



### Rapidly Analyze a Wide Range of Glycol Ethers by GC-MS Using the New Rxi®-1301Sil MS Column

Chromatographic conditions were developed for a fast GC-MS glycol ether analysis on the Rxi®-1301Sil MS column. This column provides better resolution and faster run times than the thick film cyanopropylphenyl-type columns commonly used for speciation of the glycol ethers.

### Combined Determination of 1,4-Dioxane and Nitrosamine Contaminants in Drinking Water

Typically, 1,4-dioxane and nitrosamines are analyzed in drinking water following separate extraction and analysis procedures, such as Methods 521 and 522. However, here we present a combined method that uses large volume splitless injection and GC-MS (SIM) to meet low part-per-trillion detection limits for these compounds in a fraction of the time required when running separate methods.

### Helium, Hydrogen, or Nitrogen—The Choice is Yours: Unique Rtx®-CLPesticides Column Set Provides Optimal Results for Organochlorine Pesticides GC-Micro-ECD Analysis Using Any Carrier Gas

Using an Rtx®-CLPesticides column set is the best strategy for labs considering alternate carrier gases as a way to reduce helium consumption. These columns have a unique selectivity and produce faster results than competitor columns when using either helium or hydrogen. In addition, only Rtx®-CLPesticides columns can be used with nitrogen, which give labs the freedom to choose the carrier gas option that is best for them.



### A Guide to the Analysis of Halogenated Environmental Pollutants Using Electron Capture Detection

Analyses of halogenated pollutants can be difficult because samples often are contaminated with nontarget compounds and methods can require rigorous quality control. This technical guide covers sample extraction, cleanup, and GC-ECD analysis. Includes chromatographic analysis of chlorinated pesticides, PCBs, chlorinated herbicides, haloacetic acids and more on a single column set. [Request free printed copies today.](#) (PDF - 3612kB)



### Reduce Helium Consumption by 68% Using Nitrogen Purge Gas for VOCs in Water

Labs analyzing purgeable organic compounds in water can save money and reduce helium dependence by using Method 524.4 with nitrogen purge gas and an Rtx®-VMS column. By making the switch, you can reduce helium consumption by 68%, while meeting all Method 524.4 requirements. (PDF - 1464kB)

### Half the Column, Same Chromatogram: Maintain Resolution of BDE 49 and BDE 71 With Proper Method Translation After Trimming an Rtx®-1614 Column for Maintenance

Column trimming can extend GC column lifetime when analyzing polybrominated diphenyl ethers (PBDEs); however, the method must be adapted to the shorter column length in order to maintain separation of critical congeners. Here we demonstrate that with proper method translation an Rtx®-1614 GC column can be trimmed nearly in half and still meet resolution requirements for BDE 49 and BDE 71.



### Techniques for Optimizing GC Analysis of Ethylene Glycol in Water

Direct injections of water-based samples, such as samples containing ethylene glycol, can cause poor peak shape, sample carryover, and FID flameout. Avoid these problems using the chromatography tips described here. (PDF - 921kB)



## Analyze Seven EPA Methods on One GC Column Pair! Pesticides, PCBs, Herbicides, and More on Rtx®-CLPesticides & Rtx®-CLPesticides2 Columns

Rtx®-CLPesticides and Rtx®-CLPesticides2 columns are ideal for multiple environmental ECD methods. Here we demonstrate the effectiveness of this column pair for chlorinated pesticides, PCBs as Aroclors, chlorinated herbicides, and haloacetic acids. Includes EPA Methods 8081B, 8082A, 8151A, 504.1, 505, 508.1, and 552.2. Speed up your analyses and reduce downtime using the versatile Rtx®-CLPesticides/Rtx®-CLPesticides2 column pair in a dual column configuration. (PDF - 3972kB)



## Ship Our Rugged Air Canisters at No Extra Cost

Air sampling canisters from Restek are durable, easy to use, and highly inert. They weigh just grams more than canisters from other vendors and cost the same to ship. Check out this weight and cost comparison to see for yourself! (PDF - 1795kB)



## Improve Results for Chlorinated Pesticides With Resprep® CarboPrep® SPE Cleanup

Ensure cleaner sample extracts and obtain high recoveries of target pesticides by adding a Resprep® CarboPrep® SPE cleanup step when preparing samples for chlorinated pesticides analysis. (PDF - 1683kB)

## Fingerprinting Crude Oils and Tarballs using Biomarkers and Comprehensive Two-Dimensional Gas Chromatography

Comprehensive two-dimensional gas chromatography time-of-flight mass spectrometry (GC×GC-TOFMS) was used to analyze petroleum biomarkers creating unique fingerprints of crude oil samples and tarballs collected after the Deepwater Horizon oil spill.



## Improve GC Analysis of Extractable Petroleum Hydrocarbons Using Resprep® EPH Fractionation SPE Cartridges

New manufacturing and testing procedures for Resprep® EPH fractionation SPE cartridges reduce background levels of extractable contaminants and assure more reliable fractionation of aliphatics from aromatics. (PDF - 1279kB)

## Rapid Determination of TO-15 Volatile Organic Compounds (VOCs) in Air

The efficacy of using a Nutech preconcentrator and a 30 m analytical column for VOC analysis of air samples according to Method TO-15 was evaluated. Results demonstrate that method criteria were easily met and in much faster analysis times than typical methods based on 60 m columns.



## Restek Ultra-Clean Resin

Restek-exclusive Ultra-Clean resin is a great alternative to XAD®-2 resin for sampling semivolatiles. Learn more about how our GC-tested resin, as well as our polyurethane foam (PUF) plugs, can help you with your ambient, indoor, and industrial hygiene air-sampling applications. (PDF - 656kB)



## New Rxi®-PAH GC Column; Resolve Important Isobaric Polycyclic Aromatic Hydrocarbons for Food Safety and Environmental Methods

Separate isobaric polycyclic aromatic hydrocarbons, including priority EFSA PAH4 compounds benz[a]anthracene, chrysene, benzo[b]fluoranthene, and benzo[a]pyrene, easily and accurately on an Rxi®-PAH column. Whether you need more resolution or faster analysis, these new GC columns offer the selectivity and efficiency you need for food safety and environmental PAH analysis. (PDF - 826kB)



## A New Solution for Trace-Level Analysis of 1,4-Dioxane in Drinking Water: Large Volume Injection in an Unmodified Splitless GC Inlet

Quantify 1,4-dioxane in drinking water down to 5.0 ppt using a new approach. The technique described here uses an unmodified split/splitless GC inlet with concurrent solvent recondensation-large volume splitless injection (CSR-LVSI) to lower detection limits. This 8-page brochure details system setup, sample prep, and analysis. (PDF - 1812kB)



## Florisil® SPE Cleanup for Chlorinated Pesticides Analysis

Florisil SPE tubes are ideal for cleanup of sample extracts prior to GC-ECD analysis of chlorinated pesticides. By using Florisil tubes for extract cleanup, background interferences can be reduced and recoveries can be improved. (PDF - 1182kB)



## Introducing New Restek EPA 524.3 Certified Reference Materials

Restek has formulated the most complete set of EPA 524.3 reference standards for the monitoring of purgeable organic compounds in drinking water—using as few as three ampuls! This collection of certified reference materials (CRMs) also covers the seven volatile organic compounds (VOCs) included in UCMR3. (PDF - 1000kB)



## Airmail, 2012 vol. 2

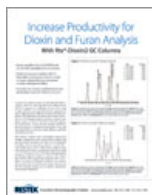
This issue of Airmail includes a fast, sensitive analysis of TO-15 volatiles on a 30 m column, as well as an update on opportunities for air labs to collaborate with the EPA to meet Agency measuring and monitoring needs. Also features Tedlar® bags. (PDF - 867kB)

## Analysis of Trace Oxygenates in Petroleum-Contaminated Wastewater, Using Purge-and-Trap GC-MS (U.S. EPA Methods 5030B & 8260)

Determination of oxygenates in a gasoline-water matrix is difficult, because analytes such as MTBE and TBA coelute on many columns and share GC-MS identification ions. We developed a sensitive, accurate analysis using an Rtx®-VMS column and optimized conditions.

## Lowering Detection Limits for 1,4-Dioxane in Drinking Water Using Large Volume Injection in an Unmodified Splitless GC Inlet

Concurrent solvent recondensation–large volume splitless injection (CSR-LVSI) typically requires a special GC inlet. The technique described here uses an unmodified split/splitless inlet with CSR-LVSI to lower detection limits for the analysis of 1,4-dioxane in drinking water.



## Increase Productivity for Dioxin and Furan Analysis with Rtx®-Dioxin2 GC Columns

Rtx®-Dioxin2 columns have higher temperature stability (340 °C) than other confirmation columns and also provide isomer specificity for both 2,3,7,8-TCDD and 2,3,7,8-TCDF in a single column. These attributes allowed the Maxxam Analytics HR-MS group to make productivity improvements that resulted in their being honored with a Kaizen award. (PDF - 691kB)



## Rxi®-624Sil MS Columns—Exceptionally Inert, Low Bleed Columns for Volatiles Analysis

Analyze volatile compounds and polar analytes with greater confidence using Rxi®-624Sil MS columns. Optimized selectivity, higher inertness, and lower bleed result in reliable separations and accurate, trace-level determinations. Includes environmental and pharmaceutical applications. (PDF - 3111kB)



## Restek Airmail, 2012 vol. 1

This 4-page newsletter includes an analysis of Massachusetts DEP air-phase petroleum hydrocarbons, as well as an update on the U.S. EPA Photochemical Assessment Monitoring Stations (PAMS) program. Also features Tedlar® bags and air canisters. (PDF - 774kB)

## Large Volume Splitless Injection Using an Unmodified Split/Splitless Inlet and GC-TOFMS for Pesticides and Brominated Flame Retardants

Concurrent solvent recondensation large volume splitless injection (CSR-LVSI) GC/MS is used here for analyzing pesticides and brominated flame retardants in drinking water based on EPA Method 527. CSR-LVSI allows a time-consuming sample extract concentration step to be eliminated, but can also be used with extract concentration for lower detection limits.



## Rxi® GC Columns: 3-IN-1 TECHNOLOGY

Rxi® GC columns deliver more accurate, reliable trace-level results than any other fused silica column on the market. Take variation out of the equation and lower detection limits with highly inert, low bleed Rxi® gas chromatography columns. (PDF - 1992kB)

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## Avoid Resampling Soil Vapors: Confirm Tracer Gas in the Field Using a Leak Detector

Confirming sample port integrity with a leak detector is a simple, cost-effective alternative to lab analysis of tracer gas in vapor intrusion VOC samples. Prevent resampling of soil vapors by confirming sample port integrity in the field prior to sampling.

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## Seven EPA Methods on One Column Pair Using a micro-ECD

Get improved resolution, faster analyses, and less downtime by using Rtx®-CLPesticides and Rtx®-CLPesticides2 columns for multiple GC/ECD methods. Instead of changing columns between methods, you can save time by analyzing chlorinated pesticides, PCBs, herbicides, and other halogenated compounds on a single column set. Rtx®-CLPesticides and Rtx®-CLPesticides2 columns have a unique selectivity and outperform other column sets offered specifically for multiple GC/ECD methods.



## Guide to Whole Air Canister Sampling

Ambient air sampling involves collecting a representative sample of ambient air for analysis. There are two general approaches: 1) "whole air" sampling with canisters or Tedlar® bags and 2) "in-field concentration" sampling using sorbent tubes or cold traps. In this guide, we focus on collecting whole air samples in canisters, a flexible technique with many applications. (PDF - 1408kB)

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## Optimized Volatiles Analysis Ensures Fast VOC Separations

Analytical conditions for GC analysis of volatile organic compounds have been optimized to ensure good resolution of critical pairs, while maximizing sample throughput. Rxi®-624Sil MS columns are shown to outperform other 624s.



## Gas Sampling Bags: Cost-Effective Alternatives for Air Monitoring

Gas sampling bags can be a cost-effective alternative to canisters and thermal desorption tubes for many air monitoring applications, including VOCs and permanent gases. This 4-page flyer provides general guidelines, product specifications, and recommended applications. (PDF - 953kB)

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## New Wool Ensures More Accurate Semivolatiles Analyses

New Semivolatiles Wool, pre-packed in Restek liners, is designed specifically for semivolatiles analysis and result in more accurate results at lower levels, compared to similar products.

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## Analyze Haloacetic Acids in Under 13 Minutes with Rtx®-CLPesticides Columns

Sample throughput for haloacetic acids in drinking water can be increased significantly using Rtx®-CLPesticides/Rtx®-CLPesticides2 columns. Target HAAs were fully resolved in under 13 minutes.

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## 3-Fold Faster Polybrominated Diphenyl Ether (PBDE) Short Column Method

Sample throughput for PBDE analysis can be significantly increased using a 15m Rtx®-1614 column. Excellent responses and peak shapes are obtained for all congeners, including BDE-209, in just 20 minutes.

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## Reliably Detect Pesticides Down to 10 pg with Sensitive SIM GC-MS Multiresidue Method

As labs operate in an extremely competitive market, the demand for more sensitive multiresidue pesticide methods is increasing. Here we demonstrate linearity down to 10 pg on-column for a wide range of pesticides differing in volatility, compound class, and degree of activity. The inertness of the Rxi®-5Sil MS column ensures linear performance and more accurate low-level quantification for multiresidue pesticide methods.

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## PTV On-Column Liner Gives You Two Inlets in One

Programmable temperature vaporization inlets are versatile, yet normally do not accommodate on-column injection. Now, using a PTV On-Column liner, the capabilities of PTV can be expanded to include true on-column injections.

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## Characterizing All 136 Tetra- to Octachlorinated Dioxins and Furans

The Rtx<sup>®</sup>-Dioxin2 column has a unique selectivity for dioxins and furans, including specificity for 2,3,7,8-TCDD and 2,3,7,8-TCDF. Here we characterize all 136 tetra- through octachlorine dioxins and furans and define all possible coelutions. While commonly used cyanopropyl columns are limited by a low maximum operating temperature of 240°C, the Rtx<sup>®</sup>-Dioxin2 column is stable up to 340°C, extending column lifetime and improving the analyses of dioxins and furans.



## Underground Storage Tanks: Compliance Monitoring with Restek Reference Standards

Restek develops reference standards for underground storage tank testing. This flyer includes UST fuel composite standards, single source fuel standards, fuel surrogate & internal standards, & standards blended for specific state methods. (PDF - 438kB)

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## Increase Polycyclic Aromatic Hydrocarbon Sample Throughput

Here we analyze polycyclic (polynuclear) aromatic hydrocarbons (PAHs) from the US EPA, European Union (EU), and Portugal lists by UHPLC and HPLC. Procedures shown use two optimized stationary phases (Pinnacle<sup>®</sup> DB PAH and Pinnacle<sup>®</sup> II PAH) and provide 3.5 to 6 minute analyses, allowing labs to achieve significantly faster sample throughput.

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## One Stop Shop for EPA Method 535

An optimized EPA Method 535 procedure offers superior sensitivity for the ethanesulfonic acid (ESA) and oxanilic acid (OA) degradates of chloroacetanilide herbicides alachlor, acetochlor, and metolachlor. Alachlor ESA and acetochlor ESA isomers are reliably resolved, and the procedure is simplified with a full line of Method 535 products, including reference standards, solid phase extraction cartridges, and HPLC columns.



## Thermal Desorption: A Practical Applications Guide: I. Environmental Air Monitoring and Occupational Health & Safety

Thermal desorption is now recognized as the technique of choice for environmental air monitoring and occupational health and safety. This 28-page publication from Markes International Ltd. presents several real world thermal desorption applications. (PDF - 1137kB)

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## Enhancing Air Monitoring Methods with Thermal Desorption

The use of carbon disulfide (CS<sub>2</sub>) extraction as an air monitoring method for vapor-phase organic compounds (VOCs) is fundamentally limited with respect to detection limits. Thermal desorption (TD) is a complementary gas extraction technique whereby sorbent tubes are heated in a flow of carrier gas. Trapped vapors desorb from the sample tubes into the gas stream and are transferred into the GC/MS analyzer. Here, we summarize the key advantages of thermal desorption versus solvent extraction.

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## 13 Minute Chlorophenoxyacid Herbicides Analysis

The Rtx<sup>®</sup>-CLPesticides and Rtx<sup>®</sup>-CLPesticides2 column pair is an excellent choice for chlorophenoxyacid herbicide analysis. Now, with an optimized film thickness for the 0.32mm ID version, this difficult analysis can be made in less than 13 minutes on both the primary and confirmation columns. Near baseline resolution is achieved for all analytes except for bentazon/picloram on the Rtx<sup>®</sup>-CLPesticides column; however, this pair is fully resolved on the Rtx<sup>®</sup>-CLPesticides2.



## Whole Air Sampling for Vapor Intrusion

This 2-page note describes the features and benefits of our popular TO-Can<sup>®</sup> air monitoring canisters (SUMMA<sup>®</sup> can equivalents), our new canister air sampling timer, and our convenient, reliable passive air sampling kits. (PDF - 206kB)



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## A Guide to Preparing and Analyzing Chlorinated Pesticides

Analyses of chlorinated pesticides can be difficult because samples often are contaminated with non-target compounds (e.g., lipids), and the method can require rigorous quality control. Our 24-page guide covers sample extraction methodology, sample cleanup, and chromatography. A chromatographic analysis of widely used chlorinated herbicides also is illustrated. One of our most popular technical guides. (PDF - 4049kB)

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## Accurately Quantify PAHs Down to 5 pg On-Column

Semivolatiles methods, such as EPA Method 8270, place stringent demands on gas chromatography (GC) columns. Here we demonstrate the performance of Rxi®-5Sil MS columns for semivolatiles analysis in terms of bleed, efficiency, and activity. Excellent sensitivity and resolution are seen, even for difficult PAHs such as benzo(b)fluoranthene & benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene and dibenzo(a,h)anthracene. Both basic and acidic compounds show good response even at low levels.

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## Complete Resolution of 13 DNPH Carbonyls as Derivatives

The new Allure® AK HPLC column was developed specifically for the analysis of aldehydes and ketones, including the 13 carbonyl compounds specified in the California Air Resources Board (CARB) Method 1004. The data shown in this article demonstrate excellent resolution, even of buteraldehyde and methyl ethyl ketone (MEK), in less than 12 minutes using a 200mm Allure® AK HPLC column.

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## Resolving the Benzo(j)fluoranthene Challenge

Polynuclear aromatic hydrocarbons are a significant, and wide-spread, source of pollution. The US EPA mandates testing of the 16 PAHs they designate as most hazardous; the target list in other countries is expanding and includes new compounds that are difficult to separate. Here we demonstrate the ability of the Rxi®-17 column to effectively resolve dibenzo pyrene isomers, as well as to separate benzo(j)fluoranthene from benzo(b)fluoranthene and benzo(k)fluoranthene.

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## Faster Organochlorine Pesticide Sample Throughput

Increasing sample throughput is an effective way to reduce operating costs for environmental labs. Here we introduce new film thicknesses for the Rtx®-CLPesticide and Rtx®-CLPesticide2 GC columns, optimized for complete separations and short analysis times. Using these new columns, all US EPA Method 8081 organochlorine pesticides are resolved in <9 min. We also show complete separation of these compounds in <5 min. using these columns and a Gerstel MACH column heating system.

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## Choosing a Liner for Semivolatiles Analyses

Liner choice is a critical decision in semivolatiles analysis. Liners containing wool packing are recommended to minimize molecular weight discrimination. Attributes of different types of liners, including the Drilled Uniliner®, are discussed.



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## Reduce Acetonitrile Dependence by Analyzing Polycyclic Aromatic Hydrocarbons with Methanol-Based Mobile Phase

Switching to a methanol-based mobile phase for polycyclic aromatic hydrocarbon analysis—using the method shown here—is an effective way to save money by reducing acetonitrile consumption. (PDF - 119kB)

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## High Throughput of Semivolatile Samples by GC/MS

We developed the 20m x 0.18mm x 0.30µm Rxi®-5ms column to balance the demand for shorter analysis times with the need to maintain both column capacity and column efficiency. Here we establish conditions for eluting more than 90 semivolatiles, including 7 surrogates and 6 internal standards, in less than 12 minutes. Benzo(b) and benzo(k)fluoranthene were resolved well and sample throughput was improved by 75%. This highly inert, low bleed column is ideal for GC/MS analysis.



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## Thermal Desorption Tubes: Versatile Air Sampling for a Wide Range of Applications

This flyer give an overview of TD sampling and describes many applications that can be sampled using this versatile technique. Includes a comparison of tube and canister sampling, to help you determine which VOC sampling technique is best for you. (PDF - 177kB)

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## Fast, Sensitive LC/MS/MS Analysis of Paraquat and Diquat

Developed through collaboration with scientists at AB/MDS Sciex, this analysis allows complete resolution of paraquat and diquat with a simple, isocratic mobile phase. It is significantly faster than conventional methodologies and, with detection limits of 5ppb for paraquat or 0.1ppb for diquat, sensitivity is superior — without preconcentration.

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## Low-Level GC/MS for Semivolatiles in Drinking Water

Using this new column, resolution and peak shapes for 88 semivolatile compounds commonly analyzed in drinking water are exceptionally good at 10ng each on column. Because the Rxi®-5ms column performs well with analytes in a diverse range of chemical classes, we highly recommend it for analyzing complex mixtures of semivolatiles.

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## Analysis of Semivolatile Organics

Exceptional inertness and ultra-low bleed enable an Rxi®-5ms column to resolve sub-1ng quantities of acidic or basic analytes under a single set of conditions. In this example analysis, an Rxi®-5ms column separated 93 target analytes in US EPA Method 8270D in less than 18 minutes.

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## Excellent Responses in GC/MS Analysis of Semivolatiles

The newest members of our new line of Rxi<sup>®</sup> columns, Rxi<sup>®</sup>-1ms columns, offer the same outstanding inertness, ultra-low bleed, and batch-to-batch reproducibility as our Rxi<sup>®</sup>-5ms columns. Rxi<sup>®</sup>-1ms columns provide excellent selectivity and symmetric peaks for the diverse chemicals that can make up a semivolatiles sample.

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## Monitoring Petroleum Hydrocarbons by Solid Phase Extraction/GC

New manufacturing processes for our Massachusetts TPH solid phase extraction cartridges reduce extractable contaminants almost to blank levels, and assure more reliable fractionation of aliphatics from aromatics. Large, uniform lots of silica reduce the frequency of verifying fractionation results.

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## A 12-Minute Purge and Trap GC/MS Analysis for Volatiles

An Rtx<sup>®</sup>-VMS column provides rapid, baseline resolution of most volatile analytes in the CLP OLM 04.1 analysis for groundwaters or drinking waters from Superfund sites. A particularly challenging stipulation of the method, 90% resolution of the gaseous components, is easily attained.

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