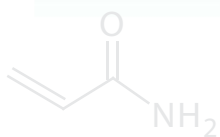
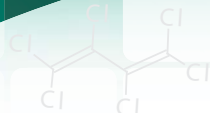
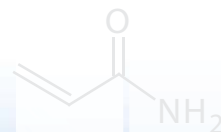
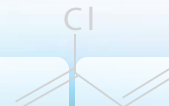
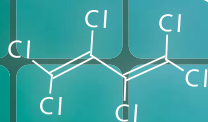
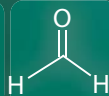


Chromatography
Supplies & Inlets

High Sensitivity
Headspace Analysis

EPA/OSHA Volatiles
Sampling & Analysis



Environmental

Industrial Hygiene

Food & Flavor

Forensics

Indoor Air Quality

Mold Investigation

Product Outgassing

Homeland Security

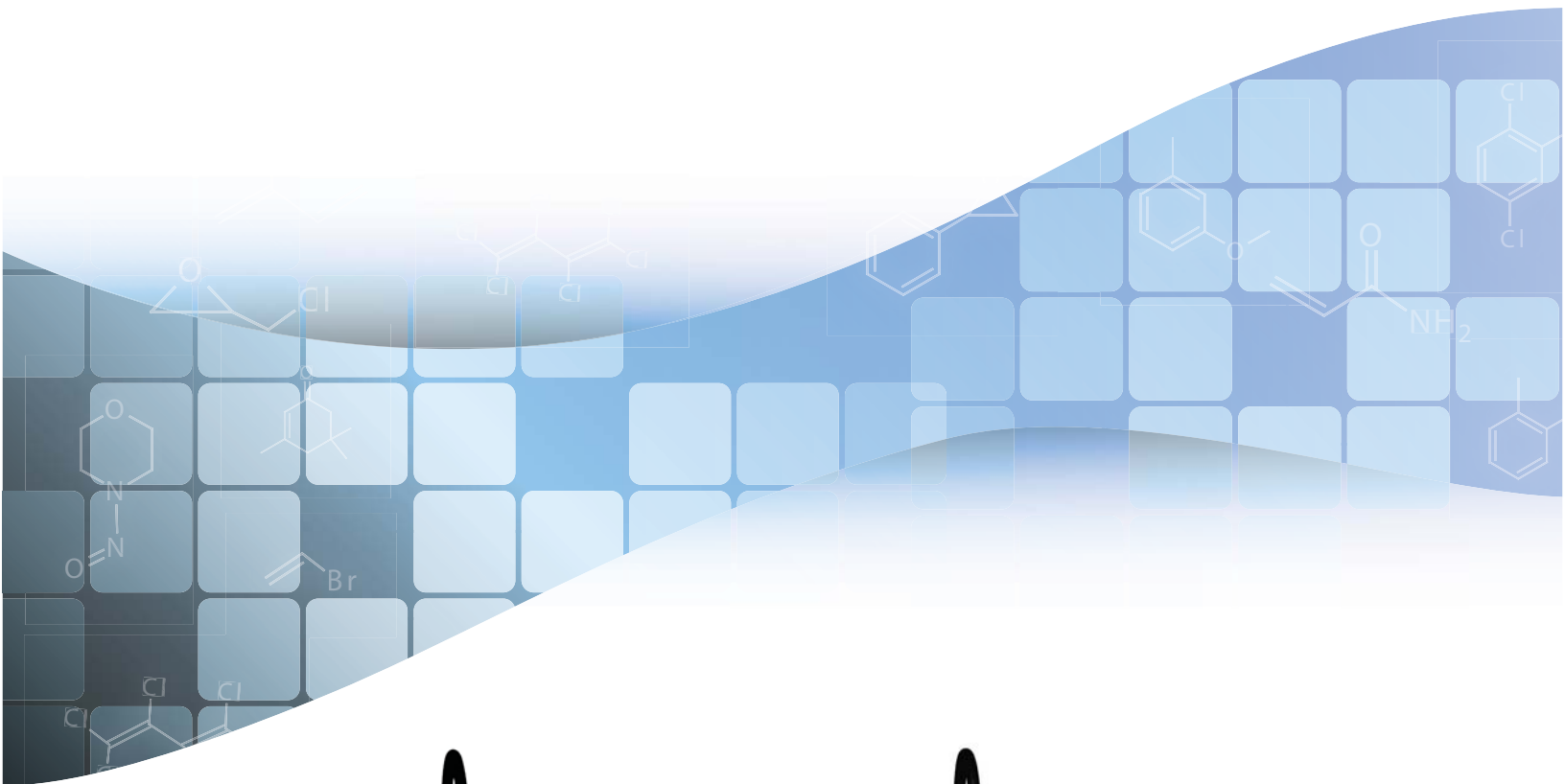
Breath Analysis

2015 – 2016 CATALOG

Solutions for Chemical Monitoring & Analysis

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44 – 53	Silonite® Coating	<i>The most inert surface coating available</i>
54 – 91	Sampling	<i>Complete line of sampling canisters and systems</i>
92 – 115	Analytical Applications	<i>Solutions for a wide range of applications</i>
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7650-HS with On-Column Extraction
See pages 6 – 19

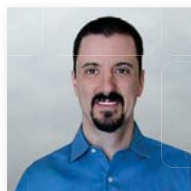


7200 | 7650-M MillionAir™ Analysis System
See pages 28 – 29



HDS™ Personal Monitors
See pages 84 – 87

Entech Instruments, Inc. | Solutions & Service



Doug Markle
*SouthWest & Mid-Atlantic
Analytical Solutions Engineer*



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Systems Manager*



Christopher Riepe
Central Analytical Solutions Engineer



Tom Walton
NorthEast Analytical Solutions Engineer



Benjamin Kim
East Coast Support Engineer



Tom Wilber
Customer Service Manager

President's Letter



Entech Instruments, Inc. is proud to be a world leader in GC and GCMS inlet systems for headspace and environmental analysis. Our instruments use the latest advancements in quantitative extraction and preparation technologies to recover a wider range of headspace compounds than ever before. The all-new 7650-HS is the most sensitive and most comprehensive headspace solution on the market. Featuring our “*On-Column Extraction*” sample preparation technology, the 7650-HS provides accurate determination of fully equilibrated headspace compositions for compounds boiling from -60°C to > 400°C, including thermally labile compounds that are not compatible with other trapping techniques.

With the ability to handle sample vials from 20cc to 1000cc, the 7650-HS can preconcentrate 1–1000cc of headspace, with full water and matrix management to provide a highly focused, rapid injection into a GC, free of matrix interferences. Entech's patent pending Porous Cartridge Micro Extraction (PCME) technology takes SPME to the next level by providing enhanced sensitivity, improved quantitation, and greater robustness than its fiber based predecessor. PCME utilizes a unique flow through cartridge (rather than a coated fiber) to collect and gently desorb the sample, and can sample up to 20 times faster through the application of a vacuum on the headspace to greatly increase the recovery of SVOCs relative to SPME. Combined with approximately 50 times greater phase loading, PCME can often fully extract the sample from the matrix without interferences, providing superior improvement in sensitivity and reproducibility. Our unmatched Silonite® surface coatings continue to be perfected, resulting in the most consistent, durable, and inert coatings available for GC inlet systems and for mercury vapor handling without surface interactions. Silonite® surface treatments play a vital role in achieving our ultimate goal; to provide our customers with complete solutions for “analytical grade” VOC and SVOC handling and inlet systems that can sample, store, and recover virtually all GCMS compatible compounds. Our HDS™ Personal Monitors for the collection of workplace air for laboratory analysis are currently in the OSHA and NIOSH evaluation process, with methods expected very soon. Helium Diffusion Sampling is also being used to study Indoor Air Quality and allows for very simple and cost effective sample collection and analysis for the monitoring of air impurities down to sub-PPB levels while performing time integrated sampling from 15 minutes to several weeks. For EPA Method TO-15 analysis, Entech leads the way as the only supplier that supports the complete application for monitoring airborne contaminants using Silonite® coated stainless steel canisters. Entech has assembled an extraordinary and talented team – a combined knowledge of over 200 years of laboratory and field experience – to provide our clients with premier customer service and on-site support. To our valued customers we would like to say thank you for your patronage through the years and we look forward to servicing your analytical needs for many years to come.

Sincerely,
Daniel B. Cardin - President

Instruments



7650-HS with On-Column Extraction
See pages 6 – 19



7200 | 7650-M MillionAir™ Analysis System
See pages 28 – 29



5400B Thermal Transfer
See pages 34 – 35

2

This Section Covers

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- 4 – 5 Advanced Sample Handling Systems and Strategies
- 6 – 11 7650-HS Trace Level Headspace System with On-Column Extraction
- 12 – 13 7650-HS – Loop Injection | Food & Beverage Analysis System
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- 42 – 43 3100D Canister Cleaning Systems

Instrument & System Selection Guide

GC / GCMS Inlet Systems

Type	Range	Applications	Instruments	Pages
Loop Injection (0.1 PPM to %)	Volatiles / Semi-Volatiles	Packaging PPM Level Gases HDS™ Personal Monitors Soil Gas 8260 Screening	7650-L10	22 – 23, 28 – 29
	Volatiles	Source Level Gases Soil Gas	7032AQ-L, 7032AB-L	32 – 33
Preconcentration (Sub-PPB to PPM)	Volatiles / Semi-Volatiles	Food & Beverage Fragrance Product Testing Forensics Clinical Analysis Homeland Security	7650-HS	6 – 15
	Volatiles	Environmental Monitoring Industrial Hygiene Mold (MVOCs) Indoor Air Quality Sulfur Compounds	7200 with 7650 7016D, 7032AQ	20 – 23 24 – 27, 32 – 33
PCME (Porous Cartridge Micro-Extraction)	Volatiles / Semi-Volatiles	Pesticides in Foods Nitrosamines & Acrylimides in Foods Pharmaceuticals in Drinking water SVOCs in Drinking & Waste Water Taints & Odors in Foods / Alcoholic Beverages Materials Testing (plastics, textiles, auto parts, indoor synthetics) Environmental Sampling of PAHs and SVOCs in Air	5800P	16 – 19
	Volatiles / Semi-Volatiles	Environmental Monitoring Product Testing	5400B Thermal Transfer	34 – 35

Volatiles
PCME also supports these applications

PCME
(Porous Cartridge Micro-Extraction)

Gas Standards Preparation

Type	Range	Applications	Instruments	Pages
Automatic Precision Dilution	Volatiles	Environmental Monitoring	4700 Precision Diluter	36 – 37
Manual Dilution	Volatiles	Environmental Monitoring	Digital Dilution System™	38
HDS™ Personal Monitors	Volatiles	Workplace Monitoring	HDS™ Exposure Chamber HDS™ Prep. Station	40 41

Canister / Bottle-Vac™ Cleaning

Type	Range	Applications	Instruments	Pages
Cleaning Systems	Volatiles / Semi-Volatiles	Environmental Monitoring Remote Headspace Sampling	3100D	42 – 43

Advanced Sample Handling Systems

Introducing the next generation in Headspace and Environmental GCMS sample introduction systems. Entech's robotic autosamplers have an ultra-inert Silonite® flow path that ensures complete recovery of compounds sampled while minimizing the potential for sample carryover. These autosamplers are optimized for collecting large volumes of headspace or other gas-phase samples using large vials or Silonite® coated vacuum sampling canisters to achieve both trace level detection and quantitative recovery of all compounds present. Entech's exclusive On-Column Extraction provides chemists with information never before possible, using the SPME concept to absorb rather than adsorb samples during sample enrichment. Three different versions of this autosampler are shown below, one for trace level headspace analysis of liquid and solids samples, and the other two for advanced Environmental and Industrial Hygiene analysis of whole air collected samples. Obtain the system optimized for your application and take full advantage of all the benefits offered by our latest sample handling solutions.



7650-HS Analyzer – with On-Column Extraction (Trace Level Headspace)

The 7650-HS uses Entech's exclusive On-Column Multi Trapping System (OCMTS) that provides better "true" characterization of trace headspace concentrations than any other headspace technique. A 3-stage trapping system features an initial thick film GC column that performs On-Column Extraction to "absorb" semi-volatile compounds, allowing them to be simply "reverse flushed" off the thick film column and onto the analytical column in the GC for better recovery of both high boilers and thermally labile compounds. Although similar to SPME trapping with PDMS, this thick-film column is exposed to a known volume of sample by using a vacuum downstream to "pull" the requested volume through the extraction column. Downstream, water management and cold traps recover lighter compounds to complete the quantitative recovery of the largest range of compounds currently possible. No other analytical technology provides a clearer picture of what is in the sample headspace, covering boiling points of -50°C to $>400^{\circ}\text{C}$, including thermally labile compounds.



7650-M "Million Air" Autosampler (Environmental and IH Analysis)

The 7650-M "Million Air" platform is our next generation autosampler for analyzing whole air samples. The 7650-M is the only trace level, whole air VOC autosampler that is capable of production level, multi-sample analysis using a single inlet to ensure consistent blank levels without the carryover challenges found in many rotary valve based autosamplers. This unique design also eliminates errors seen when analyzing samples over wide concentration ranges. The 7650-M combines with the 7200 Preconcentrator to provide quantitative analysis of samples over a "1 million fold concentration range". This range is simply not possible with rotary valve based systems that will absorb some of the previous sample connected to that inlet position, simply because of the length of time samples remain on each rotary valve inlet. The 7650-M can also perform loop injection of high concentration samples directly to the GC. This feature avoids any sample contact with the Tenax® trap when analyzing high concentration samples. Another new feature of the 7650-M is rapid sample screening (6–7 minutes per sample). Screening on the 7650-M allows the determination of the best analytical volume without any fear of system contamination. A 6L canister tray now allows up to six, 6L canisters to be screened directly by the robotic inlet without connection to any transfer lines in as little as 40 minutes. The 7650-M is configurable with trays that are optimized for sample vials, bottles, and canisters from 50cc to 6L. Up to 18 expansion ports can be added for analysis of 6L Silonite® canisters and Tedlar® bags. For soil gas analysis, up to 38, 1L sample canisters can be analyzed unattended to maximize productivity.



7650-L10 Loop Injection Autosampler (PPM Level and IH Analysis)

The 7650-L10 is a stand-alone, gas-phase sample analyzer intended for sample concentrations from 0.1–5000 PPM. Loop sizes from 0.1 to 5.0cc are available to optimize analytical sensitivity and dynamic range. A high-efficiency, LN_2 focusing system is available for the analysis of very volatile compounds when using larger loops to ensure rapid GC injections for unrivaled light end peak resolution. The 7650-L10 can be used to analyze headspace from vials ranging from 40mL to 1000mLs, or from Silonite® coated, gas sampling canisters. The 7650-L10 is also the ideal choice for the analysis of PPM level samples collected in our new 50cc Helium Diffusion Sampling (HDS™) Personal Monitors. HDS™ Personal Monitor easily collects all chemicals in the workplace using a single sampling device rather than having to use several different adsorbent tubes or badges.

Sample Handling Strategies for Improved Sensitivity and Statistical Accuracy

Entech offers the only “large vial” autosamplers available for headspace analysis. A large vial size is important to increase sample loading for improved statistical accuracy and to provide additional sample and headspace volume for improved detection limits when performing equilibrated static headspace analysis. This larger vial size can also accommodate large objects or products as a whole so they are presented to the analyzer the same as they would be to the consumer. For many compounds, olfactory detection is hundreds of times lower than what is possible by loop injection GCMS headspace analysis. Our autosamplers support 4 high sensitivity sample handling approaches listed below, including “remote headspace” sampling, which offers the most statistically accurate means of product quality measurement.

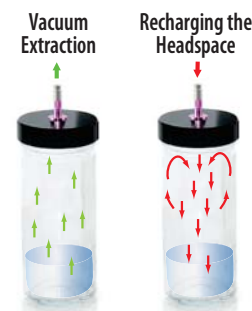
Large Volume Static Headspace (LVSH – On-Column Extraction and Loop Systems)

Large Volume Static Headspace offers a quantitative approach for the analysis of trace level volatiles in liquids and solids. Achieving equilibrium and then quickly pulling a reproducible volume of headspace using convective transfer provides equal weighting of the light and heavy compounds in the headspace. Unlike SPME, the analyzer will receive the same distribution of headspace compounds as a consumer would receive when first smelling the headspace. This is very important when fine-tuning a product for improved consumer appeal. Static conditions virtually eliminate aerosols and foaming – which are all too common with Purge & Trap techniques. The large volume eliminates the need to boost headspace concentrations through sample heating, which may denature thermally labile compounds and produce headspace artifacts.



Pulsed Vacuum Extraction Headspace (PVEH – On-Column Extraction Systems)

Pulsed Vacuum Extraction Headspace, or PVEH, allows for lower detection limits without the aerosols and foaming present in Purge & Trap. Volatiles in liquids and solids can be transferred more rapidly into the headspace by pulling a vacuum on the vial during sample preparation. After equilibration, the vial pressure is increased using UHP Helium or Nitrogen to provide a carrier gas to more efficiently transfer volatiles and SVOCs to a preconcentration system. “pulsed” vacuum & pressure filling are repeated until the desired sensitivity is achieved.



Porous Cartridge Microextraction (PCME).

Introducing the next generation of Solid-Phase Microextraction (SPME) extraction and analysis. Rather than using a fiber inside of a needle, PCME uses a porous cartridge that is coated with PDMS + Tenax® TA to extend the loading capacity and sampling rate of the Classical SPME sampler, while improving the robustness and speed of desorption. The PCME cartridge features a built-in micro-seal that allows sampling of the headspace under vacuum, increasing the recovery of SVOCs by 10–20 fold over atmospheric pressure diffusive sampling with SPME. The larger loading capacity of the cartridge minimizes matrix interferences, allowing a more reproducible equilibrium to be achieved between the cartridge and the sample, improving quantitation. Simply sample from 1–48 hours, then perform either manual desorptions with the low-cost 5800P PCME Desorber, or add on automation for higher productivity. Due to the benefits of longer sampling times and vacuum assisted extraction, PCME is uniquely capable of analyzing BOTH volatiles and semi-volatiles without contacting the matrix. PCME is the complete extraction technique that solves hundreds of analytical challenges for the sampling and analysis of matrices that previously required solvent extraction.



Remote Headspace Analysis

Direct collection of gas samples into vacuum-tight, inert containers enables the analysis of a tremendous number of systems as a whole. Quick, vacuum sampling into Silonite® canisters or Bottle-Vac™ samplers, provides significant advantages over sampling onto charcoal tubes or Tedlar® bags. These containers feature inert internal surfaces similar to that of a GC column, allowing collected headspace compounds to remain stable for weeks prior to analysis. For ease of sampling, storage, and extended compound ranges, these canisters offer an excellent alternative to Tedlar® bag, or thermal desorption tube sampling.

Introducing the all-new

7650-HS

Headspace Preparation System



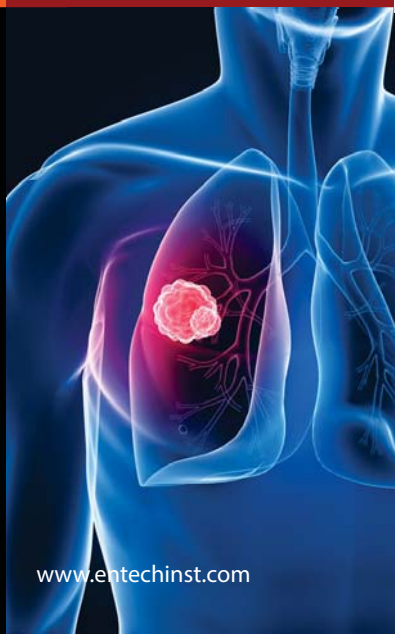
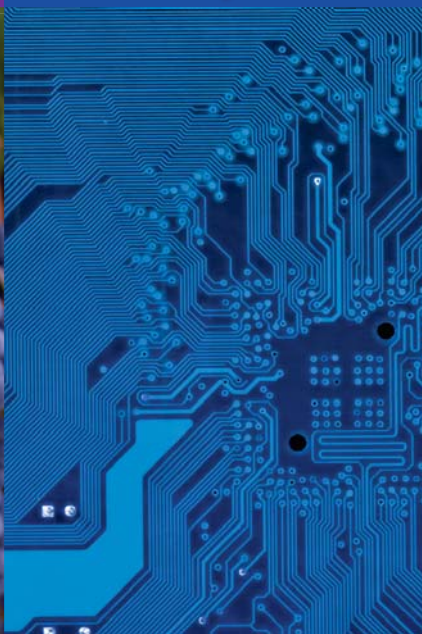
See what you've been missing.

Food & Fragrance

Industry & QA

Crime & Terrorism

Clinical Science



One Instrument, Endless Possibilities.

The most comprehensive and sensitive headspace system available!

Exclusive Vacuum-Tight Sample Interface

Headspace extraction is performed using Entech's unique septumless micro-seal for repeated gas-tight sample access. This approach completely avoids the use of septa, preventing the coring and compound absorption found with these simple rubber seals. The micro-seal also allows samples to be stored under vacuum for enhanced volatiles extraction.

On-Column Multi-Trapping System

The most advanced headspace sample preparation solution available. Provides an "On-Column Extraction" step prior to adsorbent and water traps to greatly increase the range of recoverable compounds to include those too thermally labile to be recovered from any adsorbent trap.

Sample Trays

Standard – Select the ideal tray for vials up to 1L in size.

Cold Trays – Electronically cooled base plate with thermally insulated trays supporting all vial sizes. *Available soon!*

Sample Vials / Media

Vials – 20mL to 1L. Choose the ideal vial sizes to optimize productivity and sample handling for best statistical accuracy.

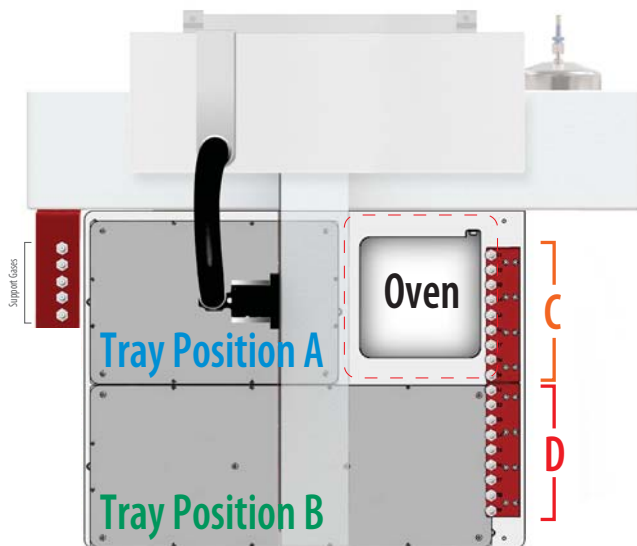
Expansion Ports in sets of 9 (max. 18)

Supports analysis of samples collected in Tedlar® bags, or larger canisters that cannot fit into 7650-HS trays. Ideal for real-time analysis during material outgassing studies conducted in dynamic flux chambers as per ASTM or ISO emission testing methods.



On-Column Multi-Trapping System. (OCMTS)

The 7650-HS OCMTS uses a thick-film precolumn to trap the heavy volatiles, followed by advanced water removal and VOC trapping stages.



Omni-Sampler overhead view.

Ovens & Bushings

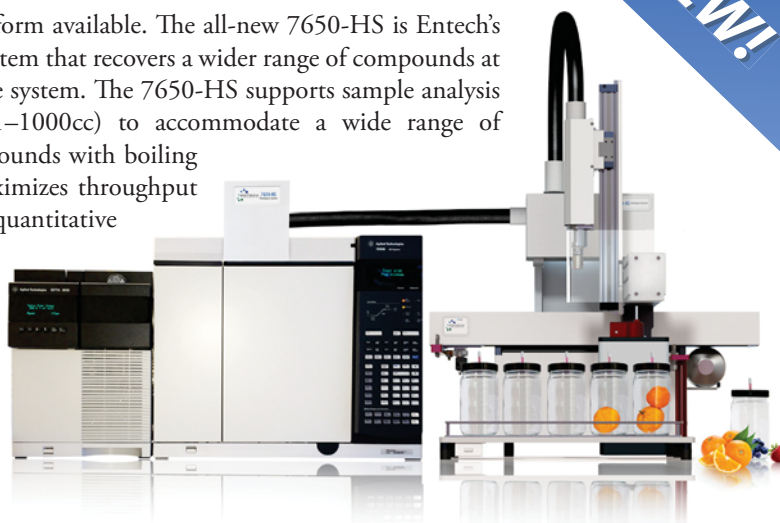
Mixing Oven – Use a mixing oven for liquids and solids with vials from 20 to 1000mL for rapid equilibration from ambient to 100°C.

Non-Mixing Oven – Choose a non-mixing oven for gas-phase sample analysis of Entech Bottle-Vacs™ and MiniCans™. An ideal choice for Remote Headspace Analysis. Maximum temperature 170°C.

7650 - HS with On-Column Extraction

NEW!

Introducing the most advanced headspace platform available. The all-new 7650-HS is Entech's latest GCMS headspace sample preparation system that recovers a wider range of compounds at lower concentrations than any other headspace system. The 7650-HS supports sample analysis via large and small volume static headspace (1–1000cc) to accommodate a wide range of concentrations with quantitative recovery of compounds with boiling points from -50°C to $>400^{\circ}\text{C}$. The 7650-HS maximizes throughput while offering state-of-the-art performance in quantitative accuracy, sensitivity, and very low carryover. The 7650-HS resides to the right of your GCMS, with an advanced preconcentration trapping system that sits on top of the GC just inches away from the GC column to ensure complete sample transfer to the column. The 7650-HS is fully 1D/2D GC compatible, supporting the latest food, flavor, aroma, product testing, environmental, and clinical applications.



7650-HS with On-Column Extraction

The 7650-HS uses a unique approach for sample enrichment that characterizes headspace concentrations more accurately than any other headspace solution. A technique developed by Entech called OCMTS (On-Column Multi-Trapping System) first passes the headspace through a thick-film GC column to perform an “On-Column Extraction”, allowing far better recovery of heavy and thermally labile compounds than direct trapping onto Tenax® or other more reactive adsorbents. Downstream water management and cold traps recover lighter compounds that are unretained by the initial thick-film column. After a water bakeout step, all traps are backflushed to the GCMS completing the quantitative recovery of the largest range of compounds currently possible. No other technique gives a clearer picture of what is in the sample headspace, covering boiling points of -70°C to $>400^{\circ}\text{C}$, producing chromatograms that truly represent the amounts that are in the equilibrated headspace rather than the artificial picture created by SPME and other non-equilibrated headspace techniques. The 7650-HS is the most powerful and complete headspace preparation system on the market today. Add the 7650-HS to your laboratory's arsenal and see what you've been missing!

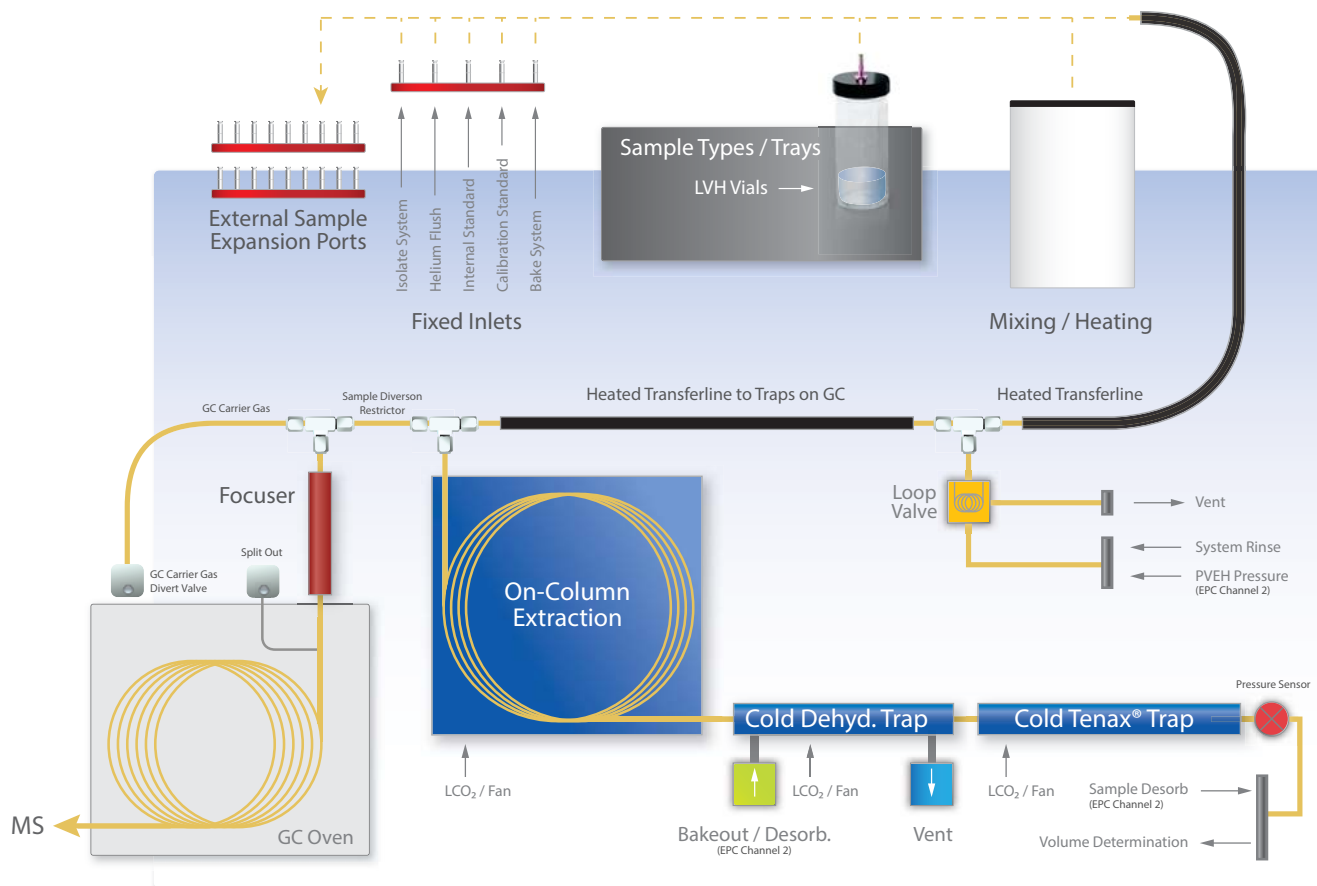
“Classical” SPME vs On-Column Extraction

Classical SPME (Solid Phase Microextraction) uses passive diffusion to collect and partition headspace compounds onto a coated fiber/filament placed directly in the sample headspace. The time required for each analyte to come to equilibrium with a SPME fiber depends on individual vapor pressures and coating affinities. Lighter, more volatile compounds have much less phase affinity than heavier compounds. As a result, true headspace concentrations fail to be accurately analyzed and reported whenever the SPME fiber headspace exposures exceed the equilibration time of the most volatile analytes – ***which may occur in just a few seconds!***

Unfortunately, it can take 10–90 minutes to collect enough of the heavier aroma compounds to allow detection by GCMS, resulting in the heavier compounds being over represented relative to lighter compounds by several hundred fold. This fact alone makes passive SPME a qualitative, rather than

quantitative technique for the determination of headspace composition. In addition, the extent of partitioning into a SPME fiber for any particular analyte is dependent on temperature and sample matrix variations. Upon desorption, the SPME filament is placed directly into a hot injector – ***which may thermally alter the sample composition.***

On-Column Extraction with the 7650-HS utilizes a thick-film GC column to perform the extraction, allowing a known volume to be sampled for quantitative determination of headspace composition. By using a much thinner film than classical SPME, On-Column Extraction reduces Siloxane bleed and ensures carryover elimination prior to the next sample analysis. Lighter analytes not retained on the column are collected on cold Tenax®, allowing for true quantitation of both the light and heavy headspace compounds.



Food & Flavor / Beverage Analysis

Vials: 20, 40, 125, 250, 500, 1000cc
 Sample Temp.: Ambient–100°C
 Analytical Volume: 0.5–1000cc
 Sample Tray: 4°C to Ambient

Unlike Classical “diffusive SPME” techniques – *which cannot quantify the actual headspace volume analyzed* – the 7650-HS precisely measures the sample headspace volume drawn through the On-Column Multi-Trapping System to provide a quantitative representation of aroma compounds in the sample headspace. Aroma Significant Compounds (ASC), are easily identified with a small volume injection (10cc) using GC/Olfactometry. The mass spectrum for detected aromas can then be obtained by analyzing a larger volume of headspace (50–1000cc). Only those aromas detected within the small volume GC/O analysis need be identified – *significantly reducing aroma characterization complexity*. (High ethanol concentrations can be eliminated prior to injection by forward purging the Tenax® trap at 0°C prior to back desorption.)

Arson & Criminal Forensics

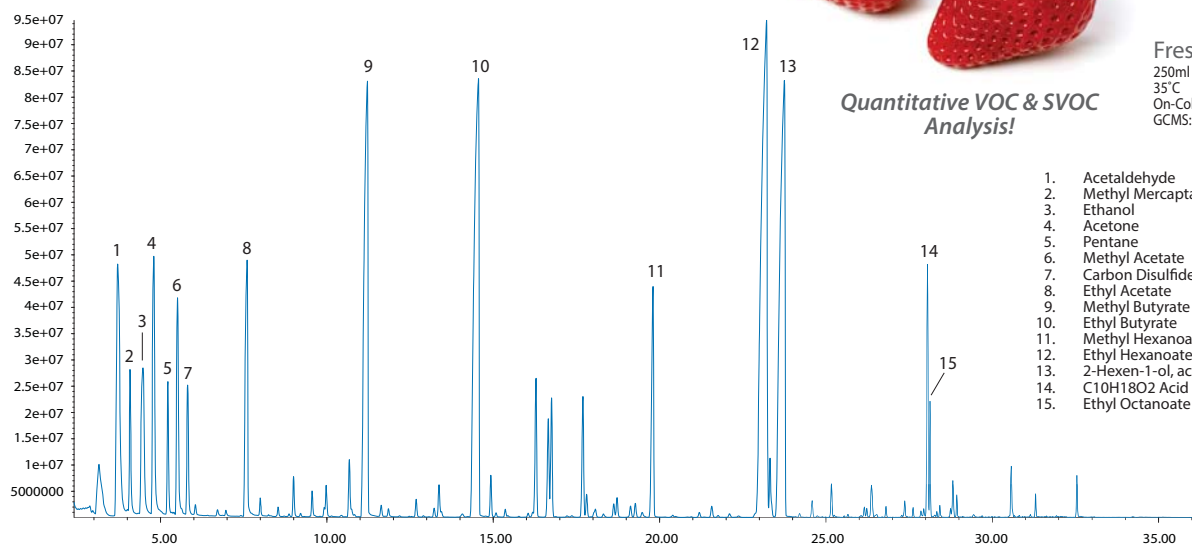
The detection of trace levels of accelerants during arson investigation, the presence of drugs of abuse, or simply the detection of a chemical signature of evidentiary nature is often limited by how well the chemical signal can be properly “amplified” to allow detection and identification by today’s GCMS systems (Gas Chromatograph / Mass Spectrometer).

This generally means providing a very large volume of sample to the GCMS to boost the signal, thereby improving detection limits. High resolution gas chromatography, however, requires very small injection volumes to achieve fast enough injection rates to maintain good chromatographic resolution of both light and heavy compounds.

Entech has developed large volume preconcentration systems for decreasing the vapor phase volume 1 million fold, reducing a 1 liter sample volume down to literally 1 microliter to allow very rapid injection into GCMS systems optimized for trace analysis. This makes the difference between detecting all chemicals present down to low part-per-trillion levels, or seeing nothing but background air.

Visit us online at www.entechinst.com for a complete list of 7650-HS applications!

Fresh Strawberries | 250ml Headspace of 50 grams

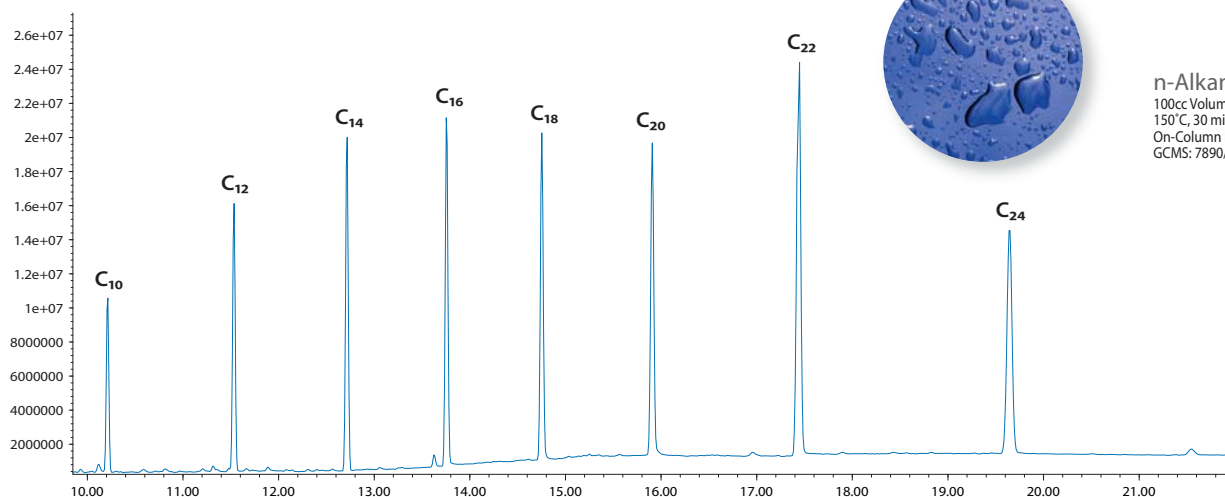


Quantitative VOC & SVOC Analysis!

Fresh Strawberries
250ml Headspace of 50g
35°C
On-Column Extraction
GCMS: 7890/5975

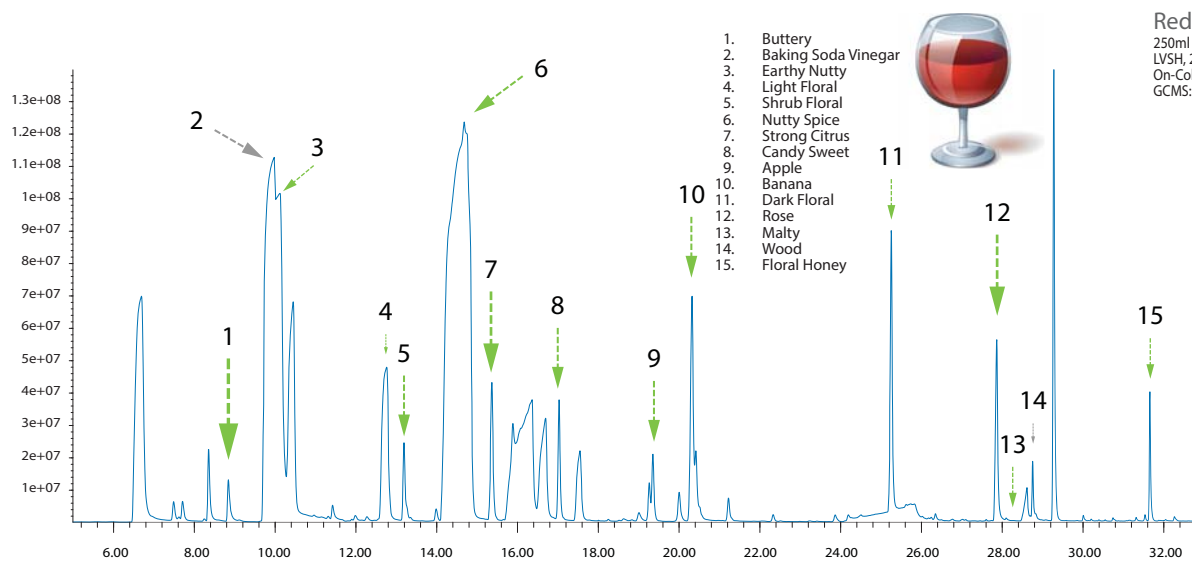
1. Acetaldehyde
2. Methyl Mercaptan
3. Ethanol
4. Acetone
5. Pentane
6. Methyl Acetate
7. Carbon Disulfide
8. Ethyl Acetate
9. Methyl Butyrate
10. Ethyl Butyrate
11. Methyl Hexanoate
12. Ethyl Hexanoate
13. 2-Hexen-1-ol, acetate
14. C10H18O2 Acid Ester
15. Ethyl Octanoate

n-Alkane Standard – On-Column Extraction | 46ng / 100cc, C₁₀–C₂₄



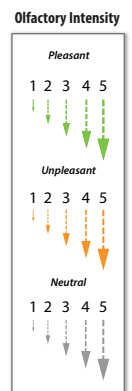
n-Alkane Standard
100cc Volume, Silonite® Canister
150°C, 30 min. Preheat.
On-Column Extraction
GCMS: 7890/5975

Cabernet Sauvignon – On-Column Multi-Trapping System | 250ml Headspace of 50 grams



Red Wine
250ml Headspace of 50g
LVSH, 25°C
On-Column Multi-Trapping
GCMS: 7890/5975

1. Buttery
2. Baking Soda Vinegar
3. Earthy Nutty
4. Light Floral
5. Shrub Floral
6. Nutty Spice
7. Strong Citrus
8. Candy Sweet
9. Apple
10. Banana
11. Dark Floral
12. Rose
13. Malty
14. Wood
15. Floral Honey



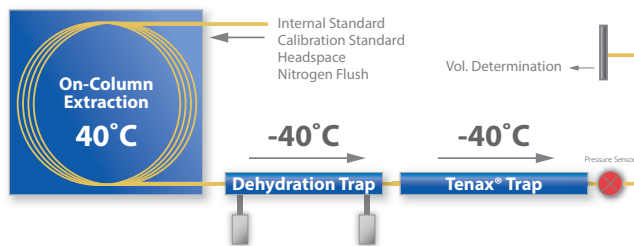
- Analyze Solids, Liquids, or Gases
- Sample Vial Sizes from 20 to 1000mL
Optimal sensitivity and statistical accuracy.
- Micro-QT™ Septumless Sample Interface
Gas-tight seal down to full vacuum.
- Supports Vacuum Extraction
Perfect for rapid headspace equilibration into large vials.
- Detect up to C₂₅ **Quantitatively!**
PPM to sub-PPB Level Detection.
- Recovers Thermally Labile Compounds
Analyze compounds containing sulfur, phosphorous, nitrogen.
- **Exclusive!** On-Column Trapping
Thick-film column primary trap maximizes recovery while eliminating thermal decomposition.
- Extremely Low Carryover
- Supports All Balance Gas Compositions
(Air, nitrogen, CO₂, H₂, He, methane, mixture).
- Easily Handles High Ethanol Matrices
- Heat Samples from Ambient to 100°C
- Sample from 1 to 1000cc
Maximize GCMS dynamic range!
- Liquid Nitrogen Focuser
Improves separation/resolution of compounds boiling <100°C.
- Mixing Oven
Rapid heating and sample equilibration.
- Advanced Water Management
Cold trap dehydration technology.

Applications

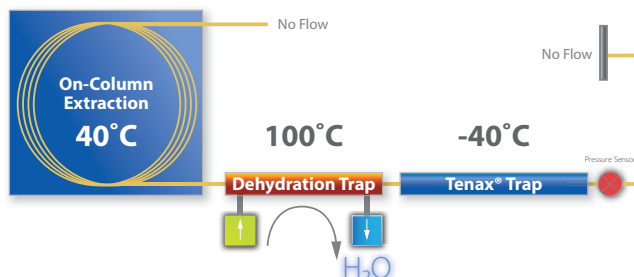
- **Food & Flavor** – Food / Flavor / Beverage Analysis.
- **Package Testing** – Improved Statistical Accuracy.
- **Product Testing** – Flux Chambers / Emission Rates.
- **Forensics** – Drug Lab Solvents / Metabolites / Accelerants.
- **Breath Analysis** – Exposure Monitoring.
- **Homeland Security** – CWAs and TICs.
- **Pharmaceuticals** – Residual Solvents.

On-Column Multi-Trapping System

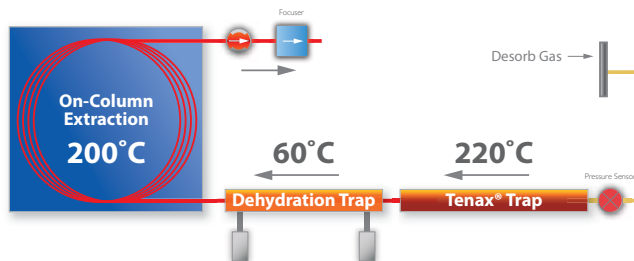
1 Trapping Int Std | Cal Std | Sample Headspace



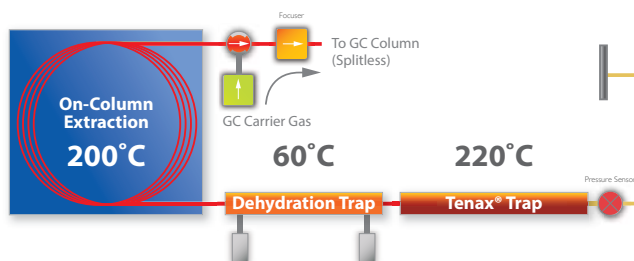
2 Removing Water



3 Reverse Flow Recovery and Refocusing



4 Sample Injection to GC



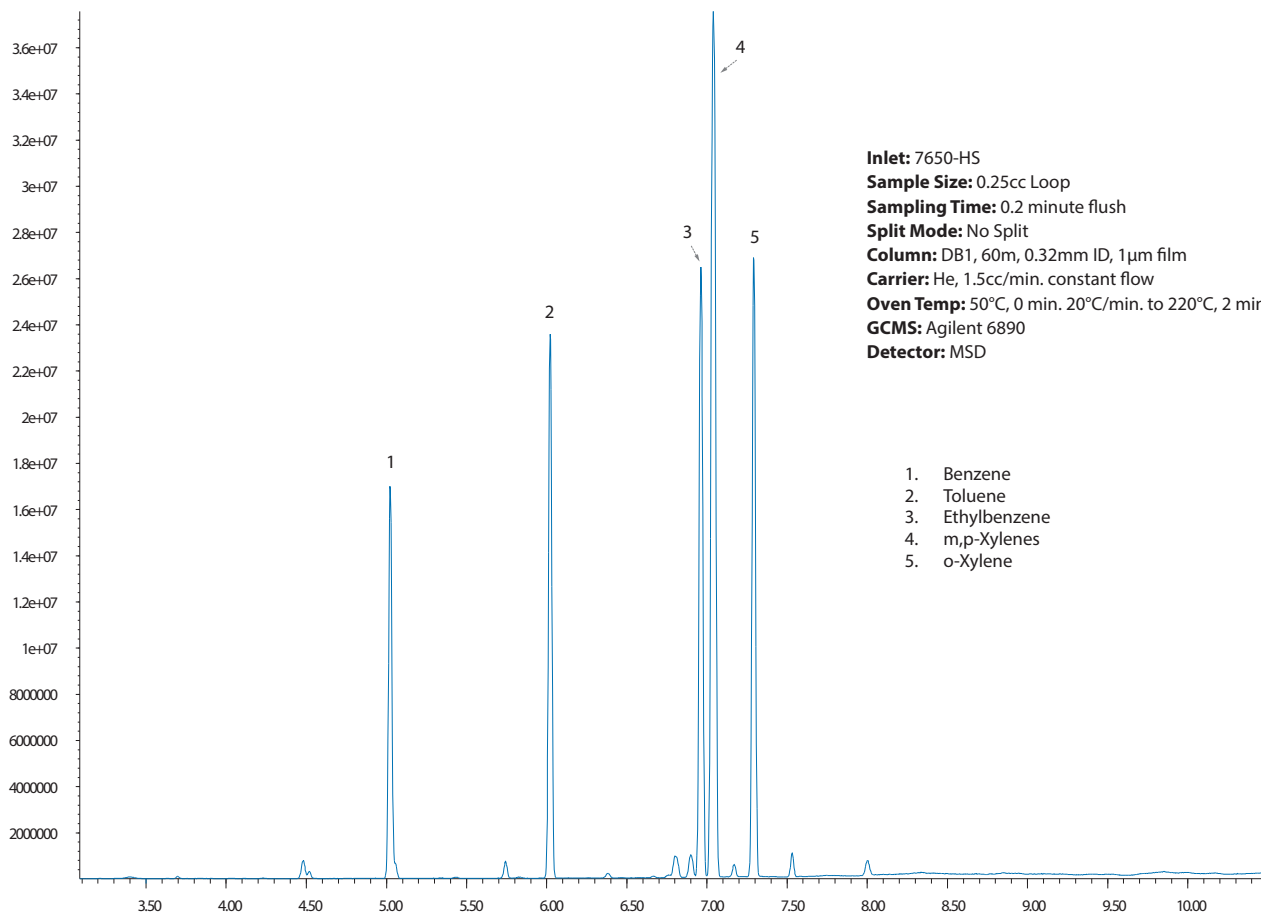
See What You've
Been Missing!
**On-Column
Extraction**

Call Us Today to Learn More!

Loop Injection

The 7650-HS uses the new digital actuator solution from Entech to provide an effective solution for injecting a small, reproducible volume of headspace into a GC or GCMS when performing PPM level analysis. Internal Standard calibration is supported by sequentially flushing and injecting the ISTD, then the sample using the same loop. Changing the loop size is easy, allowing a range from 0.1cc–2cc to be quantitatively measured and analyzed. Combined with the large volume injection capabilities of the 7650-HS, the full range of sample volume now becomes 0.1 to over 1000cc, creating the most complete solution available for quantitative headspace analysis.

BTEX Standard | 25 PPM, 0.25cc Loop Injection





7650-HS | Food & Beverage System

The most comprehensive Food & Beverage aroma analysis system available.

Study food, ingredients, and beverages in more detail than ever before! It is no longer enough for an aroma chemist to simply determine whether an aroma compound is present. Now, it is possible to see just how much of a particular compound exists in a sample and whether its contribution to the overall headspace aroma is significant to the consumer – at specific temperatures and matrix formulations. The 7650-HS with On-Column Extraction enables a sample to be equilibrated at a given temperature, while ensuring recovery of all compounds at their true headspace concentrations. This degree of accuracy simply cannot be achieved using diffusive SPME or simple purging onto a Tenax trap. Maximizing throughput and quantitative accuracy for headspace analysis of aroma compounds is now possible using the advanced 7650-HS with On-Column Extraction. Obtain the true concentrations for the lightest to the heaviest compounds (boiling point from -50°C to $>400^{\circ}\text{C}$) – ***including thermally labile compounds that are unrecoverable using Purge and Trap and Thermal Desorption techniques.***

Preheat samples from ambient to 100°C while mixing, then preconcentrate the equilibrated headspace using On-Column Extraction and Cold Trapping at temperatures independent of the sample temperature. The 7650-HS features a Silonite-D® coated transfer line that is as inert as a GC column, eliminating losses that are common with standard metal tubing. Analyze 1–1000cc of headspace for accurate determination of ***“Aroma Significant Compounds”***.

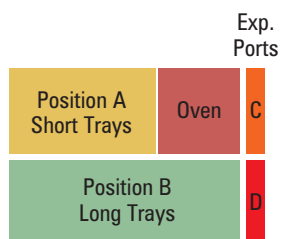
DESCRIPTION	PART #	UNIT
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7650-HS | On-Column Extraction System
Configurations & Options:

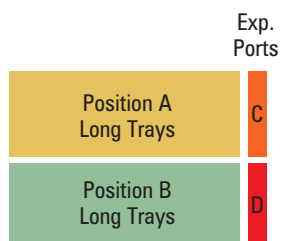
7650-HS with LN ₂ Option (7650-HS LN ₂)	7650-HS-LN2	EA
Mixing Oven (Ambient – 100°C Mixing - 20cc to 1L)	HS-OVEN-407-1M	EA
10-Pos. 1L Vial Tray (Non-cooled)	HS-LT384-010	EA

Sample Handling Trays 7650-HS / 7650

Tray Options



7650-HS / 7650
with oven installed.



7650-HS / 7650
without oven installed.

DESCRIPTION	SAMPLE POSITIONS	PART #	UNIT
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Short Trays – (7650-HS / 7650)*

20mL / 40mL / 60mL Vial	50	HS-ST115-050	EA
Silonite® 316SS HDS™ Personal Monitor	50	HS-ST119-050	EA
100mL / 200mL Silonite® MiniCan™	32	HS-ST158-032	EA
125mL Wide-Mouth Vial / 125mL Boston Round Bottle	24	HS-ST197-024	EA
250mL Wide-Mouth Vial / 250mL Boston Round Bottle	15	HS-ST248-015	EA
500mL Wide-Mouth Vial / 450mL MiniCan™	11	HS-ST280-011	EA
500mL Boston Round / 500mL Bottle-Vac™	11	HS-ST301-011	EA
1L Wide-Mouth Vial / 1L Bottle-Vac™	6	HS-ST384-006	EA
1L–1.4L Silonite® MiniCan™	6	HS-ST407-006	EA

Long Trays – (7650-HS / 7650)*

20mL / 40mL / 60mL Vial	86	HS-LT115-086	EA
Silonite® 316SS HDS™ Personal Monitor	86	HS-LT119-086	EA
100mL / 200mL Silonite® MiniCan™	53	HS-LT158-053	EA
125mL Wide-Mouth Vial / 125mL Boston Round Bottle	40	HS-LT197-040	EA
250mL Wide-Mouth Vial / 250mL Boston Round Bottle	24	HS-LT248-024	EA
500mL Wide-Mouth Vial / 450mL MiniCan™	18	HS-LT280-018	EA
500mL Boston Round / 500mL Bottle-Vac™	18	HS-LT301-018	EA
1L Wide-Mouth Vial / 1L Bottle-Vac™	10	HS-LT384-010	EA
1L–1.4L Silonite® MiniCan™	10	HS-LT407-010	EA
6L Canister Tray	6	HS-FT906-06	EA
6L Can Alignment Tool	N/A	HS-FT906-Align	EA

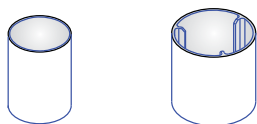
* Note – Use Long Trays in Autosampler Position B, and in Position A when Ovens or Agitators are not present.

Sample Ovens 7650-HS / 7650



7650-HS Mixing Oven

4" Diameter, 1-Position: PN OS-OVEN-407-1M



Reducing bushings allow smaller sample vials and containers to be analyzed in large position trays. Bushings must be placed in both the tray and the oven to support the sample container analyzed.

DESCRIPTION	PART #	UNIT
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Sample Mixing Oven (7650-HS)	HS-OVEN-407-1M	EA
Non-Mixing Oven (7650-HS / 7650)	HS-OVEN-407-1	EA
BottleVac™ & Vial Reducing Bushings		
20mL / 40mL / 60mL Vial Bushings (Includes 20mL / 40mL inserts - 1 of each)	19-76520	EA
125mL Bottle-Vac™ Bushing	19-76525	EA
125mL LVSH Vial Bushing	19-76530	EA
250mL Bottle-Vac™ Bushing	19-76535	EA
250mL LVSH Vial Bushing	19-76540	EA
500mL Bottle-Vac™ Bushing	19-76545	EA
500mL LVSH Vial Bushing	19-76550	EA
1L Bottle-Vac™ Bushing	19-76555	EA
1L LVSH Vial Bushing	19-76560	EA
MiniCan™ Oven Reducing Bushings / Extenders		
50mL HDS™ Personal Monitor	19-76565	EA
100mL / 200mL MiniCan™	19-76570	EA
450mL / 600mL MiniCan™	19-76580	EA
1L MiniCan™ Extender	19-76585	EA
Expansion Ports (OS / OS-Plus / 7650)		
9 Port Expander (w/Male MicroValves™)	HS-EXPAND9	EA
9 Port Expander (w/Silonite® Male MicroValves)	HS-EXPAND9S	EA

Sample Vials for GC and GC/MS Analysis

The 7650-HS supports a wide variety of container sizes. Automation ready containers include wide-mouth, Large Volume Static Headspace (LVSH) vials for sampling liquids and solids (20mL, 40mL, 60mL, 125mL, 250mL, 500mL, 1L), Bottle-Vac™ samplers (See p. 69), and Silonite® coated MiniCans™ (See p. 68).

DESCRIPTION	PART #	UNIT
7650-HS LVSH / PCME* Vials		
20mL Clear Vials (Case of 72)	39-75020	72pk
20mL Amber Vials (Case of 72)	39-75020A	72pk
40mL Clear Vials (Case of 72)	39-75040	72pk
40mL Amber Vials (Case of 72)	39-75040A	72pk
60mL Clear Vials (Case of 144)	39-75060	144pk
60mL Amber Vials (Case of 72)	39-75060A	72pk
125mL LVSH Vials (Case of 12)	39-75125BW	12pk
250mL LVSH Vials (Case of 12)	39-75250BW	12pk
500mL LVSH Vials (Case of 12)	39-75500W	12pk
1L LVSH Vials (Case of 12)	39-75L1W	12pk

* See page 17 for PCME Cartridges and Vial Liners

Micro-QT™ Valves - LVSH

Micro-QT™ Valve (LVSH*)	HS-LVSH-SMS	EA
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Vial Caps – LVSH / PCME

Plastic Vial Caps (for 20/40/60mL Vials)	39-76044B	144pk
Vial Cap (125mL High Temperature)	39-768120S	EA
Vial Cap (125mL Low Temperature)	39-768120SP	EA
Vial Cap (250mL High Temperature)	39-768250S	EA
Vial Cap (250mL Low Temperature)	39-768250SP	EA
Vial Cap (500mL High Temperature)	39-768500S	EA
Vial Cap (1L High Temperature)	39-768940S	EA

Vial & Bottle Liners – LVSH

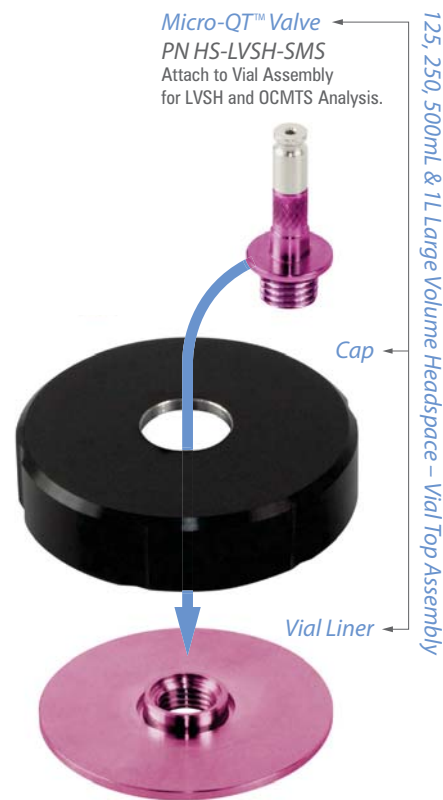
(Silonite® Vial and Bottle Liners only)

Silonite® Liner (20/40/60mL Vials/125mL Bottles)	HS-760024	EA
Silonite® Liner (250/500mL/1L Bottles)	HS-760028	EA
Silonite® Liner (125mL LVSH Vial)	HS-760125	EA
Silonite® Liner (250mL LVSH Vial)	HS-760250	EA
Silonite® Liner (500mL LVSH Vial)	HS-760500	EA
Silonite® Liner (1L LVSH Vial)	HS-761000	EA

* On-Column Multi-Trapping System (OCMTS) | Large Volume Static Headspace (LVSH)



40, 60mL Volatile Organic Analyte (VOA) Vials and 125, 250, 500mL & 1L Large Volume Static Headspace (LVSH) Vials with MicroValve™ Septumless Connectors.



* Optional Micro-QT™ Valve Fitting for 20, 40, and 60mL Headspace Vials PN 30-22610S



Ready for Quantitative Recovery of SVOCs?

It's not just SPME. It's PCME
A revolutionary new extraction technology.



500X MORE SURFACE AREA
than traditional SPME Fibers.



Faster adsorption. Faster Desorption.

PCME has 500X more surface area with 50X more phase loading, resulting in more complete extraction and faster transfer to the GC column.

Achieve Complete Equilibrium.

PCME performs extractions to the point where a true equilibrium is achieved, where no further net transfer from the sample to the cartridge is occurring.

Vacuum Extraction Maximizes SVOC Recovery.

PCME, as an off-line vacuum extraction technique with optional heating and agitation, provides the only solution for recovery of Semi-Volatile compounds out to a boiling point range of 500 deg C.

Durable, reusable, & cost effective.

With a strong and robust design, it is nearly impossible to damage or affect the integrity of a PCME cartridge. They are designed to last for hundreds of sample analyses. PCME cartridges are also more resilient to phase stripping due to a thinner application of coating.

Affordable Automation coming soon!

PCME cartridges are supported by low cost manual desorption solutions, with very affordable robotic solutions coming soon. With barcoding built right into the cartridge, the tracking of sampling events with Entech PCME control software is a breeze.

Porous Cartridge Microextraction (PCME)

Introducing PCME, the next generation of Solid-Phase Microextraction (SPME). Rather than using a fiber and needle combination, PCME uses a porous cartridge that is coated with either PDMS or PDMS + Tenax TA to extend the loading capacity and sampling rate of the classical SPME sampler, while improving the robustness and speed of desorption. PCME cartridges perform headspace extraction over an extended period of time (1-48 hours) using a vacuum applied through the built in micro-seal to greatly enhance the recovery of SVOCs relative to SPME. The 5800P PCME Desorber allows direct desorption of the PCME cartridge through the top of most GC injectors to ensure recovery of very heavy compounds. A Liquid Nitrogen focusing option is also available to improve the chromatography of lighter end headspace components. Long extraction times under vacuum increases the overall sensitivity for compounds in the C₆ to C₃₀ range, including pesticides, endocrine disruptors, pharmaceuticals in water, carcinogens in foods, and biomarkers in biological fluids.

This is an ideal solution for eliminating the need for solvent extraction when analyzing taints, odors, contaminants, drugs of abuse, and other challenging compounds when detection nearing the part-per-quadrillion range is required.

Porous Cartridge Microextraction (PCME)

The next generation “SPME-Like” solution that offers superior recovery of semi-volatile compounds with enhanced sensitivity and quantitative headspace accuracy!

Applications include:

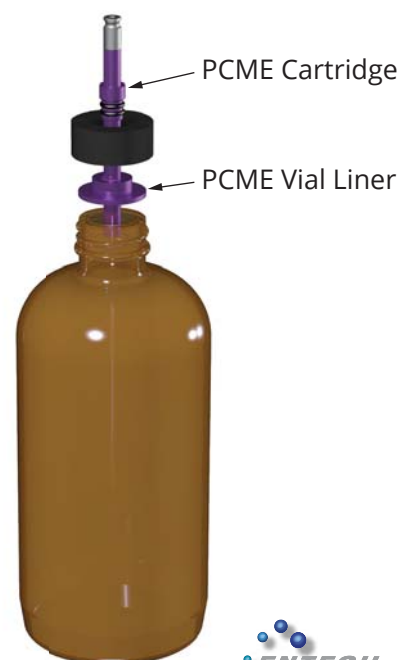
Agriculture	Herbicides
Amines & Nitroaromatics	Pesticides
Clinical, Forensic, Bioanalytical	Phenols
Dioxins, PCBs, PBDEs	Preservatives
Drugs & Pharmaceuticals	Semivolatiles
Environmental	Solvents
Foods, Flavors & Fragrances	Volatiles
Gases & Hydrocarbons	

For a complete list of applications, visit www.entechinst.com

PCME

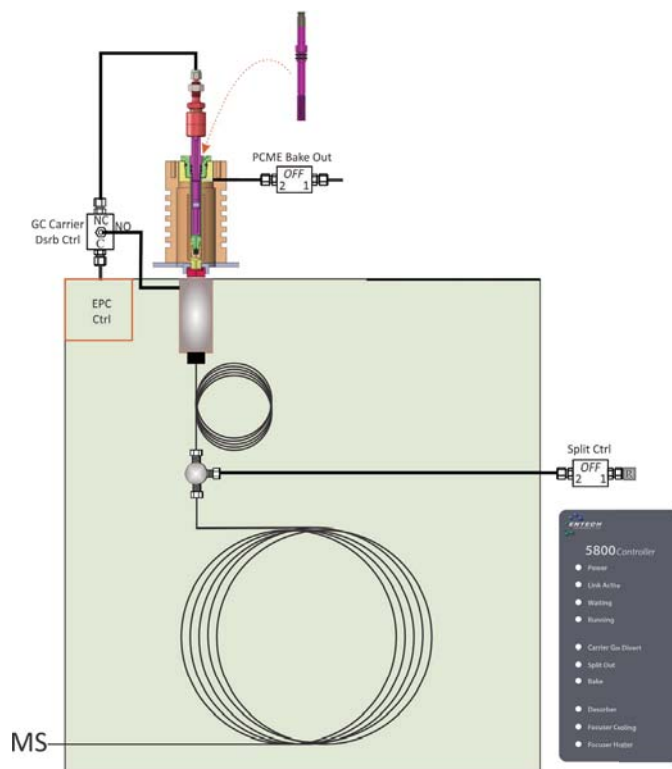
DESCRIPTION	PART #	UNIT
PCME Cartridges		
PDMS Cartridge (100% PDMS)	PCME-P01	EA
PDMS / Tenax® Cartridge (PDMS / Tenax®)	PCME-PT01	EA
Tenax® Cartridge (Tenax® Only)	PCME-T01	EA
PCME Vial Liners*		
24mm PCME Liner (20/40/60mL vials/125mL Bottles)	PCME-Liner024S	EA
28mm PCME Liner (250/500/1000mL Amber Bottles)	PCME-Liner028S	EA
PCME Liner for 125mL Wide-Mouth Vials	PCME-Liner125S	EA
PCME Liner for 250mL Wide-Mouth Vials	PCME-Liner250S	EA
PCME Liner for 500mL Wide-Mouth Vials	PCME-Liner500S	EA
PCME Liner for 1000mL Wide-Mouth Vials	PCME-Liner1000S	EA

* See page 15 for Vial Caps



5800P PCME Inlet System

PCME cartridges can be analyzed using the 5800P inlet. After equilibrating the PCME cartridge in the sample headspace under vacuum for several hours or up to 2 days at temperatures from ambient to up to 60°C for maximum SVOC recovery, simply remove the cartridge, insert it into the 5800P PCME Desorber, snap on the gas supply to the top micro-seal, and press START on the GC front panel. The complete desorption process is performed automatically to transfer both volatile and semi-volatile compounds onto the GCMS for extremely sensitive and accurate headspace analysis. Precisely control the desorption temperature to either limit or maximize the molecular weight range transferred onto the column. A pre-column mounted prior to a split valve allows rapid loading and pre-focusing of SVOCs at initial oven temperatures, followed by split-less transfer onto a second GC column with rising GC oven temperatures. A unique desorber design allows a completely Silonite® coated flow path, with simple replacement of a liner and pre-column to maintain maximum inertness of the sample flow path. Methods are created and stored on the same PC operating the GCMS. Develop methods using this low cost solution, and then add the 7800P Autosampler to fully automate the analysis of up to 90 PCME cartridges.



The 5800P Inlet System

easily transfer volatile and semi-volatile compounds to a GCMS for extremely sensitive and accurate headspace analysis.

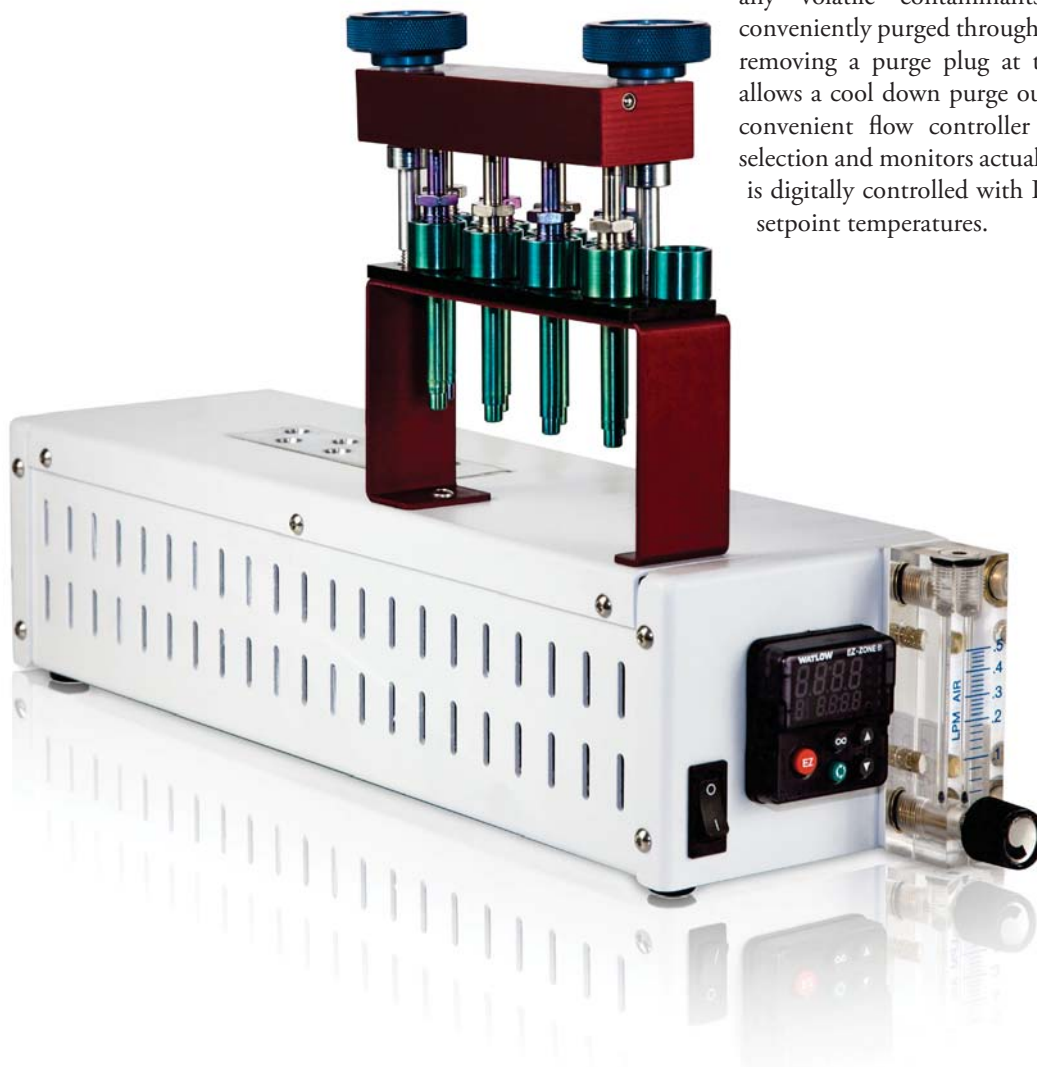


5800P PCME Inlet System

DESCRIPTION	PART #	UNIT
5800P PCME Inlet System	5800P	EA
5800P PCME Inlet-HV (240VAC/50Hz)	5800P-HV	EA
5800P Controller	5800C	EA
Replaceable Desorber Liner	5800P-LNR1	EA

5030 PCME / Tube Thermal Conditioner

Introducing The 5030 PCME / TD Tube Thermal Conditioner. This system provides a convenient way to thermally recondition both 3.5" x 1/4" adsorbent traps and our new Porous Cartridge Microextraction (PCME) headspace samplers. The 5030 will thermally condition up to 30 PCME cartridges or 3.5" TD Tubes at a time, at temperatures up to 350 deg C while flowing UHP Nitrogen through them to eliminate any volatile contaminants. PCME cartridges are conveniently purged through the outer isolation sleeve by removing a purge plug at the bottom, which in turn allows a cool down purge outside of the heated zone. A convenient flow controller on the front allows flow selection and monitors actual flow rates. The temperature is digitally controlled with LED feedback of actual and setpoint temperatures.



5030 PCME / Tube Thermal Conditioner



DESCRIPTION	PART #	UNIT
PCME / Tube Thermal Conditioner		
Thermal Conditioner (30-Pos. at up to 350 °C)	5030	EA
Thermal Conditioner-HV (240VAC/50Hz)	5030-HV	EA
30 Position Purge Portal	5030-P30	EA
30 Position Spare Tray	7800-T30	EA



7200 Preconcentrator

The 7200 Preconcentrator represents the next generation in GC and GCMS sample preparation systems for the analysis of vapor-phase volatile compounds. The 7200 takes the industry standard, 7100A's 3-stage preconcentration and water management technology, and elevates it to a whole new level. Many of the past limitations often seen in rotary valve based devices are now eliminated by combining digital valve isolation control with advanced robotic autosamplers, dropping the potential for carryover and cross-contamination far below previously obtainable levels.

A Silonite-D® coating throughout the flow path virtually eliminates unwanted chemical reactions, ensuring complete recovery of volatile and light semi-volatile compounds. The 7200's advanced water and CO₂ management technologies provide superior recovery of polar and non-polar organics, while an inert heated flow path allows analysis of hydrocarbons in the range of C₂-C₁₈ (depending upon trapping configuration).

Four built-in inlets are available on the 7200 for direct sample introduction, or as inlets for multi-position autosamplers such as the 7650 and 7016D. Internal traps feature an optimized geometry that improves trap temperature consistency during analysis. *Accu-Sample™* technology (patent pending) combines digital valve control with direct volume measurement rather than indirect time integrated flow measurements to allow better small volume accuracy down to 10cc over a wider pressure range while permitting both air and non-air matrices to be analyzed accurately. An optional loop injection valve can be added to reduce quantitative sample volume measurements down to as low as 0.25cc.

7200 Preconcentrator

Features

- Quantitative Measurements**
Volumes from 0.5–1000cc. Digital flow path management for precise volume determination of complex gas matrices including: Landfill Gas, Helium Diffusion Sampling, High Methane, and more!
- Ultra-Wide Calibrated Dynamic Range**
Handles high & low concentrations with fewer dilutions.
- Silonite-D® Coated Flow Paths**
Silonite-D® provides amazing inertness, durability, and corrosion resistance you can trust!



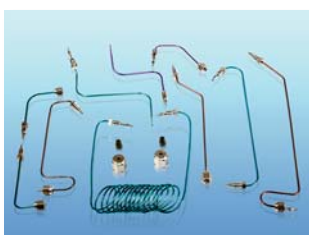
4-Line Heated Inlet PN 09-33303



Trap Heater PN 09-7200-00



7200 1/8" GB Trap PN 7200-T2



Silonite-D® Tubing PN 90-72113

DESCRIPTION	PART #	UNIT
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7200 Preconcentrator

Instruments and Options:

7200 Preconcentrator (Preconcentrator bundle with 1cc Loop)	7200-01	EA
7200 Preconcentrator (Preconcentrator bundle without 1cc Loop Option)	7200-02	EA
7200 Empty Silonite-D® Trap*	7200-T1	EA
7200 1/8" Glass Bead Trap*	7200-T2	EA
7200 Tenax® TA Trap*	7200-T3	EA
7200 Tenax® Plus 1/8" Glass Bead Trap*	7200-T4	EA
7100 / 7200 Swp. / Prg. Gas Hydrocarbon Trap*	04-25000	EA
Silonite-D® for 2 Valve Flow Path	90-72112	EA
Silonite-D® for 3 Valve Flow Path	90-72113	EA
7200 Sample Trap Heater Assembly	09-7200-00	EA
7200 4 Canister Heated Inlet Line	09-33303	EA
7200 GC Transfer Line Heater	09-33008	EA
6890 / 7890 Remote Start Cable	12-31097	EA
1-Stage Diaphragm Pump	10-20010	EA
1-Stg. Diaphragm Pmp. 240VAC/50Hz	10-20014	EA

* Configure the 7200's traps for your application. Contact Entech for more info.

System Hygiene

Like the previous generation 7100A Preconcentrator, the 7200 also has the ability to backflush the lines out to the sample ports to eliminate the previous sample in each line prior to connecting the next sample. However, with laboratories now faced with analyzing both ambient air and soil gas samples routinely, system hygiene must go beyond a simple backflush. Isolation to prevent undesired exposure to traps, tubing, and valve rotors during the analytical process has become much more important. The 7200 features a shorter sample path than its predecessor, while also having the ability to prevent any cross-contamination while moving its Stream Select Valve to the next desired port. This is accomplished by isolating the downstream flow path using Entech's new digital rotary valve technology. In addition, new autosampling inlets are available for the 7200 that shorten exposure times to potentially high concentration samples to seconds rather than hours or days as with rotary valve based autosamplers. This further reduces the possibility of both carryover and cross-contamination when analyzing higher concentration soil gas samples.

Quality Assurance

The 7200 comes equipped with tools for validating system performance, including the ability to perform automated leak checking and matrix spiking. The 7200 also records critical parameters during each sample preconcentration to verify proper system operation, such as trapping flow rates, flow volumes, trap pressure drop, trapping temperatures, water management parameters, desorption temperatures / flows, autosampler position, and sample transfer times. Data is saved as a SQL database for easy integration into a Laboratory Information Management System (LIMS). An automated summary is also generated to provide critical run-time parameters in an easy to interpret, single page report.

Leak Checking

A major source of error in GC inlet systems is the presence of leaks that go undetected. The 7200 performs automated leak checking using both pressure and vacuum techniques to ensure that a leak-tight system exists before samples are analyzed. A report is generated giving the starting and ending pressure during the monitoring period. Leak checking can be done either by selecting individual sample ports, or by selecting a sequence table, which defines a group of samples on the autosampler. Leak checking of samples when using Entech robotic autosamplers such as the 7650 is not required since all samples remain air-tight and completely isolated until they are accessed for analysis.

The Perfect Choice for EPA T0-14a and T0-15 Applications!

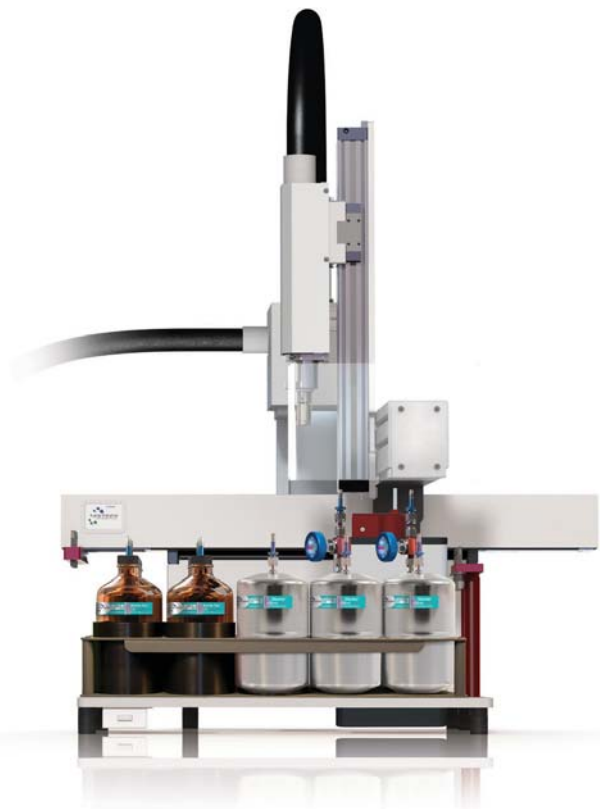
Next Generation MillionAir™ System

The combination of the 7200 Preconcentrator with a special version of Entech's robotic autosampler line, the 7650-M, creates the perfect solution for laboratories needing to maximize the dynamic range of their air analyzer. The MillionAir™ system gets its name by being able to handle samples with literally a million fold difference in concentration without pre-dilution. Air labs have always been faced with the dilemma of having to screen potentially high concentration air samples to determine if dilution will be needed, while at the same time preventing the contamination of their analyzer. Older rotary valve autosamplers used by all other manufacturers expose potentially high concentration samples to inlet lines for hours or even days, creating a background in the system that may take days or even weeks of flushing to eliminate. With the MillionAir™ system, contact with the sample is only seconds long. Better yet, the 7650-M contains its own loop valve that can bypass the 7200 primary traps altogether, injecting the sample directly to the GCMS either for screening purposes or for quantitative analysis. Samples can be screened in as little as 4–5 minutes using an isothermal analysis to determine levels of TCE, PCE, and BTEX, which are the major contaminants in soil gas that can raise havoc in other systems when hot samples are processed without dilution. With the Entech MillionAir™ system, both screening and analysis using sample volumes as low as 0.1 cc can extend the calibration curve well into the PPM range, drastically reducing the number of samples that have to be diluted before analysis. The MillionAir™ system is the ideal solution for today's competitive TO-15 laboratory.



7200 | 7650-M, MillionAir™ System. See page 28 to learn more!

New Option!
MillionAir™
Advanced injection control
10⁶ Concentration Range without Dilution



The 7650 Canister Autosampler

Features

- High or Low Level Analysis**
The 7650 Autosampler features stand-alone loop analysis, or pair with the 7200 Preconcentrator for trace analysis.
- Analyze up to 20 1L MiniCans/Bottle-Vacs**
The 7650 holds 1 – 1.4L canisters in two, 10-position trays with intersample isolation far beyond that of rotary valve autosamplers.
- Toxic Organics Valve™ Compatibility**
Now, add MiniCan™ autosampling for your canisters that use the popular TOV™ and Nupro® valves by simply attaching a MicroValve™ to the top of the sampler valve prior to analysis.
- Silonite–D® Coated Inlet Lines**
The 7650 1/16" heated Inlet line inserts directly into a canister's MicroValve™ for a zero dead volume, secure sample connection. After minimal sample contact during transfer to a Preconcentrator or GCMS, the inlet line is immediately flushed with UHP helium or nitrogen. Carryover is often less than one millionth the concentration of the previous sample!
- Extended Autosampling Capacity**
Analyze up to 18 additional 6L canisters or Tedlar® bags using expansion ports on the side of the 7650 Autosampler. Now, you can analyze any canister in your inventory using proven "direct inlet" reliability.

7650 Canister Autosampler

The 7650 brings the automated analysis of MiniCans™, Bottle-Vacs™, and other large volume sampling canisters to a whole new level! Drawing upon the benefits of its predecessors, the 7650 is the first canister autosampler to facilitate the analysis of up to twenty, 1 to 1.4L canisters while maintaining samples in a completely closed and isolated state until required for analysis. This level of isolation greatly reduces the potential for cross contamination, making the 7650 an ideal choice for today's soil gas laboratories. All samples, standards, and blanks flow through the same direct flow path, eliminating any problematic background level variations – *a well-known challenge with rotary valve based autosamplers.*

The 7650 features a reliable and precise pneumatic z-axis control along with minimal transfer-line sample contact. The brief sample transfer process is immediately followed with an inlet line nitrogen flush to further reduce any sample contamination risk. Since the heated transfer line directly inserts into a MiniCan™ or Bottle-Vac™ canister via an ultra-compact MicroValve™ fitting, there is absolutely zero unswept dead-volume.

When paired with the 7200 Preconcentrator, the 7650 becomes an ideal autosampler solution for today's modern laboratories that must routinely analyze both high and low concentration samples. (See pages 28–29 to discover more about the 7200 | 7650-M configuration for PPM to sub-PPB level analysis with the new MillionAir™ option.)

The 7650 also includes an easily accessible, array of inlet expansion ports in banks of 9, for the analysis of up to 18 additional canisters or Tedlar® bags. The 7650 can also be operated with an additional loop injection valve for either stand alone operation or as a complimentary feature with the 7200.

The 7650 also has the ability to deliver sample canisters to an oven for heating up to 170°C prior to analysis for the recovery of higher molecular weight compounds.

Applications

- Volatiles in Ambient Air
- Soil Gas
- Vapor Intrusion
- Indoor Air Quality
- Mold Microbial VOC Detection
- Landfill Gas
- Remote Headspace Analysis (Vacuum Samplers)
- HDS™ MiniCan™ and Bottle-Vac™ Analysis
- HDS™ Personal Monitor Analysis

The 7650 Autosampler – Optimal sample throughput and superior accuracy with the lowest carryover available anywhere!

Five fixed ports are available to facilitate the introduction of UHP Nitrogen, Internal Standard, Calibration Standard, and two additional fixed ports without using up sample tray positions.



HDS™ Personal Monitor Analysis.

The 7650's amazing single inlet system is designed to easily handle 1 - 1.4L MiniCans™ and 1L Bottle-Vacs™. Smaller canisters / vials can be analyzed using optimized trays. Add up to 18 additional canisters or Tedlar® bags with the 7650's expansion ports.

A Canister Autosampler with the amazing precision you need for today's demanding air analysis challenges.



The 7200 Preconcentrator and 7650 Canister Autosampler

DESCRIPTION	PART #	UNIT
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7650 Autosampler

Options:

7650 Headspace Autosampler	7650-01	EA
86-Pos. HDS™ Personal Monitor Tray	HS-LT119-086	EA
10 Pos. 1–1.4L MiniCan Tray	HS-LT407-010	EA
SmartLab™ 2A – USB Cable (2m)	12-51120	EA
9-Position external sample inlet*	OS-EXPAND9S	EA
7650 – 220-240VAC/50Hz Option	7650-01-HV	EA

* Optional Items – Contact Entech for more information and configurations.



7016D Autosampler shown with 6L Canisters

Features

- Automated Analysis**
 Up to sixteen 6L Silonite® canisters or Tedlar® bags can be analyzed in accordance with EPA Methods TO-14a / TO-15.
- Reduced Intersample Carryover**
 Digital actuator stops prior to next requested position to allow for vacuum removal of line contaminants.
- Back-Flushing of Each Line After Analysis**
 Using automated software control.
- Automated Leak Checking**
 Verification of leak-tight connections prior to opening valves.
- Silonite® Coated Inlet Lines**
 Ultra-inert flow paths for recovery of reactive compounds.
- Complete SmartLab™2A Automation**
 Sophisticated Windows® 7 compatible software with automation control via USB connection.
- Easy Valve Alignment**
 Easy adjustments of valve rotation for tubing positions.

7016D Canister Autosampler

The new 7016D features 16 inlet positions for automated analysis of canisters and Tedlar® bags. The 7016D quickly connects to a 7200 Volatiles Preconcentrator for automated analysis of VOCs in canisters to comply with EPA Analytical Methods TO-14a and TO-15.

The 7016D utilizes sophisticated SmartLab™2A Windows® software and an all-new, digitally controlled rotary valve actuator with “smart positioning”. Valve alignment is easy and no longer requires rotation of the valve and tubing. All Flow path tubing in the 7016D is Silonite® coated and heated to reduce flow path carryover while maximizing sample recovery.

The 7016D is recommended for ambient air samples below 100 PPBv. For mixing ambient air and soil gas samples, the 7650 Robotic Autosampler is recommended.



7016D shown with 2.7L Canister Adapter

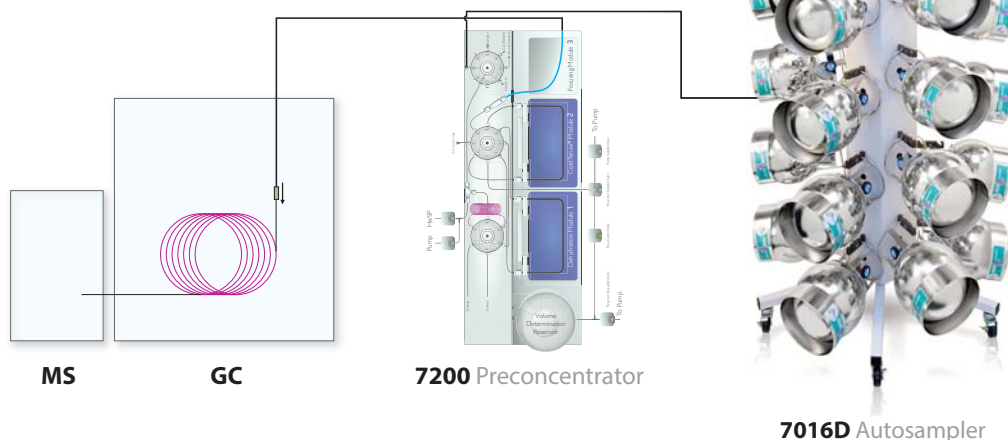
DESCRIPTION	PART #	UNIT
7016D Canister Autosampler (16 Position 6L Canister Autosampler w/ Digital Rotary Valve)*	7016D	EA
Silonite® Coated Valve (for Sulfur Analysis: Silonite® Digital Rotary Valve w/ connection fittings.)	7016-02	EA
5m SmartLab™2A USB Cable	12-51150	EA
Bracket for 2.7L Canisters	19-27010	EA
Bracket for 0.5 to 1.4L Canisters	19-14010	EA
7016D – 220–240VAC/50Hz Option	7016D-HV	EA

*Silonite® Canisters sold separately.

7016D Canister Autosampler

Up to three 7016D canister autosamplers can be simultaneously connected to the 7200 Volatiles Preconcentrator. A typical system is shown below.

Expand your analytical system by connecting multiple 7016D Autosamplers!



7100A (Accessories & Spare Parts)

DESCRIPTION	PART #	UNIT
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With Valco® Fittings:

Module 1 Empty Trap	04-11310	EA
Module 1 Glass Bead Trap	04-11320	EA
Module 2 Tenax® Trap	04-11330	EA
Module 1,2 Glass Bead/Tenax® Trap	04-11340	EA
7100A Flow Path Tube Kit	90-71110	EA
1/8" - 1/16" Bulkhead Union	37-01200	EA
1/8" - 1/16" Silonite® Bulkhead Union	37-01250	EA

With Swagelok®-Style Fittings:

Module 1 Empty Trap	04-11310A	EA
Module 1 Glass Bead Trap	04-11320A	EA
Module 2 Tenax® Trap	04-11330A	EA
Module 1,2 Glass Bead/Tenax® Trap	04-11340A	EA
7100A Flow Path Tube Kit	90-71110A	EA
1/8" - 1/16" Bulkhead Union	30-02043	EA
1/8" - 1/16" Silonite® Bulkhead Union	30-02043S	EA

Other Parts

9' x 1/32" Silonite® GC Transfer Line	06-08051	EA
GC Transfer Line Heater	09-33006	EA
Trap Heater (M1/M2)	09-13010	EA
200 nccm MFC (Mass Flow Controller)	03-10200C	EA
Bulkhead Heater/TC Assembly	09-13020	EA
LN ₂ Cryo Valve (M1-M3)	01-71760	EA
LN ₂ Sponge (M3)	19-71355	EA
Silonite® Glass Liner for 7100-01	36-71550	EA
1-Stage Diaphragm Pump Repair Kit	10-20016	EA

DESCRIPTION	PART #	UNIT
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4 Sample Inlet (for 1/4" TOV-2 Valves)	09-33203	EA
4 Sample Inlet (for Micro-QT Valves)	09-33410	EA
Syringe Injection Option	7100-01	EA
Silonite® Valves and Fittings	7100-02	EA



4-Line Heated Inlet PN 09-33203



Syringe Inj. Option PN 7100-01



Empty Trap PN 04-11310



M1 / M2 Trap Heater PN 09-13010

Air Toxics Analysis by GC/MS



7200 Preconcentrator



7016D Canister Tower Autosampler shown with 16 6L Canisters.



7200 | 7016D Air Toxics System – Large Canister 16-Position Inlet

The 7200 Preconcentrator combines with the 7016D Inlet for Ambient Air Toxics Analysis.

The 7200 paired with the 7016D creates an excellent solution for 2.7, 3.2, 6L, and 15L canisters used for ambient level air toxics analysis in compliance with EPA Methods TO-14a and TO-15. The 7200's 4-sample inlet can accommodate the simultaneous connection of up to three 7016D autosamplers to maximize unattended canister analysis. The new 7016D features the time-tested reliability of our popular 7016 Autosampler, along with new SmartLab™ 2A communication and digital rotary valve control – for even more reliable valve positioning.

The 7200 and 7016D both feature Entech's new SmartLab™ 2A control platform. SmartLab™ 2A sets a new standard for optimal and reliable instrument communication for Windows® 7 environments. Run time data storage and management is simplified, and includes a standardized report that presents all the important information you need for straightforward, quality assessment. Now, with the 7200 | 7016D System, you can analyze your large canisters with confidence!

DESCRIPTION	PART #	UNIT
-------------	--------	------

7200 | 7016D Large Canister Air Toxics System
Instruments and Options:

7200 Preconcentrator (w/o Loop Option)	7200-02	EA
7016D 16-Position Autosampler	7016D	EA
<i>(See pages 24–25, Canisters Sold Separately)</i>		
7200-02 Silonite® Flow Path*	7200-A22	EA
7016D 2.7L Canister Bracket*	19-27010	EA
7016D MiniCan™ / Bottle-Vac™ Cradle*	19-14010	EA

* Optional Items – Contact us for more information and configurations.

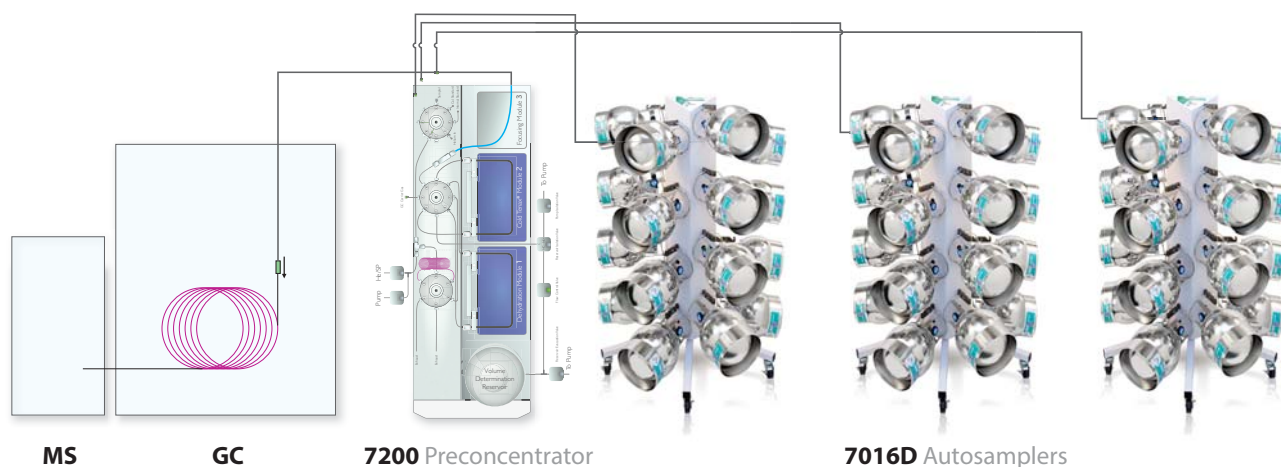


7200 / 7016D Air Toxics Analysis System

Features

- Even Better Sample to Sample Isolation**
The 7200 / 7016D Air Toxics System features Accu-Sample™ technology to reduce cross-contamination.
- Automated Analysis**
Accurate analysis of 0.5–1000cc of sample using precise volume determination, great water management, and Accu-Sample™ technology.
- Quantitative Accuracy**
This system ensures sampling and analytical precision is never compromised by changing matrices (air, humid air, nitrogen, helium, CO₂, methane, argon, hydrogen).
- Large Silonite® Canister Analysis**
Reliably connect and analyze any extra-large canisters in your inventory. Simply connect additional 7016D autosamplers for higher throughput requirements.

7200 | 7016D System Connections



The 7200 and 7016D Air Toxics System
 ultimate precision for large canister analysis.



New Option!
MillionAir™ 7200 | 7650-M – MillionAir™ System – *High Throughput Air Analysis*



The 7200 Preconcentrator and 7650-M Inlet combine for state-of-the-art whole air analysis.

Introducing the all-new 7200 | 7650-M, MillionAir™ Analysis System. The most advanced instrumentation ever developed for the analysis of volatile and light semi-volatile compounds in air and soil gas. Now, you can choose to analyze any size canister in your inventory with the quality assurance of direct inlet robotics. The 7650-M features the new MillionAir™ option that includes the ability to perform rapid screening of samples without exposure to the 7200 Trapping system, thereby maintaining far superior system hygiene relative to other preconcentration systems.

The 7600 and 7650-M canister autosampler minimizes carryover when exposed to high concentration samples by combining brief sample contact time, zero dead-volume canister connections, and *Accu-Sample™* technology found in the 7200. *Accu-Sample™* control completely isolates samples within specific, low-volume flow-path segments, and prevents trap exposure during important sample select and preflush operations. The 7200's built-in loop option allows as little as 0.25cc to be precisely controlled and injected. The result is greater dynamic range and a reduction in the number of sample dilutions required when analyzing Soil Gas and other high-concentration samples.

DESCRIPTION	PART #	UNIT
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7200 | 7650-M, MillionAir™ Analysis System*
 System Includes:

7200 Preconcentrator (with 1cc Loop)	7200-01	EA
7650 w/ Loop Injection	7650-M	EA

*Order 7200-01-HV and 7650-M-HV for 220/240VAC Operation.

7200 | 7650-M Air Analysis System

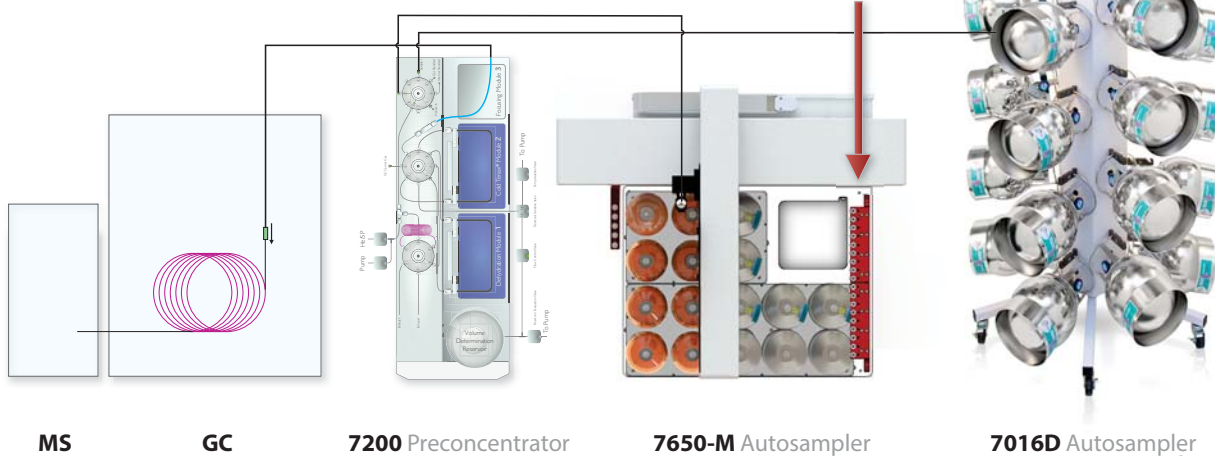
Features

- **Direct Inlet Robotics**
The 7650-M features a single inlet with a Silonite-D® coated transfer line to eliminate rotary valves and multiple inlet lines from the inlet flow path for the best possible sample isolation and analytical accuracy.
- **Automated Analysis**
Accu-Sample™ technology provides superior water management to quantitatively analyze 10 – 1000cc of sample volume. Choose the 7200 Loop option to achieve accurate sample volumes from 0.25cc to 1cc.
- **New! MillionAir™ System**
New, very low volume injection mode that allows analysis of a concentration range of up to one million fold.
- **Extended Range Air Analysis**
Wide volume range (0.25–1000cc) for increased dynamic range without dilution. Directly handle PPM level samples without carryover. Supports single canister calibrations.
- **Quantitative Accuracy**
Sampling and analytical precision is not affected by changing matrices (air, humid air, nitrogen, helium, CO₂, methane, argon, hydrogen).
- **Large Silonite® Canister and Tedlar® Bag Analysis**
Add two, 9 port expansion ports to easily connect 18 large canisters and Tedlar® bags. The 7200 also features a built-in 4 sample inlet that can accommodate up to two 7016 or 7016D autosamplers in addition to the 7650-M for unsurpassed flexibility and sample throughput.

Now, analyze all sample types, including Tedlar® bags, canisters, and thermal desorption tubes – Tube screening and analysis requires the addition of the 5400B Thermal Transfer System (See pages 34 – 35). **Contact us or your local Entech Distributor to learn more about the amazing capabilities of the 7200 | 7650-M Air Analysis System!**

7200 | 7650-M | 7016D System Connections

Analyze up to 18 additional canisters using the 7650-M's expansion ports!



Industrial Hygiene HDS™ Analysis by GC/MS

30



7650-L10 HDS™ System – High-Throughput PPM Level Headspace Inlet

The 7650-L10 Loop Injection System is perfect for high-throughput HDS™ Personal Monitor Analysis.

The 7650-L10 Autosampler configured for Loop Injection creates an ideal, high-throughput system for HDS™ Personal Monitor and other PPM level sample analysis. An elegant, direct to sample container transfer line connection creates far less of an opportunity for carryover and cross-contamination. No connective fittings, no stream select rotary valves, minimal contact time with the sample, and minimal sample path fittings all come together to make the 7650-L10 system an ideal choice to handle the wide range of concentrations that are often present within many industrial workplace environments.

The 7650-L10 HDS™ Loop Injection System can easily handle compounds with PEL's to 2 PPM by full scan, or PEL's below 1 PPM (eg - Benzene) using single ion monitoring.

Analyze up to 172 samples unattended. *It's the ultimate system for full scan GCMS analysis of C₂-C₁₂ compounds down to 0.05 PPM.*

DESCRIPTION	PART #	UNIT
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High Throughput HDS™ Personal Monitor Analysis Instruments and Options:

7650 Loop Injection System (Contact Entech to configure your 7650 Loop Injection options)	7650-L10	EA
86-Position Tray*	HS-LT119-086	EA

* 7650 allows individual sample heating prior to analysis for recovery of heavier SVOCs.

7410 D Headspace Inlet

The 7410D inlet delivers all the reliability of MicroValve™ automated headspace analysis in a very compact footprint!

Featuring the same septumless, “direct to sample” inlet design as our 7650 autosampler, the 7410D eliminates the need for dead end stream select rotary valves found in other canister and Tedlar® bag autosamplers. Automate loop injection for PPM analysis of fixed gases and hydrocarbons from C₁ – C₁₂.



Single-position oven installed PN 7410-H1



7410D shown with MiniCan™ and Bottle-Vac™ Samplers



Features

- Direct Inlet Robotics**
No rotary valves and a proven single inlet design that eliminates carryover!
- Improved System Hygiene**
Minimal contact with sample ensures great system hygiene.
- Silonite® Coated Transfer Line**
Transfer Line inserts directly into sample interface and maximizes transmission of headspace compounds.
- Flexible Analysis**
Compatible with a wide range of sample canisters and vials (20mL to 1400mL).

DESCRIPTION	PART #	UNIT
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7410D Headspace Inlet
Autosampler and Options:

7410D Headspace Inlet	7410D	EA
7410D – 220-240VAC/50Hz Option	7410D-HV	EA
7410D Single Position Oven (4" Diameter – Single Position)	7410-H1	EA
7410D Single Position Oven–HV (220-240VAC/50Hz Option)	7410-H1-HV	EA
Canister Adapter (w/ 45° Bend)	29-TC002BF	EA
Canister Adapter (w/ 90° Bend)	29-TC002B90F	EA
SmartLab™ 2A – USB Cable (2m)	12-51120	EA



7032AQ Autosampler shown with MiniCans™ and Bottle-Vac™ Canisters



Tedlar® Bag Fittings on 7032AB Autosampler



7032AQ Autosampler shown with large canister extension fittings

7032A Autosampling Systems

The 7032A Autosampler automates the introduction of up to 21 MiniCans™, Bottle-Vacs™, or Tedlar® bags into the 7200 or 7100A Preconcentrators. The 7032A is ideal for gas-phase volatiles applications where concentrations are expected to fall between 0.5 PPB and 100 PPB. For higher concentrations, a loop injection valve can be installed (7032AQ-L, 7032AB-L) to allow much smaller volumes to be accurately delivered for a wider dynamic range. With the loop injection valve installed, these autosamplers are attached directly to a GC or GCMS without the need for preconcentration when analyzing concentrations exceeding 0.1 PPM.

The 7032Ax-L autosampler provides 21-position loop injection automation for GC or GCMS analysis of 0.02 to >1000 PPM VOCs sampled into Bottle-Vac™ samplers or 450mL – 1.4L MiniCans™. Two versions make it simple to order an autosampler that is configured for either Micro Valves (7032AQ-L) or Tedlar® Bags (7032AB-L). The 7032Ax-L can be attached directly to a GC or GCMS with an optional cryofocuser for maximizing the resolution of light VOCs. An electronic flow controller allows programmable splitting of sample or standards to effectively reduce volumes injected on-column.

The 7032Ax-L supports spiking of surrogates directly into each canister before analysis, greatly enhancing the reliability and defensibility of the generated data.

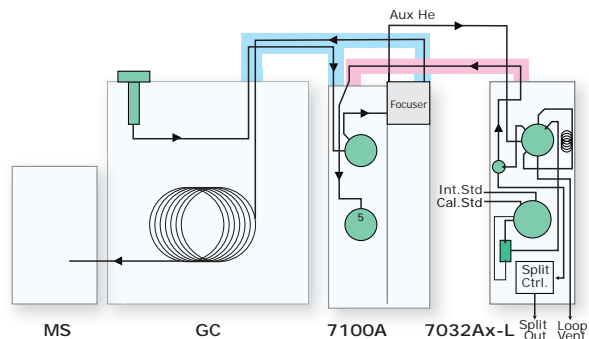
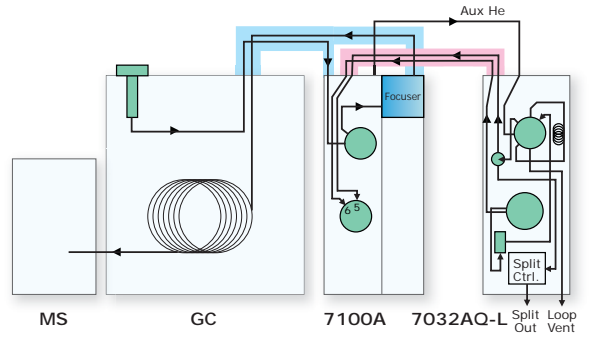
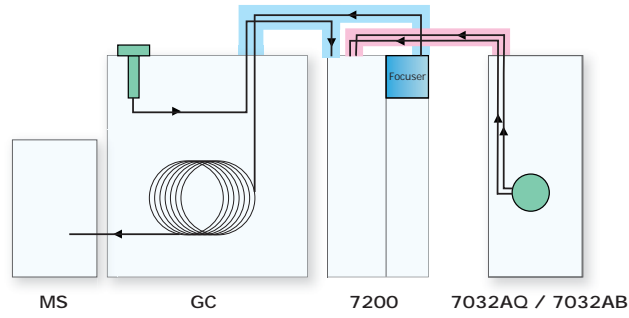
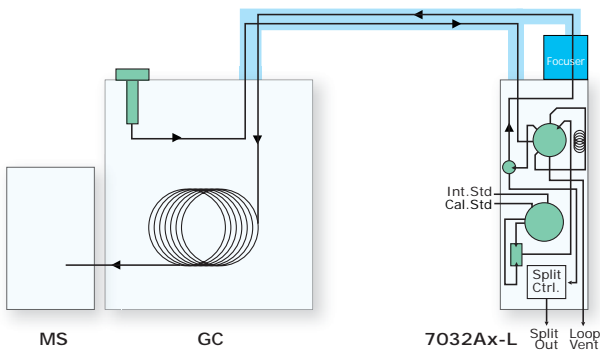
The 7032AB-L makes leak-tight connections to Tedlar® bags using hand-tightened torque wheels for easy, tool free connection to Tedlar® bags with 3/16" sampling ports. The ultimate detection limits possible with the 7032Ax-L autosamplers are analyzer dependent. Newer mass spectrometers are capable of detecting VOCs down to 10–20 PPB using 1.0cc loop injection and cryofocusing.

DESCRIPTION	PART #	UNIT
7032AQ – Micro-QT™ System (w/Heated Transfer Line, 2m SL2A USB cable) - Canisters Sold Separately.	7032AQ	EA
7032AB – Tedlar® Bag System (includes 3/16" fittings) - Tedlar® Bags not included	7032AB	EA
7032AB-L* – Tedlar® Bag / Loop (includes 3/16" fittings) - Tedlar® Bags not included	7032AB-L	EA
7032AQ-L* – Micro-QT™ / Loop (w/Heated Transfer Line, 2m SL2A USB cable) - Canisters Sold Separately.	7032AQ-L	EA
Cryofocusing Option	7032-02	EA
Loop Split Option	7032-01	EA
Silonite® Coated Valve (for Sulfur Analysis: Silonite® rotary valve and connection fittings)	7032-06L	EA
MQT Valve for Tedlar® Bag - 7032AQ	30-22300	EA
1/4" to 3/16" Reducing Ferrules (for Tedlar® Bag connection: 10pk)	06-08022	10pk
5m SmartLab™2A USB Cable	12-51150	EA
7032A – 220-240VAC/50Hz Option	7032-230	EA

* Specify type of GC for correct communication cable

Applications

- Stack Gas / Refinery Gas / Sewer Gas
- Landfill Gas / Soil Gas / Vapor Intrusion
- Indoor Air Quality / Site Investigation
- Industrial Hygiene / Personal Monitoring
- Material Offgassing / Tank Headspace
- Mold Microbial VOC Detection
- Emergency Response



7032AQ-L / 7032AB-L (Direct)

- 0.1 PPM to % Level Analysis
- Sample Volume Flexibility
Adjusted by changing loop or using split option
- Focusing Option Available
When analyzing highly volatile compounds at 0.05–0.5 PPM
- No CO₂ Management
- Applications:
IH, C₁–C₁₂ HCs by GC/FID, Process Gas, Permanent Gases by GC/TCD

7032AQ / 7032AB Features

- Automated Analysis
21 MiniCans™, Bottle-Vacs™ or Tedlar Bags in any order, including replicates (10–1000cc)
- Back-Flushing of Each Line After Analysis
Utilizing automated software control
- Silonite® Coated Transfer Lines
Inert flow path for excellent transmission of compounds and minimal carryover

7032AQ-L / 7032AB-L Hybrid System

- Addition of Loop Injection Valve
A separate flow path for high and low concentration samples
- High Concentration Sample Transfer
To 7100A via calibrated loop injection (0.5–2cc)
- Low Concentration Sample Transfer
To 7100A under mass flow control (10–1000cc)
- Automated Addition of Surrogate Standard
Prior to analysis

7032Ax-L / 7100A Preconcentration System*

- Eliminate CO₂ Prior to Analysis
Utilizing 7100A's preconcentration traps
- Share Same GC(MS)
For both high and low level analyses
- Share Same Calibration Curve
For loop injection and mass flow controller introduced samples
- Applications:
Extending TO-14 / TO-15 to PPM levels, Landfill Gas, CO₂ Purity

* This configuration is not supported with a 7200 Preconcentrator.



The 5400B Thermal Transfer System

5400B Thermal Transfer System

The analysis of adsorbent tubes can be a nightmare for analytical laboratories, especially when there is a requirement to get results on 100% of the tubes tested. Instrument problems, unexpected analyte loading outside of the GCMS calibrated range, and cross-contamination make the normal “one-shot” analysis very risky. Even attempting to recover a “split” fraction of the tube sample onto another tube is plagued with problems such as added background, poor leak-free validation, and incomplete recoveries from yet a second tube.

The 5400B Thermal Transfer System simplifies all of this. The 5400B easily automates the transfer of tube samples into vacuum-tight Bottle-Vac™ samplers. And unlike Tedlar® bags, Bottle-Vacs™ can be heated to maintain the recovery of TO-15 analytes.

During desorption, roughly 600cc of nitrogen is used, improving recovery relative to direct GC thermal desorbers which attempt to desorb the sample with as little helium as possible. The 5400B performs automated leak checking before thermally desorbing the tube sample to ensure quantitative sample recovery. After desorption, the final pressure is adjusted to obtain the same desorption volume for each sample transfer. Once transferred to a Bottle-Vac™, as little as 0.1–1.0cc of sample can be analyzed, or over 70% of the desorbed contents of the tube using the Omni-Sampler Plus or 7200 Preconcentration Systems. Further dilutions are also easily accomplished using the Digital Dilution System (See page 38).

The new SVOC Preparation tube allows the elimination of a solvent prior to back desorption of an SVOC standard into a Bottle-Vac™ using the 5400B. The internal packing maximizes SVOC recovery utilizing a PDMS coating followed by a weak adsorbent to minimize desorption temperatures when transferring the SVOCs to a Bottle-Vac™. Analysis of the SVOC standard in canisters requires canister heating using the Omni-Sampler Plus.

Features

- **Sample Screening**
- **Perform Multiple Analyses**
- **Increase Dynamic Range**
Optimize GCMS resolution for quantitative analysis.
- **Tube / Canister Shared Calibration**
Reliable and simplified GCMS analysis.
- **Flexible Configuration**
Easily customize your 5400B to handle multiple tube sizes.
- **Flow Rate Control**
Control desorption flow rate to optimize recovery.
- **Leak Checking**
New, low volume pressurized leak check eliminates potential for sample loss.
- **High Temperature Operation**
Higher temperature operation to 340°C for improved high molecular weight recovery.
- **Complete Software Control**
Improved Windows® 8 software with an advanced and intuitive user interface.

Note: Unlike other thermal desorption systems, the 5400B can be configured with different heaters to handle virtually any commercially available tube size.

For maximum recovery of SVOCs, MiniCans™ or Bottle-Vacs™ can be heated during automated analysis with an Omni-Sampler, 7650, or 7410D Autosampler.

DESCRIPTION	PART #	UNIT
5400B Thermal Transfer System*	5400B	EA
Heater - 6mm OD x 11.5cm (Supelco®, Dynatherm®)	09-25010	EA
Heater - ¼" OD x 7" (Tekmar®, Gerstal®)	09-25020	EA
Heater - ¼" OD x 3.5" (Perkin-Elmer®, Markes®, Entech®)	09-25030	EA
Heater - ⅝" OD x 5" (VOST, ¼" ends)	09-25070	EA
Female Micro-QT™ / Tube Fitting	30-22810B	EA
⅜" Radiello® Desorber Tube	36-54100	EA
SVOC Preparation Tube	36-54200	EA

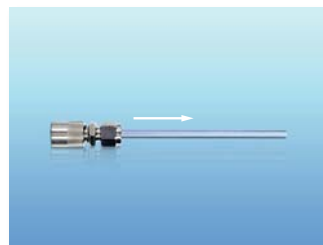
* Heaters are not included with base unit.
Order Heaters separately and configure as needed.



1 Attach trap heater onto 5400B assembly.



2 Attach other trap heaters as needed.



3 Attach Micro-QT fitting onto desorption tube.



4 Insert tube with fitting into tube heater.



5 Gently snug thumb-wheel on bulkhead fitting and perform pressurized leak check.

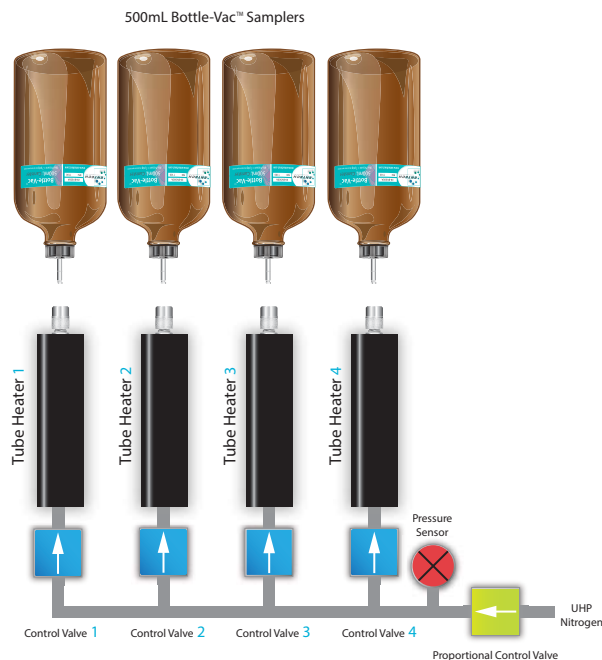


6 Attach an evacuated container to the top.

Features

- Automated Leak Checking
- Automatic Desorption Process
- Consistent Desorption Volume

All the information you need, displayed in just one window!



Finally, a way to analyze thermal desorption tubes that makes sense!



Expand your TD Tube Analysis Capabilities!

Call Us Today to Learn More!

Transfer tube samples to Bottle-Vac™ samplers to accurately perform screening, perform multiple analyses, and store samples!



4700 Precision Diluter

4700 Precision Diluter

Introducing the all-new 4700 Precision Diluter. The 4700 comes complete with all 6 channels installed, allowing up to 4 cylinders or canisters containing PPB–PPM levels of calibrated VOC standards to be diluted extremely accurately into Silonite® canisters for the preparation of PPB and sub-PPB level standard mixes for calibrating GCMS systems for EPA Methods TO-14a and TO-15.

The 4700 features short Silonite-D® flow paths, virtually zero dead volume, and precise computer control to create ultra-reliable automated dilution mixtures never before possible. A high accuracy pressure sensor ensures perfect dilutions using nitrogen, zero air, helium, or one of several other bulk gases. The inlet for Channel 6 is located on the front of the 4700, allowing created standards to be reconnected for further dilution. A full 100x dilution is possible with an expected accuracy of 2%, with the ability to perform another 100x dilution on the first canister to yield a final dilution of 10,000 fold! Starting with standards at 1 PPM, this feature enables the creation of accurate standards at 100 part per trillion to accommodate today's challenging monitoring requirements. A digital scale may be used to validate dilution accuracy, using the gravimetric calibration of the pressure sensor. Considering NIST referenced weights are available to ensure proper scale calibration, removal of internal sensors for annual calibration becomes unnecessary with the 4700.

Features

- 6 Channels Installed and Ready!**
The 4700 comes standard with six channels. This allows for dedicated ISTDs, CalSTDs, and sample dilution channels.
- Performs Dilutions up to 10,000x!**
The 4700 Precision Diluter can easily perform 1–100x dilutions (100 PPB to 1 PPB), or dilutions up to 10,000x by using CH6 for second stage dilution.
- Dilutes High Concentrations**
High concentration samples such as soil gas can be effortlessly diluted with the 4700.
- Conserves Cylinder Standards**
The 4700 conserves cylinder standards relative to dynamic blending.
- Ideal for Challenge Standards**
The 4700 can create 1 PPB challenge standards for 6L canister inertness validation tests. (One 110L cylinder fills 1800 6L canisters.)
- Gravimetric Dilution Validation**
An optional digital scale can be used to validate dilution ratios gravimetrically, thus eliminating any need for expensive annual sensor calibrations.

DESCRIPTION	PART #	UNIT
4700 Precision Diluter (Includes 6 channels)	4700	EA
4700 Table/Bracket Option	4700-TSC	EA

Calibration Standards (See pp.38–39 for more Standards)

DESCRIPTION	PART #	UNIT
1 PPM TO-14a Standard (110L Cylinder, 1700psig)	40-45010	EA
1 PPM TO-15 Subset Standard (110L Cylinder, 1700psig)	40-45110	EA
1 PPM TO-15 Plus Standard (110L Cylinder, 1700psig)	40-45115	EA
1 PPM 4 Component Internal Standard (110L Cylinder, 1700psig)	40-45210	EA
2–5 PPM Carbonyl Standard (800L Cylinder, 2000psig)	40-45130	EA
77-84 Cmpd TO15 Standard (800L Cylinder, 2000psig)	40-45120	EA
77-84 Cmpd TO-15 Standard (w/ Formaldehyde) (800L Cylinder, 2000psig)	40-45120WF	EA
4-Position Cylinder Holder (for 110L Standard Cylinders)	40-44910	EA
High Purity Stainless Regulator w/ CGA180	40-02001	EA

Sample Pressurization

The 4700 uses pressure differentials rather than mass flow controllers to meter in the standard, which has several advantages. First, very little of the standard mix is used in making a dilution. This allows the original cylinder to last longer, keeping cylinder pressures higher where contents are more stable. This now makes it cost effective to create accurate standards into every field canister in a laboratory's inventory to check them for proper recovery once every 2 years.

Even small 110L cylinders at 1 PPM will allow over 10,000 6L canisters to be filled to atmospheric pressure with a 1 PPB mixture by first making a 20 PPB working standard that can be further diluted into each canister to be tested. This results in just pennies worth of standard being consumed during each inertness test.

By contrast, typical dynamic diluters that must balance flows and pressures can typically only fill 50–100 6L canisters per 102L cylinder, making field canister inertness testing prohibitively expensive. Secondly, now low pressure standards or even samples can be further diluted using inlet #6 which is conveniently located on the front of the 4700. Easily perform up to a 100x dilution into a 6L canister, or up to a 40x dilution into a Bottle-Vac™ to obtain the working concentrations that are more acceptable to GCMS inlet systems.

The 4700 can perform automated pressurizing of canister field samples to bring them to a positive pressure after receipt by the laboratory. A high accuracy sensor ($\pm 0.3\%$) first measures the initial pressure, then fills the canister to a requested final pressure and calculates the dilution factor. A second operating mode allows dilution by a constant factor of 1.5, 2, or 3x. This conveniently eliminates the need to determine different dilution factors for each sample. Pressurizing samples with a surrogate-containing nitrogen cylinder can add further reliability to the results by validating the actual volume withdrawn from the sample canister during analysis.

SmartLab™ 2A Control Interface

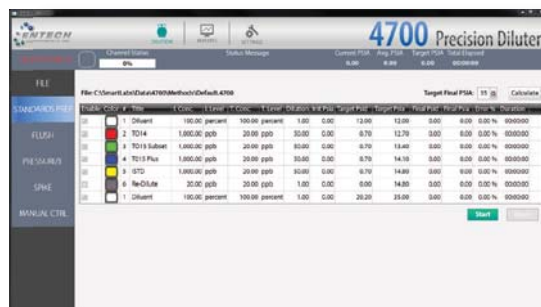
The 4700 is controlled using Entech's SmartLab 2A network. This software allows the defining and running of methods as well as the pressurizing of samples or standards prior to GCMS analysis. An easy to use graphical interface simplifies operation and accelerates user understanding of operation principles.

Automatic Dilution Calculations

The automatic dilution calculation system, which is integrated throughout the Entech 4700's user interface, makes it very simple and intuitive to specify and describe target concentrations and final concentrations between 100% and 1 part per trillion.

Dilution values may be entered using any convenient unit of measure, and all values will automatically be converted to a common base within the Entech 4700 software.

The 4700 Precision Diluter's Feature Rich Software enables full control.



An intuitive user interface, optional touch pad quick entry, color coding, status lights, advanced reports, & much more!

DDS™ – Digital Dilution System

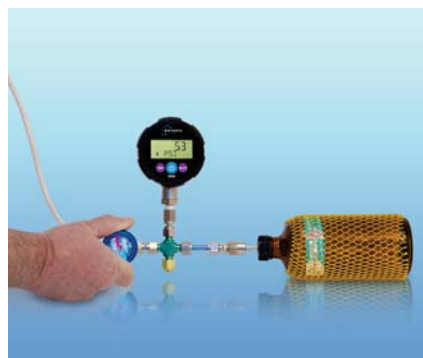
Sample Dilution



DDS™ – Four systems in one!

The DDS™ is an absolute must for any TO-15 laboratory.

Transfer a known quantity from a high concentration sample via syringe to an evacuated Bottle-Vac™ or MiniCan™, followed by pressurization using the DDS™ to a consistent, final pressure to complete the dilution process as shown below.



Sample Surrogate Spiking

Easily attach every sample that comes into the lab for a quick pressurization to 1.5x or 2x using UHP Nitrogen or preferably a Nitrogen cylinder filled with a surrogate of known concentration to enhance the quality assurance of each and every analysis.

Standards Dilution

Easily make a 2 PPB standard from a 40 PPB standard canister to support the preparation of trace level calibration curves. Dilutions from 5 to 50x are easily and accurately achieved, allowing wider dynamic calibration ranges without having to preconcentrate extremely small or large volumes.



Field Testing of Canisters

Verify sample integrity with the precision and reliability of the DDS™ Gauge.

The ability to detect small leaks is > 10x better than standard dial gauges. DDS™ readings are also not affected by changes in altitude.



DESCRIPTION	PART #	UNIT
Digital Dilution System (DDS™)	03-32010	1
Includes:		
DDS™ Digital Gauge Assembly	03-32030	1
¼" Silonite® Cross Assembly	03-32020	1
¼" Silonite® Female Micro-QT™	30-22800S	1
¼" Silonite® Toxic Organic Valve™	29-TOV-2S	1

DDS™ – One System. So Many Uses!

Create standard mixtures to your exact laboratory requirements.

Entech now provides multiple standard cylinders with no overlapping compounds. Start with the TO-14a Standard, then add on the particular TO-15 compounds required to meet your needs. Up to 4 different cylinders can be blended together to low PPB levels into a Silonite® canister using the 4700 Precision Diluter. Dedicating channels for Internal Standard and Cal Standard mixes simplifies operation.

TO-14a | Standard

Volume ~110L Balance: Nitrogen
PN 40-45101

Freon 12	1,1,2-Trichloroethane
Chloromethane	Toluene
Freon-114	1,2-Dibromoethane
Vinyl Chloride	Tetrachloroethylene
Bromomethane	Chlorobenzene
Chloroethane	Ethylbenzene
Freon-11	p-Xylene
1,1-Dichloroethene	m-Xylene
Methylene chloride	Styrene
Freon-113	o-Xylene
1,1-Dichloroethane	1,1,2,2-Tetrachloroethane
cis-1,2-dichloroethene	1,3,5-Trimethylbenzene
Chloroform	1,2,4-Trimethylbenzene
1,2 Dichloroethane	1,3-Dichlorobenzene
1,1,1-Trichloroethane	1,4-Dichlorobenzene
Benzene	1,2-Dichlorobenzene
Carbon Tetrachloride	1,2,4-Trichlorobenzene
1,2-Dichloropropane	Hexachloro-1,3-Butadiene
Trichloroethylene	
cis-1,3-Dichloropropene	
trans-1,3-Dichloropropene	

TO-15 | Subset Standard

Volume ~110L Balance: Nitrogen
PN 40-45110

Propylene
1,3-Butadiene
Vinyl Bromide
Acetone
Isopropyl Alcohol
Carbon Disulfide*
Allyl Chloride
trans-1,2-Dichloroethene
Methyl-t-Butyl Ether (MTBE)
Vinyl Acetate
Methyl Ethyl Ketone
n-Hexane
Ethyl Acetate
Tetrahydrofuran
Cyclohexane
Bromodichloromethane
1,4-Dioxane
2,2,4-Trimethylpentane
n-Heptane
Methyl Isobutyl Ketone
Methyl Butyl Ketone
Dibromochloromethane
Bromoform
4-Ethyltoluene
Benzyl Chloride*

TO-15 | Plus Standard

Volume ~110L Balance: Nitrogen
PN 40-45115

Acrolein
Acrylonitrile
Acetonitrile
1,1,1,2-Tetrachloroethane
2-Chloroprene
2-Chlorotoluene
Methanol
Ethanol
tert-Butyl Alcohol
Diisopropyl Ether
Ethyl-tert-Butyl Ether
tert-Amyl Methyl Ether
Methyl Methacrylate
Cumene (Isopropylbenzene)
o-Cymene (2-Isopropyltoluene)
n-Propylbenzene
n-Butylbenzene
tert-Butylbenzene
sec-Butylbenzene
Naphthalene

* No Stability Guarantee
Restricted to 500psia @ 1 PPM

Sulfur Standard

Volume ~110L Balance: Nitrogen
PN 40-45600

2,5-Dimethylthiophene
2-Methylthiophene
3-Methylthiophene
Butyl Mercaptan
Carbon disulfide
Dimethyl Disulfide
Dimethyl Sulfide
Ethyl Mercaptan
Ethyl Sulfide
Hydrogen Sulfide
Isopropyl Mercaptan
Methyl Mercaptan
Pentyl Mercaptan
Propyl Mercaptan
Tert-butyl Mercaptan
Thiophene
Carbonyl Sulfide
Isobutyl Mercaptan
2-Ethylthiophene

Additional Calibration Standards

Entech offers an Internal Standard for TO-14a and TO-15 Method applications. A Carbonyl Standard is available that includes Formaldehyde (now easily recoverable from Entech canister solutions). A complete 77-84 component standard is listed which covers a wide range of required target compounds.

Internal Standard

Volume ~110L Balance: Nitrogen
PN 40-45210

Bromochloromethane
Chlorobenzene-d5
1,4-Difluorobenzene
1,4-Bromofluorobenzene



102L Cylinder

Carbonyl Standard

Volume ~ 800L Balance: Nitrogen
PN 40-45130

Formaldehyde
Acetaldehyde
Acetone
Propionaldehyde
2-Butanone



4-Position 102L Cylinder Holder
Clamps or screws onto table edge.
PN 40-44910
(Cylinders not included)

77-84 Compound TO15 Standard

Volume ~ 800L Balance: Nitrogen
PN 40-45120 / PN 40-45120WF (w/ Formaldehyde)

Acetaldehyde	1,4-Dioxane	Pentanal
Acetone	Cyclohexane	Pentane
Acetonitrile	Cyclopentane	2-Pentanone
Acrolein	Dichlorodifluoromethane (R-12)	3-Pentanone
Acrylonitrile	Dichloromethane	Propanal
Benzene	Ethanol	1-Propanol
Benzyl Chloride	Ethyl Benzene	2-Propanol
Bromodichloromethane	Formaldehyde	Propene
Bromoform	Hexachloro-1,3-Butadiene	p-Xylene
Bromomethane	Hexanal	Styrene
1,3-Butadiene	Hexane	Tetrachloroethylene
Butanal	2-Hexanone	Tetrachloromethane
1-Butanol	3-Hexanone	Toluene
Carbon Disulfide	Isobutene	trans-1,2-Dichloroethene
Chlorobenzene	Isoprene	trans-1,3-Dichloropropene
Chlorodifluoromethane (R-22)	m-Dichlorobenzene	1,1,2,2-Tetrachloroethane
Chloroethane	Methacrolein	Trichloroethylene
Chloroform	Methanol	Trichlorofluoromethane (R-11)
Chloromethane	Methyl Ethyl Ketone	1,1,1-Trichloroethane
Dibromochloromethane	Methyl Iodide	1,1,2-Trichloro-
1,1-Dichloroethane	4-Methyl-2-Pentanone	1,2,2-Trifluoroethane (CFC-113)
1,1-Dichloroethene	Methyl Tertiary Butyl Ether	1,1,2-Trichloroethane
cis-1,2-Dichloroethene	Methyl Vinyl Ketone	1,2,3-Trimethylbenzene
cis-1,3-Dichloropropene	m-Xylene	1,2,4-Trichlorobenzene
1,2-Dibromoethane	Naphthalene	1,2,4-Trimethylbenzene
1,2-Dichloroethane	o-Dichlorobenzene	1,3,5-Trimethylbenzene
1,2-Dichloropropane	o-Xylene	Vinyl Acetate
1,2-Dichlorotetrafluoroethane (R-114)	p-Dichlorobenzene	Vinyl Chloride

* No Concentration Guarantee
Blend Tolerance +/-10%
Analytical Tolerance +/-5%



HDS™ PM Exposure Chamber PN: HDS-EC1

Features

- Multiple Ports**
Multiple ports are ready for evacuation, filling with diluent, gas, or liquid standards, pressure / vacuum measurements, and more!
- Multiple HDS™ Personal Monitors**
Easily test up to 4 HDS™ Personal Monitors at a time.
- Silonite® Coated Chamber**
The HDS™ Personal Monitor Exposure Chamber features a large 6L volume with the reliable inertness of Silonite®.
- Verify Specific Sampling Rates**
Prepare and test virtually any volatile chemical's sampling rates relative to the collection rate of air when using our HDS™ Personal Monitors.
- Easy HDS™ Sampling**
Liquid standards are spiked into chamber through the top and allowed to equilibrate prior to sampling. No disturbance in concentrations or chamber pressure when starting / stopping the sampling process.
- Reliable Measurements**
No flows to control or special gases required. When done, simply analyze by loop injection (PPM Level) or extract 10cc when monitoring PPB levels (7200).

HDS™ Personal Monitor Exposure Chamber

The new HDS™ Personal Monitor Exposure Chamber allows laboratories to prepare and validate virtually any volatile chemical's sampling rates relative to the collection rate of air when using the Entech HDS™ Personal Monitors. Although sampling rates do not vary much on a compound by compound basis, our new exposure chamber will allow the verification of exact rates of virtually any volatile chemical to within a few percent, measured against the gravimetrically determined weight gain achieved during the sampling process. No other IH technique has such an accurate means by which to measure the amount of sample collected "during" the sampling event. HDS™ Personal Monitors collect chemicals at a relative rate that is about 75–95% as fast as the collection of air. This exposure chamber can obtain specific sampling rate data on 4 HDS™ Personal Monitors at a time and the validation process is easy. Neat, or multi-component liquid standards can be injected into the exposure chamber and allowed to equilibrate to achieve the desired gas phase concentrations before HDS™ Personal Monitor sampling.

Test and Validate
the sampling rate
of virtually any
VOC!

Call Us Today to Learn More!



DESCRIPTION

PART

UNIT

HDS™ PM Exposure Chamber HDS-EC1 EA

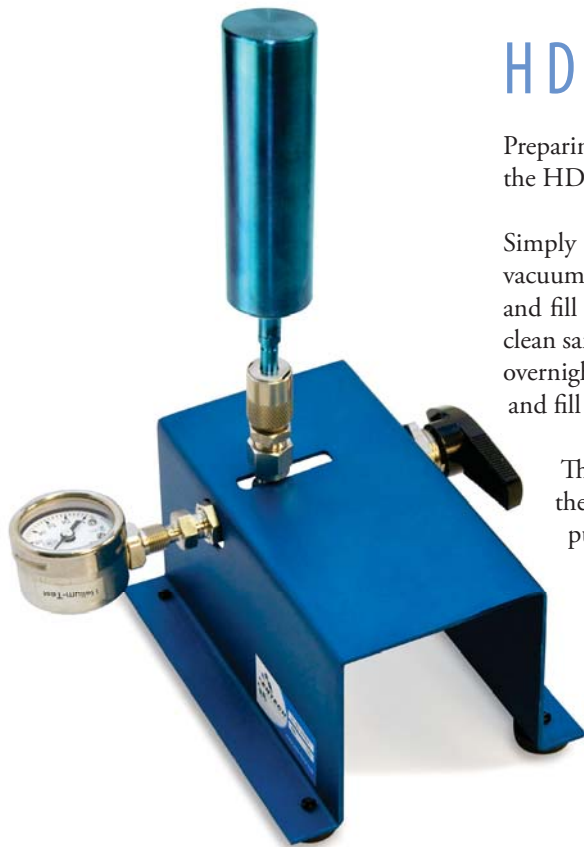
Includes 30" Hg-0-30psig gauge and female MicroValve™ on top (with NPT fittings) and a male MicroValve™ to attach either a flush gas or vacuum for easy cleaning. Note: Base unit does not include Toxic Organics Valve (TOV-2™) and fittings. Call for more information on how to best configure your Exposure Chamber.

HDS™ – PS1 Personal Monitor Prep. Station

Preparing HDS™ Personal Monitors for field sampling just became a lot easier with the HDS™ Personal Monitor Prep Station!

Simply attach an HDS™ Personal Monitor to the HDS-PS1 Prep Station and use a vacuum pump and cylinder containing Helium and BFT to evacuate, fill, evacuate, and fill the sampler. The personal monitor is now ready to be sent to the field. To clean samplers, simply evacuate, fill, and evacuate the samplers then place in an oven overnight at 70–100°C. Cool the samplers then follow the normal fill, evacuation, and fill process. Your samplers are now ready for the next field sampling event.

The HDS-PS1 comes with the prep station manifold as shown, and includes the compound gauge, 3-way valve, and female Micro-QT™ Valve. Diaphragm pump and cylinders containing the Helium/BFT mix are sold separately.



HDS™ – PS1 Prep Station PN: HDS-PS1

DESCRIPTION	PART #	UNIT
HDS™ Personal Monitor Prep. Station (Includes compound gauge, 3-way valve, and female Micro-QT™)	HDS-PS1	EA
2-Stage Diaphragm Vac. Pump – 120 VAC Option	10-20030	EA
2-Stg. Diaph. Vac. Pmp. – 220-240VAC/50Hz	10-20034	EA
4-Position Expander (Prepare 4 samplers simultaneously)	HDS-PM-4XM	EA
¼" Silonite® Female Micro-QT™ (for 4-Pos. Expander.)	30-22800S	EA

Industrial Hygiene – HDS™ Cylinder Standards

Two separate cylinder mixes are required by the laboratory for the preparation and analysis of HDS™ Personal Monitors.

HDS™ Preparation: A cylinder containing 1 PPM Bromofluorotoluene (BFT) in Helium is used to “charge” the samplers prior to sending them into the field. Since the BFT remains at the same concentration through the sampling process and delivery back to the laboratory, the BFT serves as an excellent recovery standard to validate leak-tight and inert conditions.

HDS™ Analysis: A second cylinder containing Fluorobenzene (FB) in Nitrogen at 1 PPM is used as an internal standard. Each HDS™ Personal Monitor is pressurized to 7psig (7psi above atmospheric pressure) either manually or automatically on the Entech 7650-L10, 7410D, or 7200 | 7650-M MillionAir™ System, providing an internal standard to verify the correct delivery of the sample to the GCMS.

The Helium/BFT standard utilizes a single stage high purity regulator, while the N2/FB cylinder uses a 2-stage high purity regulator to maintain a more constant 7psig to improve analytical precision. Lower concentration BFT and FB at 10 PPB are used when performing HDS™ sampling in larger canisters and Bottle-Vacs™ for high sensitivity measurements to low or sub-PPB levels.

HDS™ Cylinder Standards

DESCRIPTION	PART #	UNIT
1 PPM BFT in Helium (500L Cylinder, 1200psig)	40-HDS-BFT-H	EA
10 PPB BFT in Helium (500L Cylinder, 1200psig)	40-HDS-BFT-E	EA
1 PPM FB in Nitrogen (500L Cylinder, 1200psig)	40-HDS-FB-H	EA
10 PPB FB in Nitrogen (500L Cylinder, 1200psig)	40-HDS-FB-E	EA



3100D Canister Cleaner



The 3100D Features all-new software.

3112D Canister Cleaning System
with 3100-12 6L Canister Manifold
PN 09-OV6L12

3112D Oven Size

Height: 34 inches (86.36cm)

Width: 33 inches (83.82cm)

Depth: 35 inches (88.9cm)

3100D Canister Cleaning Systems

The only oil-free canister cleaning systems on the market.

Canisters are cleaned for reuse by evacuating and refilling with nitrogen or zero air multiple times to completely eliminate VOCs introduced during the previous sampling. After cleaning, canisters are left under vacuum in preparation for resampling. System pressure and vacuum readings control the evacuation and fill times for consistent batch to batch cleaning. Silonite® coated manifolds and separate fill and evacuation flow paths ensure the most rapid elimination of VOCs and SVOCs possible. The “D” models now include method control of oven temperatures and adaptive feedback and control of the molecular drag pump system to improve pump system performance and longevity.

The 3112D oven manifold accommodates up to *twelve* 6L canisters for complete heating during the cleaning process. Connect two ovens and clean up to *twenty-four* 6L canisters simultaneously! The new 3108D Canister Cleaning System cleans up to *eight* 6L canisters, *AND* with the addition of expansion manifolds – cleans up to *thirty-two* 1–1.4L MiniCans™ or Bottle-Vacs™!



3112D Canister Cleaning System

DESCRIPTION	PART #	UNIT
3112D Cleaning System*	3112D	EA
Includes:		
3100D & Control Software	3100D	EA
3100D Molecular Drag Pump	10-31000	EA
3100D Humidifier	07-10531	EA
6L x 12 Canister Oven**	09-OV6L12	EA
12-Position 6L Canister Manifold	3100-12	EA
3112 External Fill/Evac Manifold	15-31010	EA
2-Stage Diaphragm Pump – 120VAC	10-20030	EA
3100A/D Table/Bracket Option	3100-TSC	EA

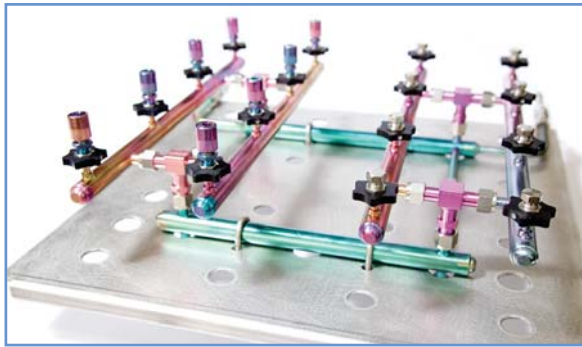
* Order 3112D-HV for 220–240VAC Operation.

** Order 09-OV6L12-HV for 220–240VAC Operation. Manifold required.

www.entechnst.com

Both the 3112D and 3108D
Cleaning Systems Feature
Precise Digital Control
&
Convective Heating!

3108D Canister Cleaning System



3108D Expansion Manifolds* – The perfect solution for cleaning MiniCans™ and Bottle-Vacs™.

Utilize our new, 8-Position, 1/4" and MicroValve™ Expansion Manifolds to clean up to 32 MiniCan™ or Bottle-Vac™ canisters per 3108D oven! (Two Expansion Manifolds are pictured above with both MicroValve™ and 1/4" options.)

* Expansion manifolds are currently only available for the 3108D Canister Cleaning System.



3108D Canister Cleaning System
6L Canister, 8-Position Manifold
PN 09-OV6L8

3108D Oven Size
Height: 37.5 inches (95.25cm)
Width: 21.5 inches (54.61cm)
Depth: 28 inches (71.12cm)



3108D Humidifier
PN 07-10531



External Manifold for
Dual Oven Connection
PN 3100-03

3108D Features

- Digital Control
- Convection Heating
- Software Controlled Oven Temperatures
- Full Adaptive Feedback and Control of Molecular Drag Pump

DESCRIPTION	PART #	UNIT
3108D Cleaning System* Equipment and Options:	3108D	EA
3108D & Control Software	3108D	EA
3108D Molecular Drag Pump	10-31000	EA
3108D Humidifier	07-10531	EA
6L x 8 Canister Oven**	09-OV6L8	EA
8-Position 6L Canister Manifold	3100-08	EA
3108 External Fill/Evac Manifold	15-31080	EA
2-Stage Diaphragm Pump – 120VAC	10-20030	EA
8-Pos. 1/4" TOV™ Canister Expansion Manifold	3108-08	EA
8-Pos. MicroValve™ Canister Expansion Manifold	3108-08QT	EA

* Specify 3108D-HV for 220-240 VAC Operation.

** Order 09-OV6L8-HV for 220-240 VAC Operation. Manifold required.

DESCRIPTION	PART #	UNIT
3100D – External Manifold (2 Oven Parallel Operation)	3100-03	EA
3100D 3112D – Expansion Tubing (2nd Oven Fill / Evacuation Tubing Kit)	15-31020P	EA
3100D 3108D – Expansion Tubing (2nd Oven Fill / Evacuation Tubing Kit)	15-31080P	EA
3100D – 220-240VAC/50Hz Option	3100-230	EA
3100D – 100 VAC Option	3100-100	EA
2-Stage Diaphragm Pump – 240VAC (220-240VAC/50Hz option)	10-20034	EA
2-Stage Pump Kit (Diaphragm Pump Maintenance Kit)	10-20017	EA
3100A/D Table/Bracket Option	3100-TSC	EA

Silonite® Coating

Our exclusive Silonite® coating process creates the most inert sampling products available. No other competitive passivation process comes close to matching the superior performance, consistency, durability, and scientific reliability of Silonite®.



Silonite® Tubing & Loops
See pages 46 – 47



Silonite® Fittings
See page 48



Silonite® Cylinders
See page 50



Silonite® Injection Liners
See pages 52 – 53

This Section Covers

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| 45 | Silonite® Surface Coatings |
| 46 | Silonite® Coated Tubing |
| 47 | Silonite® Coated Loops & Cut Tubing |
| 48 | Silonite® Coated Fittings |
| 49 | Custom Silonite® Coating |
| 50 | High Pressure Silonite® Cylinders |
| 51 | Silonite® Coated Valves |
| 52 – 53 | Silonite® Coated Injection Liners |

Silonite® Surface Coatings

Silonite® The Most Inert Surface Treatment Available

Silonite® is a ceramic coating treatment developed by Entech to provide an extremely inert surface for chromatography applications. Silonite® creates an ultra-smooth surface which reduces the potential for chemical adsorption. The high density of the Silonite® coating nearly eliminates the absorption effects prevalent in plastics (Teflon®, Tedlar® or Siloxane treated surfaces).

Silonite® Coating (Thickness: 40-100 nm)



The Silonite® Color Secret

What makes Silonite® coated parts so colorful? Placing a smooth, transparent coating over stainless steel surfaces results in a phenomenon known as “thin film interference” where light reflecting off the Silonite® ceramic coating becomes out of phase with light reflecting off the stainless steel surface below. The cancellation of part of the light spectrum and enhancement of other wavelengths turns normal white light into one of several different shades exhibited by Silonite® coated parts. The actual color formed is an indication of the thickness of the coating. As the thickness increases from 150–1000 angstroms, the apparent color of Silonite® coating goes through a color progression:



Silonite® color consistency indicates a uniform coating thickness, providing maximum inertness, durability and corrosion protection.

The Silonite® Advantage

Stainless steel and glass are the most commonly used materials in GC Inlet and sample handling systems. However, surface imperfections and inherent chemical dependent adsorption exists with even the highest quality 316L stainless steel, causing substantial losses of vapor phase chemicals. At elevated temperatures, surface metal oxides can be catalytic, especially exposed iron on the surface or in pores below the surface. The fact that 316SS is 67% iron makes catalytic losses a certainty unless the surface is treated with Silonite®. Glass, although more inert than stainless steel, also contains additives which have a negative effect on surface inertness. These include Iron, Sodium and Boron. Placing a thin layer of Silonite® over these surfaces eliminates exposure of the sample to these reactive additives and impurities.

Features and Applications

- More Inert than Metal or Glass
- Reduces Porosity of Metal Surfaces
- Ultra-Thin Coating
Thin enough to maintain substantial flexibility.
- Complete Surface Bonding
Through chemical and mechanical processes.
- Corrosion Resistance

Chromatography Inlet Systems

- Injection Liners
- Tubing
- Valves

Sample Handling

- Canisters
- Cylinders
- Valves

Analyzer Components

- Sulfur and Mercury Analysis
- Corrosion Protection of Parts





Silonite® Coated Tubing

Silonite® greatly improves the chemical inertness of stainless steel tubing. Combining the durability of stainless steel with the inertness of a non-reactive ceramic coating creates the perfect solution for real world chemical applications.

Unlike other coatings on the market, Silonite® provides the most consistent, high-density barrier available. Silonite's consistency ensures chemicals never reach reactive metal oxides on interior tubing walls. The smooth coating layer provides an even, laminar flow, creating a lower pressure drop and discourages deposition of high molecular weight contaminants. This helps to maintain a clean flow path and preserves Silonite's inert, non-adsorptive properties within the tubing.

Silonite® tubing can be further deactivated in a proprietary process which results in an incredibly thin, low-bleed coating. Our Silonite-D tubing provides the best inertness for chromatography applications. Polar and reactive compounds show even better GC injection profiles with reduced tailing during analysis.

Silonite® Deactivated Tubing

DESCRIPTION	PART #	UNIT
1/32" x 0.02" Silonite® Tubing (Deactivated)	15-87020D	FT.
1/16" x 0.02" Silonite® Tubing (Deactivated)	15-87120D	FT.
1/16" x 0.04" Silonite® Tubing (Deactivated)	15-87140D	FT.
1/8" x 0.085" Silonite® Tubing (Deactivated)	15-87280D	FT.
1/4" x 0.21" Silonite® Tubing (Deactivated)	15-87421D	FT.

Silonite® Coated Tubing

Features

- **Silonite® Coating**
Inert and durable surface prevents interaction with reactive metal oxides on tubing walls.
- **Resists Cracking**
Silonite® is flexible enough to handle mild bending.
- **Even Better Recovery**
Including reactive organic compounds containing oxygen, nitrogen, sulfur and phosphorous.
- **Ultra-Smooth Surface**
Reduces internal surface area and porosity.
- **Superior Quality Assurance**
Batch tested for inertness.
- **Handles a Wide Temperature Range**
-200°C to 450°C.

Applications

- GC Transfer Lines
- Sample Loops
- Chemical Analyzers
- GC Inlet Systems
(P&T, Headspace, Thermal Desorption)
- Sulfur and Mercury Analysis

O.D.	Min. Bend Radius
1/32"	0.75"
1/16"	1.0"
1/8"	2.0"
1/4"	4.0"

Silonite® Deactivated Loops

Applications

- Sulfur Compound Analysis
- Formaldehyde Analysis
- Mercury Sample Collection and Analysis
- Polar Compound Analysis
Faster cleanup for each analysis!



Silonite® Coated Loop

Silonite® Coated Loops are pre-bent before coating. This creates the most inert internal surface possible. Loops are batch tested using dry, polar standards at room temperature to verify complete inertness.

We take the time and care required to ensure the acclaimed inertness and durability of Silonite® during our intricate, software controlled surface treatment process.

Silonite® quality is visibly evident by its consistent color. Wide spectrum color shifts, or a “rainbow” appearance as seen in competitive coatings can be an indication of irregular surface thickness and therefore inconsistent inertness and corrosion resistance.

DESCRIPTION	PART #	UNIT
50µL Silonite® Loop (Deactivated)	07-60050	EA
125µL Silonite® Loop (Deactivated)	07-60125	EA
250µL Silonite® Loop (Deactivated)	07-60250	EA
0.5cc Silonite® Loop (Deactivated)	07-60500	EA
1.0cc Silonite® Loop (Deactivated)	07-61000	EA
2.0cc Silonite® Loop (Deactivated)	07-62000	EA
5.0cc Silonite® Loop (Deactivated)	07-65000	EA

(Includes nuts and ferrules)

Silonite® Coated Cut Tubing

Features

- Superior Inertness
Tubing coated inside and out.
- Pre-bent Cut Tubing
Tubing can be pre-bent to customer specifications.



Silonite® Coated Cut Tubing

Small lengths of tubing can be coated on both the inside and outside for use in sampling systems and analyzers.

DESCRIPTION	LENGTH (Max)	PART #	UNIT
1/32" OD x 0.022" ID	10'	15-88020	FT.
1/16" OD x 0.02" ID	8'	15-88120	FT.
1/16" OD x 0.04" ID	20'	15-88140	FT.
1/8" OD x 0.083" ID	20'	15-88280	FT.

Union



Male Connector



Reducing Union



Reducer



Tee



Elbow



Cross



Valco® Tee



Silonite® Coated Fittings

Entech stocks a wide variety of Silonite® coated fittings. We can also coat custom fittings upon request. Contact our Silonite® Coating Department: Silonite@entechinst.com

DESCRIPTION	PART #	UNIT
-------------	--------	------

Unions:

1/6" Silonite® Union	37-01010	EA
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1/8" Silonite® Union	37-02010	EA
----------------------	----------	----

1/4" Silonite® Union	37-04010	EA
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Male Connectors:

1/6"–1/8" Silonite® NPT Connector	37-01002	EA
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1/8"–1/8" Silonite® NPT Connector	37-02030	EA
-----------------------------------	----------	----

1/4"–1/8" Silonite® NPT Connector	37-04030	EA
-----------------------------------	----------	----

Reducing Unions:

1/6"–1/8" Silonite® Reducing Union	37-01020	EA
------------------------------------	----------	----

1/6"–1/4" Silonite® Reducing Union	37-01040	EA
------------------------------------	----------	----

1/8"–1/4" Silonite® Reducing Union	37-02040	EA
------------------------------------	----------	----

Reducers:

1/4" Fitting – 1/6" Tube, Silonite® Reducer	37-01140	EA
---	----------	----

1/4" Fitting – 1/8" Tube, Silonite® Reducer	37-02140	EA
---	----------	----

1/4" Fitting – 1/4" Tube, Silonite® Reducer	37-04140	EA
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Tees:

1/6" Silonite® Tee	37-01310	EA
--------------------	----------	----

1/8" Silonite® Tee	37-02310	EA
--------------------	----------	----

1/4" Silonite® Tee	37-04310	EA
--------------------	----------	----

Elbows:

1/4" Silonite® Elbow	37-04020	EA
----------------------	----------	----

Crosses:

1/4" Silonite® Cross	37-04410	EA
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Valco® Fittings:

1/6" Silonite® ZDV Bulkhead Union	37-01200	EA
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1/6" Silonite® ZDV Union	37-01210	EA
--------------------------	----------	----

1/6"–1/8" Silonite® ZDV Reducing Bulkhead Union	37-01250	EA
---	----------	----

1/6" Silonite® Tee	37-01350	EA
--------------------	----------	----

NOTE: Nuts are not coated since they do not come in contact with a sample path. Ferrules are also not coated since Silonite coating would make the surface harder, resulting in variances in sealing characteristics.
(See page 17 for Silonite® Micro-QT™ Valves for Vials)

Custom Silonite® Coating

Any 300 series stainless steel or glass shape can be Silonite® coated. Entech coats OEM parts for a variety of uses, and in various industries. Contact us today to see how Silonite® can be the right solution for your applications.

Features

- Corrosion Protection
- Chemical Inlets and Manifolds
- Sulfur Compound Analysis
- Analyzer Components
- Regulators

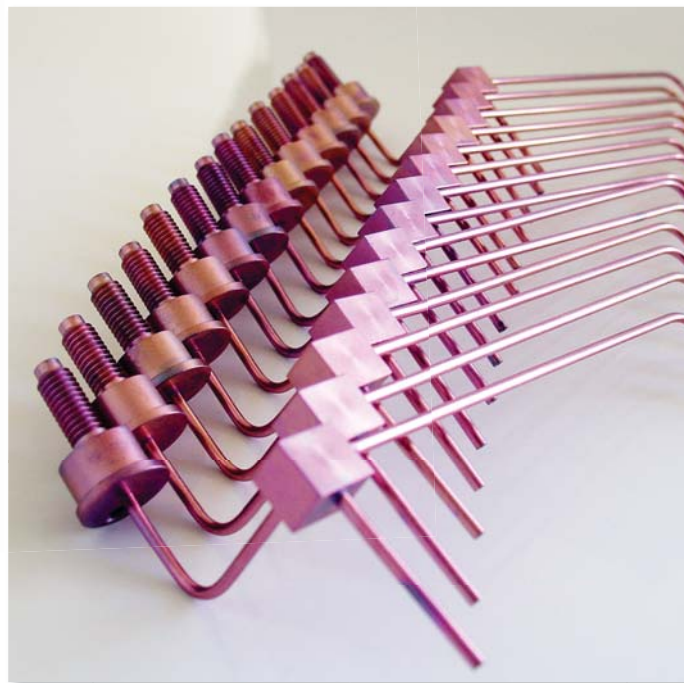


Silonite® The most inert surface treatment available!

We are ready to assist you with your application!
Contact Entech's Silonite® Coating Department:
Silonite@entechinst.com



Silonite® Coated Manifold



Silonite® Coated Micro GC Sample Inlet Pathways

Silonite® High Pressure Cylinders



Refinery Sulfur Gas Sampling

High pressure refinery gas sampling cylinders are now available with our Silonite® coating that allows sulfur compounds to remain stable for weeks prior to analysis. Corrosion resistance in the presence of HCl is also improved. Sampling cylinders and valves are rated to 1800psig, allowing for direct sampling of liquid propylene, LPG, and high pressure natural gas. Silonite® coated cylinders also conform to new regulations requiring sulfur monitoring in refinery flare gas stacks.

DESCRIPTION	PART #	UNIT
300cc, 1800psig Silonite® Cylinder	29-60300L	EA
500cc, 1800psig Silonite® Cylinder	29-60500L	EA
1000cc, 1800psig Silonite® Cylinder	29-61000L	EA

Other sizes are available upon request.
Contact our Silonite® Coating Department: Silonite@entechinst.com



Male-Male Valve PN 29-66200L Male-Female Valve PN 29-66100L

Silonite® High Pressure Valves

DESCRIPTION	PART #	UNIT
¼" Swagelok® MNPT to ¼" FNPT	29-66100L	EA
¼" Swagelok® MNPT to ¼" MNPT	29-66200L	EA

Entech stocks a wide variety of Silonite® coated valves. We can also coat custom valves upon request. Contact our Silonite® Coating Department: Silonite@entechinst.com

Silonite® Coated Valco® Valves

Includes valve, rotor, nuts, ferrules & 2" Stand-off



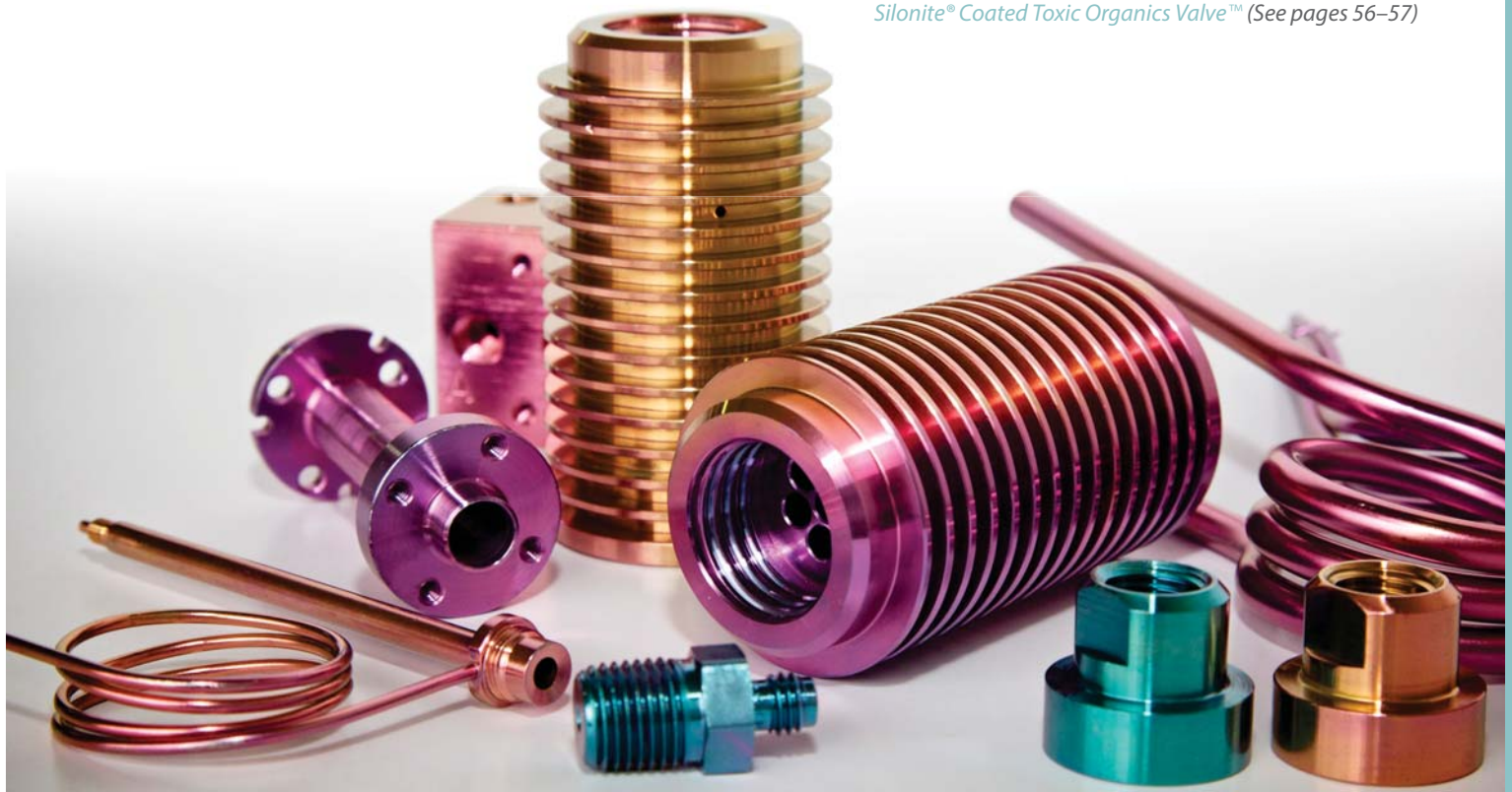
Silonite® Coated Valco® Valves

DESCRIPTION	PART #	UNIT
1/16", 6-Port, 2-Position	31-30820S	EA
1/16", 8-Port, 2-Position	31-30120S	EA
1/16", 9-Port, 8-Position	31-30220S	EA
1/8", 17-Port, 16-Position	31-30320S	EA
1/16", 34-Port, 16-Position	31-30420S	EA

We are ready to assist you with your application!
 Contact our Silonite® Coating Department:
Silonite@entechinst.com



Silonite® Coated Toxic Organics Valve™ (See pages 56–57)





Silonite® Coated Injection Liners

Silonite® Capillary Injection Liners

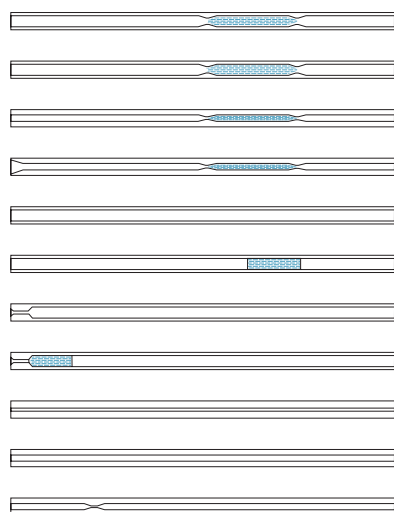
Silonite® coated GC Injection Liners provide a "no-bleed" solution for the analysis of reactive compounds. Available to fit most common GC models.

Order in Packages of 5 and in Bulk.

Call Us Today to Learn More!

Silonite® Injection Liners for Agilent® Instruments

Agilent 5890 / 6890 / 7890

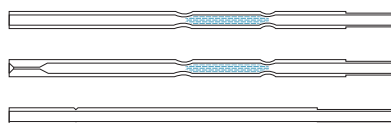


DESCRIPTION	Length & ID	PART #	UNIT
Split/Splitless FocusLiner™	(78.5 x 6.3mm, 4mm ID)	37-45010	EA
Split/Splitless Tapered FocusLiner™	(78.5 x 6.3mm, 4mm ID)	37-45020	EA
Split/Splitless Fast FocusLiner™	(78.5 x 6.3mm, 2.3mm ID)	37-45030	EA
Split/Splitless Tapered Fast FocusLiner™	(78.5 x 6.3mm, 2.3mm ID)	37-45040	EA
Split Straight-through Liner	(78.5 x 6.3mm, 4mm ID)	37-45050*	EA
Split w/Quartz Wool	(78.5 x 6.3mm, 4mm ID)	37-45060*	EA
Split/Splitless w/Single Taper	(78.5 x 6.3mm, 4mm ID)	37-45070*	EA
Split/Splitless w/Single Taper-Qtz Wool	(78.5 x 6.3mm, 4mm ID)	37-45080*	EA
Direct, Straight-through Liner	(78.5 x 6.3mm, 1.2mm ID)	37-45090*	EA
Splitless (Quartz) Straight-through Liner	(78.5 x 6.3mm, 2mm ID)	37-45100	EA
Splitless w/Recessed Gooseneck	(8.5 x 6.3mm, 2mm ID)	37-45110*	EA

* Also fits Varian® 1177 Injector

Silonite® Injection Liners for Perkin-Elmer® Instruments

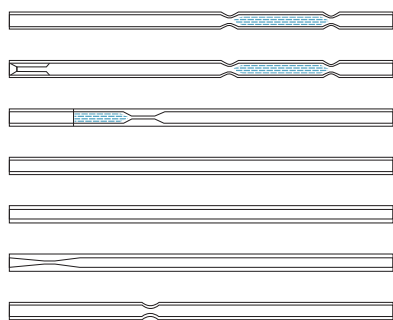
Perkin-Elmer AutoSystem™



DESCRIPTION	Length & ID	PART #	UNIT
Split/Splitless FocusLiner™	(92 x 6.2mm, 4mm ID)	37-46210	EA
Split/Splitless Tapered FocusLiner™	(92 x 6.2mm, 4mm ID)	37-46030	EA
Split, Straight-through Liner	(92 x 5.2mm, 4mm ID)	37-46110	EA

Silonite® Injection Liners for Shimadzu® Instruments

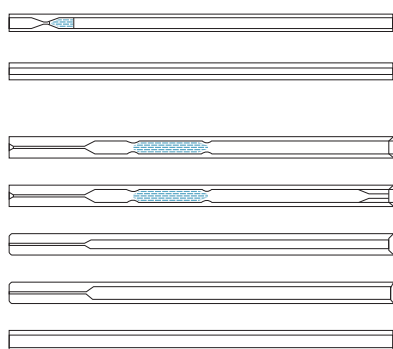
17A (SPL-17 Injectors)



DESCRIPTION	Length & ID	PART #	UNIT
Split/Splitless FocusLiner™	(95.5 x 5.0mm, 3.4mm ID)	37-43150	EA
Split/Splitless Tapered FocusLiner™	(95.5 x 5.0mm, 3.4mm ID)	37-43010	EA
Split/Splitless w/Recessed Gooseneck/Ortz Wool	(95.5 x 5.0mm, 3.4mm ID)	37-43110	EA
Split Straight-through Liner	(95.5 x 5.0mm, 3.4mm ID)	37-43130	EA
Splitless Straight-through Liner	(95.5 x 5.0mm, 2.6mm ID)	37-43140	EA
Direct	(95.5 x 5.0mm, 2.3mm ID)	37-43160	EA
Split/Splitless w/Middle Gooseneck	(95.5 x 5.0mm, 3.4mm ID)	37-43210	EA

Silonite® Injection Liners for Thermo Finnigan® Instruments

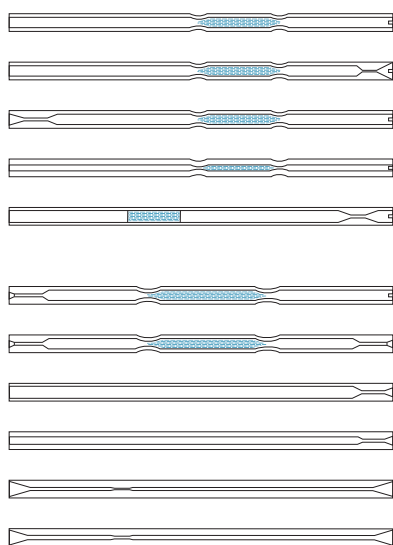
Mega Series 4000 / 5000 / 8000



DESCRIPTION	Length & ID	PART #	UNIT
Split/Splitless w/Recessed Gooseneck/Ortz Wool	(79.5 x 5mm, 3mm ID)	37-44010	EA
Splitless Straight-through Liner	(79.5 x 5mm, 2mm ID)	37-44020	EA
Model 8000 / TRACE™			
Split/Splitless FocusLiner™	(105 x 8mm, 5mm ID)	37-44030	EA
Split/Splitless Tapered FocusLiner™	(105 x 8mm, 5mm ID)	37-44040	EA
Splitless w/Single Taper	(105 x 8mm, 3mm ID)	37-44050	EA
Split w/Single Taper	(105 x 8mm, 5mm ID)	37-44060	EA
Split, Straight-through Liner	(105 x 8mm, 5mm ID)	37-44070	EA

Silonite® Injection Liners for Varian® Instruments

Injector Models 1075 / 1077 - GC Model 3400 & 3600



DESCRIPTION	Length & ID	PART #	UNIT
Split/Splitless FocusLiner™	(72 x 6.3mm, 4mm ID)	37-42130	EA
Split/Splitless Tapered FocusLiner™	(72 x 6.3mm, 4mm ID)	37-42210	EA
Split/Splitless FocusLiner™ w/Top-end Restriction	(72 x 6.3mm, 4mm ID)	37-42310	EA
Split/Splitless Fast FocusLiner™	(72 x 6.3mm, 2.3mm ID)	37-42110	EA
Split w/Quartz Wool	(72 x 6.3mm, 4mm ID)	37-42150	EA
Injector Models 1078 / 1079 - Temperature Programmable Injector			
Split/Splitless FocusLiner™	(54 x 5mm, 3.4mm ID)	37-42160	EA
Split/Splitless Tapered FocusLiner™	(54 x 5mm, 3.4mm ID)	37-42180	EA
Split/Splitless w/Single Taper	(54 x 5mm, 3.4mm ID)	37-42200	EA
Splitless w/Single Taper	(54 x 5mm, 2mm ID)	37-42220	EA
SPI Liner (Restriction 0.25mm)	(54 x 4.6mm, 0.5mm ID)	37-42240	EA
SPI Liner (Restriction 0.25mm for 0.53mm ID on-column)	(54 x 4.6mm, 0.5mm ID)	37-42260	EA

(Injector Model 1177 & GC Models 3380 / 3800 / 3900 - See Agilent® Injection Liners)

Available in Packages of 5 and in Bulk. Call Entech or Your Local Distributor for Ordering Information!

Sampling

Entech has developed the most extensive line of canisters and systems for gaseous sample collection available. Learn more about solutions and exciting innovations in vapor intrusion, helium diffusion, and time integrated sampling technologies.



Silonite® Canister Solutions
New, Toxic Organics Valve™. See pages 58 – 59



Time Integrated Sampling
CS1200ES Canister Sampler. See pages 62 – 64



Soil Gas Sampling
MicroValve™ Soil Gas Sampler. See page 78



Helium Diffusion Sampling
HDS™ Personal Monitors. See pages 84 – 87

This Section Covers

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60	Silonite® Canisters – Grab / Restricted Sampling
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66 – 67	MicroValve™ Sampling, Fittings, and Accessories
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70 – 71	MicroValve™ Canisters – Grab / Restricted Sampling
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76 – 79	Vapor Intrusion Soil Gas Sampling
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Canister Sampling Overview

Entech continues to be at the forefront of canister sampling technology. We are the only manufacturer that tests 100% of our canisters for chemical inertness by verifying the recovery of a mix of several challenging compounds. All Entech canisters feature the proprietary Silonite® coating which maximizes the recovery of the widest range of compounds possible. Silonite® is so effective because it creates an internal canister surface that is extremely inert – like the inside of a GC column. In fact, most GC-compatible compounds can be collected and recovered for analysis from Silonite® coated canisters.

Entech's continued research into making canisters even more inert has led to the development of Silonite® Ultra, with the ability to maintain the stability of even light semi-volatiles such as Naphthalene and Methyl-naphthalene. Gently heating Silonite® canisters recovers higher molecular weight and even thermally labile compounds that would otherwise decompose upon heating in adsorbent trapping media. The valves used to maintain canister vacuum and sample isolation play an important role in the successful recovery of target compounds. The TOV-2™ and Micro-QT™ valves were designed by Entech to optimize recoveries of VOCs and SVOCs. These valves can be used for quick fill grab, restricted orifice, or time weighted sampling applications.

TOV™ Canisters

Entech is pleased to offer the next generation Toxic Organics Valve™ (TOV-2™). This ultra-compact, packless valve features no internal welds and a completely swept flow path. The easier sealing TOV-2™ is an ideal compliment for our Silonite® canisters – a combination that exceeds all TO-14a and TO-15 method requirements. Learn more on page 58.



Micro-QT™ Valve Canisters

Micro-QT™ Valves improve the level of automation, ease of use, and performance of canisters and samplers. The Entech designed valve is completely contained in a ¼" tubular housing which uniquely allows for maximum flexibility in the lab and in the field. Inclusion volume is 80 times smaller than in Nupro® valves, resulting in far less contamination when making and breaking connections.

The compact MicroValve's internal volume also reduces the exposure to potentially contaminated surfaces, making the Micro-QT™ valve easy to clean, especially when analyzing semivolatile compounds.

(Learn more about MicroValves™ on pages 66–67)



Perfect for TO-14a and TO-15 Applications!

Now, Even
Better!

Introducing the packless, repairable valve designed specifically for Toxic Organics sampling and analysis.

TOV-2™

Toxic Organics Valve



TOV-2S (Silonite® coated version shown)

Featuring an inert, reliable, and compact flow path – 4 times less internal volume!



TOV-2™ The “next generation” Toxic Organics Valve.

The TOV-2™ Toxic Organics Valve has been specifically designed to ensure complete recovery of low level TO-14a and TO-15 target compounds. A packless system features an ultra-compact, passivated sample path with no internal weld scars, and a Silonite® coating option for superior inertness and durability. The TOV-2™ has Entech’s exclusive NF technology that uses replaceable ferrules that exhibit less carryover relative to replaceable vespel or V/G ferrules. The TOV-2’s new “sure-seal” valve seat creates a leak-tight seal even more easily than before. A low cost kit is available so you can easily maintain valves at the peak of scientific reliability and performance. Ask your Entech Analytical Solutions Manager or Distributor about how this advancement can deliver maximum recovery with minimal carryover for assured compliance with new lower level VOC methods.



Now, maximize the flexibility of your canister inventory! Add the benefits of our exclusive McDaniel's Controls gauge directly on the TOV-2™.

Want to use a gauge or no gauge? The choice is yours!

Toxic Organics Valve™ with Gauge
PN 29-TOV-2SG

DESCRIPTION	PART #	UNIT
Toxic Organics Valve™	29-TOV-2	EA
Silonite® Toxic Organics Valve™	29-TOV-2S	EA
Toxic Organics Valve™ with Gauge	29-TOV-2G	EA
Silonite® Toxic Organics Valve™ w/ Gauge	29-TOV-2SG	EA
Toxic Organics Valve™ Repair Kit	29-TOV-2-KIT2	EA

Toxic Organics Valve™

Features

- **Packless System**
The ultimate reliability in a metal sealing valve.
- **Ultra-Compact Design**
No other valve in its class can come close to matching the analytical transparency of the TOV™.
- **Silonite® Flow Path**
A Silonite® treated flow path is available for superior inertness, corrosion resistance, and trustworthy sampling.
- **It's Repairable!**
Ever throw away an entire valve because it can no longer seal properly? A low cost repair kit is available for the TOV™!
- **EPA Methods TO-14a and TO-15 Ready**
The Toxic Organics Valve™ and Entech's Silonite® canisters are the most reliable way to collect samples for EPA methods TO-14a and TO-15.

A "Must Have" component for Low Level TO-15.

TOV-2™

Toxic Organics Valve

57



Silonite® Canisters with the **NEW** Toxic Organics Valve™ (TOV-2)



15L Can w/ TOV-2SG™



6L Can w/ TOV-2SG™

2.7L Dual Stem Can
w/ TOV-2S™ and Gauge

3.2L Can w/ TOV-2SG™

0.01–100 PPB Trace Level

Entech's Silonite® canisters feature a large volume capacity for detection of volatile chemicals down to the low part per trillion range. An inert and durable internal Silonite® coating provides a high-quality, long-term sample storage solution. Losses in the valve are avoided by using our new Toxic Organics Valve™ (TOV-2™) which includes Entech's new "sure-seal" technology. An integrated valve guard is securely welded to the canister for superior light-weight valve protection without any stresses to the valve stem associated with heavy "strapped-type" valve guards. These canisters are certified to meet or exceed the technical specifications required for EPA methods TO-14a and TO-15. High quality performance is verified for EVERY canister with our demanding chemical inertness tests.

Features

- Silonite® Surface Coating**
We believe that each and every canister should be as inert and corrosion resistant as possible. That is why all of our canisters feature Silonite®.
- Welded Valve Guard**
Unlike "strap" designs, our TOV™ guard provides superior valve protection and far less added weight.
- Extended Range Canister Sampling**
Our Silonite® Canisters are more inert than SUMMA® or electropolished canisters, allowing recovery of a greater range of chemicals – including reduced sulfur compounds.

The 3.2L and 2.7L are lighter alternatives for canister sampling featuring minimal weight and maximum portability. 6L and 15L Canisters are ideal for large volume sampling and lab standards.

DESCRIPTION	PART #	UNIT
1L Can w/ Toxic Organics Valve™ (TOV-2)	29-MC1LV	EA
1L Can TOV-2™ & McDaniel® Gauge (30"Hg-0-30)	29-MC1LVG	EA
1L Can Silonite® Toxic Organics Valve™ (TOV-2)	29-MC1LSV	EA
1L Can Silonite® TOV-2™ & McDaniel® Gauge	29-MC1LSVG	EA
1.4L Can w/ Toxic Organics Valve™ (TOV-2)	29-MC1400V	EA
1.4L Can TOV-2™ & McDaniel® Gauge (30"Hg-0-30)	29-MC1400VG	EA
1.4L Can Silonite® Toxic Organics Valve™ (TOV-2)	29-MC1400SV	EA
1.4L Can Silonite® TOV-2™ & McDaniel® Gauge	29-MC1400SVG	EA
2.7L Can w/ Toxic Organics Valve™ (TOV-2)	29-10271	EA
2.7L Can TOV-2™ & McDaniel® Gauge (30"Hg-0-30)	29-10271VG	EA
2.7L Can Silonite® Toxic Organics Valve™ (TOV-2)	29-10272	EA
2.7L Can Silonite® TOV-2™ & McDaniel® Gauge	29-10272VG	EA
3.2L Can w/ Toxic Organics Valve™ (TOV-2)	29-10321	EA
3.2L Can TOV-2™ & McDaniel® Gauge (30"Hg-0-30)	29-10321VG	EA
3.2L Can Silonite® Toxic Organics Valve™ (TOV-2)	29-10322	EA
3.2L Can Silonite® TOV-2™ & McDaniel® Gauge	29-10322VG	EA
6L Can w/ Toxic Organics Valve™ (TOV-2)	29-10621	EA
6L Can TOV-2™ & McDaniel® Gauge (30"Hg-0-30)	29-10621VG	EA
6L Can Silonite® Toxic Organics Valve™ (TOV-2)	29-10622	EA
6L Can Silonite® TOV-2™ & McDaniel® Gauge	29-10622VG	EA
15L Can w/ Toxic Organics Valve™ (TOV-2)	29-11521	EA
15L Can TOV-2™ & McDaniel® Gauge (30"Hg-0-30)	29-11521VG	EA
15L Can Silonite® Toxic Organics Valve™ (TOV-2)	29-11522	EA
15L Can Silonite® TOV-2™ & McDaniel® Gauge	29-11522VG	EA

Field Canister Testing

We are the only manufacturer to offer the unsurpassed range, quality, and reliability of McDaniel Controls, Inc. gauges with 1/4" compression fitting. The compression fitting connects easily to a dual stem canister, or our new dual port TOV-2™ without any need for Teflon® tape for improved canister cleanliness.

You can also choose to verify sample integrity in the field with the precision and reliability of the DDS™ Gauge. The digital gauge shown below features absolute pressure readings that are never affected by altitude!

6L Can w/ DDS™ Gauge
PN 03-32030



It's easy to attach a McDaniels Controls gauge using the dual-stem canister design, or simply connect the new TOV-2™ with gauge to any single stem canister!



6L Canister shown with TOV-2SG
PN 29-10622VG

We Stock a
Wide Variety of
Canister Sizes

Call Today for Your Quantity Discount Price!

Test Gauges for TOV-2™ Canisters

We also offer high quality McDaniel® Gauge assemblies for easy field testing of standard TOV-2™ equipped canisters that do not have the included gauge option or a dual stem with an attached gauge.

DESCRIPTION	PART #	UNIT
30" Hg Vacuum Gauge (Assembly for 1/4" TOV-2™)	29-70030	EA
30" Hg-0-30psig Compound Gauge (for 1/4" TOV-2™)	29-70040	EA



30" Hg-0-30psig Compound Gauge
PN 29-70040

Filtered Grab Sampler for TOV™ Canisters

Performing unfiltered sampling into your Silonite® canister can lead to particulate contamination. This will eventually reduce volatile compound recovery, while making it more difficult to achieve EPA required blank levels. Entech's Grab Samplers are a great solution to keep your canisters clean. The external filter allows rapid equilibration with the local environment to reduce net loss due to adsorption, and the “thimble” geometry provides the surface area required to quickly fill large canisters. All filters are Silonite® coated to maximize recovery of volatile chemicals.



Time to Fill Canisters (in Minutes)

Part No.	Description	2.7L Canister	6.0L Canister
39-RS-0	Grab Sampler	< 0.2	< 0.3

Filtered Restricted Samplers for TOV™ Canisters

Entech's Restricted Samplers are identical to the Grab Samplers listed above, but also include a sapphire orifice to slow down sampling rates. Fill rates remain constant until the canister is half full. Sampling can be stopped at this point for a true time weighted sample or allowed to continue if a time-weighted average is not required. Approximate times for filling to 50% and 95% of atmospheric pressure are listed in the table below.



Restricted Sampler for TOV™ Canisters
PN 39-RS-x



Replacement Silonite® Filter
PN 39-92150

DESCRIPTION	PART #	UNIT
Grab Sampler for Silonite® Canisters (No Restrictor)	39-RS-0	EA
Restricted Sampler for Silonite® Canisters (600cc/min)	39-RS-1	EA
Restricted Sampler for Silonite® Canisters (150cc/min)	39-RS-2	EA
Restricted Sampler for Silonite® Canisters (63cc/min)	39-RS-3	EA
Restricted Sampler for Silonite® Canisters (38cc/min)	39-RS-4	EA
Restricted Sampler for Silonite® Canisters (19cc/min)	39-RS-5	EA
Restricted Sampler for Silonite® Canisters (13cc/min)	39-RS-6	EA
Replacement Silonite® Filter and O-Ring	39-92150	EA

Time to Fill Canisters – Fill to 50% and 95% of Atmospheric Pressure (in Minutes)

Part No.	Code	Approx. Flow Rate	1L Canister		1.4L Canister		2.7L Canister		3.2L Canister		6.0L Canister	
			50%	95%	50%	95%	50%	95%	50%	95%	50%	95%
39-RS-0	0	No Restrictor	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.3
39-RS-1	1	600cc/Min	1	3	1.3	4	3	8	4	10	5	15
39-RS-2	2	150cc/Min	3	8	4	15	10	30	10	35	15	45
39-RS-3	3	63cc/Min	7	20	10	30	20	60	25	70	45	130
39-RS-4	4	38cc/Min	10	30	14	45	30	90	40	100	*	*
39-RS-5	5	19cc/Min	25	75	35	100	75	200	90	250	*	*
39-RS-6	6	13cc/Min	40	100	50	130	*	*	*	*	*	*
39-RS-x	Restricted Sampler for Silonite® canisters: (Replace x with desired flow code)											

* Canister/Flow combinations not recommended by Entech Instruments, Inc.

TM1050 Remote Start/Stop System

The TM1050 enables start/stop canister fill operations with a direct wire connection from up to 500 feet away. The TM1050's wire connection allows remote sampling events to be accurately captured within confined spaces, or in hazardous environments. Examples include manhole/sewer sampling, collection of gases near a planned release, and collection of combustion/explosion products from a safe distance. The TM1050 is powered by a simple 9V battery using a "latching" valve that requires very little power. Each 9V battery can power in excess of 100 on/off operations for reliable sample collection over extended time periods.

We Provide Solutions for Your Application
 Call Today to Learn More!



The TM1050S Remote Start/Stop System
 PN 39-TM1050S

DESCRIPTION	PART #	UNIT
TM1050 Remote Start/Stop System*	39-TM1050	EA
TM1050S Remote Start/Stop System*	39-TM1050S	EA
100' Extended Remote Cable	39-TM1050-C2	EA
500' Extended Remote Cable	39-TM1050-C3	EA
6L Silonite® Canister (w/ Toxic Organics Valve™)	29-10621	EA
Silonite® Filtered Grab Sampler (No Restrictor)	39-RS-0	EA

* TM1050 system includes a Remote Control Unit, Start/Stop Valve Assembly, and a 20' remote cable. Order 39-TM1050S for Silonite® coated Start/Stop Valve Assembly version.



CS1200E Passive Canister Sampler

39-CS1200E53 (Silonite® coated version shown)

Featuring an inert, compact, and reliable flow path with superior low flow stability.



PN: 39-92197 – Silonite® Filter Inlet w/ Rain Guard

PN: 39-CS12-KIT2 – Low Flow Stability Upgrade Kit



CS1200E – Passive Canister Sampler

Now featuring all new low flow stability for extremely precise Time Weighted Average

Low Level TO-15 monitoring requires consistent analyte recovery while collecting the maximum sample volume possible to support larger preconcentration volumes or repeat analyses from the same canister. The CS1200E will reliably fill canisters at a constant rate with better demonstrated recovery of TO-15 compounds than any other sampler. (See App. Note 2014-05)

Silonite® Filter Inlet Kit with Rain Guard

PN: 39-92197 – Silonite® Coated Filter Inlet w/ Rain Guard

An important component for Low Level TO-15.

Untreated 300 series stainless steel is 67–70% iron, which is very reactive toward many TO-15 compounds. In addition, untreated stainless tubing has an internal oxide layer that readily adsorbs polar and heavier VOCs. The standard CS1200E inlet now comes internally polished, passivated, and Silonite® coated to insure maximum recovery of all target compounds – virtually eliminating losses and carryover. A Silonite® coated filter is placed on the inlet to completely eliminate dust and particulate intrusion during shipping. The rain guard is capped to avoid contamination during shipping.



CS1200Ex-SG – For longer duration soil gas sampling

www.entechinst.com

CS1200E Passive Canister Sampler

Time-weighted average VOC concentrations can be easily determined by sampling into canisters at a constant flow rate. Canisters can be filled to nearly atmospheric pressure using an ultra-clean, mechanical flow controller. Sapphire orifices combined with pressure regulation offer superior flow stability when compared to needle valve or frit regulated controllers. Different orifices are available to fill a 6L canister over 1, 3, 8 or 24 hours, or even 1–2 weeks. Part numbers for CS1200E flow controllers are separated by flow range. One flow range can be changed to another by attaching the appropriate critical orifice shown in the table below. Silonite® coated flow controllers are designated with an “S” following the part number.

CS1200E (Options & Accessories)

DESCRIPTION	PART #	UNIT
CS1200E Time Integrated Passive Sampler	39-CS1200Ex	EA
Silonite® CS1200E Time Integrated Sampler	39-CS1200ESx	EA
Female MicroValve™ Adapter	30-22800	EA
Silonite® Female MicroValve™ Adapter	30-22800S	EA
Low-Profile Male Micro-QT Valve™	30-22330	EA
Silonite® Low-Profile Male Micro-QT Valve™	30-33220S	EA
Rain Guard / Shipping Cap	39-92199	EA
Replacement Threaded Inlet Line	39-92210	EA
Replacement Silonite® Coated Filter	39-92150	EA
Replacement 30-0" Hg Gauge	39-27560	EA
Flow Calibrator (0.1–10ccm)	39-20010A	EA
Flow Calibrator (5–100ccm)	39-20035A	EA
Sampling Enclosure	39-50000	EA
Long Inlet for Sampling Enclosure	39-92212S	EA
Silonite® Filter Inlet Kit w/ Rain Guard	39-92197	EA
Low Flow Stability Upgrade Kit	39-CS12-KIT2	EA
Silonite® Dual Canister Sampling Adapter	39-99001	EA

Tool-Free Field Sampling

Entech is proud to be the exclusive provider of “validated” tool-free solutions for the collection of time integrated canister samples. Simply add our new low profile male Micro-QT™ fitting onto the top of your TOV™, Nupro®, or other canister valve, pair the Micro-QT™ fitting with a female MicroValve™ adapter attached to the CS1200E, and make sampling a “snap” for your customers. Ditch the tools and headaches of over-tightened fittings. The Micro-QT™ valve was chosen by NASA for the collection of air samples on the International Space Station, and with 10 years of field testing, don't risk your reputation on anything else.



Rain Guard / Shipping Cap
PN 39-92199



MicroValve™ Adapter
PN 30-22800S



Low-Profile Micro-QT Valve™
PN 30-33220S



Replacement Silonite® Filter and O-Ring
PN 39-92150



Silonite® Sapphire Restrictor
PN 39-24010S



1.5 - 3m Canister Stand
PN 29-stand-1-3m

CS1200E Restrictor			CS1200E Canister Fill Duration Range						
Code*	Part #**	Flow Range	450mL	600mL	1L	1.4L	2.7L	3.2L	6L
0	39-23000(S)	100 – 300 cc/min.	—	—	—	—	4 min. – 15 min.	5 min. – 20 min.	10 min. – 45 min.
1	39-23010(S)	40 – 60 cc/min.	2 – 10 min.	3 min. – 15 min.	6 min. – 25 min.	8 min. – 35 min.	16 min. – 67 min.	20 min. – 80 min.	35 min. – 2.5 hrs.
2	39-23030(S)	13.5 – 54 cc/min.	9 – 30 min.	12 min. – 40 min.	20 min. – 80 min.	25 min. – 100 min.	50 min. – 3.3 hrs.	1 hr. – 4 hrs.	2 hrs. – 8 hrs.
3	39-23080(S)	5 – 20 cc/min.	20 – 80 min.	30 min. – 120 min.	50 min. – 3 hrs.	1 hrs. – 4 hrs.	2 hrs. – 9 hrs.	2.2 hrs. – 10 hrs.	5 hrs. – 20 hrs.
4	39-23240(S)	1.2 – 6.8 cc/min.	1 – 3 hrs.	1.2 hrs. – 4 hrs.	1.5 hrs. – 5 hrs.	3 hrs. – 12 hrs.	6 hrs. – 1 day	7.8 hrs. – 31.3 hrs.	14 hrs. – 2 days
5	39-24010(S)	0.4 – 1.2 cc/min.	3 – 10 hrs.	4 hrs. – 12 hrs.	5 hrs. – 15 hrs.	10 hrs. – 36 hrs.	1 – 3 days	1 – 3.5 days	2 days – 7 days
6	39-24020(S)	0.2 – 0.6 cc/min.	—	—	10 hrs. – 30 hrs.	1.5 days – 4 days	2.5 days – 7 days	3 days – 7 days	7 days – 14 days

* 39-CS1200ESx Restricted Sampler w/Silonite® (Replace x with desired flow code)

** 39-2xxxxS Replacement Restrictor w/Silonite® (Add “S” to Restrictor Part Number)

FlowProfessor™ Calibration System

Introducing the all-new FlowProfessor™, the easiest and most accurate way to calibrate your Entech CS1200E field samplers. Using the latest CS1200E technology updated in 2014, the FlowProfessor™ totally automates the calibration process for sampling into canisters as small as 450cc and as large as 15L. Just set the canister size, the sampling duration, and the vacuum to leave in the canister after sampling (typically 2" Hg) from the simple Windows® menu, attach the FlowProfessor™ to the CS1200E, and select START CALIBRATION. The FlowProfessor™ automatically adjusts the flow setting of the CS1200E to obtain the correct flow every time. The sophisticated software even adjusts for estimated field temperatures and sampling site elevation to optimize sampling rates under any environmental condition. Trying to accomplish those calculations manually can be difficult at best.

Using the new CS1200E with greater low-flow stability, accurate filling of a 6L canister can be set from 1 hour to a full 2 weeks. Can you imagine doing continuous monitoring at a field location and only collecting 2 samples a month? Now that's all easily automated with the FlowProfessor™ from Entech. Even the quality of the restrictor and diaphragm are verified to ensure consistent flow rates in the field.

Generate a calibration report for long-term documentation, and then send the CS1200E out to the field in Entech's new shipping boxes that perfectly protect both the canister and the flow controller in a single, compact container.

The FlowProfessor™ + CS1200E + Silonite® Sampling Canister + You. A winning combination for today's air monitoring lab.



FlowProfessor™ shown with CS1200ES and 6L Silonite® canister.



FlowProfessor™ Software for Windows® makes complex CS1200E calibration easy!



The FlowProfessor™ easily attaches to a CS1200E for calibration.

DESCRIPTION	PART #	UNIT
FlowProfessor™ (CS1200E Calibration System)	39-FP-02	EA

1800 Canister Sampling System

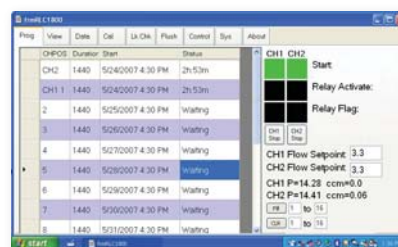
The 1800 delivers the greatest level of instrument control and widest compound recovery range of any multi-canister sampling system. The 1800 can be scaled to meet your needs, operating as a single channel, dual channel, or in conjunction with the 1816 16-position canister sampler. A power inverter is also available for 12vDC operation at remote sites.

The included Windows® 8 touch screen Tablet controller with Wi-Fi capability allows status and programming changes on-site or remotely. Record and retrieve sampling history in real time, including start/stop times, pressures and max/min/average flow rates for each sample. Schedule sampling times or initiate sampling events locally using feedback from other real-time monitors. Automated leak checking and flushing help to maintain low blank levels and improve sample integrity.

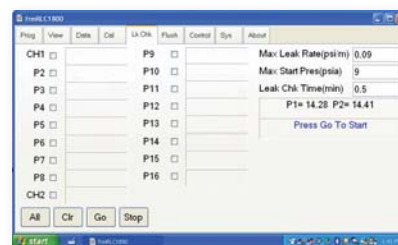
Using the canister's vacuum to drive sampling eliminates compound loss, contamination and carryover problems created by pressurizing the sample through a pump. Silonite® coating of the flow path enhances compound recovery. When used with Entech's Silonite® canisters, even reduced sulfur compounds, formaldehyde, and C₂-C₈ carbonyls are recoverable.



1800 Dual Channel System shown with 16-Position 1816 Multi-Canister Sampler.



Schedule start times for CH1, Pos1-16, or remote start using an event driven contact closure. CH2 can be programmed to collect once every 6 days starting at midnight.



Leak checks all positions to ensure proper sample collection. Can be programmed to skip a position if the canister does not meet the initial vacuum requirements.



1816 Multi-Canister Sampler for the 1800 Canister Sampling System.

DESCRIPTION	PART #	UNIT
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1800 – Dual-Position Canister Sampler (Includes Touch Panel display, dual 0.2% accuracy 0-15 psia sensors, and dual isolatch valves)	1800	EA
--	------	----

DC Inverter (for battery, solar, or fuel cell power)	1800-01	EA
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Choose from the following Mass Flow Controllers.
(One required for each sample position. Two max.)

20 NCCM (5-48hr in 6L canisters)	03-10020C	EA
---	-----------	----

150 NCCM MFC (1-8hr in 6L canisters)	03-10150C	EA
---	-----------	----

1800 – 220-240VAC/50Hz Option	1800-230	EA
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1816 Multi-Canister Sampler

The 1816 Multiple Canister Sampler works with channel 1 of the 1800 for unattended filling of up to 16 canisters. Like the 1800, the 1816 uses Silonite® tubing and fittings to minimize surface losses for improved polar compound recovery.

Each position is automatically leak checked prior to sampling, creating a “pass/fail” status. If a leak is detected during unattended operation, the system can be programmed to skip the event or advance to the next leak-tight canister position.

DESCRIPTION	PART #	UNIT
-------------	--------	------

1816 – 16-Position Canister Sampler (Includes 16 Silonite® coated Lines)	1816	EA
--	------	----

Replacement Silonite® Sampling Lines	06-08060	EA
---	----------	----

MicroValve™ Canisters (Patent Pending)

Micro-QT™ and Micro-QT2™ Valve Canisters are the next generation in canister sampling devices. Micro-QT™, or “Quarter-Inch Tube” Valves, have several advantages over other canister valves. Micro-QT™/QT2™ valves minimize the volume of outside “contaminated” air that is introduced into a canister when testing vacuum or otherwise making a connection to a sampling line or GC inlet. The inclusion volume for the Micro-QT™ Valve is 0.01cc, which is ten times smaller than other miniature quick connect fittings. The inclusion volume is the “outside” volume that is introduced into a “system” when male/female valve connections are made. When testing vacuum through a Nupro® Valve, approx. 2cc of air is introduced into a canister, which is the combined volume of the Nupro® Valve and an external gauge. This is 200 times more air than using a pre-evacuated test gauge with Micro-QT™ valve fittings.

The internal Silonite® coated sealing spring in a MicroValve™ is stronger than those used in Swagelok® Miniature Quick Connects, to further reduce the potential for leaks even at cold storage temperatures (-15°C). A compression fitting cap is also available, which when used with the MicroValve™ creates a lower combined leak rate than any other currently accepted canister valve.

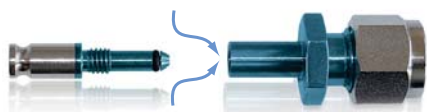
Micro-QT™ and Micro-QT2™ valves are referred to simply as MicroValves™ when describing features common to both.

Micro-QT™ Valve



The Micro-QT™ Valve is designed exclusively for “through the valve” sampling. This valve is optimized for volatile or even light semivolatiles compounds when performing rapid sampling. Like the Micro-QT2™ Valve below, the Micro-QT™ Valve is compatible with all existing Entech sampling devices by simply adding a female QT to ¼” adapter (PN 30-22800). New sampling canisters optimized for MicroValves™ are shown on pages 68–69.

Micro-QT2™ Valve



The Micro-QT2™ Valve is a two-piece valve that can be removed in the field to draw in a sample “around the valve” without requiring a separate sampling device. This allows recovery of the heavier semivolatiles compounds that might otherwise condense in the valve on the way into the canister. The ability to sample around the valve is unique to the Micro-QT2™ valve design. This valve can also be sampled “through the valve” using a Restricted or Time Integrated Sampler.

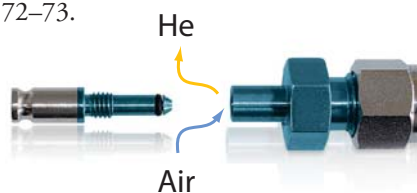
HDS

Helium Diffusion Sampling™



HDS™ Micro-QT2™ Valve

The HDS Micro-QT2™ Valve is a two-piece valve that can be removed in the field to perform time integrated sampling from hours to weeks without requiring a separate sampling device. Learn more about HDS™ on pages 72–73.



NEW!

Features

- No Welds
- Easily Cleaned
- Very Light & Compact
- Lowest Inclusion Volume
- Inexpensive
- Ideal for Automation
- Semi-volatiles Compatible
- Faster Heating



PN 30-22100



PN 30-22120S



PN 30-22300S



PN 30-22320S



PN 30-22360S



PN 30-22800S



PN 30-22820S



PN 30-22830S



PN 30-22895S



PN 30-22930S



PN 30-22060



PN 30-22070



MicroValves™ & Accessories

DESCRIPTION	PART #	UNIT
Male Micro-Qt™ & Micro-Qt2™ Valves		
Micro-Qt2™ Valve (Silonite® coating standard)	30-22100	EA
Micro-Qt2™ Valve to ¼" Connector	30-22120	EA
Micro-Qt2™ Valve to ¼" Connector (w/ Silonite®)	30-22120S	EA
Micro-Qt™ Valve to ¼" Connector	30-22300	EA
Micro-Qt™ Valve to ¼" Connector (w/ Silonite®)	30-22300S	EA
Micro-Qt™ Valve to ¼" Tube	30-22320	EA
Micro-Qt™ Valve to ¼" Tube (w/ Silonite®)	30-22320S	EA
Double-Ended Micro-Qt™ Valve	30-22360	EA
Double-Ended Micro-Qt™ Valve (w/ Silonite®)	30-22360S	EA
Micro-Qt™ Valve to Luer-Lok®	30-22180	EA
Micro-Qt™ Valve to Luer-Lok® (w/ Silonite®)	30-22180S	EA
Female Micro-Qt™ & Micro-Qt2™ Valves		
Female Micro-Qt™ Valve to ¼" Connector	30-22800	EA
Female Micro-Qt™ Valve to ¼" Connector (w/ Silonite®)	30-22800S	EA
Female Micro-Qt™ Valve to ⅛" FNPT Assembly	30-22820	EA
Female Micro-Qt™ Valve to ⅛" FNPT Assembly (w/ Silonite®)	30-22820S	EA
Female Micro-Qt™ Valve to ⅛" Bulkhead Fitting	30-22830	EA
Female Micro-Qt™ Valve to ⅛" Bulkhead Fitting (w/ Silonite®)	30-22830S	EA
Female Micro-Qt™ Valve to ⅛" MNPT Assembly	30-22895	EA
Female Micro-Qt™ Valve to ⅛" MNPT Assembly (w/ Silonite®)	30-22895S	EA
Female Micro-Qt™ Valve to ¼" Tube	30-22930	EA
Female Micro-Qt™ Valve to ¼" Tube (w/ Silonite®)	30-22930S	EA
MicroValve™ Caps & Accessories		
MicroValve™ External Leak-tight Cap / Chain (Finger-tightened)	30-22060	EA
MicroValve™ External Leak-tight Cap / Chain (Long-term storage)	30-22070	EA
30-0"Hg Vacuum Test Gauge (w/ Micro-Qt™)	29-70010QT	EA
30"Hg-0-30psig Compound Gauge (w/ Micro-Qt™)	29-70020QT	EA
Micro-Qt™ Starter Kit (Includes items listed below)		
30-0"Hg Vacuum Test Gauge (w/ Micro-Qt™)	29-70010QT	1
30"Hg-0-30psig Compound Gauge (w/ Micro-Qt™)	29-70020QT	1
Female Micro-Qt™ Valve to ¼" Connector	30-22800	5
Double-Ended Micro-Qt™ Valve	30-22360	1
250mL LVSH Vial with Micro-Qt™ Valve	39-MQTClean-250	1



MiniCan™ Samplers feature an advanced Silonite® coating for maximum inertness.

Advanced Air Sampling with MiniCans™

MiniCans™ are the next generation of air sampling canisters from Entech. Designed for tool-free operation and advanced robotic analyzers, Silonite® treated MiniCans™ allow the recovery of a wider range of compounds than any other sampling canister – including semi-volatiles up through the full diesel range and C₂₅ hydrocarbons. Like their larger 6L cousins, MiniCans™ excel at recovering compounds that are incompatible with tube sampling technology, including Siloxanes, H₂S, mercaptans, formaldehyde, amines, ammonia, and many other thermally labile compounds. Despite the MiniCan's small size, advances in GCMS sensitivity allow for detection limits that easily surpass EPA Method TO-14a and TO-15 requirements. The MiniCan's superior analytical performance, low shipping weight, lower cost, and autosampler friendly design make it an ideal solution for advanced air monitoring applications.

New, reliable 24 Hour sampling with Quad-Pod Stand and CS1200ES advanced low flow technology.



100mL

29-MC100SQT

200mL

29-MC200SQT

450mL

29-MC450SQT

600mL

29-MC600QT2

1 Liter

29-MC1LSQT

1.4 Liter

29-MC1400SQT

with Quad-Pod Stand | CS1200ES

MiniCans™ with Micro-QT™ Valves

Applications

High Concentration

- Personal IH Monitoring
- Indoor Air Quality
- Fugitive Emissions
- Landfill Gas/Soil Gas
- Stack Gas
- Chemical Weapons
- Process Monitoring

Low Concentration

- Fence Line Monitoring
- Breath Analysis
- EPA TO-14a / TO-15
- Ozone Precursors
- Mold Detection (MVOCs)
- Markers in Foods
- Gas Impurities

VOL.	DIA. (IN)	MAX. Time Integration	PART #	UNIT
100mL	1.5"	2.5 hrs	29-MC100QT	EA
100mL	1.5"	2.5 hrs	29-MC100SQT	EA
200mL	1.5"	5 hrs	29-MC200QT	EA
200mL	1.5"	5 hrs	29-MC200SQT	EA
450mL	2.75"	10 hrs	29-MC450QT	EA
450mL	2.75"	10 hrs	29-MC450SQT	EA
450mL	2.75"	10 hrs	29-MC450QT2	EA
450mL	2.75"	10 hrs	29-MC450SQT2	EA
600mL	2.75"	15 hrs	29-MC600QT	EA
600mL	2.75"	15 hrs	29-MC600SQT	EA
600mL	2.75"	15 hrs	29-MC600QT2	EA
1L	4.0"	24 hrs	29-MC1LQT	EA
1L	4.0"	24 hrs	29-MC1LSQT	EA
1.4L	4.0"	34 hrs	29-MC1400QT	EA
1.4L	4.0"	34 hrs	29-MC1400SQT	EA

Bottle-Vac™ Samplers

Bottle-Vac™ samplers are the most economical gas-phase sample collection containers available. They use Micro-QT™ Valves which are small and non-contaminating by design. Our Bottle-Vac™ samplers are as gas-tight as stainless-steel canisters, making them a low-cost alternative for whole air sampling. A sample is only exposed to treated glass, 316 stainless or Silonite® coated stainless-steel, and a small O-ring which forms the seal at the cap. All of these materials are inert, allowing for a wide range of analytes to be recovered. Time-weighted sampling techniques are possible using MiniCan™ sampling inlets, or by using Helium Diffusion Sampling. (See pp 72–73)



Bottle-Vac™ Samplers

DESCRIPTION	PART #	UNIT
40mL Bottle-Vac™ Sampler	29-BV040A	EA
60mL Bottle-Vac™ Sampler	29-BV060A	EA
125mL Bottle-Vac™ Sampler	29-BV125A	EA
125mL Bottle-Vac™ Sampler (w/ Silonite® Valve)	29-BV125AS	EA
250mL Bottle-Vac™ Sampler	29-BV250A	EA
250mL Bottle-Vac™ Sampler (w/ Silonite® Valve)	29-BV250AS	EA
500mL Bottle-Vac™ Sampler	29-BV500A	EA
500mL Bottle-Vac™ Sampler (w/ Silonite® Valve)	29-BV500AS	EA
1L Bottle-Vac™ Sampler	29-BVL1A	EA
1L Bottle-Vac™ Sampler (w/ Silonite® Valve)	29-BVL1AS	EA
30" Hg Vacuum Gauge (w/ Micro-QT™)	29-70010QT	EA
30" Hg-0-30psig Compound Gauge (w/ Micro-QT™)	29-70020QT	EA

REPLACEMENT PARTS

DESCRIPTION	PART #	UNIT
Micro-QT™ Valve (40/60/125mL)	30-22610	EA
Micro-QT™ Valve, Silonite® (40/60/125mL)	30-22610S	EA
Micro-QT™ Valve (250/500/1L)	30-22630	EA
Micro-QT™ Valve, Silonite® (250/500/1L)	30-22630S	EA
125mL Amber Bottles, deactivated*	39-75125AD	12pk
250mL Amber Bottles, deactivated*	39-75250AD	12pk
500mL Amber Bottles, deactivated*	39-75500AD	12pk
1L Amber Bottles, deactivated*	39-75L1AD	12pk
Netting for 250mL Bottle-Vac™	29-59108	EA
Netting for 500mL Bottle-Vac™	29-59116	EA
Netting for 1L Bottle-Vac™	29-59132	EA
Valve Caps, 125mL, (no valve)	39-76044B	144pk
Valve Caps, 250, 500 or 1L, (no valve)	39-76464	144pk

* These items require valves, caps, and netting to be ordered separately.

Bottle-Vac™ Sample Analysis

In the laboratory, analysis by loop injection requires either pressurizing to 3–7psig, or heating to 60–70°C to increase the pressure to purge a loop. Bottle-Vac™ samplers can also be analyzed using the 7200 or 7100A Preconcentrator to withdraw a larger volume for low PPB analysis. Automated analysis can be performed using the 7650, 7410D, or 7032A Autosamplers.

Bottle-Vac™ Cleaning

Bottle-Vac™ samplers are reusable, making them less expensive per sampling event than other sampling devices, even Tedlar® bags. For PPB sampling, the bottles should be flushed with nitrogen or zero air in an oven after the fittings have been removed, then evacuated after the fittings are reattached. Fittings can be heated, flushed and stored under nitrogen in a separate container. For PPM sampling, the valves and bottles can simply be heated in an oven overnight with the fittings removed, then reassembled for immediate evacuation and delivery to the field. Bottle-Vac™ can also be easily cleaned on Entech's canister cleaning systems.

Applications – (All Tedlar® Bag uses, plus:)

- Indoor Air Quality
- Ceiling / STEL / TWA Monitoring
- Fugitive Emissions
- Landfill Gas / Soil Gas
- Fenceline Monitoring
- Breath Analysis
- Mold Detection (MVOCs)
- Impurities in Gases
- Stack Gas



Filtered Grab Sampler
for MicroValve™ Canisters
PN 30-22510S



Filtered Restricted Sampler
for MicroValve™ Canisters
PN 39-RS-QTSx (See Codes on p.70)



Filterless Grab Sampler
for MicroValve™ Canisters
PN 30-22500



Replacement Filter
PN 39-92150



Filterless Drywall Sampler
for MicroValve™ Canisters
PN 30-22530



Replacement Drywall Needles
PN 30-22545

Finger-Tightened Cap
PN 30-22060



30-0”Hg Vacuum Gauge
29-70010QT

Grab & Critical Orifice Sampling

There are several ways to fill a MicroValve™ canister or Bottle-Vac™ depending on the sampling requirements. Here’s a brief overview:

Grab Sampling

MiniCan™ or Bottle-Vac™ samplers are filled within 0.1–0.3 minutes, by either removing the valve (around the valve sampling), or using an unrestricted sampler.

Restricted Critical Orifice Sampling

Sample is collected through the valve using a filtered orifice restricted sampler. Fill rates are constant until the canister reaches one-half atmosphere.

Time Integrated Sampling

TWA sampling is used for slow filling of canisters to determine average target compound concentrations. Fill times are 10–50 times longer than with critical orifice restricted samplers. Use the CS1200E and the PN: 30-22800 adapter for Micro-QT™ Valve Samplers. (Also see HDS Sampling pages 72–73).

Micro-QT™ Valve (Samplers & Accessories)*

DESCRIPTION	PART #	UNIT
Finger-Tightened Cap	30-22060	EA
Filterless MicroValve™ Grab Sampler	30-22500	EA
Filtered MicroValve™ Grab Sampler	30-22510	EA
Filterless Drywall Sampler (Mold MVOCs)	30-22530	EA
Replacement Drywall Needles	30-22545	EA
Filtered Restricted Sampler **	39-RS-QTx	EA
Silonite® Filtered Restricted Sampler **	39-RS-QTSx	EA
Repl. Filter for Grab & Restricted Samplers	39-92150	EA
30-0”Hg Vacuum Gauge (w/Micro-QT)	29-70010QT	EA

* All listed part numbers are compatible with both QT and QT2 Valves.

** Replace “x” with code for desired fill time. See table below.

Time to Fill MiniCans™ – Fill to 50% and 95% of Atmospheric Pressure (in Minutes)

Part No.	Code	Approx. Flow Rate	450mL MiniCan™		600mL MiniCan™		1L MiniCan™		1.4L MiniCan™	
			50%	95%	50%	95%	50%	95%	50%	95%
30-22510	0	No Restrictor	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
39-RS-QT1	1	600cc/Min	*	*	*	*	1	3	1.3	4
39-RS-QT2	2	150cc/Min	1	3	2	6	3	10	5	15
39-RS-QT3	3	63cc/Min	3	10	5	15	8	25	10	30
39-RS-QT4	4	38cc/Min	5	15	8	25	12	40	15	45
39-RS-QT5	5	19cc/Min	10	30	15	50	25	75	35	100
39-RS-QT6	6	13cc/Min	15	45	25	70	40	120	60	170
39-RS-QTx	Restricted Sampler for MiniCan™ with MicroValve™: (Replace x with desired flow code)									
39-RS-QTSx	Restricted Sampler for MiniCan™ with Silonite® MicroValve™: (Replace x with desired flow code)									
39-92150	Replacement Filter / O-Ring									

* These canister / flow combinations are not recommended by Entech Instruments, Inc.

Vacuum Sampling Approaches

Grab Sampling

Sampling with MiniCan™ and Bottle-Vac™ canisters could not be easier. Simply verify sufficient canister vacuum with a check gauge and start sample collection.

A grab sample can be collected by using a filtered or non-filtered sampler fitting. Place a sampler fitting onto the MicroValve™ and press down to activate sample collection. Adding a critical orifice to these samplers can increase the sampling time to up to 1 hour.



Filtered Grab Sampling

True Time Integrated Sampling

The CS1200E provides excellent stability at low fill rates for reliable TWA sampling and can be used with both Micro-QT™ or TOV™ canister valves for tool free operation in the field.

Sampling stands are available for field use with 1L and 1.4 MiniCans™ as well as our 1L Bottle-Vac™ samplers.



CS1200E Passive Canister Sampler and 1.4L MiniCan™ shown with 1L / 1.4L "star" stand. PN 29-1400STAND (Sampler and Canister sold separately)

DESCRIPTION	PART #	UNIT
1L and 1.4L MiniCan™ Cap Stand	29-20404	EA
1L and 1.4L MiniCan™ Star Stand	29-1400STAND	EA
1L and 1.4L MiniCan™ Quad-Pod Stand	29-STAND-SAMPQT	EA



1L and 1.4L MiniCan™ cap stand. PN 29-20404



CS1200E Passive Canister Sampler and 1.4L MiniCan™ shown with our 1L / 1.4L collapsible Quad-Pod stand. PN 29-STAND-SAMPQT (Sampler and Canister sold separately)



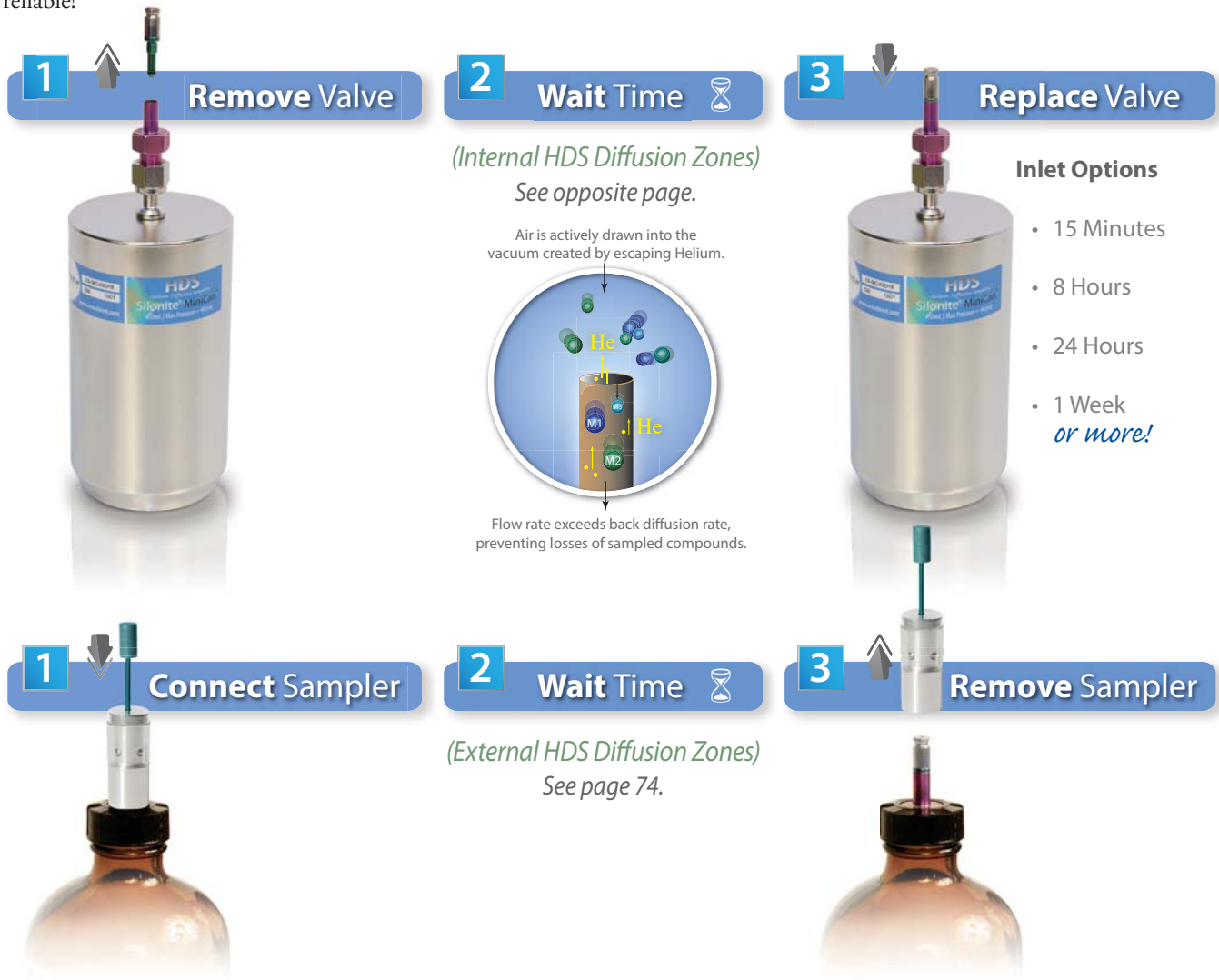
Collapsible!

HDS

Helium Diffusion Sampling™

samplers, so particulate plugging is virtually impossible. HDS™ eliminates the need for sampler calibration, as relative diffusion rates of Helium and air are virtually constant. And unlike passive sampling with tubes – *where compounds lighter than Benzene are not recovered quantitatively* – HDS monitoring recovers *all* compounds heavier than Helium. Some important carcinogenic compounds quantitatively recovered using HDS that are not recoverable using passive tube sampling devices include: Vinyl Chloride, 1,3-Butadiene, and Acrolein. HDS™ Samplers also increase their weight as more air exchanges with Helium, allowing sample collection amounts to be determined gravimetrically in the laboratory for extremely accurate and defensible measurements.

Two indoor air HDS™ sampling versions are available from Entech, 1) MiniCan™ and Bottle-Vac Samplers (detailed below). Special HDS™ MicroValves that are optimized for standard sampling event durations – *the diffusion zone exists inside of the fitting*. 2) Controlled helium / air exchange with an external HDS™ diffusion zone fitting that is designed to attach directly to Bottle-Vacs™ and MiniCans™ with standard Micro-QT™ valves. Like the HDS™ MicroValves, these external HDS™ fittings feature a specific length or ID of the diffusion zone to provide an ideal sample fill duration and canister volume. It's that easy. HDS™ collects an air sample much slower than vacuum driven controllers, allowing smaller canisters and Bottle-Vacs™ to be used for long term sampling, at a substantially reduced cost. With HDS™, collection of whole air samples has never been this easy, economical, and reliable!



Choose HDS™
for Indoor Air
Quality Monitoring

Call Today to Learn More!



500mL HDS Bottle-Vac™ Sampler
PN 29-BV500AH8



Features

- **No Calibration**
Diffusion zones are factory set and remain constant.
- **No Sample Volume Guesswork**
Weighing the sampler after collection and again after evacuation determines collected sample volume.
- **No Sample Losses**
Ultra-inert and compact sampling surfaces.
- **No Sample Contamination**
Verified leak free with gauge prior to sampling.
- **No Pumps & No Batteries**
Perfect for whole air sampling.

MiniCan™ – Helium Diffusion Sampling

DESCRIPTION	PART #	UNIT
450mL HDS MiniCan™ Sampler (8 Hour)	29-MC450H8	EA
450mL HDS MiniCan™ Sampler (24 Hour)	29-MC450H24	EA
1.4L HDS MiniCan™ Sampler (12 Hour)	29-MC1400H12	EA
1.4L HDS MiniCan™ Sampler (24 Hour)	29-MC1400H24	EA
1.4L HDS MiniCan™ Sampler (1 Week)	29-MC1400H1W	EA

Bottle-Vac™ – Helium Diffusion Sampling

DESCRIPTION	PART #	UNIT
500mL HDS Bottle-Vac™ Sampler (3 Hour)	29-BV500AH3	EA
500mL HDS Bottle-Vac™ Sampler (8 Hour)	29-BV500AH8	EA
500mL HDS Bottle-Vac™ Sampler (24 Hour)	29-BV500AH24	EA
1L HDS Bottle-Vac™ Sampler (8 Hour)	29-BVL1AH8	EA
1L HDS Bottle-Vac™ Sampler (24 Hour)	29-BVL1AH24	EA
1L HDS Bottle-Vac™ Sampler (1 Week)	29-BVL1AH1W	EA

HDS™ Indoor Air Samplers

Using Helium Diffusion Sampling into Silonite® Canisters and Bottle-Vacs™ for indoor air monitoring has never been so easy and cost effective!

Introducing Entech's low-cost external HDS™ Samplers that allow any Silonite® Canister or Bottle-Vac™ to be used to perform time integrated sampling both simply and cost-effectively. HDS™ utilizes a simple diffusion zone to control the exchange rate of helium and air, with diameters that are 20–50 times larger than typical critical orifice samplers, making particulate plugging virtually impossible.

HDS™ eliminates the need for sampler calibration, as the relative diffusion rate of Helium to air is virtually a constant. Unlike passive sampling with tubes – where compounds lighter than Benzene are not properly recovered – HDS™ monitors retain all compounds heavier than Helium. This allows even Ethane, Ethylene, and Acetylene to be collected quantitatively.

HDS™ Samplers also increase their weight as more air exchanges with Helium, so collected amounts can be determined in the laboratory gravimetrically for extremely accurate and defensible measurements. Just select the color coded sampler below and the required container size shown in the table to achieve the sampling duration desired. All of these new samplers can also be used to perform quick grab sampling (2–30 seconds) into containers that are shipped to the field under vacuum rather than being filled with helium. For more dusty locations, samplers are available with a built in filter.



Bottle-Vac™ shown with code 1 (Silver) HDS™ Indoor Air Sampler fitting. PN 39-HDS-F01

HDS™ Indoor Air Samplers – Simple, Reliable, and Cost-effective. It's the right choice!

HDS™ Indoor Air Samplers with sampling range color codes.



HDS™ MicroValve™ Samplers – Fill Durations*

* Durations shown for listed canisters and Bottle-Vac™ samplers with Micro-QT™ Valves.

HDS™ Code	HDS™ Sampler Part # with Filter	40mL Bottle-Vac™	125mL Bottle-Vac™	250mL Bottle-Vac™	500mL Bottle-Vac™	1L Bottle-Vac™	450mL MiniCan™	1L MiniCan™	1.4L MiniCan™
1 – Silver	39-HDS-F01	–	8 Hours	–	1 Day	–	1 Day	–	–
2 – Red	39-HDS-F02	4 Hours	–	1 Day	–	–	–	–	1 Week
3 – Blue	39-HDS-F03	–	–	–	–	1 Week	–	1 Week	–
4 – Black	39-HDS-F04	1 Day	–	1 Week	2 Weeks	–	–	–	1 Month

MiniCan™ & Bottle-Vac™ Carrying Cases

Several carrying cases are available for MiniCan™ and Bottle-Vac™ samplers. Options are based on the number and size of canisters needing to be shipped. Refer to the chart below for canister and valve compatibility. Custom kits can be made using PN 29-20810 which has pre-cut foam inserts to accommodate canisters, samplers, and test gauges.



29-position Carrying Case for 450mL and 600mL MiniCans™
PN 29-20600 (Shown here)



16-position Carrying Case for 1–1.4mL Bottle-Vacs™ and MiniCans™
PN 29-20620



These rugged carrying cases also feature a handy box insert to keep flow controllers, gauges, and other sampling supplies organized and ready for use in the field. Contact us today to learn more!

Shipping Supplies

Reusable boxes with foam inserts are available for secure shipping or transportation of 250mL and 500mL Bottle-Vac™ samplers. Protective dust caps are available for MicroValves™ to help prevent the introduction of particulates during transportation. Leak-proof caps are available to ensure long term storage capability under vacuum, or when subjecting O-ring sealing valves to cold conditions (below -10°C).

6L Canister Shipping Box shown with integrated Samplers and Accessories Box.
PN 29-22062 and PN 29-22064
(Samplers and Canister sold separately)



Carrying Cases (Shipping Boxes / Caps)

DESCRIPTION	PART #	UNIT
Carrying Case – 29-Position, 450mL or 600mL MiniCans™ (22"L x 17"W x 10"D)	29-20600	EA
Carrying Case – 16-Position, 1.4L MiniCans™ or 1L Bottle-Vacs™ (22"L x 17"W x 10"D)	29-20620	EA
Carrying Case – 29-Position, 500mL Bottle-Vacs™ w/Fittings (22"L x 17"W x 10"D)	29-20610	EA
Customizable Foam Case (22"L x 17"W x 10"D)	29-20810	EA
1-Position, 6L Silonite® Canister Tall Shipping Box	29-22062	EA
Samplers and Accessories Shipping Box (Designed to fit inside Tall Shipping Box)	29-22064	EA
Plastic MicroValve™ Shipping Caps (100 Pack)	16-17840	100pk

Vapor Intrusion Monitoring

Air sampling canisters have repeatedly demonstrated their superior performance over thermal desorption tubes and Tedlar® bags as having the lowest and most reliable blank levels of any air monitoring technique. This has become even more important as the latest guidelines for vapor intrusion assessment require that several volatile chemicals be monitored down to low-part-per-trillion levels. In order to successfully monitor these analytes at such low levels, it has been necessary to advance the technology required to insure the necessary cleanliness of samplers, canisters, and laboratory analyzers. All materials exposed to the sample must undergo a critical examination to make certain they are “chromatographic grade” or otherwise demonstrate minimal or no adsorption, absorption, or reactivity toward the target analytes.

For the past 25 years, Entech has focused on the successful collection, storage, and transfer of gas-phase polar and non-polar volatile chemicals with minimal loss and contamination. We have applied this experience to develop the most advanced and reliable solution available for vapor intrusion monitoring, both in indoor air and in sub-slab soil gas. Sampler internal volume and surface area has been minimized to decrease residence time, creating the lowest potential for contamination currently available. Two separate implementations of canister monitoring for vapor intrusion are discussed below.

Indoor Air

Vapor intrusion analysis for indoor air requires extremely low detection limits – often to 2–5 parts-per-trillion. Not only must active sites, absorptive surfaces, and dead volume be eliminated, but extreme care must be taken to isolate the sampler and canister from contamination during transfer to the field. In fact, all four phases of the monitoring process shown in the diagram below are important for maintaining low blank levels and accurate results: (1) Inertness Validation, (2) Laboratory Cleaning and Isolation, (3) Field Sampling, and (4) Laboratory Analysis. As the only company that manufactures solutions for each step of this application using canisters, Entech is uniquely positioned to understand and provide a complete and validated solution.

The CS1200E sampler shown on pages 62–63, features 24hr time-integrated sampling into a 1.4L Silonite® MiniCan™, or up to two week sampling into a 6L Silonite® canister. The internal surface of the CS1200ES is Silonite® coated which provides inertness similar to a GC column to virtually eliminate losses and carryover. The CS1200E(S) can be cleaned just like canisters in the laboratory, then completely isolated during shipping to avoid contamination. Contact Entech, or your authorized Entech Distributor for application literature (App. Notes 902 and 2014-05) that detail successful recovery of part-per-trillion level TO-15 compounds without sample loss or contamination using the CS1200E(S) with Silonite® canisters.

Sub-Slab Vapor Intrusion

Sub-slab vapor monitoring has produced questionable data in the past due to leakage around the grouted probe and contamination during transfer to the sample collection system. Entech’s sub-slab inlet prevents contamination from indoor air by creating a vapor-tight seal at the slab surface using our exclusive “triple seal”, all without the use of any messy grout. The Entech sampler’s internal volume is minimized and all wetted surfaces feature a Silonite “chromatographic grade” coating. The sample train is cleaned just like a canister; using a series of fill/evacuation cycles. After cleaning, the sampler is isolated until connection to the probe is required in the field. A high quality gauge on the sampler verifies the sample train has maintained a vacuum prior to opening in the field, insuring a contaminant-free connection. To eliminate the 1-2cc of indoor air “in” the probe itself, a pre-flush canister is attached for a few minutes after connecting the sampler to the probe. Other sample trains that rely solely upon a pre-flush procedure may still allow contaminants to outgas from the sampler itself, ultimately providing unreliable results for monitoring VOCs at very low levels.

4 – Phases of Successful Vapor Intrusion Monitoring



Sub-Slab Vapor Intrusion Sampler

Entech understands the challenges and solutions for reliable collection of gas-phase compounds at the low to sub-PPB range. We provide powerful “Chromatography Grade” solutions from start to finish, giving you better data with greater confidence. When performing Vapor Intrusion sampling, all sampling and analysis phases must be handled properly in order to achieve the low blank levels and high analyte recoveries that are hallmarks of canister methods. Here, all wetted surfaces are treated with Silonite®, a deactivated ceramic coating. Silonite® allows for complete deactivation of canisters and GCMS inlet systems for the best possible recovery of volatile and semivolatile compounds. A down hole monitor option is available for SOPs that require monitoring of the sub-slab vacuum.

Features

- **Ultra-Compact Design**
Maximize recovery, minimize contamination.
- **Critical Orifice Reliability**
Select flow rates, 50–200cc / min. as required by SOP.
- **Silonite® Flow Path Option**
Silonite® flow path minimizes surface interactions.
- **Down Hole Monitor Option**
Add if SOP calls for monitoring of the sub-slab vacuum.
- **Gas Extraction Cap Assembly**
Double-seal / vapor barrier with internal water dam.
- **Easy Sampling and Resampling**
Probe assembly is capped at slab surface and can be uncapped for resampling days or months later.
- **Sampling Flexibility**
Available for standard valve or MicroValve™ based canisters.



Down Hole Monitor (Optional)
30-0"Hg Vacuum Gauge Assembly PN: 39-65010
For sub-slab vacuum monitoring. Choose slower sampling soil gas sampler if maximum vacuum levels are exceeded.

1/4" Gas Extraction Cap
Assembly PN: 39-65100
Ensures leak-tight slab seal using 2 O-rings and water dam.

Probe and Insert
Assembly PN: 39-65199
Remains capped off in slab for easy resampling later!

No More Grout!
Our exclusive gas extraction cap provides a "triple seal" directly to the slab surface.
Contact Us to learn more!

DESCRIPTION	PART #	UNIT
Soil Gas Sampler (50cc per min. flow rate)	39-64405	EA
Soil Gas Sampler (100cc per min. flow rate)	39-64410	EA
Soil Gas Sampler (150cc per min. flow rate)	39-64415	EA
Soil Gas Sampler (200cc per min. flow rate)	39-64420	EA
Silonite® Soil Gas Sampler*	39-644xxS	EA
MicroValve™ Soil Gas Sampler (50cc per min. flow)	39-64405QT	EA
MicroValve™ Soil Gas Sampler (100cc per min. flow)	39-64410QT	EA
MicroValve™ Soil Gas Sampler (150cc per min. flow)	39-64415QT	EA
MicroValve™ Soil Gas Sampler (200cc per min. flow)	39-64420QT	EA
MicroValve™ Silonite® Soil Gas Sampler*	39-644xxSQT	EA
Silonite® Down Hole Monitor Option	39-65010	EA
1/4" Gas Extraction Cap Assembly	39-65100	EA
1/4" Silonite® Canister Tubing & Fittings	39-64500	EA
Silonite® Probe and Insert w/ Sealing Screw	39-65199	EA
Helium Leak Check Kit	39-65300	EA
Sample Train Helium Detect Extension	39-65310	EA
Helium Shroud Enclosure	39-65350	EA

* For Silonite® Coated Samplers, replace xx with desired flow rate version code.

Soil Gas Sampler

Our new soil gas sampler raises the bar for excellence in soil gas monitoring. A compact flow path design with an optional Silonite® coating ensures low blank levels even after sampling from highly contaminated sources.

We have a full line of Soil Gas samplers that are compatible with flow collection rate differences found in SOPs that must be followed. These compact and cost effective samplers come in 50, 100, 150, and 200 cc/min versions, to cover the entire range of sampling requirements. Entech's unique McDaniel's® gauge with ¼" compression fitting eliminates the need for Teflon® tape, reducing the potential for leaks and carryover of many halogenated compounds.

Both the flow elements and particulate frits are pressed in, preventing flow of particulates around the frit which would otherwise block the downstream critical orifice. These new soil gas samplers are the most reliable solution for Soil Gas monitoring available anywhere, and in a compact, inert, and durable package. Combined with Entech's robotic autosampler compatible 1–1.4L Silonite® MiniCans™, air laboratories now have the arsenal needed to manage the extremely large concentration ranges found in today's more demanding applications.

Features

- Critical Orifice and Filter**
Various flow ranges for guideline compliance.
- Silonite® Flow Path**
Silonite® flow path minimizes surface interaction.
- Micro-QT™ Valve Version**
MicroValve™ enables quick and reliable sampling.
- Easy Soil Gas Sampling**
Easy procedure provides the most convenient and reliable way to collect soil vapor into evacuated canisters for EPA method TO-15 analysis.

DESCRIPTION	PART #	UNIT
Soil Gas Sampler (50cc / min. flow rate)	39-64405	EA
Soil Gas Sampler (100cc / min. flow rate)	39-64410	EA
Soil Gas Sampler (150cc / min. flow rate)	39-64415	EA
Soil Gas Sampler (200cc / min. flow rate)	39-64420	EA
Silonite® Soil Gas Sampler*	39-644xxS	EA
MicroValve™ Soil Gas Sampler (50cc / min. flow)	39-64405QT	EA
MicroValve™ Soil Gas Sampler (100cc / min. flow)	39-64410QT	EA
MicroValve™ Soil Gas Sampler (150cc / min. flow)	39-64415QT	EA
MicroValve™ Soil Gas Sampler (200cc / min. flow)	39-64420QT	EA
MicroValve™ Silonite® Soil Gas Sampler*	39-644xxSQT	EA

* For Silonite® Coated Samplers, replace xx with desired flow rate version code.



30-0" Hg Vacuum Gauge
PN: 39-27560

Soil Gas line from well.

Filter and Flow Restrictor
(Critical Orifice - Provides Optimal Flow Control)

Easily connect to TOV™, Nupro®, or other packless valves. Select a MicroValve™ sampler when using MicroValve™ based canisters.

Soil Gas Sampling with MiniCans™ and Bottle-Vacs™

Canisters simplify the task of handling the extremely wide-range of soil gas concentrations commonly seen in the field. Using canisters and the Digital Dilution System (p. 38), a laboratory can screen, dilute, and re-run samples as needed to report sample concentrations spanning a range from low PPB to high PPM. It's fast. It's effective. It's easy!

Easy Soil Gas Dilutions Using the Digital Dilution System – Use a simple 16 gauge needle syringe to transfer to a Bottle-Vac!



The Bottle-Vac™ Advantage

Whether transporting to the field, or just performing low-cost, in-house canister dilutions, the Bottle-Vac™ Sampler gives the Environmental laboratory a very practical tool for air and soil gas monitoring.



The Bottle-Vac™ Sampler is ideal for Air and Soil Gas

Call Today to Learn More!

Bottle-Vac™

- Quick clean up.
- Extremely inert, deactivated glass.
- Low cost and reusable.
- EPA TO-15 compliant.
- 30 day holding time.
- Can be transported by air.
- Vacuum sampling – no pump required.
- Semi-Volatile compatible.
- Pump-free loop injection analysis.
- Highly available.

vs

Tedlar® Bag

- Very poor clean up.
- Absorptive plastic bag.
- Non-reusable – Too much carryover.
- Not EPA TO-15 compliant.
- 72 hour max. holding time – Less for some compounds.
- Cannot be transported by air – high altitude may burst bag.
- Requires pump.
- Not semi-volatile compatible.
- Requires pump for loop analysis.
- Long term availability uncertain.



Industrial Hygiene Sampling

Canisters and Bottle-Vac™ samplers provide an exciting new way to collect whole air samples in the workplace to determine exposure levels. Whole air sampling does not attempt to “extract” chemicals at the time of sampling, and is therefore inherently more reproducible and defensible than badge, cartridge, and tube sampling. Whether performing Ceiling, STEL, or Time Weighted Average sampling, detection limits

are always the same because the total amount of sample collected in each case is the same. Interaction of the target compounds with the matrix is substantially reduced by leaving the sample analytes in the gas phase, virtually eliminating any matrix effects on target compound measurements.

Ceiling – Vacuum Grab Sampling

5-10 sec 

STEL – Vacuum Sampling or Helium Diffusion Sampling™ (HDS)

15 min 

TWA – CS1200P/ MiniCan™ Vacuum Sampling or Helium Diffusion Sampling™ (HDS)

1-8 hrs 

Ceiling Measurements with Canisters

Ceiling measurements have historically been a challenge because there is no way to quickly and reproducibly collect a sample using tube and badge samplers. MiniCans™ and Bottle-Vac™ samplers make this easy. Simply opening and closing the evacuated container accomplishes the task in just a few seconds with extremely high precision. These whole air samplers can easily be checked prior to filling to show that they are still under vacuum; assuring a defensible sample collection

process. Detection limits are equal whether performing STEL or TWA sampling procedures, because the sampling container is always filled with the same amount of sample. Even a small 50cc MiniCan™ or Personal Monitor using vacuum to collect the sample will achieve the same detection limits as the larger sampling MiniCans™ and Bottle-Vacs™ because just 0.25cc is typically used during each analysis to achieve a 0.05 PPM detection limit for most compounds by GC/FID or GCMS.

HDS™ Personal Monitor shown using vacuum rather than helium diffusion sampling to collect an instantaneous ceiling measurement sample.



Filtered Grab Sampling (Options & Accessories)

DESCRIPTION	PART #	UNIT
Personal Monitor – Vacuum mode	(See pg 87)	
500mL Bottle-Vac™	29-BV500A	EA
450mL MiniCan™	29-MC450QT	EA
HDS Indoor Air Sampler with Filter	39-HDS-F01	EA
30-0" Hg Vacuum Gauge (w/Micro-QT)	29-70010QT	EA

STEL Monitoring - Vacuum Sampling Bottles

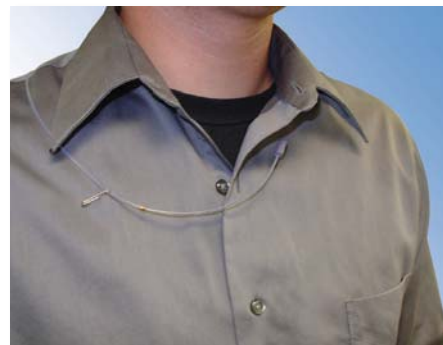
Short Term Exposure Limit, or STEL monitoring can be performed using either evacuated Bottle-Vac™ samplers and MiniCans™ or using the new HDS™ Personal Monitors found on pages 84–87.

Vacuum sampling for 15 minutes into a Bottle-Vac™ or MiniCan™ is easily accomplished using a simple restrictor and transfer line leading to the evacuated sampler worn on a convenient waist-mounted pouch. The chart below shows the fill times based on the size of the sampler used. Note that filling with a critical orifice sampler maintains a constant flow rate only until the canister or Bottle-Vac™ is half full, then the flow rate will begin to decrease. Fortunately, the sampling can be stopped at 50% of atmospheric pressure while still providing several times the amount of sample needed by a laboratory to perform the analysis. Typically laboratories will measure the pressure, dilute the sample 2–3x to create a positive pressure in the container, and then adjust for the dilution when determining concentrations. Using this approach, the dilution amount is very reliably determined via pressure measurement, allowing a high degree of accuracy.

Items needed for 15 Minute STEL Sampling.



DESCRIPTION	PART #	UNIT
500mL Bottle-Vac™ Sampler	29-BV500A	EA
450mL MiniCan™ Sampler	29-MC450SQT	EA
30-0" Hg Vacuum MicroValve™ Gauge	29-70010QT	EA
IH1200 Silonite® Inlet Line	39-36020	EA
Silonite® Female Restricted Sampler	39-RS-FQTS6	EA
Replacement Silonite® Filter	39-92150	EA
MiniCan™ / Bottle-Vac™ Pouch (Attaches to Belt)	39-35015	EA



STEL monitoring shown with Silonite® filtered inlet line sampling directly into a Bottle-Vac™ in pouch attached to belt.



The Bottle-Vac™ Sampler is ideal for STEL Monitoring.
Call Today to Learn More!

IH 1200 Personal Monitoring System

The IH1200 Personal Monitors utilize classical vacuum sampling into MiniCans™ and Bottle-Vacs™ to perform STEL or TWA monitoring for up to 12 hours. Like HDS Personal Monitors, sampling using the IH1200 eliminates the concentration and matrix effects associated with adsorbent-based sampling techniques. The IH1200 is universal, recovering all analytes in a single sampling event with no need to choose different media. Large flow rate adjustments are made by changing inlet restriction (see table below), while fine adjustments (2–3x) are made using a built in flow adjust feature. Enough sample is collected to allow multiple analyses in the laboratory, with detection limits down to low PPB if needed. The IH1200 meets the requirements of OSHA Method PV2120 for determination of workplace contaminants using MiniCan™ samplers. The sampling procedure is easy: Connect an evacuated MC450QT MiniCan™ or 500mL Bottle-Vac™ and sampling starts. Monitor the fill rate on the built-in gauge to document a constant fill rate during the sampling event; disconnect the canister to stop sampling.

Flow Restrictor
(Restrictor elements shown in table below)



The IH1200 System maintains accurate sampling flow rates without loss of volatile chemicals.

IH1200 - Restrictors and Canister Fill Times



IH1200
Personal Monitoring System.

Part No.*	Code	Approx. Flow Range	500mL Bottle-Vac™	450mL MiniCan™	Replacement Restrictor **
39-IH1200QT1	1	40-160cc/Min	2 - 12 Min	2 - 10 Min	39-23010
39-IH1200QT2	2	13.5-54cc/Min	8 - 30 Min	7 - 25 Min	39-23030
39-IH1200QT3	3	5-20cc/Min	25 - 90 Min	20 - 75 Min	39-23080
39-IH1200QT4	4	1.7-6.8cc/Min	1.2 - 4 Hrs	1 - 3 Hrs	39-23240
39-IH1200QT5	5	0.6-1.2cc/Min	4 - 12 Hrs	3 - 10 Hrs	39-24010
* 39-IH1200QTSx Restricted Sampler w/Silonite® (Replace x with desired flow code)					
** 39-2XXXXS Replacement Restrictor w/Silonite® (Add "S" to Restrictor PN)					

IH1200 Personal Monitoring System & Accessories

DESCRIPTION	PART #	UNIT
IH1200 Personal Monitoring System	39-IH1200QTx	EA
Includes:		
Personal Monitoring Flow Controller	39-CS1200Px	EA
Female Micro-QT™ Valve	30-22800	EA
Sampling Belt	39-35000	EA
Sampling Holster	39-35010	EA
Silonite® Inlet Line (w/Teflon® Sleeve)	39-36020	EA
Silonite® Inlet Filter	39-36050	EA
450mL MiniCan™ (w/ Micro-QT™ Valve)	29-MC450QT	EA
500mL Bottle-Vac™ Sampler	29-BV500A	EA
Flow Calibrator (0.1–10ccm)	39-20010A	EA
Flow Calibrator (5–100ccm)	39-20035A	EA
30-0" Hg Vacuum Gauge, Back Port (1/4" SS Nut and 1/4" G/V Ferrule)	39-27565	EA



Silonite® Sapphire Restrictor
PN 39-24010S



Flow Calibrator
PN 39-20035A

Indoor Air Quality / Mold Monitoring (MVOC)

MiniCan™ and Bottle-Vac™ samplers can be used to sample for both indoor air contaminants and for Microbial VOCs. MVOCs are only found at elevated concentrations when there is live, growing mold present. Growing mold increases the likelihood of active, spore-bound microtoxins that have been shown to cause severe respiratory problems. The sample collection procedure for MVOCs is identical to that of general indoor air contaminants such as solvents and BTEX. In most cases, a grab sample is collected which takes only a few seconds to complete. Rapid sampling enables quick screening of a large number of indoor air environments.

DESCRIPTION	PART #	UNIT
450mL MiniCan™ w/ Micro-QT™ Valve	29-MC450QT	EA
500mL Bottle-Vac™ Sampler	29-BV500A	EA
Filtered Grab Sampler for MiniCan™ / Bottle-Vac™	39-HDS-F01	EA
Bottle-Vac™ / MiniCan™ Carrying Case (16-Pos.)	29-20500	EA
Filterless Dry-Wall Sampler (Mold MVOCs)	30-22530	EA
Replacement Dry-Wall Needles	30-22545	EA

See page 70 for more information on bottle and canister restricted samplers for 0.5 to 15 minute integrated sampling. See page 75 for more information on carrying cases.



Dry-Wall Sampler PN 30-22530



Dry-Wall Needles PN 30-22545



MiniCan™ Samplers



An HDS™ Indoor Air Sampler can also be utilized as an excellent grab sampler using any standard MiniCan™ or Bottle-Vac™ under vacuum rather than Helium for easy sample collection. (See page 74) PN 39-HDS-F01

**Mold Analysis
with
MiniCans™
Bottle-Vacs™**

See More in our Analytical Applications Pages
Indoor Air Quality & Mold Analysis – p.94
Bottle-Vac™ Holding Study – p.96



Bottle-Vac™ Samplers

**Contact us to learn more about our
mold sampling and analysis solutions.**

HDS™ Personal Monitors

HDS™ Personal Monitors are a breakthrough technology based on helium diffusion that bring universal and defensible whole air canister monitoring into the realm of personal industrial hygiene monitoring. HDS™ Personal Monitors simplify the collection of chemicals in the workplace and deliver highly reliable results unaffected by factors that create errors in other diffusive samplers – *such as matrix concentrations, varying humidities, and fluctuating face velocities*. An HDS™ sample is easily collected based upon the reproducible diffusion of helium, slowly creating a vacuum that pulls air in actively as helium escapes. A surrogate recovery compound is added to prove recovery during laboratory analysis.

HDS™ Personal Monitors. Available in 15 Minute, 1, 2, 4, and 8 Hour sampling versions.



HDS™ Personal Monitor Accuracy

Entech has engineered a new “twist” in whole air monitoring that eliminates many of the potential sources of error found in other sampling methods. Unlike other monitoring approaches such as tubes and badges, the new HDS™ Monitor enables compounds to remain in the gas phase where chemicals are much less likely to interact. The HDS™ sampler has the inertness of a GC column, allowing chemicals to remain stable for up to months after sampling. Since there is no adsorption/desorption process, the HDS™ monitor is universal for all GC compatible chemicals. The only choice to be made is selecting the required sampling duration.

Proof of Sampler Integrity in the Field

Before going out to the field, each HDS™ Personal Monitor is vacuum cleaned and pressurized with helium at 5–10psig. A surrogate chemical called Bromofluorotoluene (BFT) is also added to validate leak-free operation and ensure the inertness of every sampler. Entech offers a pressure gauge to confirm a positive helium pressure immediately before field sampling to verify that unwanted sampling into the HDS™ Personal Monitor has not occurred. This pressure is measured and recorded at the time of sampling as proof of sampler integrity. Sampling starts when the control valve is removed and stops when the valve is re-attached. It's that simple.

Reproducible Sample Collection

The sampling rate of the HDS™ Personal Monitor is unaffected by changing face velocities caused by air movement around the sampler. Uptake rate is also unaffected by analyte concentrations, matrix variations, and sample collection temperatures from 0°C to 40°C. With tubes and badges, a multi-chemical sampling event may adversely affect analyte uptake rate and stability to an unknown degree. The adsorption of these compounds concentrates them, allowing for much higher potential reaction rates as compared to the HDS Personal Monitor, where the compounds remain diluted in the gas phase. Changes in relative humidities can affect the hydrophobic properties of badge samplers, creating different uptake rates. Conversely, a humid or dry environment does little to change the diffusion rate of helium and the active collection of the wet or dry air sample.

HDS™ Personal Monitor Sampling Procedure

After verification of positive pressure to confirm a leak-free sampler, the HDS™ Personal Monitor is positioned on the individual to be monitored. Removing the valve commences the sampling process. After the desired sample collection period, the valve is replaced and the sampling duration is recorded. The sampler is now ready to be sent to the laboratory for analysis.

Laboratory Verification of Sample Collection

Although the HDS™ Personal Monitors are very consistent, there is no reason to have to “assume” proper sample collection as with other workplace sampling devices. Since air is 7.3 times heavier than helium, the amount of air collected can be determined in the laboratory by weight. Measuring the weight to the nearest 0.2mg and then subtracting the weight of the sampler after evacuation will provide the % air collected to an accuracy of $\pm 1\%$. No other workplace monitoring technique offers this level of certainty and defensibility.

Reliable Sample Recovery

During laboratory analysis, proof that the sample was properly injected is obtained by verifiable recovery of an internal standard. Prior to analysis, the HDS™ Personal Monitor is pressurized with 7psig of nitrogen which contains an internal standard called Fluorobenzene (FB). Unlike adsorbent-based sampling devices, whole air samplers are uniquely capable of completely mixing the collected sample with a surrogate or internal standard prior to delivery into the analyzer. Only by creating a completely homogeneous mixture can sample recovery be proven by monitoring the response of the surrogate or internal standard.

Accurate and Defensible Sample Analysis

Whether performing GC/FID or GCMS, accuracy depends upon the ability to reproducibly measure a sample aliquot and completely transfer the sample to the analyzer while eliminating unwanted matrix components (air, water, CO₂). Concentrations down to 0.1 PPMv can be quantified by loop injection with no matrix management, typically yielding precision from 1–3%. Lower detection limits can be achieved by preconcentrating 10–20mL prior to GC/FID or GCMS injection, providing detection limits down to about .003 PPM. In either case, the response of an internal standard provides reliable confirmation of the actual volume analyzed. Monitoring accuracy and sampler inertness is also validated by recovery of the BFT surrogate.



HDS™ Personal Monitors shown with the 7650-L10 Headspace Inlet



HDS™ Personal Monitor collection in the field. Helium Diffusion through a precise orifice results in defined active sampling of air and industrial chemicals.

HDS™ Personal Monitor Sampling

How does Helium Diffusion Sampling work?

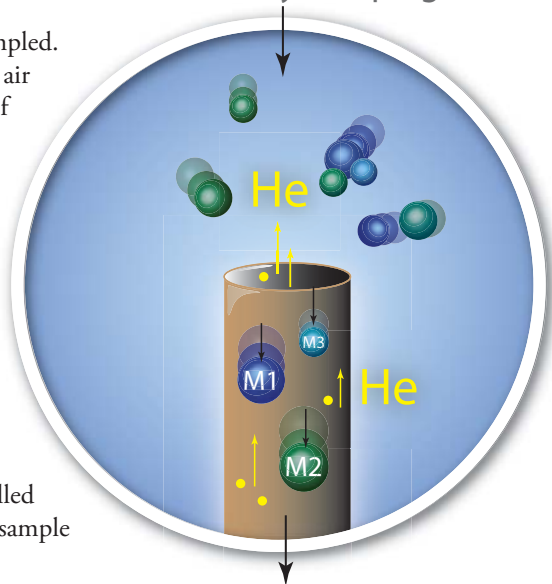
Helium diffuses much faster than air and other chemicals to be sampled. The vacuum created by escaping helium actively draws surrounding air into the sampler. This active sampling of air prevents any loss of compounds through reverse diffusion and normalizes characteristics of all compounds despite differences in diffusion rates.

The 15 minute, 1, 2, 4, and 8 Hour HDS™ Monitors use different diffusion zones to achieve their respective sampling rates. This design means all monitors feature the SAME detection limits whether performing TWA or STEL measurements. An evacuated version of the HDS™ Monitor can also be used to collect an immediate sample for ceiling measurements (p. 80).

Every HDS™ Monitor contains a surrogate recovery compound called Bromofluorotoluene (BFT). The recovery of this compound ensures sample integrity.

Replacing the valve on the HDS™ Monitor after a sampling event effectively isolates the sample until analysis.

Air is actively drawn into the vacuum created by escaping Helium.



Flow rate exceeds back diffusion rate, preventing losses of sampled compounds.

Features

- **Universal Sampling**
*No need to select media based on target analyte. Like canisters, the HDS™ Personal Monitor is **universal**.*
- **Reliable Sampling Rates**
Sampling rates are not affected by humidity, temperature, or sample matrix variables. Best of all, the HDS™ Monitor is not affected by changes in face velocities and works effectively in absolutely "still" air.
- **Amazing Detection Limits**
*Analysis of 4–8 Hour HDS™ Monitors utilizing 10cc gives detection limits 5–7 times lower than badges. The 1 Hour and 15 Minute HDS™ Monitors provide detection limits as much as 100 times lower than badges. All 5 HDS™ Personal Monitors provide the SAME detection limits – **they all collect the same amount of sample!***
- **Superior Quality Assurance**
Contamination free sampling is assured by field pressure measurement and BFT recoveries. No solvent workup is needed, making the HDS™ Personal Monitors ideal for analysis by GCMS.



HDS Personal Monitor

User's Guide

- ▶ **1 Confirm under positive pressure (3–10psig helium) using gauge.**
Test Gauge PN: 29-70020QT (Available separately)
- ▶ **2 Place HDS™ in holder near breathing zone and remove valve for 50–100% of the suggested sampling periods.**
HDS™ Holder PN: 39-35026 (Available separately)
- ▶ **3 Replace valve and record time duration of sampling event.**
- ▶ **4 Send to laboratory for analysis.**
- ▶ **5 Request type of analysis:**
 - Standard 0.1 PPM and higher
 - Trace 0.01 PPM to 1 PPM
 - Ultra Trace (SIM) 0.001 PPM



Why is the HDS™ Monitor so sensitive?

The HDS™ Personal Monitor features the ability to sample at a much lower rate than conventional badges and tubes. The collection of far less sample on a weight basis is one of the reasons why the HDS™ Personal Monitor allows for greater stability of chemicals, especially in a multi-chemical matrix, as bimolecular reaction rates are concentration dependent. During the analysis, a much larger “percentage” of the sample is utilized, making up for the decreased sampling rate. A comparison of badges and HDS™ Personal Monitors is shown below. The chart details the amount actually injected into the GCMS when analyzing 10cc from an HDS™ Personal Monitor.

Sampling Media	Sampling Rate (cc/min)	Sampling Time (min)	Total Sample Collected	Extraction Solvent	Injection Volume	Injection Split	Equiv. Sample Injected (cc)	Badge Normalized Sensitivity
Badge (8 Hour)	30	480	14400cc	2000µl	1µl	20:1	0.36	1.00
HDS™ Personal Monitor (8 Hour Version)	.033	480	16cc	N/A	10cc	1	2.6	7.2
Badge (15 Minute)	30	15	450cc	2000µl	1µl	20:1	0.01	1.00
HDS™ Personal Monitor (15 Minute Version)	1	15	13cc	N/A	10cc	1	2.2	220

* Effective volume of original sample injected during analysis.

HDS™ Sensitivity Advantage!



HDS™ Personal Monitors are available with this handy reusable shipping box.



HDS™ Personal Monitors with Silonite® MicroValves™.



Monitor Holder
PN 39-35026

30" Hg-0-30psig Compound Gauge
PN 29-70020QT

DESCRIPTION	PART #	UNIT
15 Minute HDS™ Personal Monitors*	HDS-PM15M	EA
1 Hour HDS™ Personal Monitors*	HDS-PM1HR	EA
2 Hour HDS™ Personal Monitors*	HDS-PM2HR	EA
4 Hour HDS™ Personal Monitors*	HDS-PM4HR	EA
8 Hour HDS™ Personal Monitors*	HDS-PM8HR	EA
HDS™ Personal Monitor Holder	39-35026	EA
30" Hg-0-30psig Compound Gauge	29-70020QT	EA

* All Monitors (Helium + Bromofluorotoluene 1 PPM)

Add "PK" to end of part number to order a 4 pack of that Personal Monitor.

Arson Investigation



MiniCan™ and Bottle-Vac™ samplers are ideal for investigating the presence of accelerants at a burn site. Vapor phase samples can be collected directly using Restricted Samplers (p.70), or Solvent Enhancement Enclosures (SEE). The self-contained vacuum pulls the sample into the container without a power source requirement.

Using MiniCans™ and Bottle-Vacs™ can also speed up laboratory sample preparation, as well as improve upon the sensitivity of accelerant detection. Currently, debris analysis is performed by placing a carbon strip into a paint can containing the debris and then waiting up to 24 hours before removal of the carbon strip to perform a solvent extraction.

DESCRIPTION	PART #	UNIT
450mL MiniCan™ with Micro-QT™ Valve	29-MC450QT	EA
500mL Bottle-Vac™ Sampler	29-BV500A	EA
3L Solvent Enhancement Enclosure	39-63030	EA
1 Min. MiniCan™ / Bottle-Vac™ Sampler	39-RS-QT2	EA
500mL LVH Vial and Cap (Box of 12)	39-75500W	12
Vacuum Sampler Check Gauge	29-70010QT	EA
Lid Punch for MicroValve™ (for collection canister)	39-PUNCH312	EA
Female Micro-QT™ Valve for paint can	Call	EA



Fill restrictors simplify the sampling process. An internal limiting orifice and filter control the fill rate while eliminating particulates.

Emergency Response Sampling (ERS)

Monitoring for chemicals in response to accidental releases requires the sampling device to be mobile and easy to use. It should also be small, light and inexpensive. The MiniCan™ fits this description better than any other sampling device available. Featuring a Silonite® coated interior, the MiniCan™ becomes an essential, portable and cost effective *extension* of the GC analytical process.

DESCRIPTION	PART #	UNIT
Emergency Response Startup Kit	39-40020	EA
ERS Kit Includes:		
500mL Amber Bottle-Vac™ Sampler (6)	29-BV500A	6
600mL MiniCan™ Sampler (3)	29-MC600QT2	3
Restricted Sampler-5 Min in 600mL (2)	39-RS-QT3	2
Restricted Sampler-15 Min in 600mL (2)	39-RS-QT5	2
Filterless Grab Sampler (2)	30-22500	2
Vacuum Check Gauge for MiniCans™ (1)	29-70010QT	1
Leak-Tight Cap with Chain (9)	30-22070	9
Carrying Case	29-20500	1

Entech offers an improved “paint can” sample work-up solution which offers the benefits of canister sampling technology. Debris to be tested is collected into a paint can as usual, followed by delivery to the lab. The paint can cover is then replaced with a new can cover with an integrated female Micro-QT™ valve that creates a leak-tight seal at the time when the normal carbon strip is introduced. After 1–2 hours, some of the can’s headspace is extracted into an evacuated MiniCan™ or Bottle-Vac™. Analysis of just 100cc of this headspace effectively increases the sensitivity of this technique by 50–100 times while eliminating the need for extraction solvents, making it more GCMS friendly. Analysis can be done quickly, with a same day sample turn around if required, and Arson Investigators may continue to use sampling methodologies they are comfortable with.

MiniCans™ and Bottle-Vacs™ allow accelerant extraction from debris the same day, rather than waiting 24 hours required for classical charcoal strip passive transfer and solvent extraction, with 10 to 100 times greater sensitivity!



MiniCans™ and Bottle-Vacs™ collect the entire sample, rather than trying to perform difficult separations right at the point of release (tube sampling). These vacuum samplers allow recovery of a wider range of flammable compounds than any other sampler, including chemical warfare agents and toxic industrial compounds from C₂ to C₂₅, and polar compounds as light as methanol. Even compounds like formaldehyde that were once thought to require derivitization can be sampled and analyzed directly by GCMS.

Law Enforcement

The ability to collect and analyze gas phase samples for trace chemicals has many uses in forensic science. Some of the applications include:

- **Illegal Drug Laboratories**
 - Indoor Air Quality testing during cleanup
 - Locate chemical signature from “cooking” process
 - Identify presence of chemical signature in breath (for health risk determination and forensics)
 - Chemical signature on clothing via direct thermal desorption in Large Volume Headspace (LVSH) vials.
- **Detection of Drugs of Abuse**
(or their metabolic breakdown products in breath)
- **Arson Investigation**
- **Detection of hidden chemicals**
(Vehicles, containers, or warehouses from trace vapor signature.)



Collecting a hazardous material sample.



vapors can be sampled directly once a positive canine response is obtained.



MiniCan™ Sampler for Chemical Detection and Arson Investigations.

DESCRIPTION	PART #	UNIT
500mL Bottle-Vac™ Sampler	29-BV500A	EA
Quick Fill Sampler	30-22510	EA
Restricted Sampler, Silonite® Coated (1 minute in MC450QT and Bottle-Vac™)	39-RS-QT1	EA
Vacuum Sampler Check Gauge	29-70010QT	EA

Breath Analysis

Analysis of volatile chemicals in breath can be used to determine the extent of exposure, which finds applications in both industrial hygiene and forensic science. Measuring and comparing relative abundances of chemicals produced in the human body can also help to screen for many metabolic disorders and diseases.

The economical and disposable 39-82000 Breath Sampler allows non-equilibrated bronchial air to be first eliminated before collecting the deeper, alveolar air which is more representative of levels of chemicals in the blood. Conversely, collecting air using shallow, rapid breathing allows chemicals in the mouth to be sampled when studying oral hygiene or flavor changes during food consumption (aftertaste).

DESCRIPTION	PART #	UNIT
Disposable Breath Sampler	39-82000	100pk
Vacuum Sampler Check Gauge	29-70010QT	EA
500mL Bottle-Vac™ Sampler	29-BV500A	EA
1L Bottle-Vac™ Sampler	29-BVL1A	EA
500mL Amber Bottles, deactivated*	39-75500AD	12pk
1L Amber Bottles, deactivated*	39-75L1AD	12pk



Breath Sampler shown with 1L Bottle-Vac™.



Entrust your Sulfur Gas Sampling & Analysis to Entech's H₂S Bottle-Vac™ Samplers!

H₂S Bottle-Vac™ Samplers

H₂S and Methyl Mercaptan recovery has continued to be an analytical challenge when sampled into canisters at PPB to sub-PPB levels. The presence of more than 10–15% relative humidity within a sampling canister has been shown to dramatically reduce reliable storage time of H₂S and to a lesser extent Methyl Mercaptan, relative to dry samples.

Fortunately, Entech offers an economical solution. Now, laboratories can choose to collect H₂S and Methyl Mercaptan samples into new H₂S Bottle-Vac™ canisters. These canisters are designed to accommodate a specific amount of Silica gel within the sampler in order to dehydrate the sample upon collection. This small amount of Silica gel effectively removes more than 90% of the water vapor without effecting quantitative recoveries of H₂S and Methyl Mercaptan. Easily collect H₂S, COS, and MeSH into 500mL and 1L H₂S Bottle-Vac™ canisters and reliably retain >80% recovery even after a 1–2 week storage time prior to analysis. For the collection of heavier sulfur compounds which are less affected by humidity levels, simply utilize standard Bottle-Vac™ or Silonite® canisters.



H₂S Bottle-Vac™ Samplers

DESCRIPTION	PART #	UNIT
500mL H ₂ S Bottle-Vac™ Sampler	29-BV500-H2S	EA
1L H ₂ S Bottle-Vac™ Sampler	29-BVL1-H2S	EA

Low Pressure Reduced Sulfur (0.1–100 PPB)

Sulfur gases can be collected and analyzed using Silonite® coated samplers and canisters. Sulfur compounds have been shown to be stable in Silonite® canisters for 1–2 weeks, allowing sufficient time to perform laboratory analysis, even if samples must be shipped over long distances after sampling. Odor threshold levels can be met using GCMS or GC/CLD (Chemiluminescence Detector) when preconcentrating 10–200cc of sample.

Maximum stability of H₂S and Methyl Mercaptan requires relative humidities to be below 20%. When the relative humidity is above 20%, excess water can be absorbed using Bottle-Vac samplers that contain a small amount of anhydrous Silica gel. Just enough Silica gel is used to absorb most of the water without affecting H₂S or Methyl Mercaptan concentrations, allowing these compounds to be stable for weeks. When monitoring a wider range of sulfur compounds, it is recommended to use two different samplers; the 29-BV500-H₂S or 29-BVL1-H₂S for H₂S and Methyl Mercaptan, and a standard Bottle-Vac™ or Silonite® coated MiniCan™ or larger Silonite® canister for all other compounds. Silonite® coated cylinders are also available for high-pressure refinery gas sampling environments and long-term storage requirements.

High-Pressure Refinery Gas Sampling Cylinders
(See p.50 in the Silonite® Section)



Bottle-Vac™ Samplers

Sulfur Gas – Toxic Organic Valve™ Canisters

DESCRIPTION	PART #	UNIT
450mL MiniCan™ with Silonite® TOV-2™	29-MC450SV	EA
1L MiniCan™ with Silonite® TOV-2™	29-MC1LSV	EA
1.4L MiniCan™ with Silonite® TOV-2™	29-MC1400SV	EA
6L Canister with Silonite® TOV-2™	29-10622	EA
Restricted Grab Sampler for Silonite® Canisters (x=0 to 6. See restrictor codes on pg. 60)	39-RS-x	EA



450mL, 1L, and 1400mL MiniCans™ shown with MicroValves™ and TOV-2S™

Sulfur Gas – Micro-QT™ Valve Canisters

DESCRIPTION	PART #	UNIT
450mL MiniCan™ with Silonite® Micro-QT™	29-MC450SQT	EA
600mL MiniCan™ with Silonite® Micro-QT2™	29-MC600QT2	EA
1L MiniCan™ with Silonite® TOV-2™	29-MC1LSV	EA
1.4L MiniCan™ with Silonite® Micro-QT™	29-MC1400SQT	EA
1L Bottle-Vac™ Sulfur Gas Sampler	29-BVL1-H2S	EA
Silonite® Micro-QT™ Grab Sampler	30-22510S	EA
Silonite® Micro-QT™ Restricted Sampler (x=0 to 6. See restrictor codes on pg. 70)	39-RS-QTx	EA
Micro-QT™ Valve Vacuum Check Gauge	29-70010QT	EA
Female Silonite® Micro-QT™ CS1200ESx Adpt.	30-22800S	EA



Restricted Sampler for Micro-QT™ Canisters
39-RS-QTSx (See Codes on p.70)



Restricted Sampler for TOV™ Canisters
PN 39-RS-x

Analytical Applications

Our Application laboratory continually strives to develop new and improved methods for solving real world problems. At Entech we are focused on providing complete solutions for your analytical needs.



Bottle-Vac™ Samplers

Volatiles Analysis. See page 96



Breath Analysis

Volatiles Analysis in Breath. See pages 98–99



Chemical Warfare Agents

& Toxic Industrial Compounds. See page 102



HDS Personal Monitor Analysis

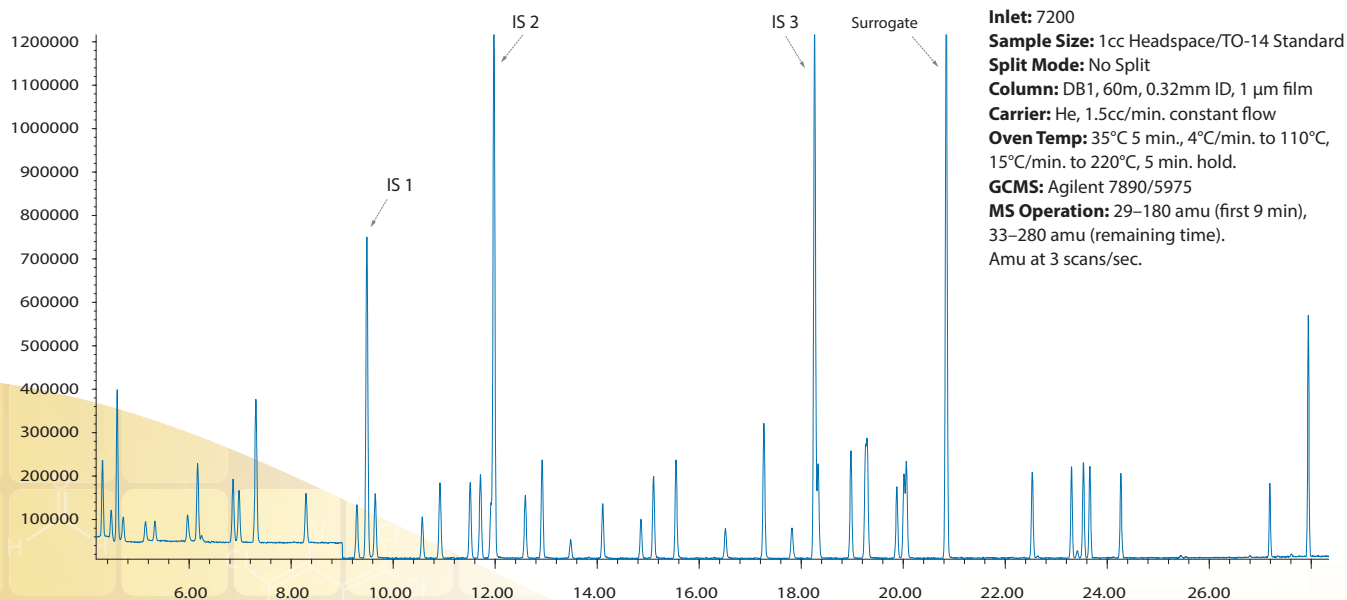
HDS Analysis. See page 104

This Section Covers

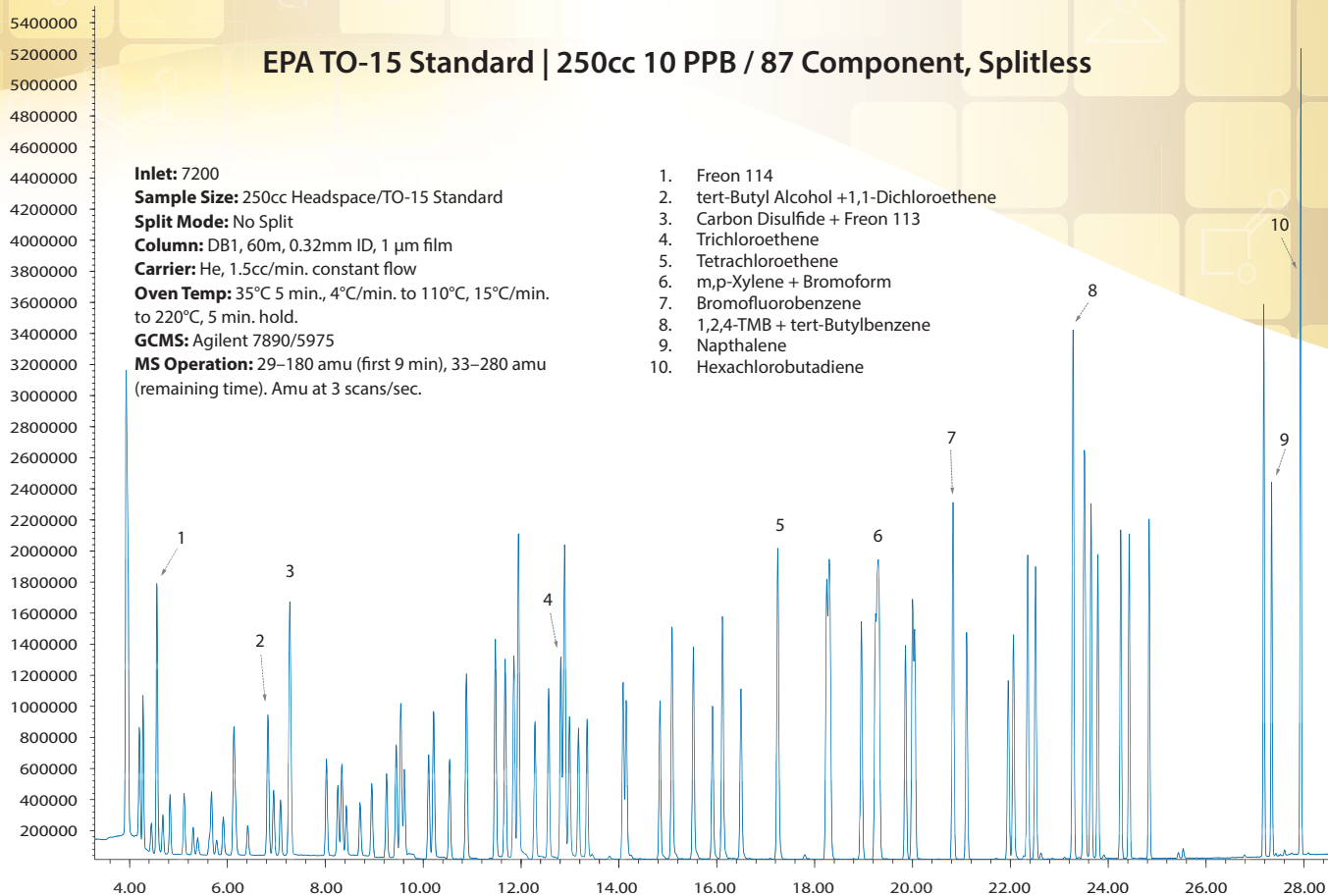
- 93 Ambient Air / EPA Methods
- 94 Indoor Air Quality & Mold Analysis
- 95 Ethylene Oxide & Glutaraldehyde
- 96 Bottle-Vac™ Volatiles Analysis
- 97 5400B – Thermal Desorption
- 98 – 99 Breath Analysis
- 100 Trace Contaminants in CO₂
- 101 Refinery Gas Analysis
- 102 Chemical Warfare | Industrial Toxics Analysis
- 103 EPA TO-14 Standard – HDS™ Analysis by Loop Injection
- 104 HDS™ Personal Monitoring | Food Packaging Analysis
- 105 Aluminum Can Coatings Analysis
- 106 Food & Ingredients – Tomatoes Analysis
- 107 Strawberries Analysis
- 108 Raspberries Analysis
- 109 Peanuts Analysis
- 110 – 111 Dark Chocolate | Potato Chips Analysis
- 112 – 113 Coffee Aroma | Cola Beverage Analysis
- 114 – 115 Alcoholic Beverage Analysis

Ambient Air / EPA Methods

EPA TO-14 Standard | 1mL Loop 10 PPB / 39 Component, Splitless

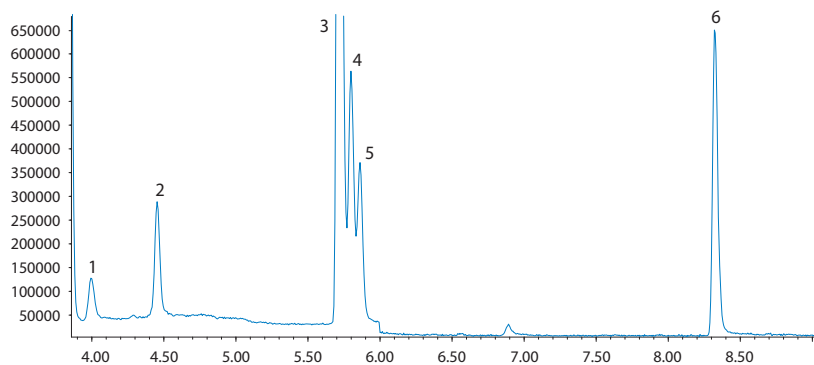


EPA TO-15 Standard | 250cc 10 PPB / 87 Component, Splitless



Indoor Air Quality

Formaldehyde & Carbonyls Analysis



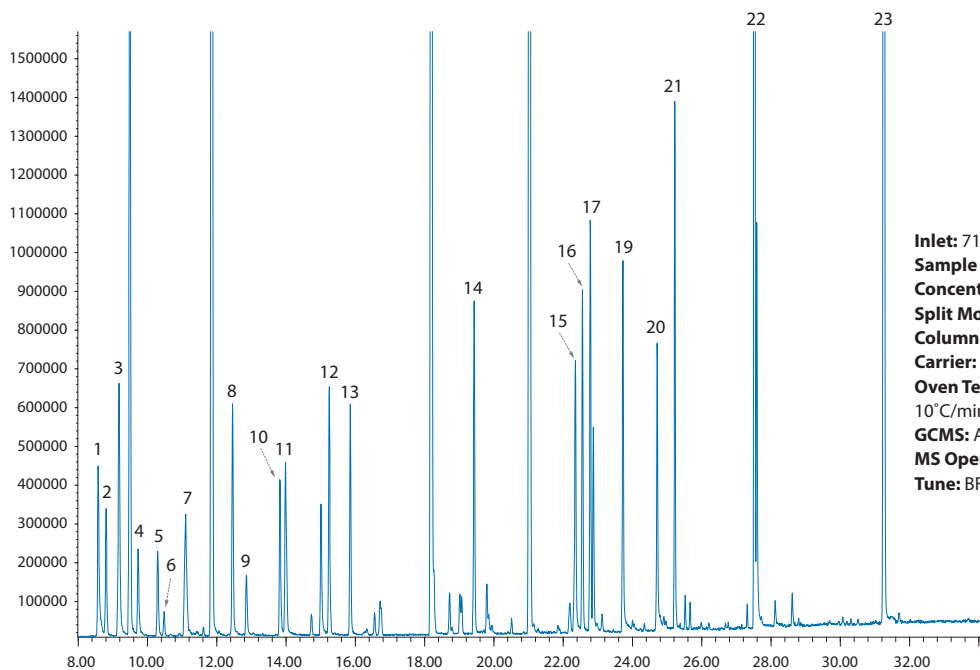
Inlet: 7100A / 7200 Preconcentrator
Sample Size: 100cc
Matrix Management: Coldtrap Dehydration, M1 – Open, M2 – Tenax®
Column: HP1, 60m, 0.32mm ID, 1 µm film
Carrier: He, 1.5cc/min. constant flow
Oven Temp: 35°C 5 min., 6°C/min. to 150°C, 15°C/min. to 220°C, 4 min. hold.
GCMS: Agilent 5973
MS Operation: 33–270 amu, 3.1Hz, EI, EM=0 Rel.
Tune: BFB

Compounds: Carbonyl Standard

1.	Formaldehyde	50 PPB	60 ng/l
2.	Acetaldehyde	20 PPB	60 ng/l
3.	Acetone-d6	100 PPB	261 ng/l
4.	Acetone	20 PPB	47 ng/l
5.	Propionaldehyde	20 PPB	47 ng/l
6.	Methylethylketone (MEK - 2-Butanone)	20 PPB	59 ng/l

Mold Analysis

MVOC Standard | 100cc, 2 PPBV

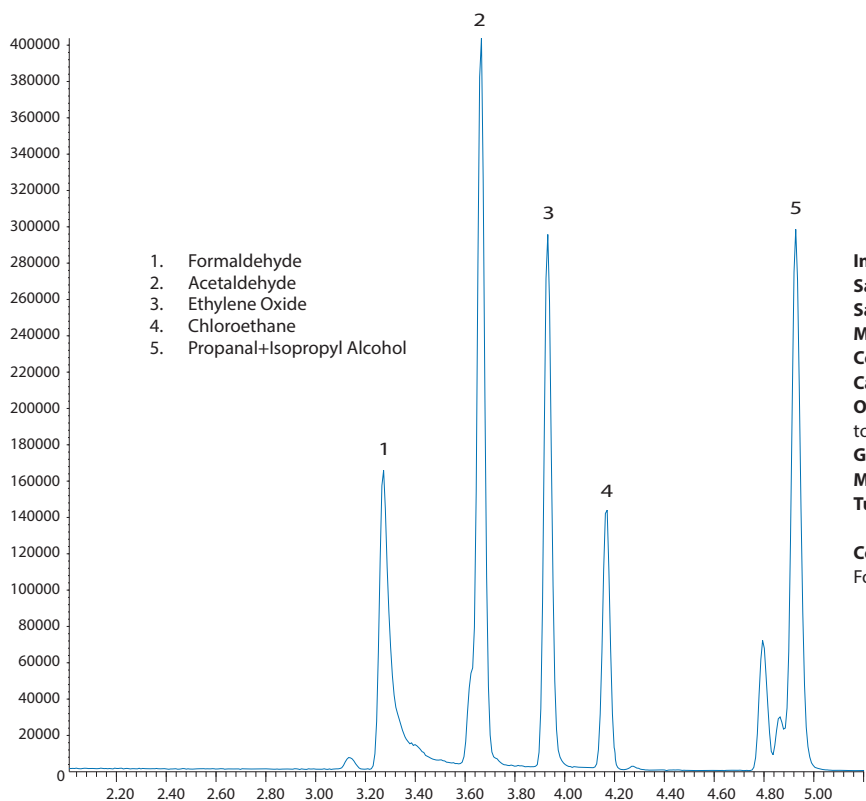


Inlet: 7100A / 7200 Preconcentrator
Sample Size: 100cc
Concentration: 2 ppbv
Split Mode: No Split
Column: DB1, 60m, 0.32mm ID, 1 µm film
Carrier: Helium
Oven Temp: 35°C 5 min., 6°C/min. to 120°C, 10°C/min. to 220°C, 2 min. hold.
GCMS: Agilent 6890/5973
MS Operation: 33–270 amu
Tune: BFB

Calibration Results for MVOCs

Analyte	%RSD	Analyte	%RSD	Analyte	%RSD
1. 2-Methylfuran	6.78	9. 1,4-Dioxane	11.91	17. 2-Pentylfuran	12.77
2. 2-Butanone	7.65	10. 3-Methyl-1-butanol	10.33	18. 3-Octanol	13.18
3. 3-Methylfuran	6.86	11. 2-Methyl-1-butanol	7.09	19. 2-Ethyl-1-hexanol	30.70
4. 2-Methyl-1-propanol	5.76	12. 1-Pentanol	3.52	20. 1-Octanol	16.47
5. 2-Methyl-2-butanol	10.63	13. 2-Hexanone	5.35	21. 2-Isopropyl-3-methoxypyrazine	11.50
6. tert-Pentyl Alcohol	12.06	14. 2-Heptanone	10.99	22. 2-Methylisoborneol	14.99
7. 3-Methyl-2-butanol	9.29	15. 1-Octen-3-ol	20.55	23. Geosmin	16.68
8. 2-Pentanol	7.42	16. 3-Octanone	11.76		

Ethylene Oxide Analysis

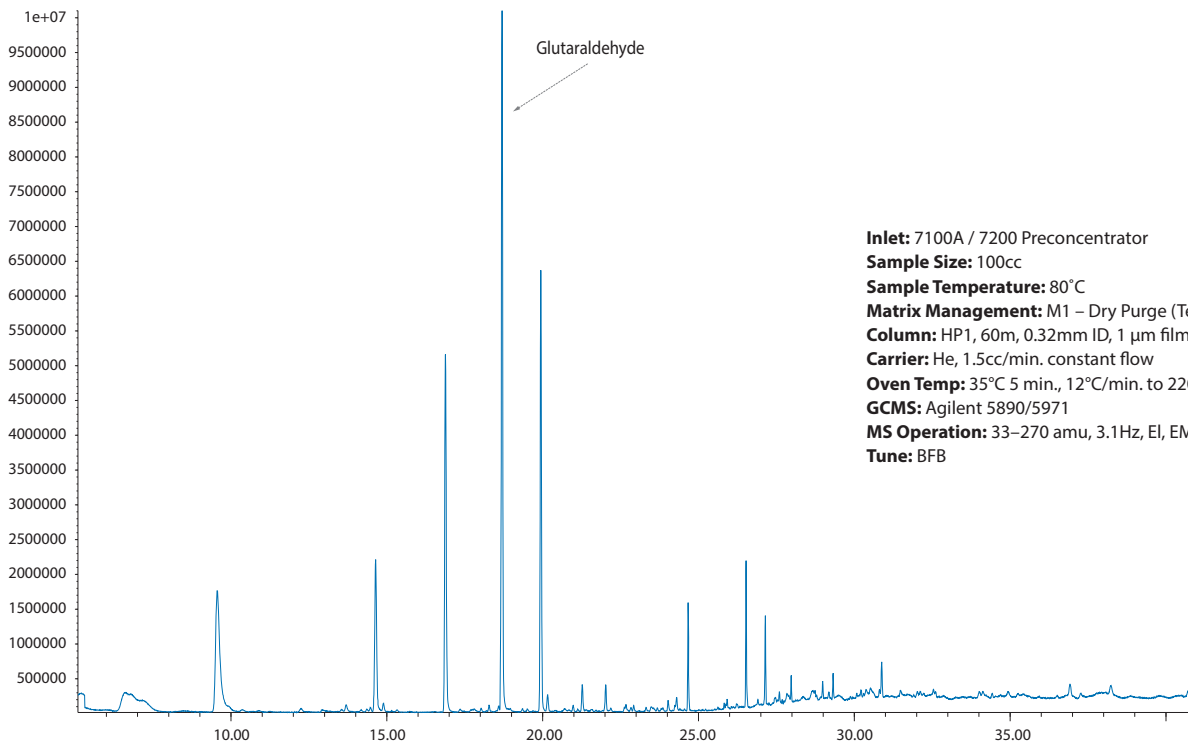


- 1. Formaldehyde
- 2. Acetaldehyde
- 3. Ethylene Oxide
- 4. Chloroethane
- 5. Propanal+Isopropyl Alcohol

Inlet: 7100A / 7200 Preconcentrator
Sample Size: 100cc
Sample Temperature: Ambient
Matrix Management: ECTD
Column: HP1, 60m, 0.32mm ID, 1 µm film
Carrier: He, 1.5cc/min. constant flow
Oven Temp: 35°C 5 min., 6°C/min. to 150°C, 15°C/min. to 220°C, 4 min. hold.
GCMS: Agilent 5973
MS Operation: 29–180 amu, 3.1Hz, EI, EM=0 Rel.
Tune: BFB

Concentrations:
 Formaldehyde: 25 ppb, other Carbonyls: 10 ppb

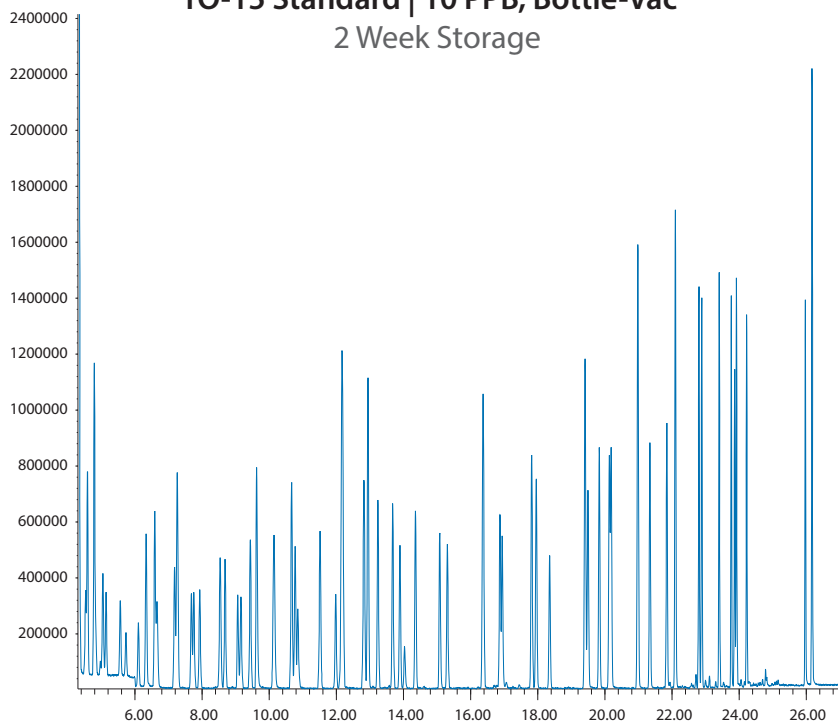
Glutaraldehyde Analysis | 100cc, 100 PPB



Inlet: 7100A / 7200 Preconcentrator
Sample Size: 100cc
Sample Temperature: 80°C
Matrix Management: M1 – Dry Purge (Tenax® TA)
Column: HP1, 60m, 0.32mm ID, 1 µm film
Carrier: He, 1.5cc/min. constant flow
Oven Temp: 35°C 5 min., 12°C/min. to 220°C, 4 min. hold.
GCMS: Agilent 5890/5971
MS Operation: 33–270 amu, 3.1Hz, EI, EM=200 Rel.
Tune: BFB

Silonite® MiniCan™ & Bottle-Vac™ Holding Study (TO-15 Standard, 14 Days – 4 Months)

TO-15 Standard | 10 PPB, Bottle-Vac™
2 Week Storage



Bottle-Vac™ Samplers

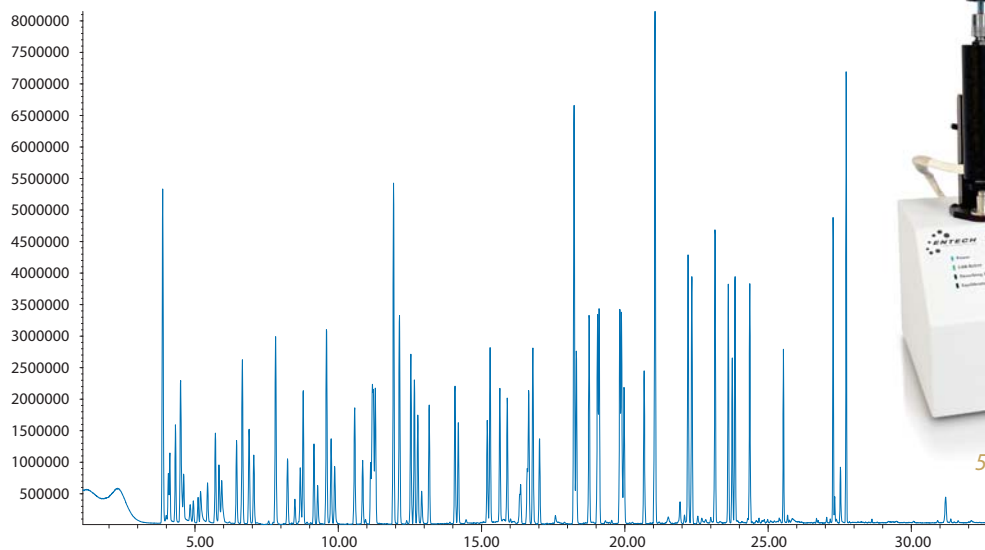
Inlet: 7100A / 7200 Preconcentrator
Sample Size: 100cc
Sample Temperature: Ambient
Matrix Management: ECTD
Column: HP1, 60m, 0.32mm ID, 1 µm film
Carrier: He, 1.5cc/min. constant flow
Oven Temp: 35°C 5 min., 6°C/min. to 120°C, 10°C/min. to 210°C, 4 min. hold.
GCMS: Agilent 6890/5973N
MS Operation: 29–150 amu (first 6 min), 33–270 amu (remaining time). 3.1Hz, EI, EM=200V Rel.
Tune: BFB

Analyte	MiniCan™ % Recovery			Bottle-Vac™ % Recovery	
	2 week	3 week	4 month	2 week	30 day
Propene	99	97	89	100	91
Dichlorodifluoromethane	94	95	92	102	95
Chloromethane	93	93	90	95	85
Dichlorotetrafluoromethane	87	91	91	95	96
Acetaldehyde	99	96	96	96	104
Vinyl Chloride	95	93	90	96	95
1,3-Butadiene	96	94	86	95	100
Bromomethane	96	95	94	97	101
Chloroethane	95	95	90	96	93
Bromoethene	94	95	91	97	93
Trichlorofluoromethane	95	95	92	97	94
Acetone	91	91	83	103	102
Propanal	93	92	82	100	87
Isopropyl Alcohol	90	96	92	99	116
1,1-Dichloroethene	96	95	90	95	98
1,1,2-Trichloro-1,2,2-Trifluoroethane	95	95	91	98	98
Methylene Chloride	96	96	92	99	99
Allyl Chloride	95	94	86	98	92
Carbon Disulfide	98	97	92	97	99
trans-1,2-Dichloroethene	95	94	88	96	97
Methyl-tert-Butyl Ether	89	90	84	93	92
1,1-Dichloroethane	96	95	91	95	96
Vinyl Acetate	88	87	76	94	92
2-Butanone	89	87	77	109	104
Hexane	97	96	89	99	99
cis-1,2-Dichloroethene	94	93	88	97	89
Ethyl Acetate	88	87	76	93	94
Chloroform	95	95	92	95	95
Tetrahydrofuran	91	91	81	94	128
1,1,1-Trichloroethane	95	95	92	94	94
1,2-Dichloroethane	94	93	89	96	94

Benzene	96	94	90	100	102
Carbon Tetrachloride	95	94	92	95	93
Cyclohexane	98	97	92	97	98
2,2,4-Trimethylpentane	97	98	97	96	96
Heptane	97	98	97	97	96
1,2-Dichloropropane	96	97	97	98	94
Trichloroethene	95	95	95	97	94
Bromodichloromethane	97	97	95	95	96
1,4-Dioxane	110	105	74	97	94
cis-1,3-Dichloropropene	91	92	81	97	91
4-Methyl-2-Pentanone	101	103	56	96	94
trans-1,3-Dichloropropane	82	81	62	97	97
Toluene	96	96	98	100	100
1,1,2-Trichloroethane	96	96	97	96	97
2-Hexanone	97	98	45	112	100
Dibromochloromethane	96	97	93	97	93
1,2-Dibromoethane	92	91	83	99	96
Tetrachloroethene	96	96	78	99	94
Chlorobenzene	96	95	93	102	95
Ethylbenzene	97	96	96	100	93
Bromoform	96	100	90	99	97
Styrene	93	92	81	100	99
o-Xylene	98	98	99	101	96
1,1,2,2-Tetrachloroethane	100	100	100	99	103
4-Ethyltoluene	97	100	93	102	92
1,3,5-Trimethylbenzene	99	97	100	106	98
1,2,4-Trimethylbenzene	99	97	100	99	95
1,3-Dichlorobenzene	99	96	91	97	93
Benzyl Chloride	93	96	65	99	83
1,4-Dichlorobenzene	96	91	80	98	95
1,2-Dichlorobenzene	104	100	103	96	94
1,2,4-Trichlorobenzene	102	92	110	82	75
Hexachlorobutadiene	112	102	120	89	84

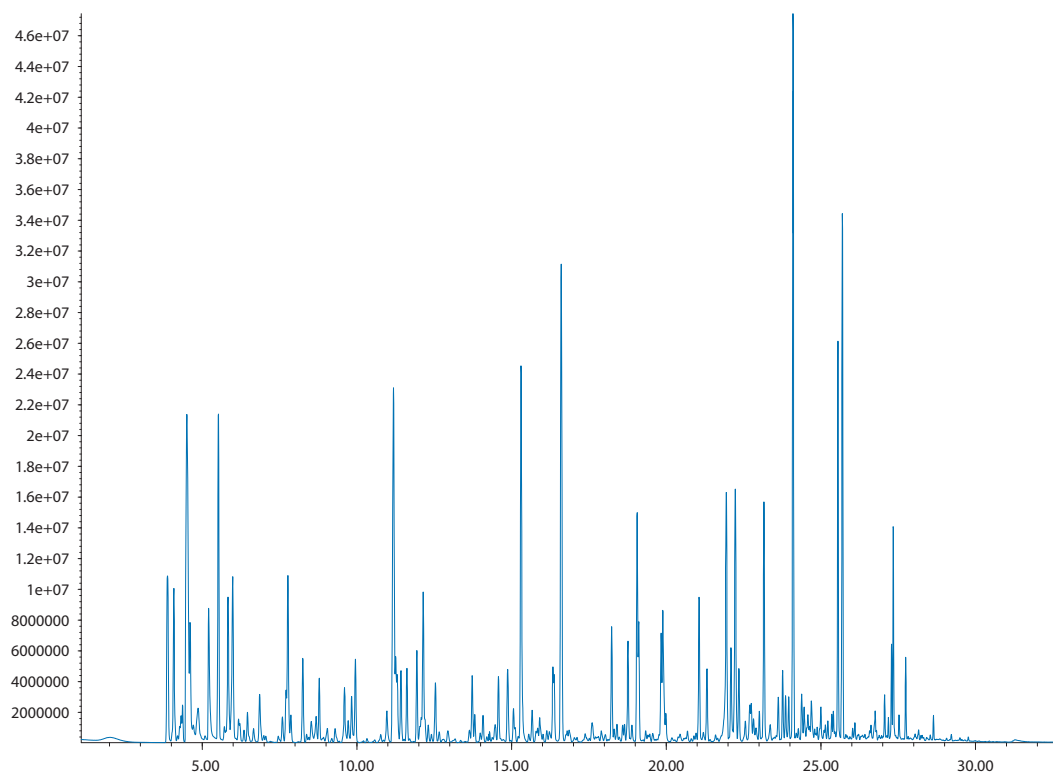
Pre-Extraction of TD Tubes

(Using the 5400B Thermal Transfer System)

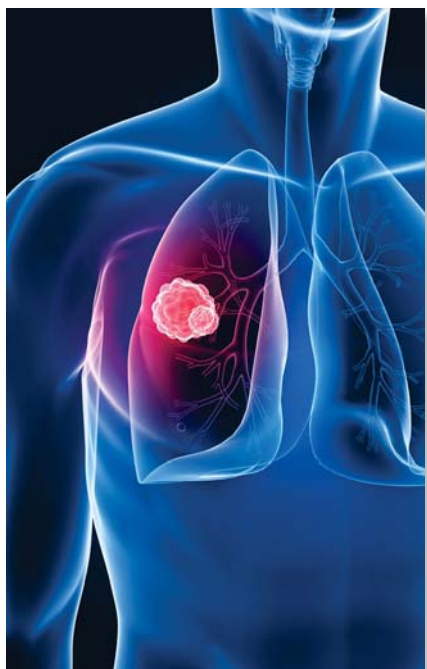


5400B Thermal Transfer System

5000cc sampled into a Carbotrap® 300 tube, desorbed with 500cc into a Bottle-Vac, with 20cc extracted, preconcentrated, and analyzed with Entech 7000 series Preconcentrator. The GC profile is nearly identical to that obtained by drawing the original 5 PPB TO-15 standard directly into the analyzer. (For full details, contact Entech or your authorized Distributor.)



5000cc of ambient air collected on a Carbotrap® 300 tube, desorbed with 500cc UHP nitrogen, from which 200cc were analyzed as before. The larger than normal sample loading can ultimately lead to lower detection limits and increased dynamic range.



Analyzing Volatiles in Human Breath

Chemicals in the blood will equilibrate with inhaled air in a similar fashion to that of O₂ and CO₂. Concentrations in breath can be correlated to blood concentrations, making breath analysis an ideal means for simple screening applications. The non-invasive sampling process makes breath collection inherently safe and easy allowing field collection of samples by non-clinical personnel. The following uses for breath analysis have been demonstrated:

- **Analysis of Exogenous Chemicals**
to determine extent of exposure in occupational monitoring.
- **Endogenous Products of Metabolism**
Analysis utilized to screen for various diseases.
- **Analysis of Volatile Drugs of Abuse**
or their metabolic breakdown products.

Monitoring Metabolic Breakdown Products for Clinical Diagnosis

Analysis of volatile chemicals in breath can be a powerful tool for clinical diagnosis. The relative concentration of “chemical markers” in breath can be used to diagnose several diseases in their earliest and most treatable stages. Many tests are also currently performed using isotopically labeled (¹³C) fats or carbohydrates to determine whether the expected concentration of the isotopes show up in metabolites, including CO₂. Some of the markers and their corresponding disease or conditions are as follows:

- **High Acetone**
Indicates poorly regulated glucose levels caused by uncontrolled diabetes.
- **High Pentane**
Increased oxygen free-radicals in damaged cells. Elevated in patients with acute myocardial infarction, arthritis or multiple sclerosis. Also elevated in schizophrenic patients.
- **Acetone, MEK, n-Propanol, Tolualdehyde and Oxepanone**
Elevated in patients with lung cancer.
- **High Ethane**
May indicate deficiency in vitamin E or trace metals such as Selenium and Copper.
- **¹³CO₂**
Produced after ingesting ¹³C labeled urea when peptic ulcer causing Helicobacter pylori bacteria are present.

Low production after ¹³C labeled Triglyceride ingestion indicates pancreatic disorders.

Low production after labeled galactose injection indicates liver damage (cirrhosis, hepatitis).

Exposure Monitoring – Breath Analysis

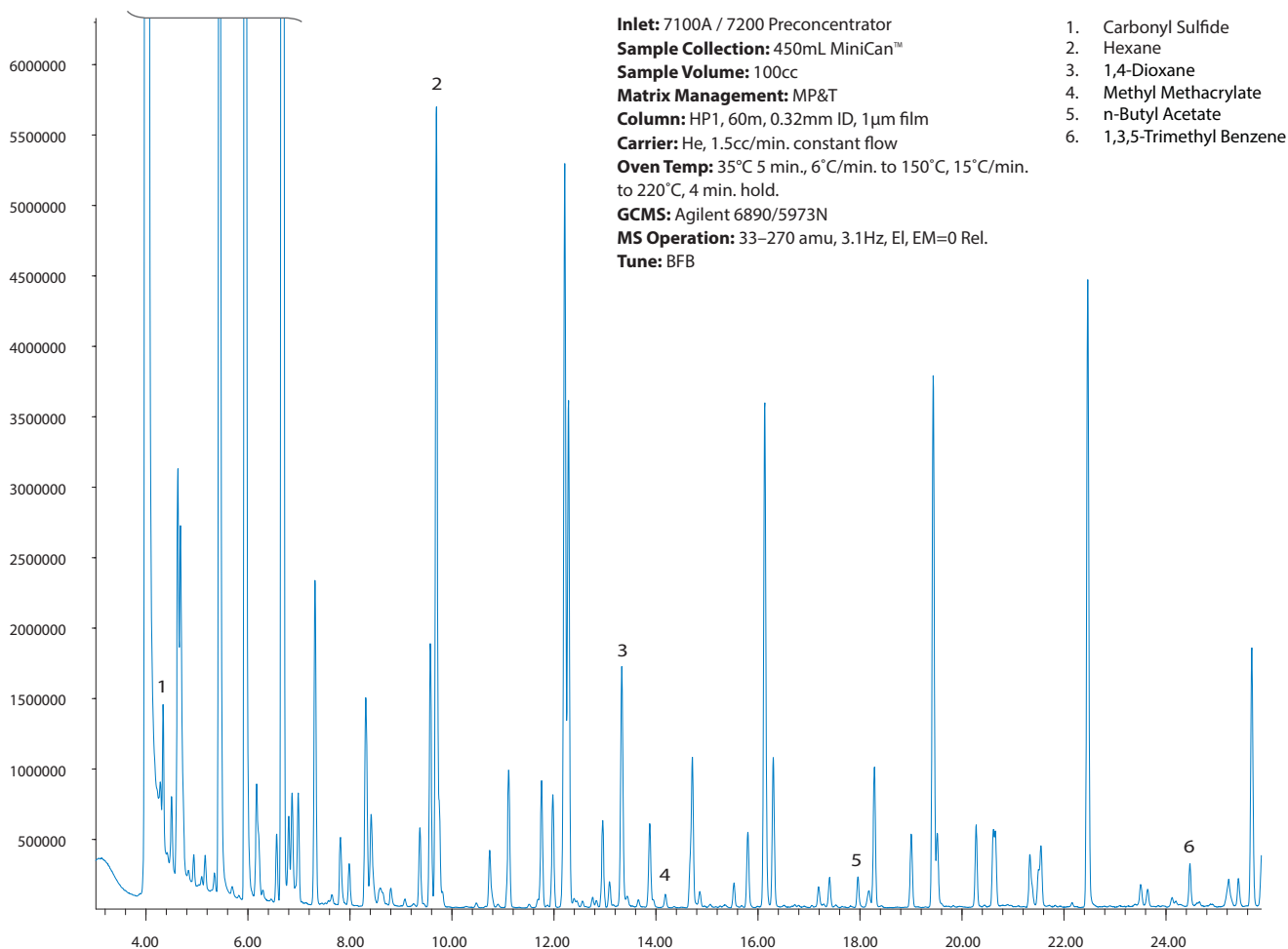
Breath samples were collected before and after exposure to 0.05 to 0.20 PPM level compounds during an eight hour work day. Compounds were clearly visible in the breath after the eight hour shift. Other compounds present are derived from both exogenous and endogenous sources. Exposure levels were 10 to 100 times below current OSHA PELs for each compound.

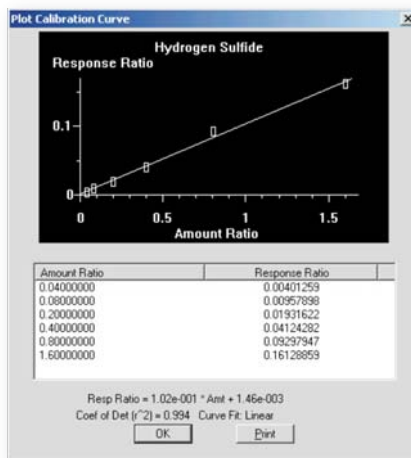
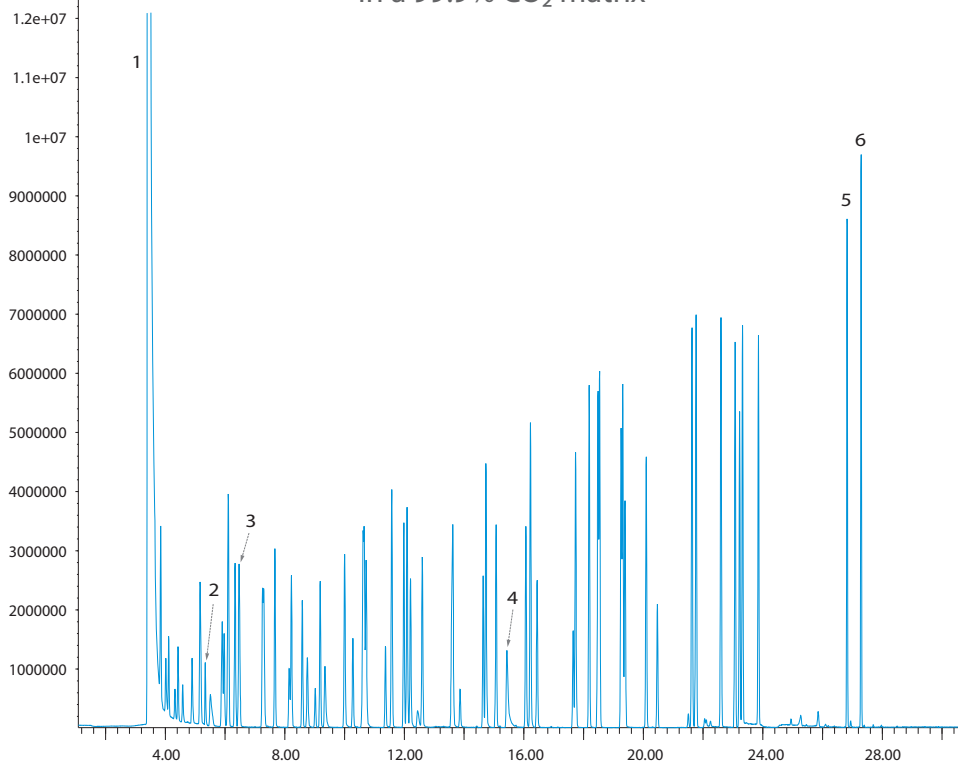
Higher concentration exposures may produce levels that can be monitored for several days after exposure. This technique does not require any prior planning, making it ideal for unexpected exposure episodes (Emergency Response). It also does not assume exposure through inhalation, treating respirative and dermal exposures equally. Monitoring of more unique compounds may have forensic applications, such as detection of the volatiles found in illegal drug manufacturing labs.



Human Breath Sampling into Bottle-Vacs™

Human Breath Analysis (After 8 Hour Exposure Study)



Reduced Sulfurs and VOCs in a CO₂ MatrixTO-15 and Sulfur Standard / 68 Compound, 20 PPB
in a 99.9% CO₂ matrix

The use of GCMS for purity is both quantitative and qualitative. The calibration curve for H₂S is shown here.

Inlet: 7100A / 7200 Preconcentrator

Sample Size: 100cc

Matrix Management: ECTD

Column: HP1, 60m, 0.32mm ID, 1 μm film

Carrier: He, 1.5cc/min. constant flow

Oven Temp: 35°C 5 min., 6°C/min. to 150°C, 15°C/min. to 220°C, 4 min. hold.

GCMS: Agilent 6890/5973N

MS Operation: 34–270 amu, 3.1Hz, EI, EM=0 Rel.

Tune: BFB

Compounds:

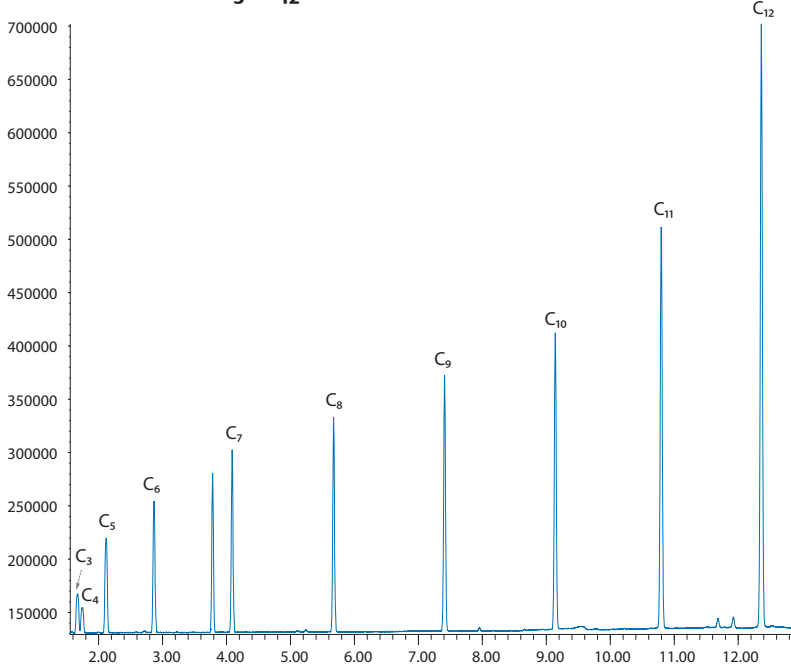
TO-14, TO-15, and Carbonyl Standards, H₂S, and Mercaptans

1. CO₂
2. Acetone
3. Carbon Disulfide
4. 2-Hexanone
5. 1,2,4-Trichlorobenzene
6. Hexachlorobutadiene

Please contact Entech and request App Note 202 for complete details on this application.

C₃-C₁₂ Hydrocarbon Analysis

C₃-C₁₂ Normal Alkanes

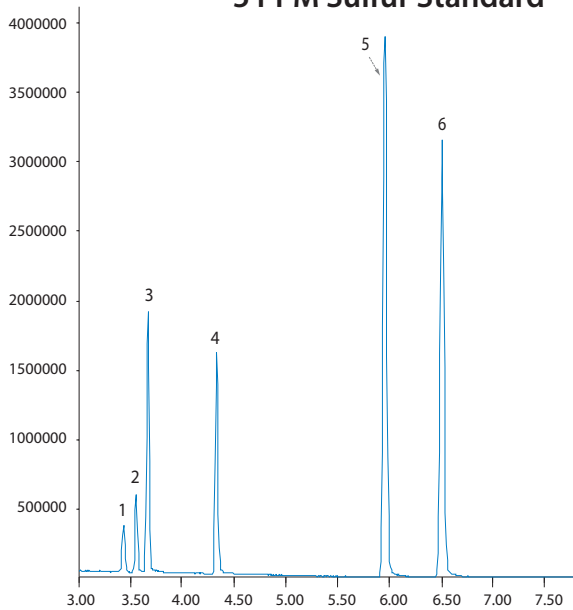


Inlet: 7650-L10
Sample Size: 0.5cc
Concentration: 1 ppmv
Split Mode: No Split
Column: HP1, 60m, 0.32mm ID, 1µm film
Carrier: He, 10cc/min. constant flow
Oven Temp: 40°C 1 min., 20°C/min. to 200°C, 0 min. hold.
GCMS: Agilent 6890
Detector: FID

Note: Standard introduced into evacuated Silonite® canister without "flow-thru" equilibration. Virtually no loss of C₁₀-C₁₂ to canister walls was observed.

Sulfur in Refinery Gas

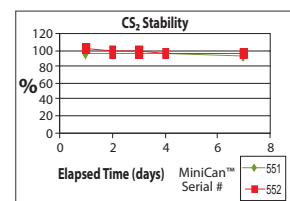
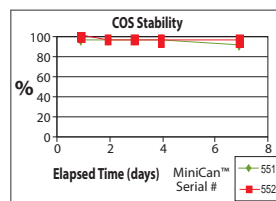
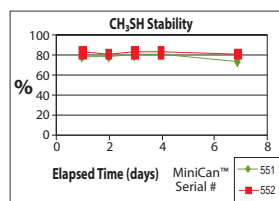
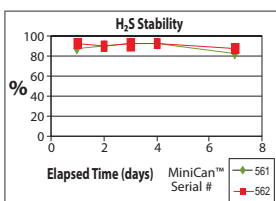
5 PPM Sulfur Standard



Inlet: 7032A-L
Sample Size: 1.0cc
7032A-L Split Ratio: 10:1
Column: HP1, 60m, 0.32mm ID, 1µm film
Carrier: He, 1.5cc/min. constant flow
Oven Temp: 35°C 9 min., Isothermal
GCMS: Agilent 5973
MS Operation: 33-270 amu, 3.1Hz, EI, EM=0 Rel.
Tune: BFB

1. CO₂
2. Hydrogen Sulfide
3. Carbonyl Sulfide
4. Methyl Mercaptan
5. Dimethyl Sulfide
6. Carbon Disulfide

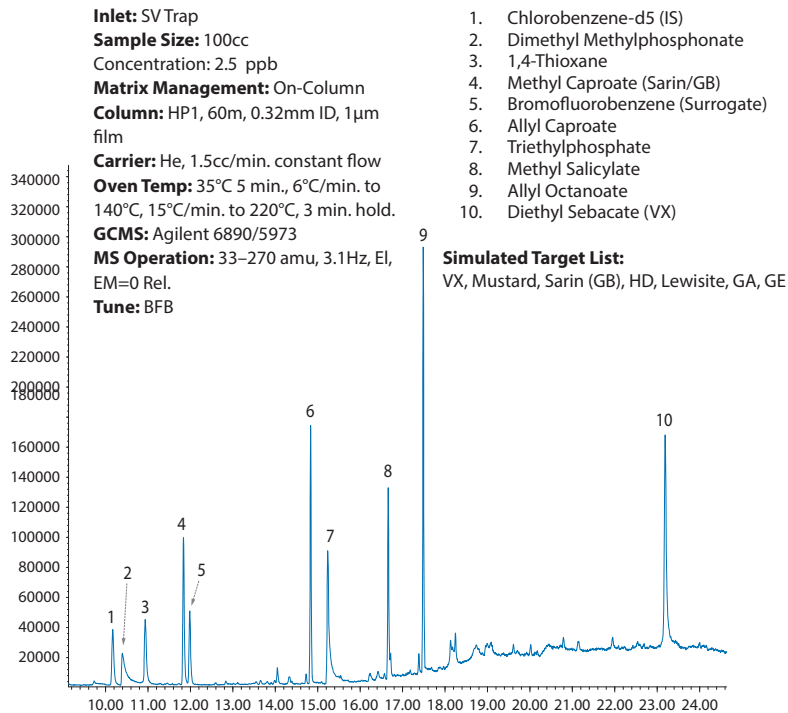
5 PPM, 7 Day Stability Study





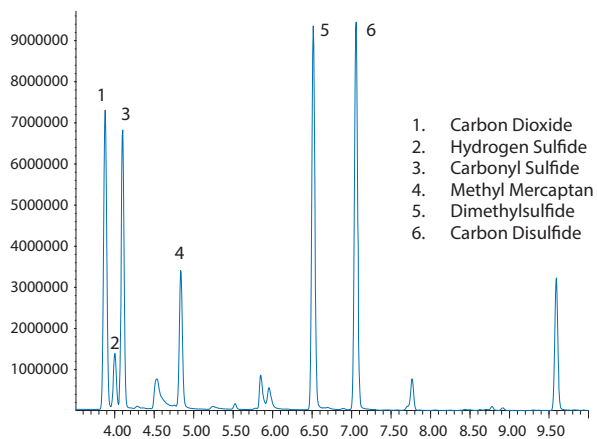
Chemical Warfare Agents

Chemical Warfare Agents | Surrogates Analysis

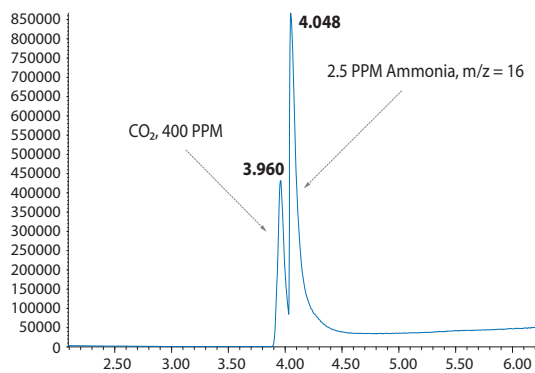


Toxic Industrial Compounds

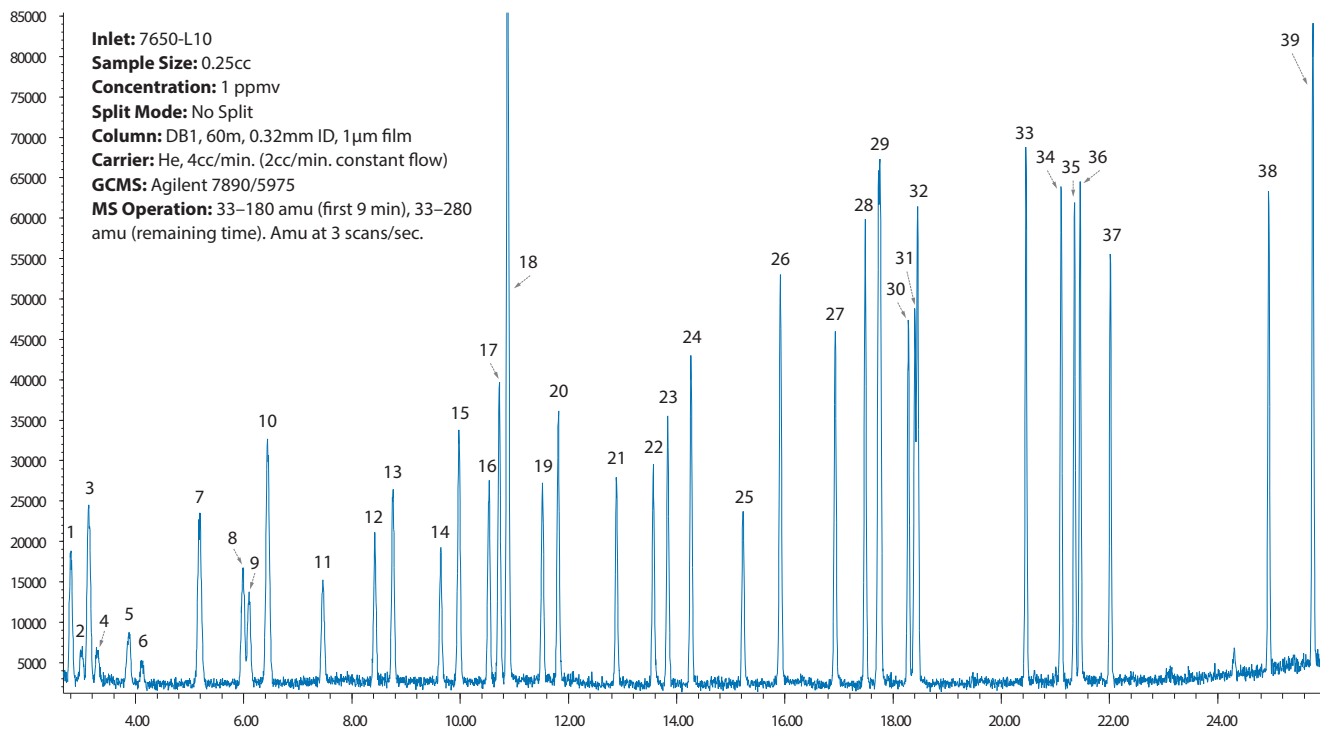
Reduced Sulfur Std | 5 PPB, 100cc,
 Extended Cold Trap Dehydration



2.5 PPM Ammonia in air | 10cc,
 Direct LN₂ Focus Method



39 Component, TO-14 Standard | 1 PPM, 0.25cc Loop Injection

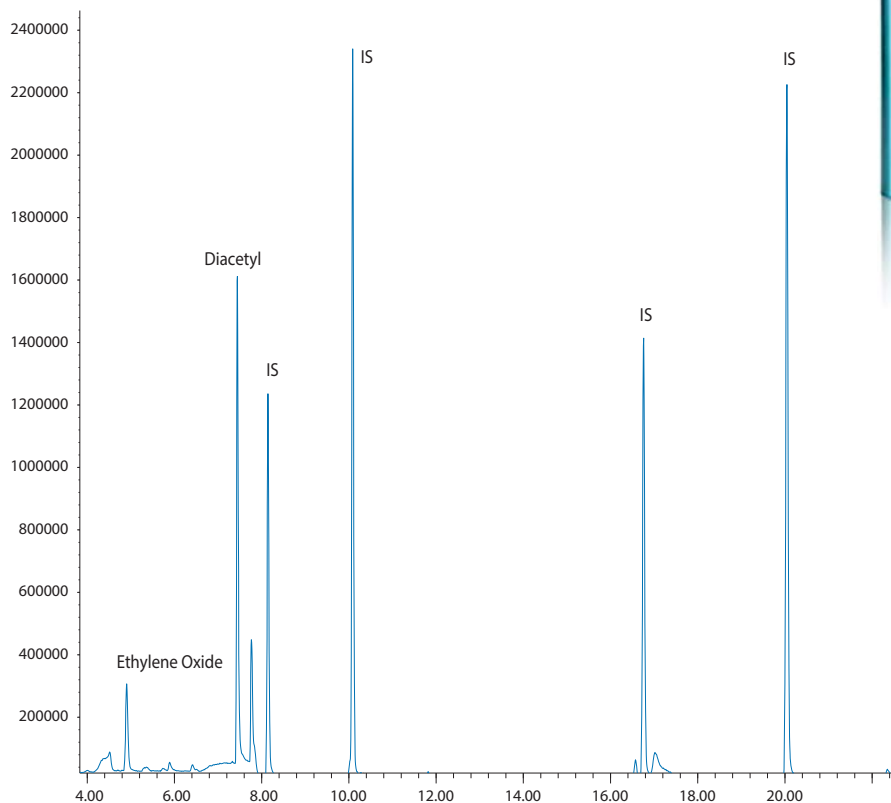


- | | | | |
|------------------------------|----------------------------|-------------------------------|-----------------------------|
| 1. Dichlorodifluoromethane | 11. 1,1-Dichloroethane | 21. cis-1,3-Dichloropropene | 31. 1,1,2-Tetrachloroethane |
| 2. Chloromethane | 12. cis-1,2-Dichloroethene | 22. trans-1,3-Dichloropropene | 32. o-Xylene |
| 3. Dichlorotetrafluoroethane | 13. Chloroform | 23. 1,1,2-Trichloroethane | 33. 1,3,5-Trimethylbenzene |
| 4. Vinyl chloride | 14. 1,1,1-Trichloroethane | 24. Toluene | 34. 1,2,4-Trimethylbenzene |
| 5. Bromomethane | 15. 1,2-Dichloroethane | 25. 1,2-Dibromoethane | 35. 1,3-Dichlorobenzene |
| 6. Chloroethane | 16. Benzene | 26. Tetrachloroethylene | 36. 1,4-Dichlorobenzene |
| 7. Trichlorofluoromethane | 17. Carbon tetrachloride | 27. Chlorobenzene | 37. 1,2-Dichlorobenzene |
| 8. 1,1-Dichloroethene | 18. Fluorobenzene (IS) | 28. Ethylbenzene | 38. 1,2,4-Trichlorobenzene |
| 9. Trichlorofluoromethane | 19. 1,2-Dichloropropane | 29. m,p-Xylene | 39. Hexachlorobutadiene |
| 10. Methylene chloride | 20. Trichloroethylene | 30. Styrene | |



HDS™ Personal Monitoring

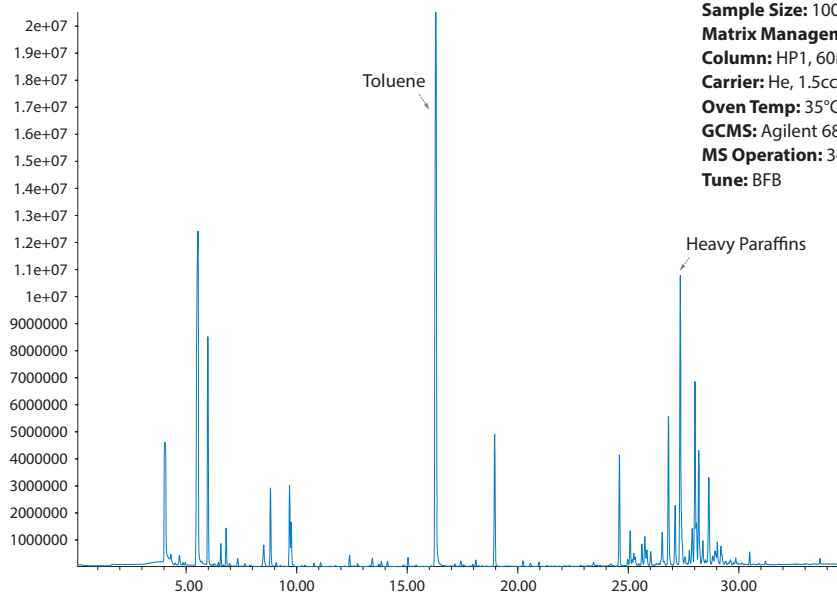
Ethylene Oxide / Diacetyl HDS™ Analysis



Inlet: 7100A / 7200
Sample Size: 10cc
Concentration: 1 ppmv
Concentration Procedure: 3-Stage Trap
Column: DB1, 60m, 0.32mm ID, 1µm film
Oven Start Temp: 35°C
GCMS: Agilent 5975C
MS Operation: Full Scan
Tune: BFB

Volatiles in Food Packaging

Cheese Wrapping Analysis



Inlet: 7100A / 7200 Preconcentrator
Sample Size: 100cc
Matrix Management: MP&T
Column: HP1, 60m, 0.32mm ID, 1µm film
Carrier: He, 1.5cc/min. constant flow
Oven Temp: 35°C 5 min., 6°C/min. to 150°C, 15°C/min. to 220°C, 4 min. hold.
GCMS: Agilent 6890/5973N
MS Operation: 34–270 amu, 3.1Hz, EI, EM=0 Rel.
Tune: BFB

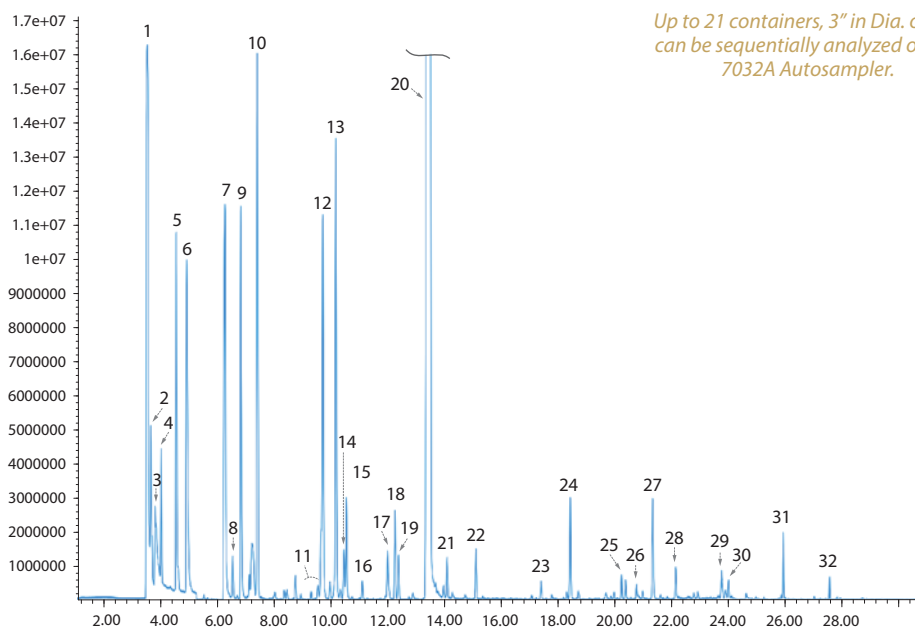
Volatile Compounds from Can Coatings



Can Gas Sampler attaches to any size can for sampling interior volume.
PN 30-20160QT



Can Coatings Analysis



Up to 21 containers, 3" in Dia. or less can be sequentially analyzed on the 7032A Autosampler.

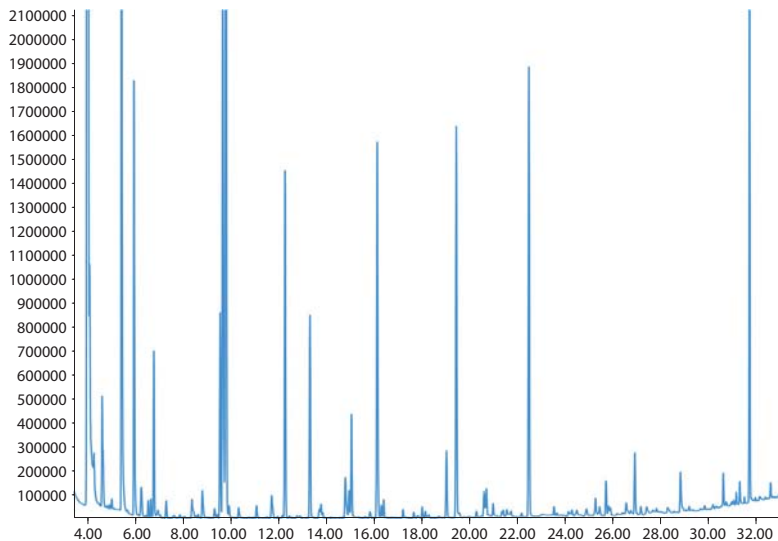
Inlet: 7100A / 7200 Preconcentrator
Sample Size: 150cc
Matrix Management: MP&T, M1-GB, M2-Tenax®
Column: HP1, 60m, 0.32mm ID, 1µm film
Carrier: He, 1.5cc/min. constant flow
Oven Temp: 35°C 5 min., 6°C/min. to 150°C, 15°C/min. to 220°C, 4 min. hold.
GCMS: Agilent 6890/5973N
MS Operation: 34-270 amu, 3.1Hz, EI, EM=0 Rel.
Tune: BFB

- | | |
|---------------------|----------------------|
| 1. CO ₂ | 17. Isobutyl Alcohol |
| 2. Propane/ Propene | 18. IS 2 |
| 3. Formaldehyde | 19. 2-Ethylacrolein |
| 4. Isobutene | 20. 1-Butanol |
| 5. Acetaldehyde | 21. Butyl Formate |
| 6. Methanol | 22. Toluene |
| 7. Ethanol | 23. Hexanal |
| 8. Propanal | 24. IS 3 |
| 9. Acetone | 25. 3-Heptanone |
| 10. Surrogate | 26. Heptanal |
| 11. Cyclohexane | 27. Surrogate 1 |
| 12. Butanal | 28. 2-Ethylhexanal |
| 13. 2-Butanone | 29. Octanal |
| 14. IS 1 | 30. Column Artifact |
| 15. Heptane | 31. Nonanal |
| 16. Benzene | 32. Decanal |

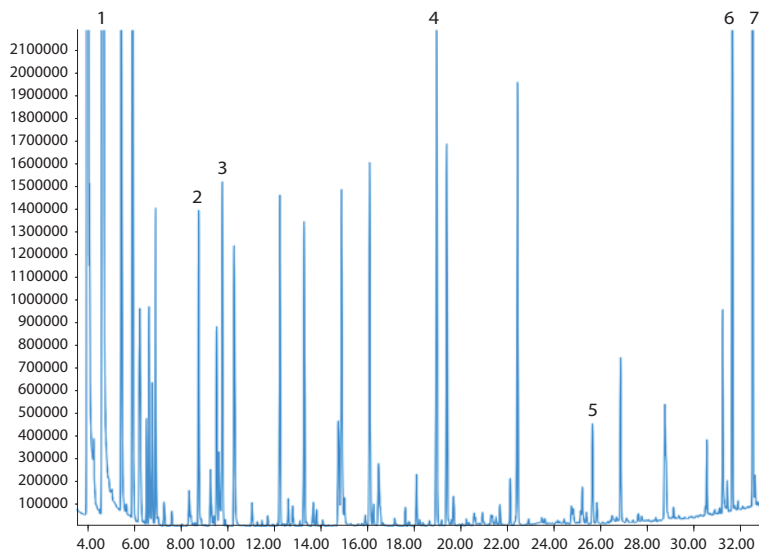
Analysis of Chemical Markers in Foods and Ingredients



Fresh Tomato



Spoiled Tomato



Inlet: 7100A / 7200 Preconcentrator
Sample Size: 100cc
Matrix Management: MP&T, M1-GB, M2-Tenax®
Column: HP1, 60m, 0.32mm ID, 1µm film
Carrier: He, 1.5cc/min. constant flow
Oven Temp: 35°C 5 min., 6°C/min. to 150°C, 15°C/min. to 220°C, 4 min. hold.
GCMS: Agilent 6890/5973N
MS Operation: 34-270 amu, 3.1Hz, EI, EM=0 Rel.
Tune: BFB

- 1. Ethanol
- 2. Ethyl Acetate
- 3. 2-Methyl Furan
- 4. Limonene
- 5. Nonanal
- 6. Decanal
- 7. Dimethyl-HexahydroNaphthalene

Fresh **vs** Spoiled Tomatoes

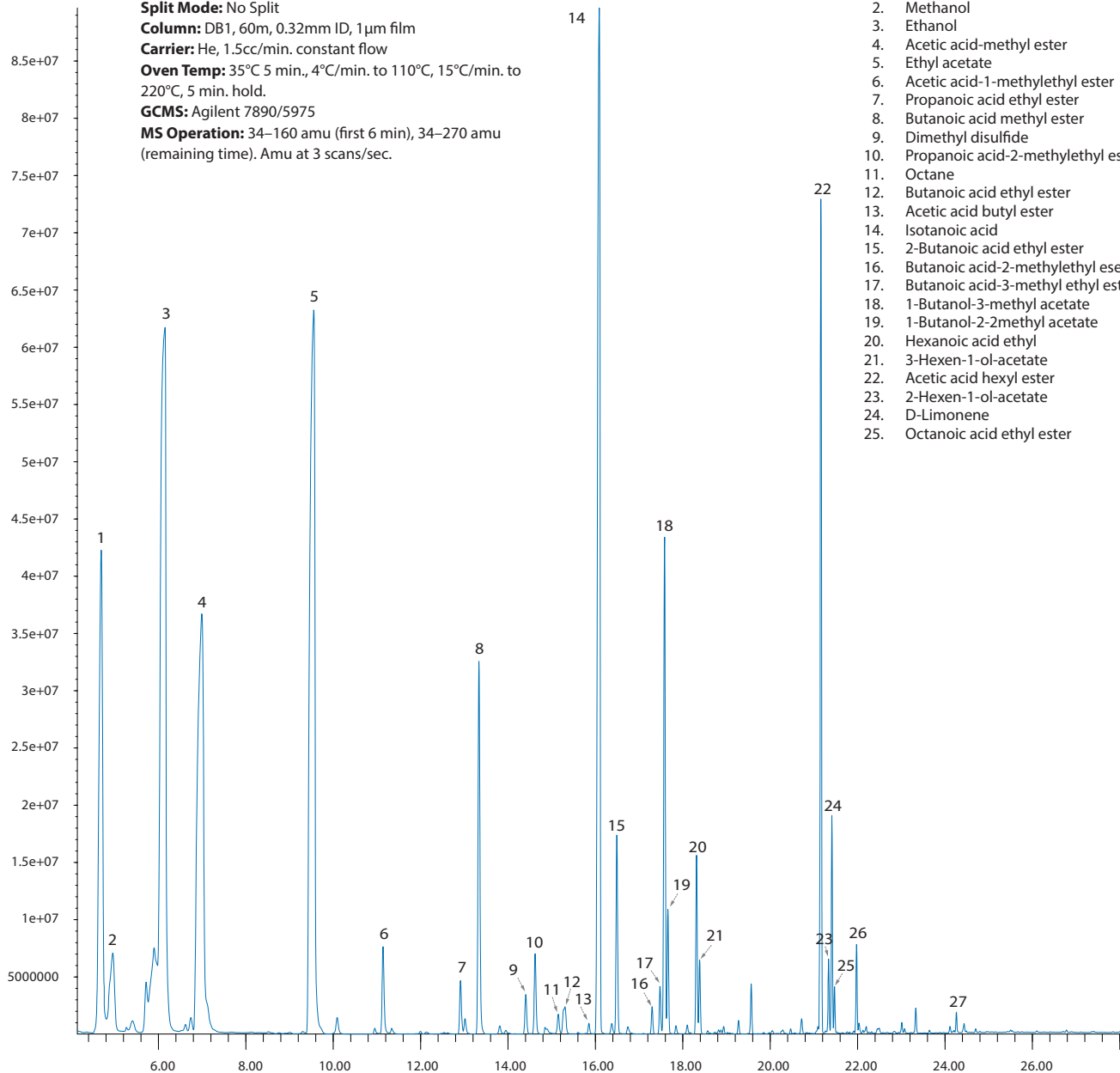
Area Counts (x10⁶)

	Fresh	Spoiled	S/F Ratio
Ethyl Acetate	74	12	0.2
Nonanal	5.5	25	4.5
Decanal	2	23	11.5
Ethanol	84	85	1.0
Limonene	8	21	2.6
Demethyl-Hexa-HydroNaphthalene	0.2	248	1240.0
2-Methyl Furan	157	43	0.3
DHNN/2-MF	0.001	5.8	4527.4



Strawberries Analysis (On-Column Extraction)

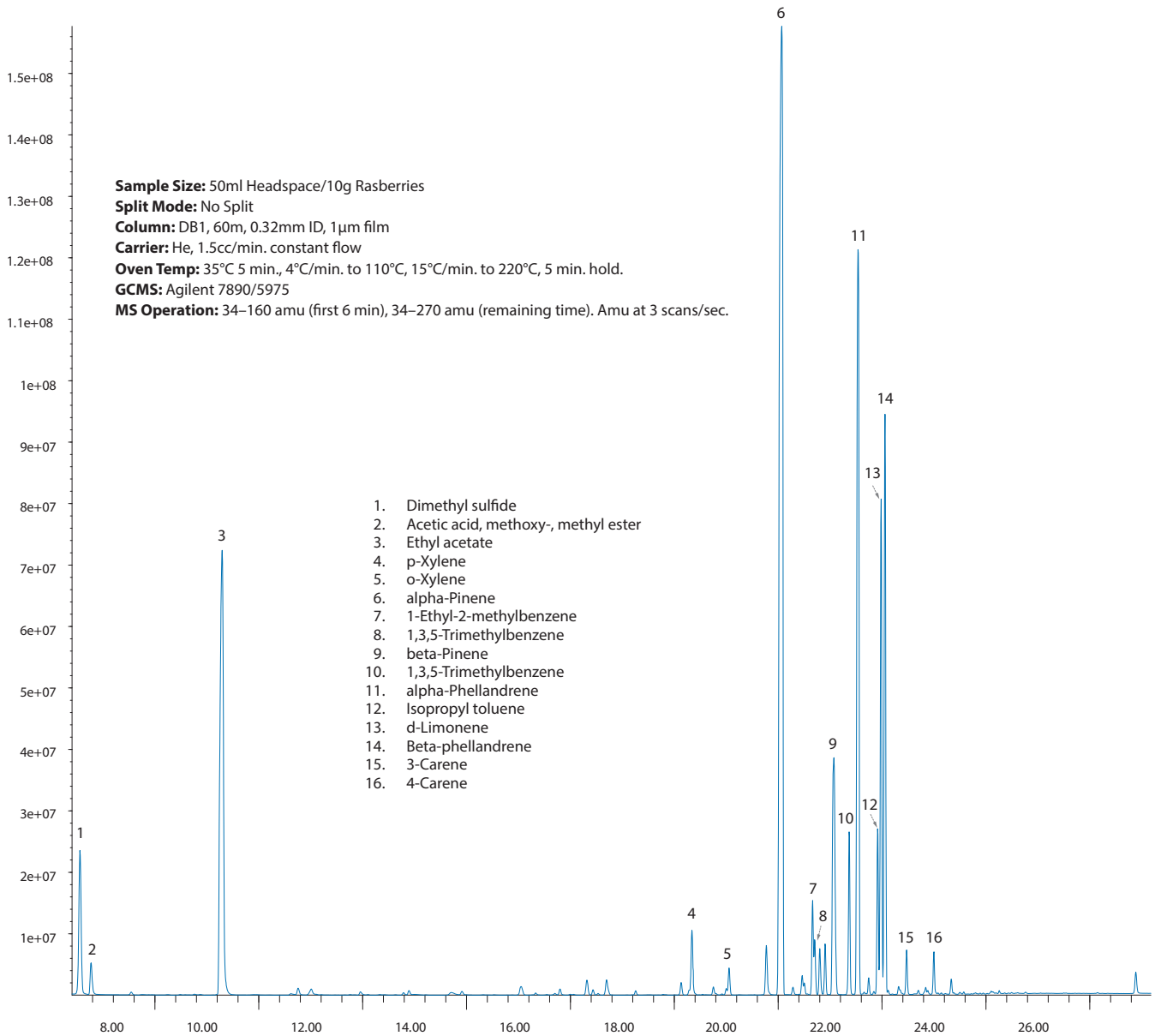
Sample Size: 50ml Headspace/10g Fresh Strawberries
Split Mode: No Split
Column: DB1, 60m, 0.32mm ID, 1µm film
Carrier: He, 1.5cc/min. constant flow
Oven Temp: 35°C 5 min., 4°C/min. to 110°C, 15°C/min. to 220°C, 5 min. hold.
GCMS: Agilent 7890/5975
MS Operation: 34–160 amu (first 6 min), 34–270 amu (remaining time). Amu at 3 scans/sec.



Raspberries Analysis



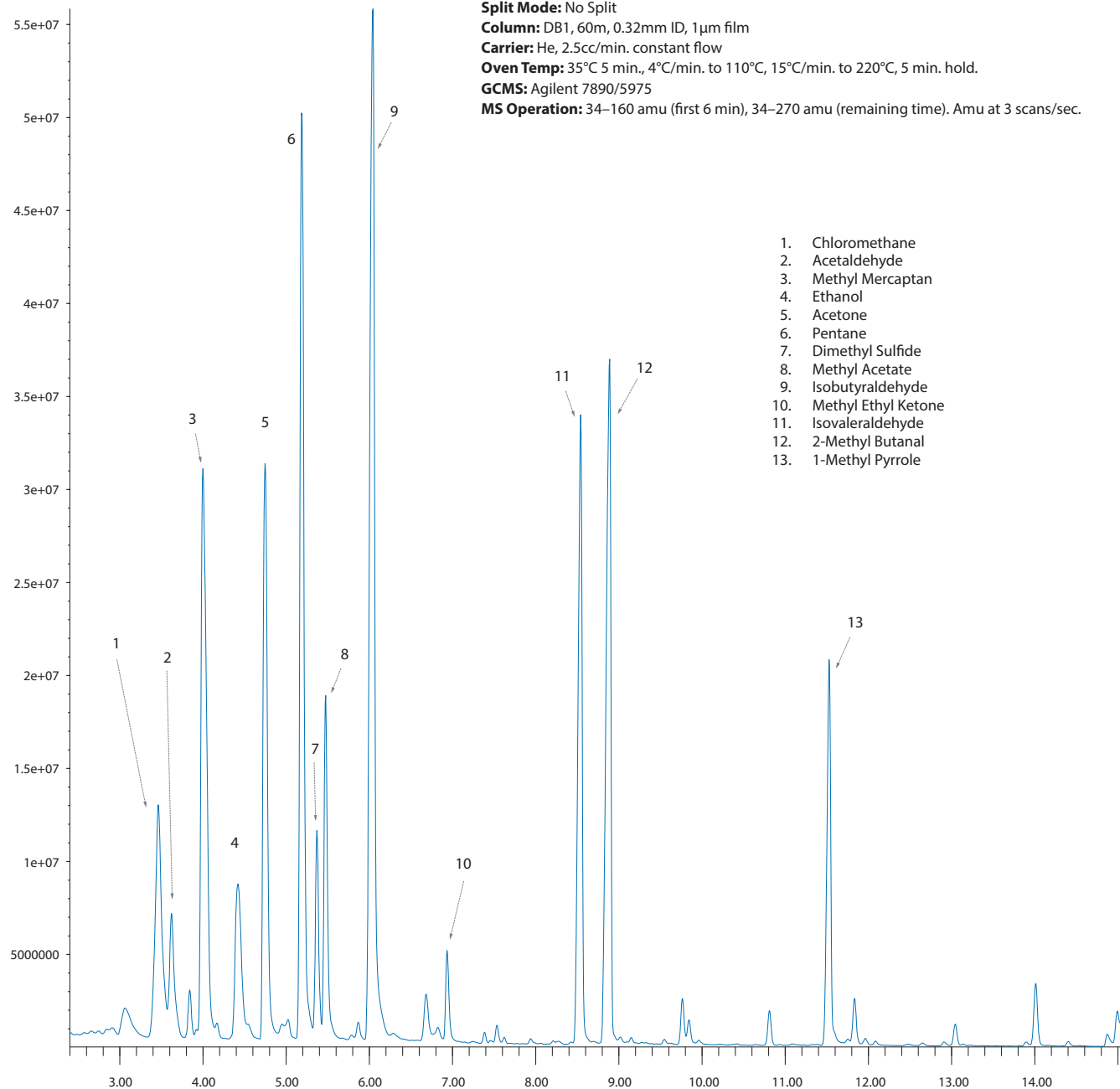
Raspberries Analysis (On-Column Extraction)





Peanuts Analysis (On-Column Extraction)

Sample Size: 250ml Headspace/50g Peanuts
Split Mode: No Split
Column: DB1, 60m, 0.32mm ID, 1µm film
Carrier: He, 2.5cc/min. constant flow
Oven Temp: 35°C 5 min., 4°C/min. to 110°C, 15°C/min. to 220°C, 5 min. hold.
GCMS: Agilent 7890/5975
MS Operation: 34–160 amu (first 6 min), 34–270 amu (remaining time). Amu at 3 scans/sec.

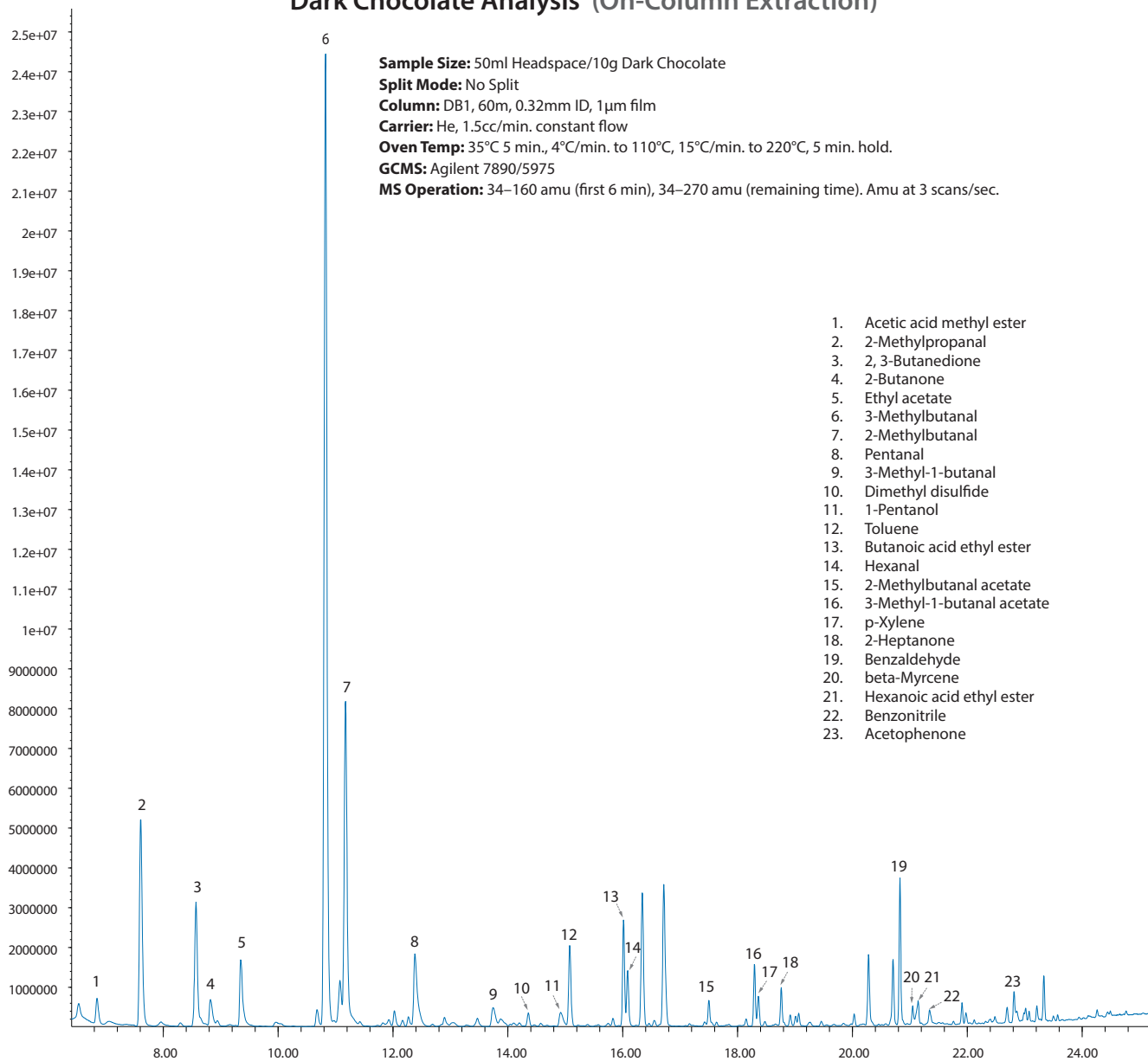


1. Chloromethane
2. Acetaldehyde
3. Methyl Mercaptan
4. Ethanol
5. Acetone
6. Pentane
7. Dimethyl Sulfide
8. Methyl Acetate
9. Isobutyraldehyde
10. Methyl Ethyl Ketone
11. Isovaleraldehyde
12. 2-Methyl Butanal
13. 1-Methyl Pyrrole

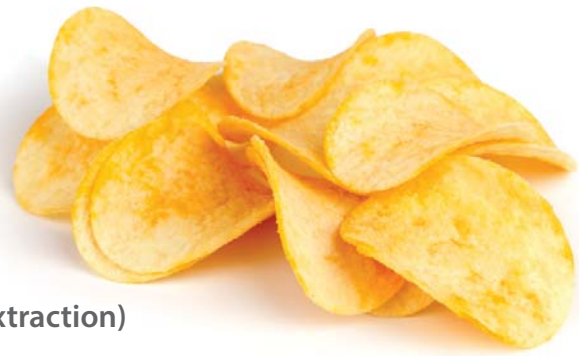
Dark Chocolate Analysis



Dark Chocolate Analysis (On-Column Extraction)



1. Acetic acid methyl ester
2. 2-Methylpropanal
3. 2, 3-Butanedione
4. 2-Butanone
5. Ethyl acetate
6. 3-Methylbutanal
7. 2-Methylbutanal
8. Pentanal
9. 3-Methyl-1-butanal
10. Dimethyl disulfide
11. 1-Pentanol
12. Toluene
13. Butanoic acid ethyl ester
14. Hexanal
15. 2-Methylbutanal acetate
16. 3-Methyl-1-butanal acetate
17. p-Xylene
18. 2-Heptanone
19. Benzaldehyde
20. beta-Myrcene
21. Hexanoic acid ethyl ester
22. Benzonitrile
23. Acetophenone



Potato Chips Analysis (On-Column Extraction)

Sample Size: 250ml Headspace/50g Potato Chips

Split Mode: No Split

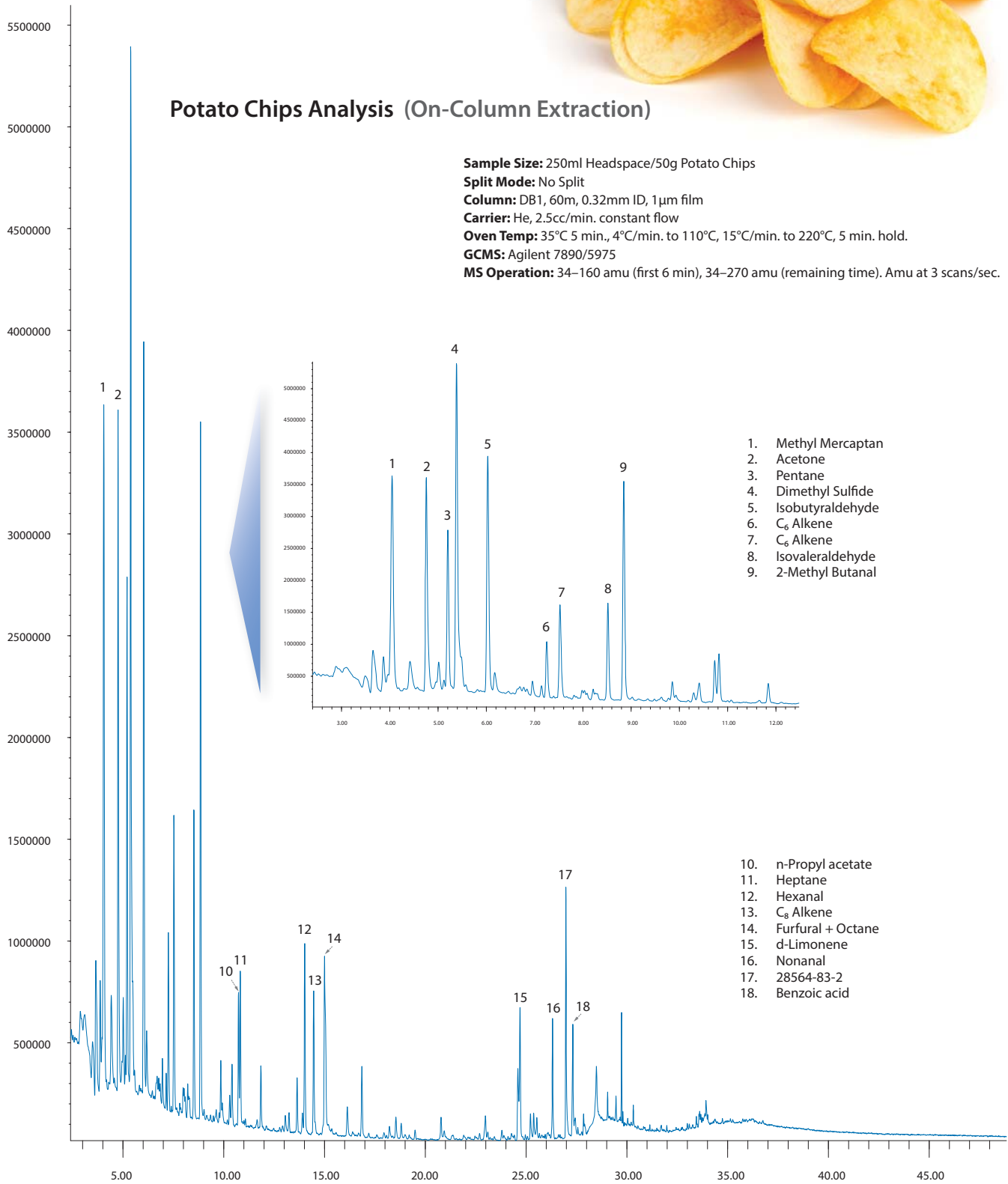
Column: DB1, 60m, 0.32mm ID, 1µm film

Carrier: He, 2.5cc/min. constant flow

Oven Temp: 35°C 5 min., 4°C/min. to 110°C, 15°C/min. to 220°C, 5 min. hold.

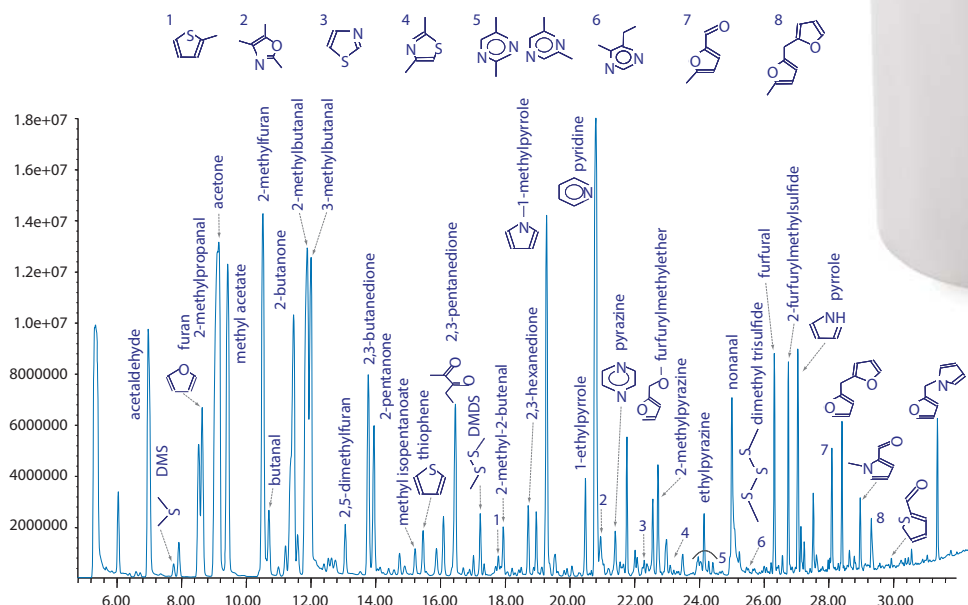
GCMS: Agilent 7890/5975

MS Operation: 34–160 amu (first 6 min), 34–270 amu (remaining time). Amu at 3 scans/sec.



Coffee Aroma Analysis

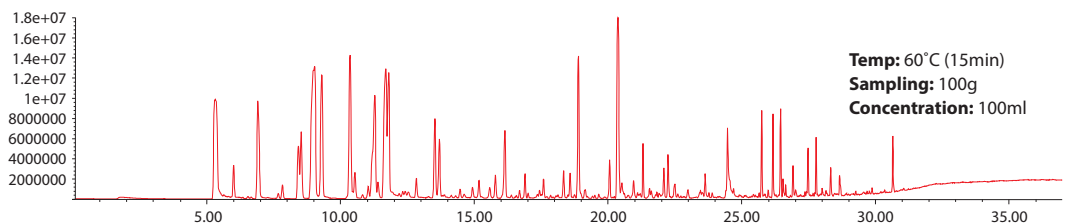
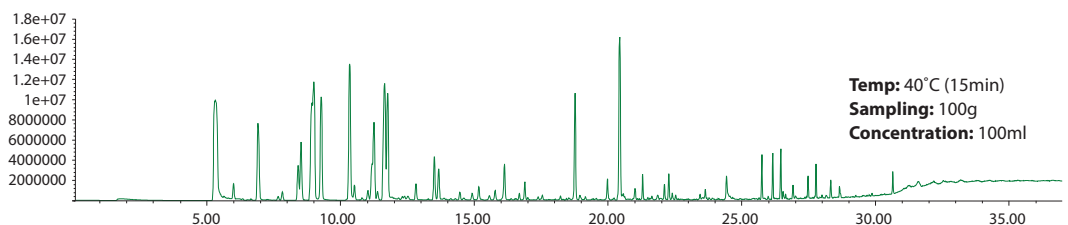
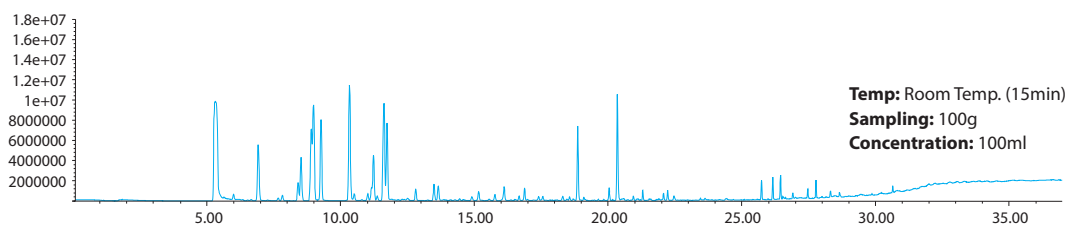
Flavor Analysis in Coffee (LVSH)



Sampling: 7100A/7200 LVSH (500ml jar) **Sample Size:** 100ml **Preconcentration:** MPT **Temp:** 60°C **MS Scan Range:** m/z 29–300 **GC Column:** HP-wax (60m length, 0.25mm I.d., 0.5m thickness) **GC Oven:** 40 (5 min) - 5/min - 100 - 10/min - 250 (hold)

Flavor Analysis in Coffee (LVSH)

at RT, 40°C, 60°C (7100A/7200)

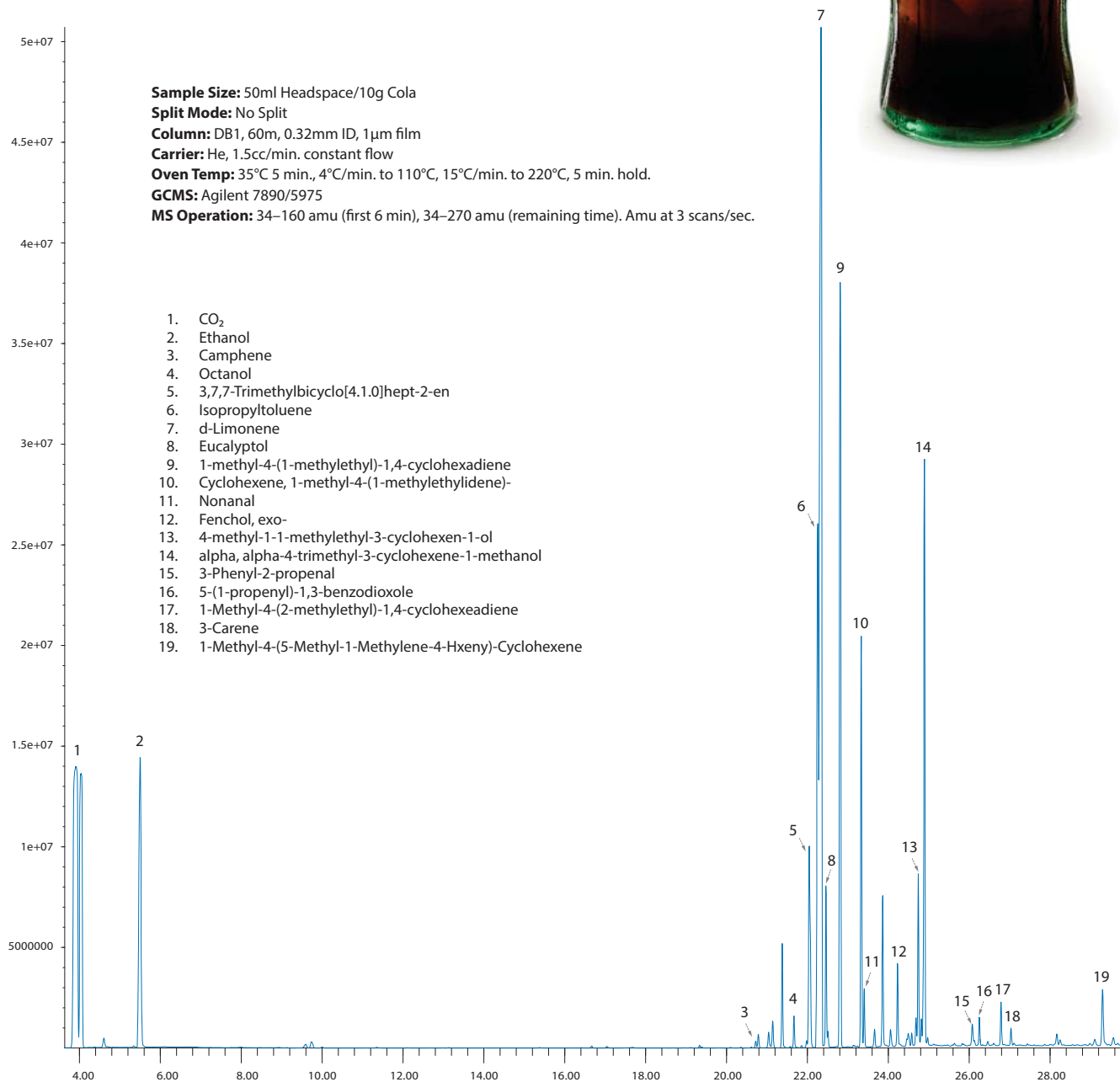


7100A / 7200 analysis of brewed coffee at three different temperatures by LVSH using a 15 minute preheat. Recovery of heavier volatiles increased with an increase in the sample temperature.



Cola Beverage Analysis (On-Column Extraction)

Sample Size: 50ml Headspace/10g Cola
Split Mode: No Split
Column: DB1, 60m, 0.32mm ID, 1µm film
Carrier: He, 1.5cc/min. constant flow
Oven Temp: 35°C 5 min., 4°C/min. to 110°C, 15°C/min. to 220°C, 5 min. hold.
GCMS: Agilent 7890/5975
MS Operation: 34–160 amu (first 6 min), 34–270 amu (remaining time). Amu at 3 scans/sec.



1. CO₂
2. Ethanol
3. Camphene
4. Octanol
5. 3,7,7-Trimethylbicyclo[4.1.0]hept-2-en
6. Isopropyltoluene
7. d-Limonene
8. Eucalyptol
9. 1-methyl-4-(1-methylethyl)-1,4-cyclohexadiene
10. Cyclohexene, 1-methyl-4-(1-methylethylidene)-
11. Nonanal
12. Fenchol, exo-
13. 4-methyl-1-1-methylethyl-3-cyclohexen-1-ol
14. alpha, alpha-4-trimethyl-3-cyclohexene-1-methanol
15. 3-Phenyl-2-propenal
16. 5-(1-propenyl)-1,3-benzodioxole
17. 1-Methyl-4-(2-methylethyl)-1,4-cyclohexadiene
18. 3-Carene
19. 1-Methyl-4-(5-Methyl-1-Methylene-4-Hxeny)-Cyclohexene

Alcoholic Beverage Analysis

A preconcentration technique with the On-Column Multi-Trapping System (OCMTS) offers a much more quantitative approach than Solid Phase Microextraction (SPME). A volume of 10–1000cc of headspace is actively pulled through a column containing a typical SPME coating of PDMS (Polydimethylsiloxane) providing hundreds of theoretical plates for compound extraction, rather than the single plate offered by classical “diffusive” SPME. This permits quantitative extraction of headspace compounds while removing the effects of high concentrations of alcohol in the headspace.

The initial on-column extraction stage, uses a thinner absorptive film than diffusive SPME to minimize carryover and allow much faster injection rates. Compounds too light to be quantitatively retained on the on-column extraction stage are captured on a cold Tenax® trap. A unique flow path design is used to eliminate exposure to plastic rotors while reducing the size of the flow path to minimize losses. Dry purging of the Tenax® trap removes most of the ethanol prior to thermal desorption back through the on-column extraction stage, with refocusing on the head of the column before final delivery to the GCMS. This process greatly improves the chromatographic performance for compounds eluting near ethanol while preventing over-pressurization of the MS and premature aging of the filament or electron multiplier.

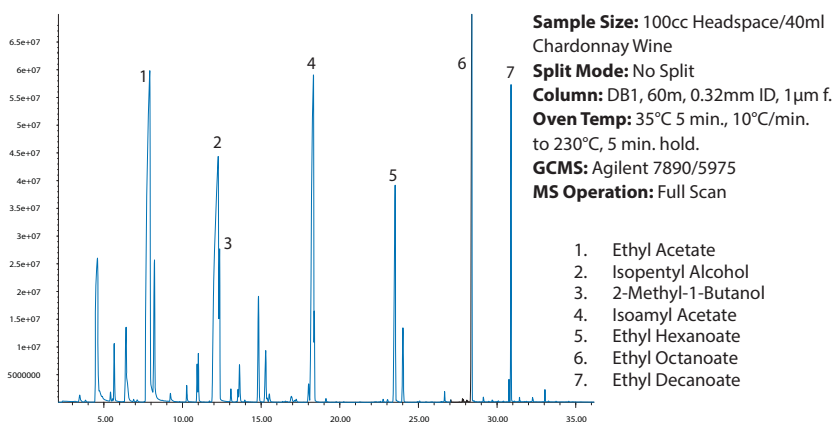
The ability to precisely control the volume of headspace analyzed while taking full advantage of both on-column extraction and volatiles recovery with a mild Tenax® adsorbent allows the measurement of very light volatiles to much heavier, thermally labile semi-volatiles. This technique ensures quantitative recovery of all headspace compounds with true characterization of the headspace for all aroma and off-flavor compounds.

Features

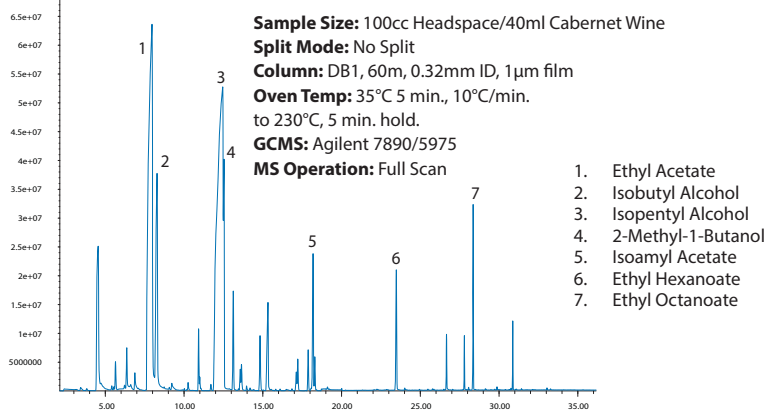
- **Headspace Analysis**
Pulls headspace of 10–1000cc.
- **Quantitative Accuracy**
Light volatiles and heavier compounds are captured using a mild Tenax® trap.
- **Ultra-clean Flow Path**
Flow path eliminates exposure to plastic rotors.
- **On-Column Extraction**
Heavier compounds are never exposed to adsorbent traps.



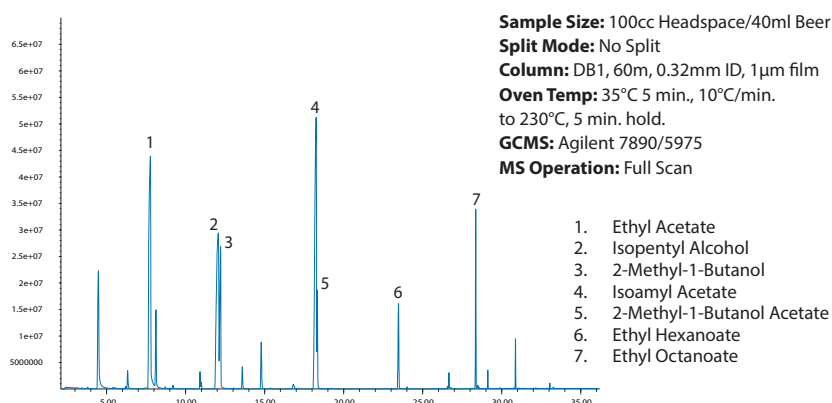
Chardonnay Analysis (On-Column Extraction)



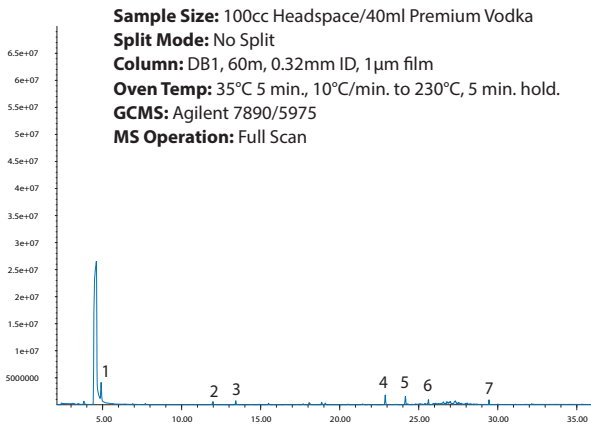
Cabernet Analysis (On-Column Extraction)



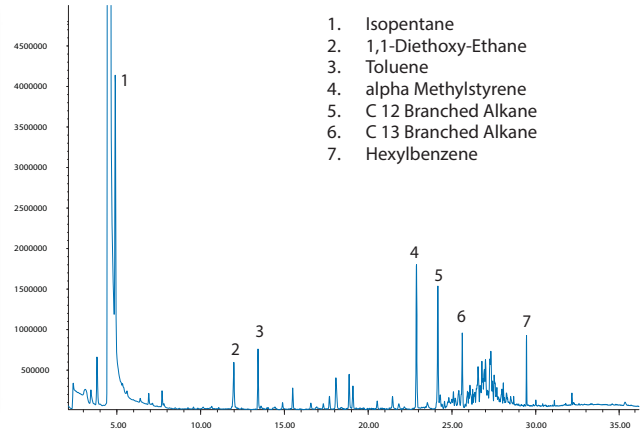
Light Beer Analysis (On-Column Extraction)



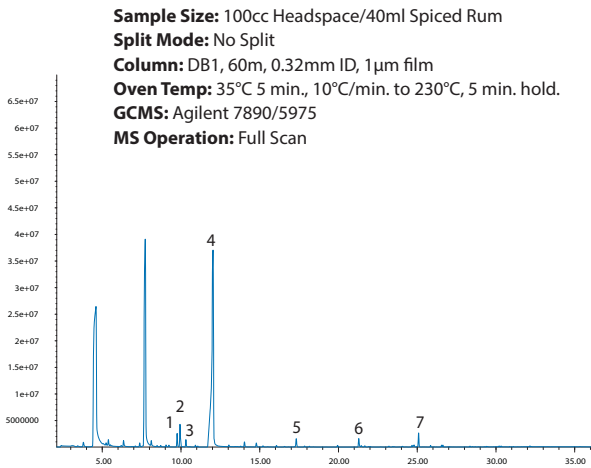
Vodka Analysis (On-Column Extraction)



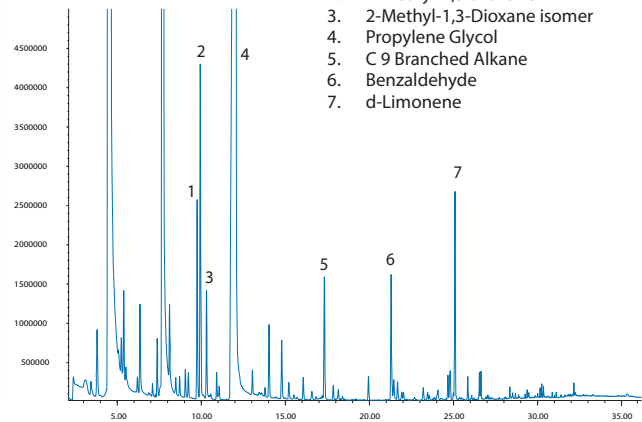
1. Isopentane
2. 1,1-Diethoxy-Ethane
3. Toluene
4. alpha Methylstyrene
5. C 12 Branched Alkane
6. C 13 Branched Alkane
7. Hexylbenzene



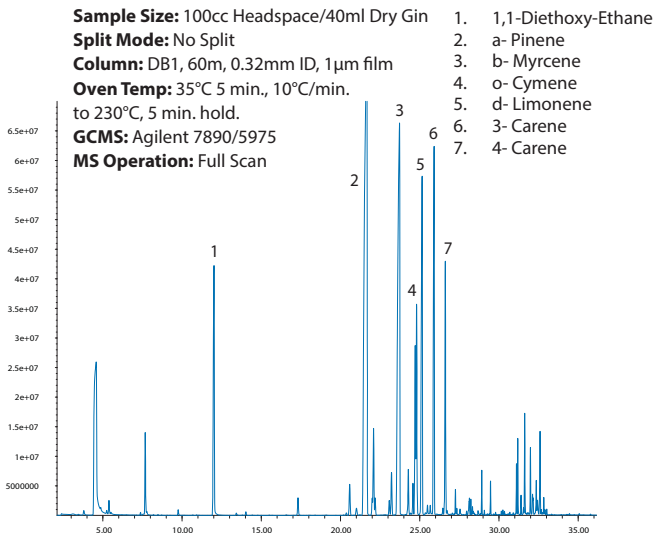
Spiced Rum Analysis (On-Column Extraction)



1. Diethoxymethane
2. 2-Methyl-1,3-Dioxane
3. 2-Methyl-1,3-Dioxane isomer
4. Propylene Glycol
5. C 9 Branched Alkane
6. Benzaldehyde
7. d-Limonene

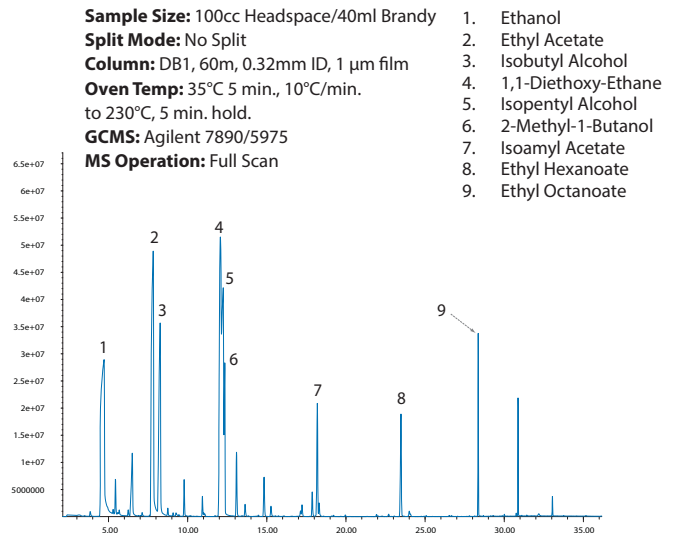


Dry Gin Analysis (On-Column Extraction)



1. 1,1-Diethoxy-Ethane
2. a- Pinene
3. b- Myrcene
4. o- Cymene
5. d- Limonene
6. 3- Carene
7. 4- Carene

Brandy Analysis (On-Column Extraction)



1. Ethanol
2. Ethyl Acetate
3. Isobutyl Alcohol
4. 1,1-Diethoxy-Ethane
5. Isopentyl Alcohol
6. 2-Methyl-1-Butanol
7. Isoamyl Acetate
8. Ethyl Hexanoate
9. Ethyl Octanoate

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