skimmer base, 4/pk	G1820-65435	G1820-65435
Cone cleaning detergent, 1 gallon	5188-5359	5188-5359
Alumina powder, abrasive, 1 kg	8660-0791	8660-0791
Cotton swab, ultra-fine cone bud shape, both ends, 100/pk	9300-2574	9300-2574
O-ring for sampling cone, Viton		G1820-65025

Ion Lens System Components for 7700 Series

Description	Part No.
7700x/e	
Extraction-offset lens assembly	G3280-67039
Extraction lens 1	G3280-60612
Extraction lens 2	G3280-60613
Omega bias lens	G3280-01650
Omega lens	G3280-60609
Screw and spacer kit for x-lens	G3280-67037
7700s	
Extraction-omega lens assembly	G3280-67035
Extraction lens 1	G1833-65592
Extraction lens 2	G1833-65593
Omega bias lens	G3280-20646
Omega lens	G3280-20653
Screw and spacer kit for s-lens	G3280-67038
7700x/s/e	
Reaction cell assembly	G3280-60650
Octopole	G3280-67045
Cell focus lens	G3280-20633
Cell entrance lens	G3280-20618
Cell exit lens	G3280-20664
Screw/spacer/O-ring for cell	G3280-67044
Tubing for cell gas	G3280-20663
Deflect lens	G3280-20628
Plate bias	G3280-60615
Polishing paper kit	G1833-65404
Waterproof sheets, #400 and #1200, 5 of each	
Manual vent valve	G3280-67046



Reaction cell assembly, G3280-60650



Extraction lens 1, G1833-65417



Extraction lens 2, G1833-65413

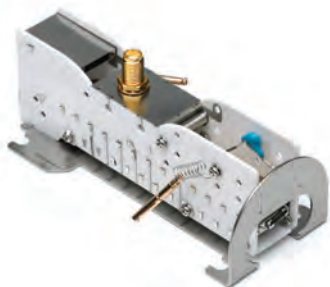
Ion Lens System Components for 7500 Series

Description	Part No.
7500a/i/s/c/cs	
Plate bias (for Eagle Q-pole)	G1833-65494
Plate bias (for Slim ring Q-pole)	G1833-65444
Polishing paper kit	G1833-65404
Waterproof sheets, #400 and #1200, 5 of each	
7500a/i/s	
Extraction lens 1	G1833-65417
Extraction lens 2	G1833-65413
Omega lens assembly	G1833-65418
Screw kit for Extraction lens	G1833-65024
Screw kit for Omega lens	G1833-65025
7500c	
Einzel lens 1	G1833-65500
Einzel lens 2	G1833-65501
Einzel lens 3	G1833-65502
Extraction lens	G1833-65499
Octopole	G1833-65094
Octopole assembly (includes cell entrance/exit without O-ring)	G1833-65503
Screw and spacer kit for extraction Einzel lens	G1833-65578
Screw kit for reaction cell	G1833-65088
Tubing for reaction gas, 2/pk	G1833-65089
7500ce/cx	
O-ring for reaction cell	G1833-66035
Extraction-Omega lens assembly	G3270-65023
Extraction lens 1	G3270-65028
Extraction lens 2	G3270-65029
Omega lens	G3270-65030
Omega bias lens	G3270-65031
Screw and spacer kit for Extraction and Omega lens	G3270-60639

(Continued)

Ion Lens System Components for 7500 Series

Description	Part No.
7500cs	
Extraction lens 1	G1833-65592
Extraction lens 2	G1833-65593
Extraction-Omega lenses assembly	G1833-65596
Omega bias lens	G1833-65594
Omega lens	G1833-65595
Screw and spacer kit for ion lens	G1833-65125
Cell entrance lens	G1833-65598
Cell exit lens	G1833-66000
Cell focus lens	G1833-65597
7500cs/ce/cx	
Focus lens for Q-pole	G1833-65599
Octopole	G1833-65133
Octopole assembly (includes cell focus, cell entrance/exit, and QP focus)	G1833-65134
Reaction cell assembly	G1833-66001
Screw and spacer kit for reaction cell	G1833-65138
Plate bias for S/N JP14100050 – JP14100313	G1833-65513
Plate bias for S/N JP14100314 or later	G1833-65562
Reaction cell assembly, stainless steel	G3270-65060



Electron multiplier, 5190-0108

Electron Multipliers

Description	7700 Part No.	7500 Part No.
Electron multiplier (ETP)		5184-1983
Electron multiplier (HPK)		G1833-65575
Electron multiplier	5190-0108	

Vacuum System Supplies

- When plasma is ON, check pump oil level every three months
- Maintain oil level between Max and Min levels on the gauge
- Standard frequency for changing the oil is approximately every six months

Warning: Be careful when changing oil because it may have absorbed dangerous substances. The oil in the foreline pump (rotary pump) on the interface side of a 7700/7500 equipped with a hydrofluoric acid resisting introduction system is especially dangerous. DO NOT TOUCH THE OIL WITH BARE HANDS.



Oil mist filter element for E2M18, 1535-4970



Odor element for oil mist filter, 5063-9153



Foreline pump oil, 6040-0834

Rotary Pumps and Vacuum System Supplies

Description	Unit	7700 Part No.	7500 Part No.
Oil mist filter element for E2M18		1535-4970	1535-4970
Oil mist filter kit for E2M18		3162-1056	3162-1056
O-Ring for vacuum chamber, Viton		5042-4790	5042-0901
Odor element for oil mist filter	5/pk	5063-9153	5063-9153
Foreline pump (rotary pump) oil, 4 L	1 gal	6040-0798	6040-0798
Foreline pump (rotary pump) oil, Inland 45, 1 L	1 liter	6040-0834	6040-0834
Electrode kit for penning gauge			G1820-81013
Tube AIM gauge			G1820-81012
O-rings for vent valve, Viton	2/pk		G1833-65332

Autosampler Supplies



Tray B, 53 position for 19 mL vials, PP,
G3160-80061

Integrated Autosampler(I-AS) Supplies

Description	Unit	Common Part No.
Tray A, 89 position for 6 mL vials, PP		G3160-80060
Tray B, 53 position for 19 mL vials, PP		G3160-80061
Tray C, 18 position for 50 mL vials, PP		G3160-80062
Tray D, 79 x 2 mL + 10 x 18 mL positions, PP		G3160-80063
Tray E, 79 x 6 mL + 10 x 18 mL positions, PP		G3160-80064
Tray F, 15 position for use in special semiconductor applications, PP		G3160-80065
PFA vial, 1.5 mL	10/pk	G3160-65317
6 mL vials	200/pk	G3160-65303
18 mL vials	55/pk	G3160-65304
50 mL vials	20/pk	G3160-65305
Polyethylene vial, 2 mL	200/pk	G3160-65315
PFA needle, 0.3 mm ID		G3160-65306
Rinsing bottle, 100 mL	6/pk	G3160-65307
Tray cover		G3160-65321
Rinse fluid inlet/outlet tubing (for I-AS with diaphragm pump)		G3160-65320
PFA Needle, 0.8 mm ID		G3160-65324
Tubing holder, PEEK		G3160-65325
Needle holder		G3160-80041
Holder for carry tray cover		G3160-60015
Peristaltic pump tubing set with connectors	1 set	G3160-65326
Peristaltic pump tubing set with connectors	5 sets	G3160-65327
Drain tubing, Tygon, from peristaltic pump to rinse bottle or drain bottle	2 pieces	G3160-65328
Serial-USB converter cable for use with G7201A MassHunter		G3160-80200



ASX-520 Autosampler



Sample rack, 60 position, G3286-80106



Sample probe, G3286-80102

ASX-500 Series Autosampler Supplies

Description	Common Part No.
Sample rack, 21 position, 50 mL vials	G3286-80103
Sample rack, 24 position, 30 mL vials	G3286-80104
Sample rack, 40 position, 20 mL vials	G3286-80105
Sample rack, 60 position, 14 mL vials	G3286-80106
Sample rack, 90 position, 8 mL vials	G3286-80107
Sample probe, 0.8 mm ID (red band)	G3286-80100
Sample probe, 0.3 mm ID (black band)	G3286-80101
Sample probe, 0.5 mm ID (blue band)	G3286-80102
Carbon fiber sample probe, 0.8 mm ID (red band)	G3286-80110
Carbon fiber sample probe, 0.3 mm ID (black band)	G3286-80111
Carbon fiber sample probe, 0.5 mm ID (blue band)	G3286-80112
Rinse/drain tubing hookup kit	G3286-80117
Drain pump tubing and connector kit (Tygon)	G3286-80118
Z-axis drive assembly with nylon cable	G3286-80230
Rinse station	G3286-80224
USB 2.0 cable (10 ft.) for use with G7201A MassHunter	G1680-63720

Peripherals Supplies

ISIS Supplies

Description	Specifications	Unit	7700 Part No.	7500 Part No.
Comprehensive spares for ISIS			G4911-67001	G3138-65006
Preconfigured kit (auto dilution)			G4911-68201	G3138-65024
Preconfigured kit (discrete sampling)			G4911-68202	G3138-65025
Preconfigured kit (high throughput)				G3138-65023
Peristaltic pump tubing, Tygon	0.89 mm ID, 3 stops	12/pk	5064-8014	5064-8014
Peristaltic pump tubing	0.25 mm ID, 2 stops, flared end	12/pk	G4911-67000	
Peristaltic pump tubing, Tygon	0.25 mm ID, 3 stops	12/pk		5064-8034
Peristaltic pump tubing, Tygon	0.25 mm ID, 2 stops	12/pk		5064-8015
Peristaltic pump tubing, Tygon	1.02 mm ID, 2 stops	12/pk	5064-8028	5064-8028
Peristaltic pump tubing, Tygon	2.29 mm ID, 2 stops	12/pk	5043-0010	5043-0010
Peristaltic pump tubing adapter		2/pk	5064-8026	5064-8026
Peristaltic pump tubing adapter	2.29 mm ID		G4911-20021	
Sample tubing, ETFE	0.8 mm ID, 1.6 mm OD		5064-8016	5064-8016
Sample tubing, PTFE	2 mm ID, 3 mm OD		5064-8020	5064-8020
Sample tubing, PFA	0.5 mm ID, 1.6 mm OD, 5 m			G1820-65105
ISTD tubing, PFA	0.3 mm ID, 1.6 mm OD, 3 m			G1820-65478
T-joint			5064-8017	5064-8017
T-joint with earth block			G3280-67062	
Cross joint			5064-8018	5064-8018
Union joint			5064-8019	5064-8019
PTFE nut	For 3 mm OD tubing	10/pk	5064-8021	5064-8021
Front and back ferrule	For 3 mm OD tubing	10/pk	5064-8022	5064-8022
PTFE nut for cross joint	For 1.6 mm OD tubing	10/pk	5064-8023	5064-8023
Front and back ferrule	For 1.6 mm OD tubing	10/pk	5064-8024	5064-8024
Tubing adapter				G3138-65158
Tubing clamp			5064-8027	5064-8027
Spiral tubing, 5 m			5064-8029	5064-8029
Wrench for valve maintenance			5064-8032	5064-8032
Tag for tubing identification		10/pk	5064-8033	5064-8033
APG remote cable			5182-2581	5182-2581
Joint holder				G3138-65102
Joint holder for nebulizer pump			G4911-01201	
Joint holder for ISIS Pump			G3138-65103	G3138-65103
Sample line connector				G3138-65104
Rotor seal for valve			G3138-65117	G3138-65117
Nut for valve		6/pk	G3138-65118	G3138-65118
Ferrule for valve		6/pk	G3138-65119	G3138-65119
Mixer			G3138-65121	G3138-65121
Sample loop, 100 µL			G3138-65122	G3138-65122
Plastic tray				G3138-65125
Tray for ISIS			G4911-60011	

ISIS Hydride Generation Accessory Supplies

Description	Specifications	Unit	Common Part No.
Hydride generation kit for 7700 Series with ISIS			G4911-68210
Gas/Liquid separator set			G3138-65130
Includes separator gas chamber, filter O-ring, separator holder, exclusive concentric nebulizer, O-ring for nebulizer, cyclone chamber and filter (5/pk)			
Separator gas chamber			G3138-65131
O-ring for filter			G3138-65132
Filter		10/pk	G3138-65137
Separator holder			G3138-65133
Exclusive concentric nebulizer			G3138-65134
O-ring for nebulizer		2/pk	G3138-65135
Cyclone chamber			G3138-65136
Peristaltic pump tubing, PharMed	2.54 mm ID, 2 stops	6/pk	G3138-65128
Tubing for gas line	3 mm ID, 4 mm ID, 5 m		G3138-65138
Plug for cross joint		3/pk	G3138-65129
Reducing union connector	8 x 4 mm		G3138-65144
Reducing union connector	6 x 3 mm		G3138-65139
Reducing union connector	6 x 4 mm		G3138-65140
Plug for carrier gas connector	4 mm OD	3/pk	G3138-65141
Y connector for pump tubing	2.5 mm ID	5/pk	G3138-65143

Consumables Kits for 7700 Series

Description	Part No.
Basic consumables kit for 7700x ICP-MS	G3280-67003
Comprehensive spares for 7700x ICP-MS	G3280-67004
Comprehensive spares for 7700s ICP-MS	G3280-67007
Comprehensive spares for 7700e ICP-MS	G3280-67085

GC Interface Supplies for 7500 Series

Description	Part No.
Injector assembly	G3158-65001
Torch	G3158-65007
Stainless steel pipe (Sulfinert) for GC-ICP-MS interface, 1/16 in.	G3158-65003

GC Interface Supplies for 7700 Series

Description	Part No.
Transfer line for 7700 GC interface	G3158-80060
Injector assembly for 7700 GC interface	G3158-80050
Torch for 7700 GC interface	G3158-80071
Pre-heating pipe with connector, stainless steel, 1/16 in.	G3158-80080
Stainless steel pipe, 1/16 in. (Sulfinert, 1.05 m)	G3158-80081
Vespel/Graphite reducing ferrule (1/8 in. to 1/16 in., VG1, 10/pk)	0100-1344
Vespel/Graphite ferrule (1/4 in., VG1, 10/pk)	0100-1331
Vespel/Graphite ferrule for 320 µm columns (0.5 mm, VG1, 10/pk)	5062-3506
Vespel/Graphite ferrule (1/16 in., VG2, 10/pk)	0100-1379
PFA tubing, 1/8 in., 2 m	G3158-60010
3-way manual valve	G3158-80024
Swagelok plug, stainless steel, 1/8 in.	0100-0071
Nut with pipe	G3158-80009
Stainless steel tee for O ₂ gas mix, 1/8 in.	0100-0542

As Speciation Columns

Description	Part No.
As speciation column for drinking water	G3154-65001
As speciation column for urine	G3288-80000
As speciation guard column	G3154-65002
LC connection kit	G1833-65200

Miscellaneous Supplies

Description	Part No.
7700 maintenance video DVD	G3280-60910
Cooling water hose, 10 m	G1833-65429
Strainer for cooling water	G1833-66024
Poly-clear fluid for G3292A chiller	G3292-80010
Fluid filter for G3292A chiller	G3292-80109
Air filter for G3292A chiller	G3292-80112
Filter for cooling water for 7500 Series	G1820-65018
Water filter connector for 7500 Series	G1820-80430
O-ring for water filter cartridge for 7500 Series	G1833-66042
O-ring for reaction cell for 7500 Series 2/pk	G3270-65036
Organic solvent introduction kit for 7700 Series	G3280-60580

■ ATOMIC SPECTROSCOPY STANDARDS

- Give you confidence in your AAS, ICP-OES or ICP-MS results
- Standards shipped from stock to maximize uptime
- Supplied with a Material Safety Data Sheet (MSDS) and Certificate of Analysis for complete assurance

AA and ICP-OES Standards

ICP-OES Wavelength Calibration Solutions for 700-ES and Vista Series

Description	Part No.
ICP-OES wavelength calibration solution: 500 mL, contains 50 mg/L Al, As, Ba, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Se, Sr, Zn and 500 mg/L K in 5 % HNO ₃ + tr HF Dilute 10 times prior to use	6610030000
ICP-OES wavelength calibration solution: 500 mL, contains 5 mg/L Al, As, Ba, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Se, Sr, Zn and 50 mg/L K in 5 % HNO ₃ + tr HF Ready to use	6610030100
ICP internal standard: 125 mL, contains 100 mg/L ⁶ Li, Sc, Y, In, Tb and Bi in 5 % HNO ₃	6610030400

Multi-Element Calibration Standards

Description	Part No.
Calibration mix 1: 125 mL, contains 100 mg/L Sb, Mo, Sn and Tl in 2 % HNO ₃ + 0.5 % HF	6610030500
Calibration mix 2: 125 mL, contains 100 mg/L Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, Se, Tl, Th, U, V and Zn in 5 % HNO ₃	6610030600
Calibration mix majors: 125 mL, contains 500 mg/L Ca, Fe, K, Mg and Na in 5 % HNO ₃	6610030700
Calibration mix 3, organic: 100 mL, contains 500 ppm Ag, Al, B, Ba, Ca, Cd, Cr, Cu, Fe, Mg, Mn, Na, Ni, P, Pb, Si, Sn, Ti, V and Zn in mineral oil	6610030200

ICP-MS Standards



Stock Tuning Solution, 5188-6564

Installation and Checkout Standards

Description	Part No.
ICP-MS Checkout Solutions for 7500ce/cx/cs system installation kit Contains tuning solution, dual mode (1), dual mode (2), wash, and water blank solutions	5185-5850
ICP-MS Checkout Solutions for 7500s system installation kit Contains tuning solution, dual mode (1), dual mode (2), abundance sensitivity (1), abundance sensitivity (2), detection limit solution, high sensitivity tune, wash, and water blank solutions	5184-3564
ICP-MS Checkout Solutions for 7500a/i/c system installation kit Contains tuning solution, dual mode (1), dual mode (2), wash, and water blank solutions	5184-3565

Tuning Solutions

Description	Part No.
PA Tuning Solution Kit: Tuning 1: 20 ppm each of Zn, Be, Cd, As; 10 ppm each of Ni, Pb, Mg; 5 ppm each of Tl, Na, Al, U, Cu, Th, Ba, Co, Sr, V, Cr, Mn, ⁶ Li, Sc, In, Lu, Bi; 2.5 ppm each of Y, Yb; matrix 2-5% HNO ₃ Tuning 2: 10 ppm each of Mo, Sb, Sn, Ge, Ru, Pd; 5 ppm of Ti, Ir; matrix 10% HCl and 1% HNO ₃ with trace amounts of HF	5188-6524
Stock Tuning Solution: Li, Y, Ce, Tl and Co; 100 mL, 10 mg/L; matrix 2% HNO ₃	5188-6564
Stock Tuning Solution: Li, Mg, Y, Ce, Tl and Co; 100 mL, 10 mg/L; matrix 2% HNO ₃	5190-0465
Tuning Solution: Li, Y, Ce, Tl and Co; 2 x 500 mL, 10 µg/L; matrix 2% HNO ₃	5184-3566
Tuning Solution: Li, Mg, Y, Ce, Tl, Co; 2 x 500 mL, 1 µg/L; matrix 2% HNO ₃	5185-5959

Multi-Element Calibration Standards

Description	Part No.
Multi-Element Calibration Standard-1, 100 mL: 10 mg/L of Ce, Dy, Er, Eu, Gd, Ho, La, Lu, Nd, Pr, Sc, Sm, Tb, Th, Tm, Y, Yb; matrix 5% HNO ₃	8500-6944
Multi-Element Calibration Standard-2A, 100 mL: 10 mg/L of Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cs, Cu, Fe, Ga, K, Li, Mg, Mn, Na, Ni, Pb, Rb, Se, Sr, Tl, U, V, Zn; matrix 5% HNO ₃	8500-6940
Multi-Element Calibration Standard-3, 100 mL: 10 mg/L of Sb, Au, Hf, Ir, Pd, Pt, Rh, Ru, Te, Sn; matrix 10% HCl/1% HNO ₃	8500-6948
Multi-Element Calibration Standard-4, 100 mL: 10 mg/L of B, Ge, Mo, Nb, P, Re, S, Si, Ta, Ti, W, Zr; matrix H ₂ O/trace HF	8500-6942

Single Element Standards

Description	Part No.
Bismuth, 100 mL, 10 mg/L	8500-6936
Cobalt, 100 mL, 10 mg/L	8500-6947
Gold, 100 mL, 10 mg/L	8500-7000
Indium, 100 mL, 10 mg/L	8500-6946
Mercury, 100 mL, 10 mg/L	8500-6941
Rhodium, 100 mL, 10 mg/L	8500-6945

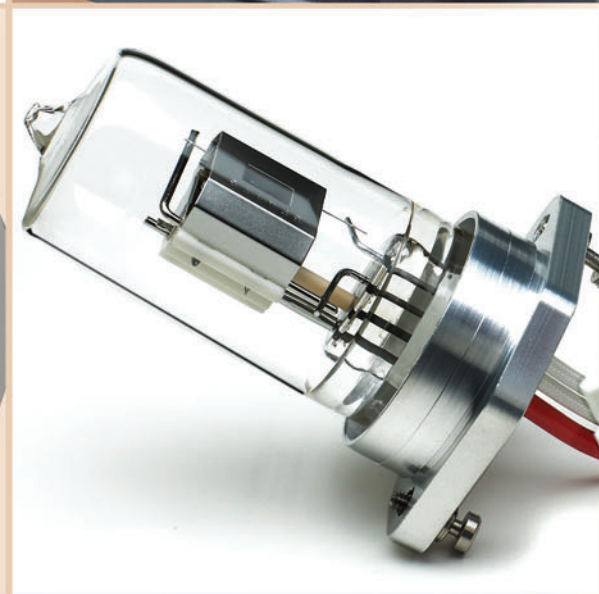
Interference Check Mixes

Description	Part No.
6020 Interference Check Solution A, 100 mL: 20,000 ppm of Cl; 3,000 ppm of Ca; 2,500 ppm each of Fe, Na; 2,000 ppm of C; 1,000 ppm each of Al, Mg, P, K, S; 20 ppm each of Ti, Mo; matrix 5% HNO ₃ with trace amounts of HF	5188-6526
6020 Interference Check Solution B, 100 mL: 20 ppm each of Cr, Co, Cu, Mn, Ni, V; 10 ppm each of As, Cd, Se, Zn; 5 ppm of Ag; matrix 5% HNO ₃	5188-6527

Environmental Standards

Description	Part No.
Environmental Calibration Standard, 100 mL: 1,000 mg/L of Fe, K, Ca, Na, Mg; 10 mg/L of Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Ti, V, Zn, Th, U; matrix 10% HNO ₃	5183-4688
Initial Calibration Verification Standard, 100 mL: 1,000 mg/L of Fe, K, Ca, Na, Mg, Sr; 10 mg/L of Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Ti, V, Zn, Th, U; matrix 5% HNO ₃	5183-4682
Internal Standard Mix, 100 mL: 100 ppm of ⁶ Li, Sc, Ge, Rh, In, Tb, Lu, Bi; matrix 10% HNO ₃	5188-6525
Internal Standard Mix, 100 mL: 10 mg/L of ⁶ Li, Sc, Ge, Y, In, Tb, Bi; matrix 5-10% HNO ₃	5183-4681
Environmental Spike Mix, 100 mL: 1,000 mg/L of Fe, K, Ca, Na, Mg; 100 mg/L of Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Ti, V, Zn, U; matrix 5% HNO ₃	5183-4687

MOLECULAR SPECTROSCOPY



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■ AGILENT 8453 UV-VIS SUPPLIES



8453A UV-Visible Spectrophotometer

The genuine Agilent cells, tubing, fittings and supplies in this section have been tested with the Agilent 8453 for reliable and repeatable results.

Agilent UV-Vis cells and supplies are manufactured in an ISO 9001-certified environment. Additionally, every Agilent UV-Vis cell includes a certificate of analysis, so you can be confident that it will conform to stringent protocols such as NIST, GLP, GMP and NAMAS. This section will help you identify the cells that fit your unique applications. You will also learn how to enhance your lab's productivity by choosing the correct spectrophotometer equipment, tubing, fittings, and dissolution testing supplies.

Cells

Macro Cells

The macro cell, which is defined by DIN 58963 as a rectangular cell with an inner width greater than 5 mm, has emerged as the standard for photometry. The most widely used macro cell is a rectangular cell with outer dimensions of 45 x 12.5 mm (height x width). The length of the cell is dependent on the desired path length.



Macro cell with PTFE lid

Macro Cells with PTFE Lid

Path Length (mm)	Ext. Dimensions (mm)	Int. Dimensions (mm)	Volume (µL)	Part No. Glass	Part No. Quartz
1	45 x 12.5 x 3.5	44.5 x 9.5	350	5063-6546	5061-3384
2	45 x 12.5 x 4.5	44.5 x 9.5	700	5063-6547	5061-3385
5	45 x 12.5 x 7.5	44.5 x 9.5	1750	5063-6548	5061-3386
10	45 x 12.5 x 12.5	44.5 x 9.5	3500	5063-6549	5061-3387
10	45 x 12.5 x 12.5	44.5 x 9.5	3500	5063-6550*	1000-0544*
20	45 x 12.5 x 22.5	44.5 x 9.5	7000	5063-6551	5063-6553
50	45 x 12.5 x 52.5	44.5 x 9.5	17500	5063-6552	5063-6554

*Matched pair



Macro cell with PTFE stopper

Macro Cells with PTFE Stopper

Path Length (mm)	Ext. Dimensions (mm)	Int. Dimensions (mm)	Volume (µL)	Part No. Glass	Part No. Quartz
5	48 x 12.5 x 7.5	42 x 9.5	1750		5063-6557
10	48 x 12.5 x 12.5	42 x 9.5	3500	5063-6556	5062-2477

Spacers are required for cells with an outer depth of less than 12.5 mm to hold them securely in the cell holder.

Semi-micro Cells

Semi-micro and micro cells have an inner width of 4 mm to 2 mm. The thickness of the base is 9 mm. All semi-micro and micro cells are for use with spectrophotometers having a beam height of 15 mm.

For applications with a wavelength range of interest in the visible range, use our low cost Agilent optical quality glass cells, made from exceptionally pure raw materials. Quartz glass gives transmission values of >80% between 200 nm and 2500 nm for an empty cell. Optical glass gives transmission values of >80% between 320 nm and 2500 nm for an empty cell.



Semi-micro cell with PTFE lid



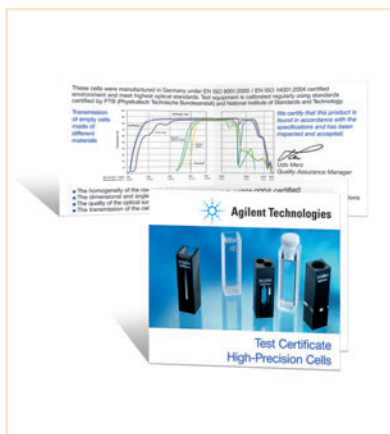
Semi-micro cell with PTFE stopper

Semi-micro Cells with PTFE Lid

Path Length (mm)	Ext. Dimensions (mm)	Int. Dimensions (mm)	Volume (μL)	Part No. Glass	Part No. Quartz
10	45 x 12.5 x 12.5	41.8 x 2	700	5063-6558	5061-3391
		36 x 4	1000		5063-6559

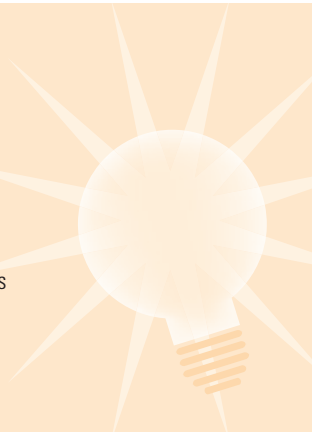
Semi-micro Cells with PTFE Stopper

Path Length (mm)	Ext. Dimensions (mm)	Int. Dimensions (mm)	Volume (μL)	Part No. Glass	Part No. Quartz
10	46 x 12.5 x 12.5	37 x 4	1000	5063-6560	5063-6561



Agilent high-precision cells are tested to meet the highest optical standards. Every Agilent cell comes with a test certificate, ensuring that the following areas have been tested and are within specifications:

- Homogeneity of the raw material
- Dimensional and angle tolerances of the component parts
- Flatness of the optical surfaces
- Transmission of the cells



Ultra-micro Cells

Ultra-micro cells are specifically designed for use in the μL range (down to 50 μL). They fit into any standard cell holder and have the advantage of requiring much smaller sample volumes than standard cells. The cells are constructed so that filling and emptying can be easily accomplished with commonly available pipette tips. Ultra-micro cells with Eppendorf pipette filling/emptying are designed to handle extremely small volumes. When only a minimum amount of sample is available, these cells provide a filling volume only slightly larger than the measuring chamber volume.



Ultra-micro cell with PTFE stopper



Ultra-micro cell with eppendorf filling

Ultra-micro Cells with PTFE Stopper

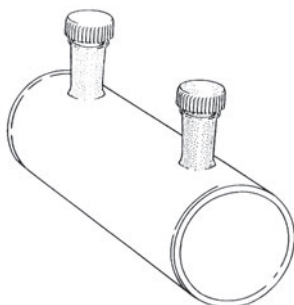
Path Length (mm)	Ext. Dimensions (mm)	Aperture (mm)	Center Height (mm)	Volume (μL)	Filling Volume (μL)	Part No. Quartz
2	45 x 12.5 x 12.5	2.5 x 2	15	10	20	5062-2497
10	45 x 12.5 x 12.5	2.5 x 2	15	50	70	5062-2496

Ultra-micro Cells with Eppendorf Pipette Filling/Emptying

Path Length (mm)	Ext. Dimensions (mm)	Aperture (mm)	Center Height (mm)	Volume (μL)	Filling Volume (μL)	Part No. Quartz
0.1	40 x 12.5 x 12.5	1 x 5	15	0.5	5	5063-6562
1	40 x 12.5 x 12.5	1 x 5	15	5.0	10	5063-6563
5	40 x 12.5 x 12.5	0.8 round	15	2.5	5	5063-6564
10	40 x 12.5 x 12.5	0.8 round	15	5.0	10	5063-6565

Cylindrical Cells

A cylindrical cell is a cell with plane-parallel optical surfaces whose inner volume is cylindrical in shape, and has a longitudinal axis parallel to the direction of the radiation beam.



Cylindrical cell with PTFE stoppers

Cylindrical Cells with PTFE Stopper

Path Length (mm)	Ext. Dimensions (mm)	Int. Dimensions (mm)	Volume (μL)	Part No. Glass	Part No. Quartz
100	102.5 x 22	19	28000	5063-6566	5061-3392

Flow-through Cells

Until recently, flow-through cells had measuring chambers that were either rectangular or circular in shape. These shapes were dictated by limitations in the manufacturing process and did not offer the best geometry for clean flushing and reduction of contamination. Agilent has developed oval aperture cells that combine low volume with excellent flow characteristics. These oval flow cells are strongly recommended for automated analyses such as dissolution testing. Black quartz is used in the vicinity of the aperture to ensure that no light passes through the side walls of the cell.



Round aperture flow cell



Rectangular aperture flow cell



Oval aperture flow cell

Flow-through Cells with Round Aperture and Screw Fitting Connection

Path Length (mm)	Ext. Dimensions (mm)	Aperture (mm)	Center Height (mm)	Volume (μL)	Part No. Quartz
10	35 x 12.5 x 12.5	2	15	30	0100-1224
10	35 x 12.5 x 12.5	3	15	80	0100-1225

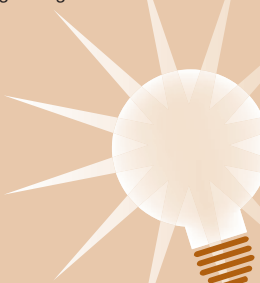
Flow-through Cells with Rectangular Aperture and Screw Fitting Connection

Path Length (mm)	Ext. Dimensions (mm)	Aperture (mm)	Center Height (mm)	Volume (μL)	Part No. Quartz
0.1	35 x 12.5 x 12.5	17.5 x 3.5	15	6.2	5188-8003
0.2	35 x 12.5 x 12.5	17.5 x 3.5	15	12.4	5188-8004
0.5	35 x 12.5 x 12.5	17.5 x 3.5	15	31	5188-8005
1	35 x 12.5 x 12.5	17.5 x 3.5	15	62	5061-3396
2	35 x 12.5 x 12.5	17.5 x 3.5	15	124	5061-3397
5	35 x 12.5 x 12.5	17.5 x 3.5	15	230	5065-9918
10	35 x 12.5 x 12.5	11 x 3.5	15	390	5061-3398
10	35 x 12.5 x 12.5	8 x 2	15	160	5062-2476

Flow-through Cells with Oval Aperture and Screw Fitting Connection

Path Length (mm)	Ext. Dimensions (mm)	Aperture (mm)	Center Height (mm)	Volume (μL)	Part No. Quartz
1	39 x 12.5 x 12.5	8 x 3	15	40	5063-6570
1	40 x 12.5 x 12.5	8 x 3	15	40	5065-9907
2	39 x 12.5 x 12.5	8 x 3	15	80	5063-6571
5	39 x 12.5 x 12.5	8 x 3	15	200	5063-6572
10	39 x 12.5 x 12.5	8 x 3	15	430	5063-6573

Note: Flow-through cells do not include tubing/fittings.



Cell Accessories



Spacer for 2 mm cell, 5061-3389



Spacer for 5 mm cell, 5061-3390



Magnetic stirring bar, 9301-1161



Cell cleaning solution, 5062-8529



Lens cleaning paper, lint free, 9300-0761



Cell tray, 5063-6577

Spacers*

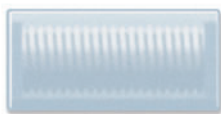
Description	Part No.
Spacer for 1 mm cell	5061-3388
Spacer for 2 mm cell	5061-3389
Spacer for 5 mm cell	5061-3390

*Spacers are required to hold cells with an outer depth of less than 12.5 mm in the cell holder.

Miscellaneous

Description	Unit	Part No.
Magnetic stirring bar*	2/pk	9301-1161
Cell cleaning solution	1 L	5062-8529
Lens cleaning paper, lint free	50/pk	9300-0761
Tray for 16 cells	10 mm	5063-6577

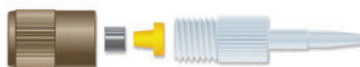
*For use with Agilent 89054A cell-stirring multicell transport and Agilent 89090A Peltier temperature controller. Stirring bars are used with cells having internal dimensions of 10 x 10 mm (W x D) and cell holders with magnetic stirring capability.



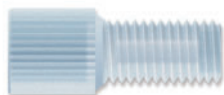
Union, 5022-2155



Cell fittings (black), 5022-2156



Conical adapter kit, 5022-2157



PTFE nuts, 5022-2158



PEEK fittings and ferrules, 5042-1337

8453 Tubings and Fittings

Description	Unit	Part No.
PTFE tubing, 1.6 mm OD	10 m	5041-2191
Pump tubing, 2.06 mm ID	12/pk	5041-2166
Pump tubing, 1.3 mm ID	12/pk	5041-2184
Pump tubing, 2.8 mm ID	12/pk	5041-2185
Tefzel ferrules and stainless steel lock rings, 1/16 in.	10/pk	5022-2154
Union, 1/4-28 thread, polypropylene	10/pk	5022-2155
Cell fittings, black (4 short and 4 long)	8/pk	5022-2156
Conical adapter kit	2/pk	5022-2157
PTFE nuts for 1/16 in. OD tubing	10/pk	5022-2158
Tubing, heat exchanger, FEP	12 cm	5042-1336
1/16 in. PEEK fittings and ferrules for 8-port valve	10/pk	5042-1337
Mounting tool for flangeless nut		0100-1710

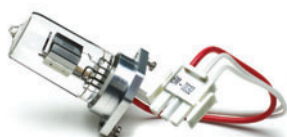
8453 Instrument Parts and Supplies



Deuterium lamp assembly, 2140-0605



Tungsten lamp assembly, G1103-60001



Deuterium lamp assembly, 08452-60104



Standard cell holder, 08451-60104



Long path-length cell holder, 89076C



Thermostatable cell holder, 89054A



Cell stirring module, 89055A

Spectrophotometer Lamps

Description	Part No.
Deuterium lamp assembly, 8453	2140-0605
Long life Deuterium lamp	2140-0813
Tungsten lamp assembly	G1103-60001
Deuterium lamp assembly, 8452	08452-60104

Cell Holders

Description	Part No.
Standard cell holder	08451-60104
Long path-length cell holder	89076C
Thermostatable cell holder	89054A
Cell stirring module for thermostatable cell holder	89055A
Magnetic stirring bar for use with 10 x 10 mm (W x D) cells, 2/pk	9301-1161



Optical filter kit, G1120-68707



Stirring module kit, G1120-60006



Tubing, heat exchanger, FEP, 5042-1336



Needle, beveled edge for G1811A, G1811-23200



Autosampler tubing and fittings kit, 5042-1334



Sipper tubing kit, 5042-1333



Cassette, fixed pressure, 5041-2167



Cassette, variable pressure, 5042-1356

G1120A 8-Position Multicell Transport Supplies

Description	Part No.
Optical filter kit Set of three optical filters to prevent photosensitive samples from being irradiated by UV light (265 and 295 nm cut-off and UV roll-off filter)	G1120-68707
Stirring module kit Stirrer is driven by circulating water from water bath (not included)	G1120-60006
Magnetic stirring bar for use with 10 x 10 mm (W x D) cells, 2/pk	9301-1161
Multicell transport adjustment tool	89075-23800
Plastic cover kit	G1120-68708

89090A Peltier Temperature Controller Supplies

Description	Part No.
Union, cell holder	5021-1870
Flow cell, 10 mm, 8 x 2 mm aperture, 160 μ L	5062-2476
Quartz cuvette, 10 mm, with PTFE stopper	5062-2477
Tubing, heat exchanger, FEP	5042-1336
Magnetic stirring bar	9301-1161

Autosampler Supplies

Description	Part No.
Needle, beveled edge for G1811A	G1811-23200
Test tubes, 12 x 100 mm, 250/pk	5022-6531
Autosampler tubing and fittings kit	5042-1334

Sipper Supplies

Description	Part No.
Sipper tubing kit	5042-1333
Flow cell, 10 mm, 80 μ L	0100-1225
Cassette, fixed pressure	5041-2167
Cassette, variable pressure	5042-1356

8453 Dissolution Testing Supplies



Multicell tubing kit, 5042-1330



Valve tubing kit, 5042-1331



Dissolution probes kit, 5042-1332



PEEK fittings and ferrules, 5042-1337



8 port valve for dissolution system, 5063-6575



Dissolution filters for 1/8 in. probe, 5181-1246

Dissolution Testing Supplies for 8453A

Description	Part No.
Multicell system tubing kit	5042-1330
Valve tubing kit for one bath	5042-1331
Dissolution probes kit, 0.9 mm ID, tubes with fittings	5042-1332
1/16 in. PEEK fittings and ferrules for 8-port valve, 10/pk	5042-1337
8-port valve for dissolution system	5063-6575
Rotor seal for 5063-6575 valve (UV-Vis) dissolution system	5067-1539
Dissolution filters for 1/8 in. probe, 45 µm pore size, 1000/pk	5181-1246



OO/PV chemical standards kit I, 5063-6503



OO/PV chemical standards kit II, 5063-6521

8453 Standards & Reagents

Our chemical standards and accessory kits provide an inexpensive and time-saving solution for operational qualification and performance verification (OO/PV) of UV-Vis spectrophotometers. The kits are designed for analysts who need to conform closely to both quality and regulatory requirements when performing UV-Vis measurements.

The chemical kits can be used with any UV-Vis spectrophotometer and consist of pre-prepared solutions in sealed ampoules. The solutions are traceable to NIST standards and specified by the European Pharmacopeia (EP) and include holmium oxide for wavelength accuracy measurement; potassium dichromate for photometric accuracy measurement; sodium nitrite, sodium iodide and potassium chloride for stray light measurements at 340, 220 and 198 nm; and toluene in hexane for resolution measurement. Each standard includes a Certificate of Analysis for traceability.



OO/PV hardware kit, 5063-6523



Tubing kit for UV-Vis OO/PV test, 5063-6522

Caffeine OO/PV sample for dissolution test,
5042-6476

Multicell transport adjustment tool, 89075-23800

Certified Calibration Standards and Accessory Kits

Description	Part No.
OO/PV Chemical Standards Kit I (for photometric accuracy, stray light and resolution measurements) Contains 10 ampoules 10 mL each of 2 dichromate, 2 sulfuric acid, 1 sodium nitrite, 1 sodium iodide, 1 potassium chloride, 1 toluene in hexane, 2 hexane	5063-6503
OO/PV Chemical Standards Kit II (for wavelength accuracy) Contains three ampoules 10 mL each of 2 perchloric acid, 1 holmium oxide in perchloric acid	5063-6521
OO/PV Hardware Kit Contains two flow cells, cell passivating fluid, tubing kit, MCT adjustment tool, temperature sensor support, syringes and OO/PV manual	5063-6523
Tubing Kit for UV-Vis OO/PV Test Contains tubings, fittings and adapter to flush flow cell	5063-6522
Caffeine OO/PV sample for dissolution test, 150 mg/L caffeine in water, 500 mL	5042-6476
Multicell transport adjustment tool	89075-23800

Checkout Samples

Description	Part No.
Test sample for UV-Vis (caffeine solution, 10 µg/mL in water)	5063-6524

■ AGILENT CARY UV-VIS & UV-VIS-NIR SUPPLIES



Cary UV-Vis-NIR 4000 Spectrophotometer

Agilent's Cary UV-Vis and UV-Vis-NIR spectrophotometers are synonymous with excellence and high performance. Our range of consumables for these products includes cuvettes, flow cells, fiber optic probes, lamps and detectors.

Cary Cuvettes and Flow Cells



Cary UV-Vis-NIR 5000 Spectrophotometer

Agilent has a wide variety of high quality cells for UV-Vis-NIR spectrophotometers.

Cell Shapes

Cylindrical Cells

For use when sample volume is not a limitation and when very short to long path lengths are needed. All cylindrical cells can be used with the cylindrical cell holder or the thermostatted cylindrical cell holder. Cylindrical cells are available as standard cells, long path length cells for extra sensitivity when measuring low concentrations, and microcells, suitable for concentrated samples, or to overcome solvent absorbance (e.g. water in the NIR or low UV regions).

Rectangular Cells

Rectangular cells are the most commonly used cell type and vary in shape from square to longer rectangles, depending on the cell path length. We offer standard cells, semi-micro cells with about 40% of the volume of a standard cell of the same path length, microcells with about 20% of the volume of a standard cell, submicro and ultra-micro cells that have microliter volumes, and disposable cells. Semi-micro cells can be used with all Cary 1, 3, 4, 5 multicell holders and with all standard single cell holders. In addition, they can be used with the Temperature Probe Accessory for cell temperature monitoring.

Disposable Polystyrene Cells

Disposable polystyrene cells are useable from 340 to 800 nm, are economical, can be used with magnetic stirrers, but cannot be used at elevated temperatures. Cells sold as matched pairs are used for most UV-Vis-NIR routine analyses. Matched pairs ensure these cells will give a similar absorbance or transmission reading when empty or filled with water. Long path length cells are ideal for use when extra sensitivity is needed for low concentration samples. These cells must be used with the long path length rectangular cell holder.

Cell Materials

Cells are available in four materials. Select the cell material depending on the wavelength range of your measurements.

Material	Wavelength (nm)
Far UV Quartz	170 to 2700
Infrasil NIR Quartz	220 to 3800
Glass	334 to 2500
Polystyrene (disposable)	340 to 800

Cell Volumes

Standard Cells

Standard cells have about the same wall thickness on all sides, and are used for most UV-Vis-NIR measurements. They require the largest sample size for a given path length.

Semi-micro Cells

Semi-micro cells have thicker side walls to reduce the volume to about 40% of the volume of a standard cell of the same path length. These cells are useful when only small sample volumes are available for testing. Cells that are black self-masking are listed with their aperture size. The aperture is located at the correct Z-height for Agilent Cary UV-Vis and UV-Vis spectrophotometers. Semi-micro cells can be used with Cary 1, 3, 4, 5 multicell holders and with all standard single cell holders. They can also be used with the Temperature Probe Accessory for cell temperature monitoring. The semi-micro cell, with a stirring well for a magnetic stirring bar, is suitable for all Cary 1, 3, 4, 5 series Peltier thermostatted multicell and single cell holders.

Microcells

Microcells have thicker sidewalls to reduce the volume to about 20% of the volume of a standard cell of the same path length. These cells are useful when limited sample volumes are available for testing.

Submicro Cells

Submicro cells have volumes in the 10 to 135 μL range, and are ideal when sample volumes are very limited, for highly concentrated samples, or for highly absorbing solvents. These quartz cells offer low volume, short path length and excellent heat transfer. They are ideal for temperature-controlled work, and all except the 1 mm path length cell can be used with the Temperature Probe. Cells that are black self-masking are listed with their aperture size.

Cary 50 Cells

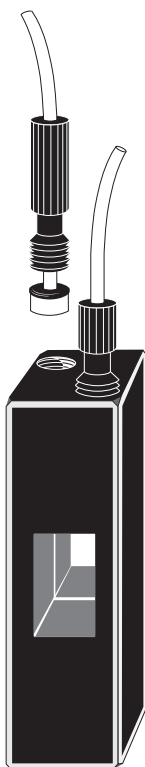
Description	Cell Type	Cell Material	Volume (μL)	Path Length (mm)	Sample Chamber Width (mm)	Aperture (mm)	Part No.
Submicro cell, black wall	Rectangular	Far UV quartz	135	10	2.0	2.0	6610021100
Submicro cell, black wall	Rectangular	Far UV quartz	40	10	2.0	2.0	6610019500

Cells with an aperture value are self-masking with a 20 mm Z dimension to match Cary spectrophotometers.

Disposable Cells

Description	Cell Type	Cell Material	Volume (mL)	Path Length (mm)	Sample Chamber Width (mm)	Unit	Part No.
Standard cell	Rectangular	Polystyrene	3.5	10	10	500/pk	6610018800
Microcell	Rectangular	Polystyrene	1.5	10	4	500/pk	6610018700

Wavelength range 340 to 800 nm



Cary 50 flow cell

Magnetic Stirrer Bars

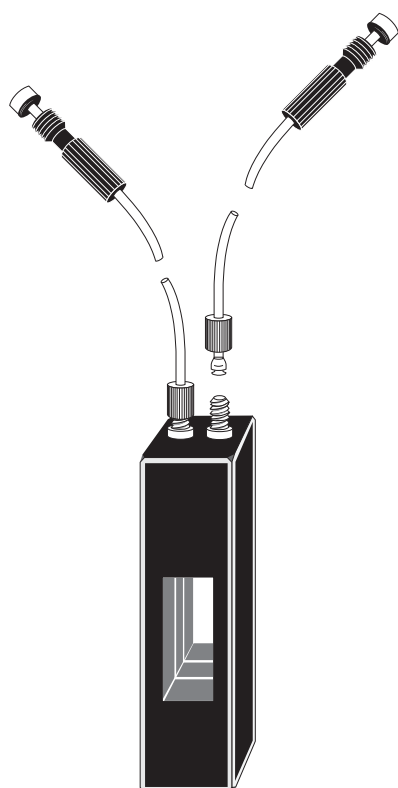
Description	Part No.
Magnetic stirrer bar, PTFE, star type	7418000400
Magnetic stirrer bars, 7 x 2 mm, 10/pk	6610018900

Cylindrical Cells

Description	Cell Material	Volume (mL)	Path Length (mm)	Sample Chamber Width (mm)	Part No.
Standard cell, two ports, matched pair	Far UV Quartz	28.2	100	19	6610002300
	Far UV Quartz	14.1	50	19	6610002200
Standard cell, one port	Far UV Quartz	2.8	10	19	6618000600

Rectangular Cells

Description	Cell Material	Volume (mL)	Path Length (mm)	Sample Chamber Width (mm)	Part No.
Standard cell, open top	Glass	35	100	9.5	6610016300
Standard cell, open top	Far UV quartz	35	100	9.5	6610016000
Standard cell, open top	Glass	17.5	50	9.5	6610016400
Standard cell, open top	Far UV quartz	17.5	50	9.5	6610016100
Standard cell, open top	Far UV quartz	7	20	10	6610016200
Standard cell, disposable	Polystyrene	3.5	10	10	6610018800
Standard cell, open top, matched pair	Infracil NIR quartz (1 pair)	3.5	10	10	6618000100
Standard cell, open top, matched pair	Glass (1 pair)	3.5	10	10	6610008800
Standard cell, stoppered, matched pair	Far UV quartz (1 pair)	3	10	10	6610001100
Standard cell, open top, matched pair	Far UV quartz	3	10	10	6610000800
Semimicro cell, black wall	Far UV quartz	1.4	10	4	6610001800
Semimicro cell, for magnetic stirrer bars, black wall	Far UV quartz	1.3	10	4	6610015400
Semimicro cell, matched pair, black wall	Far UV quartz (1 pair)	0.9	10	4	6610012700
Semimicro cell, matched pair, black wall	Far UV quartz (1 pair)	450	5	4	6610019800
Semimicro cell, matched pair, black wall	Far UV quartz (1 pair)	180	2	4	6610019700
Semimicro cell, matched pair, black wall	Far UV quartz (1 pair)	90	1	4	6610019600
Submicro Cell, low headspace thermal melt, black wall with 2.0 mm aperture	Far UV quartz	80	10	2	6610024100
Submicro cell, low headspace thermal melt, black wall	Far UV quartz	40	5	2	6610024000
Submicro cell, stoppered, black wall	Far UV quartz	50	10	2.5	6610010400
Submicro cell	Far UV quartz	10	10	1	6610013800
Ultramicro cell, low headspace thermal melt, black wall	Far UV quartz	8	1	1	6610023900



Cary 100/300 flow cell

Flow Cells

Flow cells allow the sample to pass through the cell and are connected to the sample source via tubing. Long path length flow cells are useful for low concentration samples and require the long path length rectangular cell holder. They can be used with a Cary 1, 3, 100, 300 series Routine Sampler Accessory or a Cary 50 series Sipper. Submicro flow cells are suitable for use with the Cary 1, 3, 100, 300 series Routine Sampler Accessory.

Flow Cells

Use With	Volume (μL)	Path Length (mm)	Part No.
Cary 50	113	1	6610019900
	227	2	6610020000
	568	5	6610020100
	715	10	6610020200
Cary 1, 3, 100 and 300	113	1	6610014100
	227	2	6610014200
	715	10	6610015200
All	80	10	6610008900
	390	10	6610012600
All	1	50	6610010000
	2.1	100	6610010100

Made from far UV quartz and for use with single cell or multicell holders

Cell Holders and Bases

Description	Use With	Part No.
Cell base	Cary 50	110648190
Cell holder base	Cary 400 and 500	10048100
Cell holder base	Cary 4000 to 6000i	110716190
Standard cell holder, 10 mm Supplied as standard with Cary 100/300 and Cary 5000/6000i	All Cary	110260190
Standard cell holder, 10 mm, with Z-height adjustment from 0-20 mm Supplied as standard with Cary 4000	All except Cary 50	110721900
Cary 50 cell holder, spare	Cary 50	110645090

Cary Fiber Optic Probes

Fiber Optic Probes

Use With	Description	Part No.
Cary 50	Fiber optic dip probe, stainless steel, body only Requires stainless steel tip	7910035700
	Fiber optic dip probe, stainless steel, fixed 10 mm path tip	7910036400
	Fiber optic dip probe, stainless steel, replaceable 10 mm path tip	7910036500
	Fiber optic dip probe, Torlon, body only Requires Torlon tip	7910032600
	Fiber optic dip probe, Torlon, fixed 10 mm path length	7910029900
	Fiber optic dip probe, Torlon, replaceable 10 mm path tip	7910035100
	Fiber optic dip probe, quartz, fixed 10 mm path length	7910030300
	Fiber optic micro probe, 3.5 mm diameter, fixed 10 mm path length	7910035600
	Fiber optic remote read probe, stainless steel, replaceable 10 mm path tip	7910030200
	Cary 100/300	Probe, quartz, 10 mm path length
Probe, quartz, long body		7910032100
UV-Vis reflectance probe and probe holder		7910036200
Absorbance dip probe with switch, stainless steel, 10 mm path		9910085000
Absorbance dip probe with switch and coupler, stainless steel, 10 mm path		9910085100
Transmission probe and holder		9910076700
Cary 4000/5000/6000i	UV-Vis reflectance probe	7910035500
	UV-Vis reflectance probe, 2 m	9910069300
	UV-Vis absorption probe, stainless steel, 2.5 m, 10 mm path length	9910069400
	UV-Vis transmission probe and holder, 2 x 3 m fibers	9910069600
	UV-Vis & Vis-NIR transmission probes and holder kit, 4 x 3 m fibers	9910076500
Cary 5000/6000i	UV-Vis-NIR transmission probe and holder, 2 x 3 m fibers	9910076400
	UV-Vis-NIR absorption probe, stainless steel, 2.5 m, 10 mm path length	9910069500



UV-Vis-NIR transmission probe and holder,
9910076400



Dip probe coupler, 210159300



Fiber optic coupler, 210159400



Replaceable tip, Fiber optic coupler, 9910076600

Accessories and Maintenance Supplies

Use With	Description	Part No.
Cary 50	Dip probe coupler	210159300
	Fiber optic coupler	210159400
	Replaceable tip, stainless steel, 2 mm path length	7910036000
	Replaceable tip, stainless steel, 5 mm path length	7910035900
	Replaceable tip, stainless steel, 10 mm path length	7910035800
	Replaceable tip, stainless steel, 40 mm path length	7910036100
	Replaceable tip, Torlon, 2 mm path length	7910032800
	Replaceable tip, Torlon, 5 mm path length	7910032900
	Replaceable tip, Torlon, 10 mm path length	7910033000
	Replaceable tip, Torlon, 20 mm path length	7910034600
	Replaceable tip, Torlon, 40 mm path length	7910034500
Cary 100/300	Fiber optic coupler	10056200
	Replaceable tip, stainless steel, 10 mm path length	9910076600
Cary 4000 to 6000i	UV-Vis-NIR fiber optic coupler (FiberMate accy)	7910049200
All Cary	Fiber optic alignment loop	7910027200
	Fiber optic probe light shield	7910028900
	UV-Vis reflectance probe holder, spare	9910068500

Cary Polarizer and Depolarizer



Glan-Taylor calcite prism polarizer, 210131600



Depolarizer, 1/4 wave scrambler, 210131700

The polarizer is used to transmit only one polarized component of an incident light beam. Cary polarizers are mounted in a stainless steel slide (5 x 7.5 cm) with Vernier scale and dial. A depolarizer is used to transmit the polarized component of an incident light beam with minimum degree of plane polarization, converting any plane polarization to a mixture of polarizations.

Polarizer and Depolarizer

Description	Use With	Part No.
Glan-Taylor calcite prism polarizer	Cary 1, 3, 4, 5, 100, 300, 400 to 500i, 4000 to 6000i	210131600
Depolarizer, 1/4 wave scrambler		210131700
Glan-Thompson calcite prism polarizer	Cary 1, 3, 4, 5, 100, 300, 400 to 500i, 4000 to 6000i	190029100

Cary Lamps and Detectors

Agilent offers high quality lamps and detectors that produce top level performance for your Cary spectrophotometer.

Source Lamps

Description	Use With	Part No.
D2 UV lamp	All except Cary 50	5610021800
Xenon lamp module	Cary 50	110639690
Visible source lamp	Cary 100/300	5610021700
UV source lamp, less than 190 nm	Cary 400	5610135500
D2 UV lamp	Cary 4000 to 6000i	110713990
Visible QI lamp	Cary 4000 to 6000i	5610013900

Detector Supplies

Description	Part No.
Photomultiplier tube R928, 185-900 nm	5618000200
Photomultiplier tube R955, 160-900 nm	5610024100
External detector mount, Cary 50	190036500

Cary Tubing and Reference Materials

Tubing

Description	Part No.
Silicon tubing, 3/16 in. ID x 5/16 in. OD, per m Tubing only, no connectors	2410023800
Peristaltic pump tubing replacement kit, 1.0 mm ID	3710045100
Peristaltic pump tubing replacement kit, 1.5 mm ID	3710045000
Dissolution tubing spares kit, Cary 50	6610020500
Dissolution tubing spares kit, Cary 100/300	6610020600
Peristaltic pump tubing replacement kit	9910052900
Silicon tubing, 1 mm ID, per m For connecting nebulizer capillary to SPS probe	3710026400
Spare inlet/outlet tubing	3710044600



Photometric linearity neutral density filter kit,
9910056100

Optical Filters

Description	Part No.
Attenuator filter kit with neutral density screens and blue filter	9910047700
Holmium oxide filter	118020790
Holmium oxide/didymium glass filter kit	10030200
Photometric linearity neutral density filter kit	9910056100

Standards

Description	Part No.
Calibrated color standard, 2 in. OD, 4 per set	9910084300
Calibrated solution standards kit	9910085200
Certified diffuse reflectance wavelength and wave number standard	9910081100
Certified diffuse reflectance wavelength standard	9910080900
Certified reference standard 1404 for USP certification	190034200
Certified reference standard, full certification Includes 190034200 and 9910085200	190034300
Specular reflectance standard, 1 in. OD	190012800

■ AGILENT CARY ECLIPSE FLUORESCENCE SUPPLIES



Cary Eclipse Fluorescence Spectrophotometer

Agilent's fluorescence spectrophotometers are augmented by a wide range of accessories and supplies, including a fast filter accessory, 96- and 384-well microplates, and fiber optic probes and couplers.

Fast Filter Accessory

The fast filter accessory for the Cary Eclipse is the ideal solution for investigating rapid intracellular ion movements into and out of cells (signal transduction) using ratiometric fluorescent probes. A pair of bandpass filters appropriate to the fluorophore under investigation must be mounted in the fast filter accessory. Agilent offers filter pairs appropriate for measurement of the calcium binding dyes Fura-2 and Indo-1.

Fast Filter Accessory

Description	Part No.
Fast filter accessory for Cary Eclipse	10077400
Fura-2 filters for Ca ²⁺ measurements (340 and 380 nm bandpass filters, 20 nm SBW) Requires fast filter accessory	7910043800
Indo-1 filters for Ca ²⁺ measurements (405 and 495 nm bandpass filters, 20 nm SBW) Requires fast filter accessory	7910043900

Cuvettes and Flow Cells

Ideal for use when you have only a small amount of sample, microcell cuvettes have the optimum Z-height (the distance between the base of the cell and the center of the light beam) for the Cary Eclipse fluorescence spectrophotometer.

Cuvettes and Flow Cells

Cell Type	Description	Cell Material	Volume	Path Length (mm)	Part No.
Flow Cell	Flow cell, 2 x 2 mm emission window	Far UV quartz	40 μ L	10	6610023700
	Flow cell, 2 x 2 mm emission window	Far UV quartz	40 μ L	10	9910105100
Rectangular	Fluorescence cell, open top, pair	Far UV quartz	3.5 mL	10	6610000900
	Fluorescence cell, stoppered, pair	Far UV quartz	3.5 mL	10	6610001200
	Fluorescence cell, anaerobic	Far UV quartz	3 mL	10	6610021400
	Fluorescence cell, two sides mirrored	Far UV quartz	3 mL	10	6610023500
	Submicro cell, 4 x 10 mm window	Far UV quartz	400 μ L	10	6610021500
	Submicro cell, 2 x 2 mm window	Far UV quartz	40 μ L	10	6610021600
	Submicro cell, low head space, stoppered	Far UV quartz	40 μ L	10	6610024200
	Triangular	Microcell, stoppered, square base	Far UV quartz	1.7 mL	10
Microcell, open top, square base		Far UV quartz	1.7 mL	10	6610021300

Cell Holder and Base

Description	Part No.
Cell holder, fluorescence	110664700
Cell holder base, fluorescence	210167200

Use with Cary Eclipse

Microplates

Our microplates are available in white for best overall well-to-well reproducibility, or black for the lowest background signal levels. Both types have high binding surfaces that bind medium and large biomolecules (greater than 10 kDa) that have hydrophobic and/or ionic groups. These microplates are recommended for the Cary Eclipse Microplate Reader Accessory.

96-well Microplates

Surface Treatment	Sterile	Color	Unit	Part No.
High binding	No	White	10/pk	6610022400
High binding	No	Black	10/pk	6610022500
High binding	No	White	100/pk	6610022800
High binding	No	Black	100/pk	6610022900
Untreated	Yes	White	10/pk	6610022300

384-well Microplates

Surface Treatment	Sterile	Color	Unit	Part No.
High binding	No	White	10/pk	6610022600
High binding	No	Black	10/pk	6610022700
High binding	No	White	100/pk	6610023000
High binding	No	Black	100/pk	6610023100

Base Plate for Custom Accessories

This base plate incorporates locating holes and the Cary Eclipse rapid lockdown mechanism common to most Eclipse accessories. It can be used to mount custom accessories in the Eclipse sample compartment.

Base Plate for Custom Accessories

Description	Part No.
Base plate for custom accessories, fluorescence	210167490

Fiber Optic Probes and Couplers

Fiber Optic Probes and Couplers

Description	Part No.
Fiber optic dip probe coupler accessory, fluorescence	10076800
Fiber optic coupler accessory, fluorescence	10076700
Fiber optic dip probe, fluorescence	7910043100
Fiber optic remote read 2 m probe, fluorescence	7910043000

Lamps

The lamp module contains the long life xenon flash lamp, Schwarzschild collector focusing optics and electronics within a metal enclosure. This allows safe and easy replacement of the lamp.

Lamps

Description	Part No.
Xenon flash lamp module	110666090

Standards and Reference Materials

Standards and Reference Materials

Description	Part No.
Water filled fluorescence cuvette, sealed	6610021800
Diffuser, spare	110674800
Neutral density attenuator 1.5 Abs, spare	110677500
Rhodamine B in polymer block	6610021900
Europium in polymer block	6610022200
Rhodamine B, concentrated solution sealed in triangular cuvette	6610021700
Holmium perchlorate 4% in perchloric acid, sealed in a quartz cuvette	6610022100
Wavelength accuracy standard	
Cell holder for holmium perchlorate cuvette	110678600
Required for Cary Eclipse wavelength accuracy test using holmium perchlorate solution	
Fluorescence samples, set of six hydrocarbons in polymer blocks	6610010300
Four have broad fluorescence bands for 300-700 nm, and two have sharp emission bands for wavelength calibration and bandpass checking; includes Rhodamine B in PMMA block (P/N 6610021900)	
Fluorescence demonstration kit	9910101900
Includes europium in PMMA, ovalene in PMMA, a sealed water cuvette, and a 10 x 10 mm fluorescence cuvette	

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