



ENTECH
INSTRUMENTS

See What's Really There™



2022
CATALOG

Solutions for Chemical Monitoring & Analysis

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President's Letter



Entech Instruments is continuing its tradition of providing the most advanced and accurate sample preparations systems available for headspace and gas sample analysis by GC and GCMS. Our new Multi-Capillary Column Trapping Systems (MCCTS) are transforming the way that gas phase sample preconcentration is performed prior to GC injection, all without the use of liquid nitrogen or even electronic cooling systems. These "fan cooled", extremely robust and reliable multi-stage capillary column traps manage water and CO₂ hundreds of times better than any packed trap system. This means much faster release for better chromatography, supporting "faster" GC methods, while also demonstrating far better immunity to contamination when exposed to high concentration

samples. Our MCCTS traps have been implemented in a full cryogen free TO15 solution with much faster GC injections and shorter run times than other TO15 systems on the market. Other applications using this revolutionary capillary trapping technology will also soon be announced.

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Entech's patent pending Sorbent Pen™ technology takes SPME to the next level by providing enhanced sensitivity, improved quantitation, and greater robustness than its fiber-based predecessor. Sorbent Pens utilize a unique flow through cartridge that forms a seal on a vial allowing a vacuum to be created within the vial. This new technique called VASE (Vacuum Assisted Sorbent Extraction) has been demonstrated to cover the entire range of analytes from the lightest volatile compounds (Freon 12/Vinyl Chloride and others) to very heavy 5-6 ring PAH compounds, while remaining in the headspace to avoid actual contact with the sample matrix. With 50-150x higher phase loading and the use of traditional adsorbents with thousands of times more surface area than SPME, the Sorbent Pen™ can fully extract difficult compounds from complex matrices providing superior sensitivity and reproducibility. Sorbent Pens are also available for performing Diffusive and Active air monitoring, making the Sorbent Pen technique extremely versatile. Our newly released SPR40 -Sample Preparation Rail promises to be a game changer for headspace sample preparation and general thermal desorption methods. Rather than desorbing a TD tube into a completely different instrument with separate traps, transfer lines, and rotary valves to have to clean and maintain, the SPR40 allows thermal desorption of Sorbent Pens directly into a GC or GCMS to allow dramatically improved recovery, consistency, and easy of maintenance. Watch for a new wave of applications coming out in 2019-2020 using the SPR40 Robotic inlet.

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.

Finally, for US EPA Method TO-15 and China HJ-759, Entech is proud to be the only supplier that manufacturers and supports the complete solution for sampling and analysis of airborne contaminants using Silonite™ coated stainless steel canisters. Entech has assembled an extraordinary and talented team of Chemists and Service Engineers with 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



Entech Instruments is a leading developer and manufacturer of analytical instrumentation that supports professionals around the world in the Environmental, Industrial Hygiene, Food & Beverage, Product Testing, Forensics, and Clinical Analysis markets.

To provide solutions for such a diverse set of industry applications, 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. We invite you to share your application challenges and requirements so we can create a customized solution just for you.

~ The Entech Team

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.

Large Volume Static Headspace



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.

Vacuum Extraction



Recharging the Headspace



Headspace Sorbent Pens™

Introducing the next generation of Solid-Phase Microextraction (SPME) extraction and analysis. Rather than using a fiber inside of a needle, Sorbent Pens™ use a range of coatings and packings to extend the loading capacity and sampling rate over the Classical SPME sampler, while improving the robustness and speed of desorption. Sorbent Pens™ feature 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 Sorbent Pen™ minimizes matrix interferences, allowing a more reproducible equilibrium to be achieved between the cartridge and the sample, improving quantitation. Vacuum extract samples for 1–48 hours, then perform either manual desorptions with the low-cost 5800 SPDU Sorbent Pen™ Desorber unit, or add on automation for higher productivity. Due to the benefits of longer sampling times and vacuum assisted extraction, Sorbent Pens™ are uniquely capable of analyzing BOTH volatiles and semi-volatiles without contacting the matrix. Sorbent Pens™ are the complete extraction techniques that solve 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.

(Patent Pending)

Sorbent Pens™ by

A revolutionary new extraction technology that is quantitative by design.



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Air Monitoring Sorbent Pens for Environmental and Industrial Hygiene Applications

See page 118



Vacuum Extraction for next generation headspace analysis

Perform exhaustive vacuum extraction of VOCs through many SVOCs.

Applications Abound!



Ambient Air
Monitoring



Water Testing



Drugs &
Pharmaceuticals



Flavors &
Fragrances

Headspace Sorbent Pens™ The Ultimate Extraction Power

Introducing Entech's exciting new Sorbent Pen™ technology. The most versatile extraction and sample preconcentration technology available for GC and GCMS. Sorbent Pens™ combine the features of SPME and classical ¼" adsorbent traps in a design with far more flexibility and enhanced performance. Sorbent Pens™ are extremely durable and are designed to perform both active and diffusive sampling. Following sampling, the Sorbent Pen™ is desorbed directly onto the head of a GC column, eliminating losses associated with standard thermal desorption systems that must transport the desorbed sample through rotary valves, secondary traps, and a lengthy transfer line prior to delivery onto the GC column.

The Sorbent Pen uses a new approach for headspace extraction, termed Vacuum Assisted Sorbent Extraction, or VASE. The Sorbent Pen is inserted into the top of the sample vial and brought under reduced pressure. VASE allows the recovery of a far wider range of compounds than what was previously attainable. With Sorbent Pens™, both VOCs and SVOCs can be measured in wastewater, breath condensate, alcoholic beverages, and virtually all other matrices. VASE offers a tremendous advantage over other extraction techniques that perform extractions at atmospheric pressure where diffusion rates are suppressed. Sorbent Pens™ perform sample enrichment offline from a GCMS, allowing all samples to extract simultaneously and for longer periods of time. This approach results in high throughput while yielding a more complete and reproducible extraction for more sensitive and quantitative measurements. The low cost 5800 Sorbent Pen™ Desorption Unit (5800 SPDU) makes this exciting new technique both affordable and practical for virtually any laboratory's budget. Then move up to 120 sample automation with the SPR (Sample Preparation Rail) Autosampler for the ultimate in laboratory productivity. Join the Sorbent Pen™ movement and take advantage of the next generation in GCMS sample preparation.

Improvements over SPME and Dynamic Headspace Trapping

- Highly reproducible.
- Minimal carryover without the need for a secondary bakeout/cleanup step.
- Durable - hundreds of injections.
- Thousands of times more phase than SPME to eliminate matrix effects on sorbent affinities.
- Operates at or near equilibrium to improve sensitivity and quantitative accuracy.
- Performs exhaustive vacuum extraction of VOCs through SVOCs.
- Unlike SPME, Pens are shielded from exposure to aerosols formed during agitation.
- See taints, odors, additives, flavors & fragrances at levels below previously possible.
- Faster injection rates produces better chromatography and less thermal degradation.
- Rapid injections without cryogen or electronic cooling.
- Higher throughput via parallel off-line extractions.
- Sample at elevated or sub-ambient temperatures as needed.

Applications include:

Water Analysis

- VOCs & SVOCs
- Emerging Contaminants
- Odor Agents
- EPA 8270

Flavors/Aromas

- Foods
- Beverages
- Alcoholic Beverages
- Taints/Off-Flavors

Cannabis

- Pesticide Screening
- Terpene Profiling
- Residual Solvents
- Cannabinoid Potency

For a complete list of applications, visit entechinst.com

Food Safety

- Nitrosamines
- Acrylamide
- Pesticides/Herbicides
- Carcinogens
- Preservatives

Clinical Markers/Drugs In

- Blood
- Urine
- Breath

Misc.

- Odors in Consumer Products
- Residue Drugs/Pharma
- PCBs, PBDEs

Headspace Sorbent Pens™

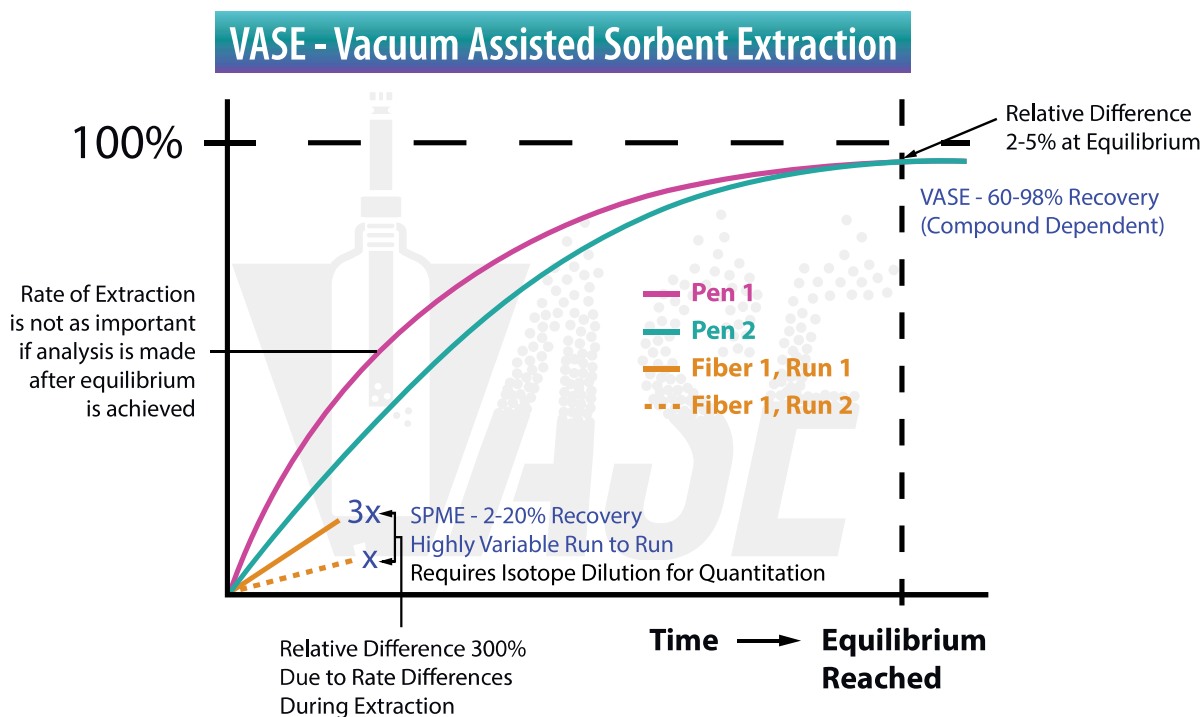
Description	Unit	Part #
Headspace Sorbent Pens™		
Tenax® TA (35 / 60)	EA	SP-HSP-T3560
Tenax® + Carboxen 1000	EA	SP-HSP-TCBXN
Tenax® + Carbopack™ X	EA	SP-HSP-TCPX
PDMS / Tenax® TA (35 / 60)	EA	SP-HSP-PDMST3560
Empty Headspace Pen	EA	SP-HSP-0
Sorbent Pen Isolation Sleeve	EA	19-5800-192

Durable, Reuseable, and Cost Effective!

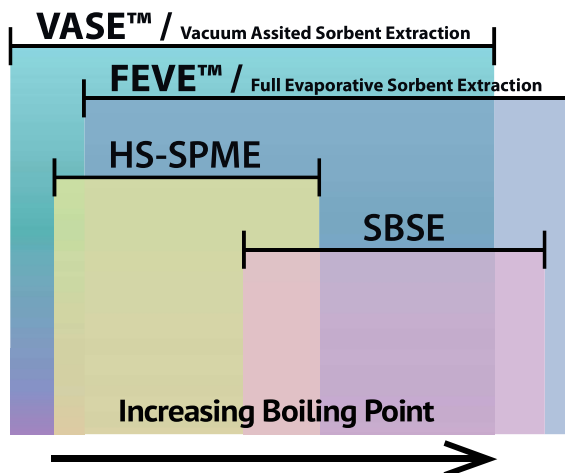


VASE, utilizing Sorbent Pens™, Operates at or Near Equilibrium to Improve Sensitivity and Reproducibility.

- Operating at or near equilibrium increases sensitivity and reduces run to run variability.
- Small changes in VASE extraction conditions result in inconsequential differences in the ultimate recovery at equilibrium, resulting in excellent reproducibility.
- Typically no need to use isotope dilution for quantitative measurements.



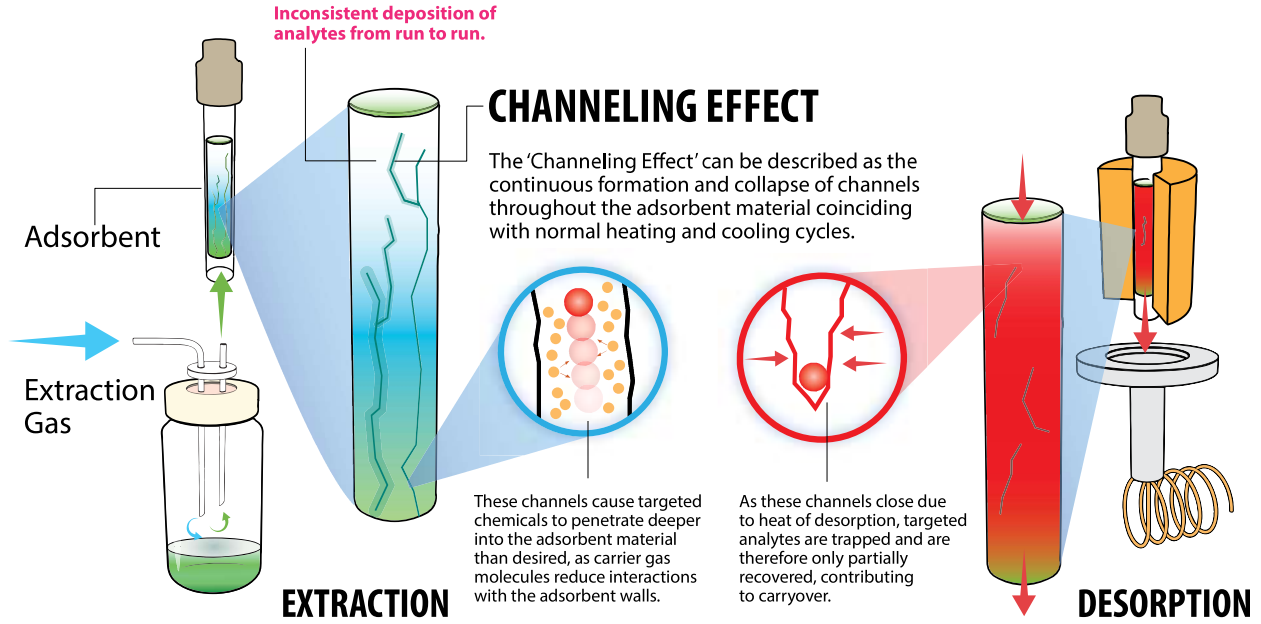
VASE and FEVE (Sorbent Pens) vs HS-SPME and SBSE Recovery Relative to Analyte Volatility.



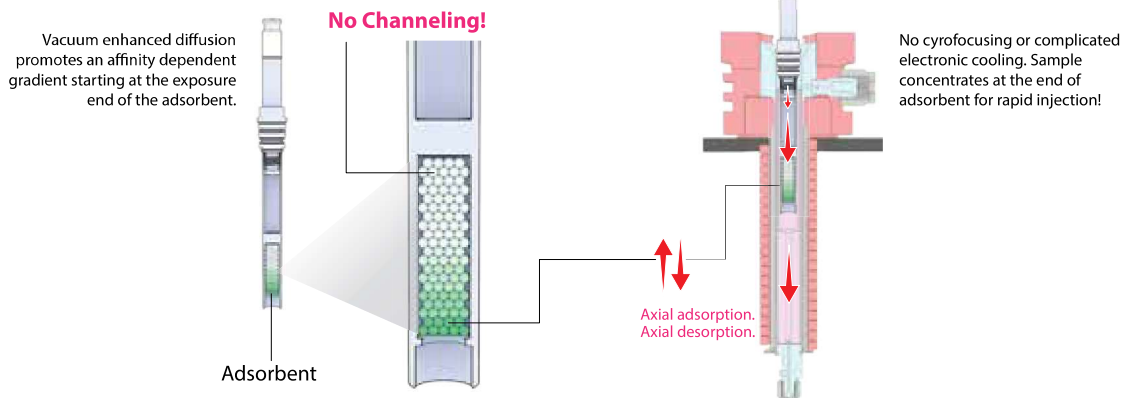
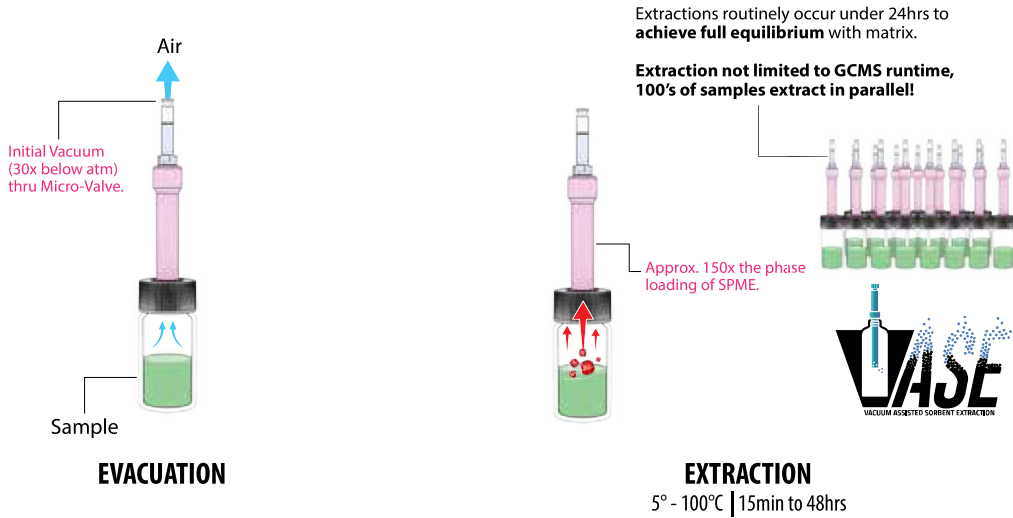
- Using VASE or FEVE, Sorbent Pens can recover compounds over a wider volatility range than either SPME or SBSE.
- Most applications done by either SPME or SBSE can be done more easily and usually with higher sensitivity and accuracy utilizing VASE or FEVE.



Channeling: Limitations of technologies using flow-through adsorbent beds

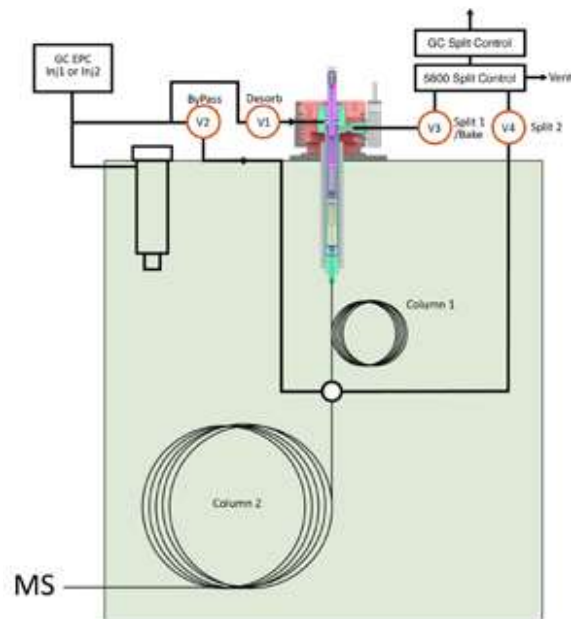


VASE Provides Extraction Efficiencies & Promotes Reproducible Analyte Deposition Gradients.



5800 Sorbent Pen™ Desorption Unit (SPDU)

The 5800 SPDU is a thermal desorption system designed to reliably deliver samples collected on Sorbent Pens™ to a GC or GCMS. The unique design of the 5800 SPDU (multiple patents pending) includes a far shorter path length to the GC column than any other thermal tube desorption system (only 1-2cm), while supporting a dual GC column interface that allows additional sample preparation “inside the GC oven”, where losses due to cold spots and exposure to active surfaces are far less likely. Most other thermal desorption systems desorb samples far away from the GC, requiring rotary valves, long transfer lines, and often additional trapping to finally deliver the sample to the GC column. Long sample path lengths generally equate to reduced recoveries, both due to the addition of reactive transfer line surfaces, and the eventual deposition of very low vapor pressure compounds that will likely affect the reliable transport of target compounds to the GC. The 5800 eliminates these concerns by desorbing samples directly into the GC, allowing consistent analytical results with minimal maintenance. The 5800 supports 3 injection modes, including SPLIT, SPLITLESS SVOC, and SPLITLESS VOC, all without any cryogenic or electronic cooling, so moisture can be managed while achieving optimum sensitivity and chromatographic resolution. All 4 types of Sorbent Pens are supported (HSP, FSP, DSP, & ASP), while maintaining a vertical position of the Sorbent Pens through the entire heating and cooling cycle to prevent the formation of gaps along the walls of the tube which often occurs with horizontally positioned desorbers, which in turn increases the potential for channeling during dynamic headspace sampling. The 5800 supports 2 split ports that are used for split injection, bakeout, backflushing, and focusing operations. The 5800 SPDU can be used without automation by introducing Sorbent Pens to the 5800 one at a time, or the SPR40 Sample Prep Rail can automate the analysis of up to 240 Sorbent Pens unattended.



5800 SPDU - Easily transfers volatile and semi-volatile compounds to a GCMS for extremely sensitive and accurate Sorbent Pen analysis.



- Direct thermal desorption of Sorbent Pens into all 3 major GC brands
- Avoids transfer lines and rotary valves, maximizing recovery and long term system stability
- Performs injections using SPLIT (VOC thru SVOC), SPLITLESS VOC, or SPLITLESS SVOC Modes for maximum flexibility, dynamic range, and sensitivity
- Backflushes to remove heavy, unwanted compounds to reduce both run times and thermal stress on GC columns
- Desorbs the sample within 1-2cm of the GC column, through an inert, easily replaceable glass liner
- Supports "Delayed Split Injections" to allow carrier gas pressures to equilibrate to improve split injection consistencies
- Maintains sorbent devices (Pens) in the vertical position to avoid "wall-gaps" when sorbents are cooled in a horizontal tube
- Entech SPRINT control software orchestrates either manual or multi-sample automated analysis
- Takes thermal desorption technology to the next level of consistency and performance

5800 SPDU Ordering Information

5800 SPDU Injector Unit



SPR-MC Controller



Description	Unit	Part #
5800 Sorbent Pen Desorption Unit, 120VAC/60Hz	EA	5800-SPDU
5800 Sorbent Pen Desorption Unit High-Voltage, 220-240VAC/50Hz	EA	5800-SPDU-HV
Module Controller Supporting 5800, 3801A, SPR-FM, & SP-FCTS (VOC Focuser), 120VAC/60Hz	EA	SPR-MC
Module Controller, 220-240VAC/50Hz	EA	SPR-MC-HV

5800 SPDU Consumables and Replacement Parts

Description	Unit	Part #
Consumables & Replacement Parts		
HSP/FSP/DSP Glass Liner, For 0.53mm ID Column 1	EA	5800-LNR-HD-1mm
HSP/FSP/DSP Glass Liner, For 1/16" OD Column 1	EA	5800-LNR-HD-2mm
ASP Glass Liner, For 1/16" OD or 0.53mm ID Column 1	EA	5800-LNR-ASP-2mm
5800 Column1 - 2 Interface Manifold	EA	5800-C12-M
5800 Insert. Silonite Coated	EA	5800-INSERT
5800 Insert Locking Pin - Keeps 5800 Insert in place when removing Pens	EA	5800-INSERT-LOCPIN
Liner Spring - Keeps glass liner pressed against bottom of Pen during desorption	EA	5800-LNR-SPRING
5800 Spring Insertion Tool	EA	5800-Spring InsertTool
5800 Liner Extraction Tool	EA	5800-LNR-ExtTool
GC Model Mounting Kits* (Must select one)		
Thermo 1300 / 1310 GC	EA	5800-GC-TH
Agilent 6890 / 7890(B)	EA	5800-GC-AG
Shimadzu 2010 GC	EA	5800-GC-SH

* Required component



Thermo® Mounting Bracket



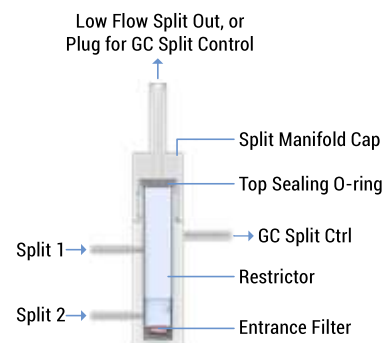
Agilent® Mounting Bracket

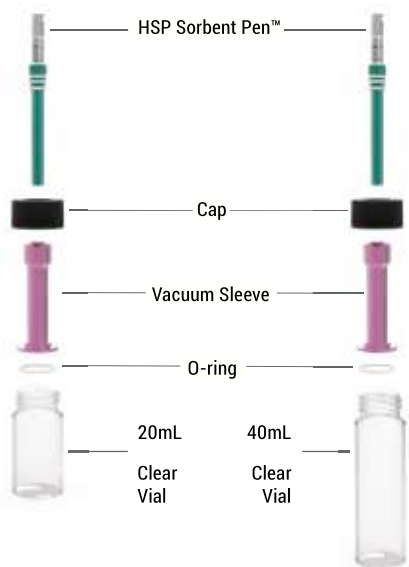


Shimadzu® Mounting Bracket



Description	Qty	Unit	Part #
Split Manifold and Restrictor Elements Kit:			
Split Manifold Enclosure	1	EA	5800-SPLT-M
Split Manifold Cap	1	EA	5800-SPLT-C
Split Manifold #3 Restrictor (Approx xxx cc/min at 10psi Helium)	1	EA	5800-SPLT-R3
Split Manifold #4 Restrictor (Approx xxx cc/min at 10psi Helium)	1	EA	5800-SPLT-R4
Split Manifold #5 Restrictor (Approx xxx cc/min at 10psi Helium)	1	EA	5800-SPLT-R5
Split Manifold #6 Restrictor (Approx 7-12 cc/min at 10psi Helium)	1	EA	5800-SPLT-R6
Split Manifold #7 Restrictor (Approx 4-7 cc/min at 10psi Helium)	1	EA	5800-SPLT-R7
Split Manifold Plug (0 split flow to allow GC to control Split Flow)	1	EA	5800-SPLT-PLUG
Split Manifold O-ring Kit	1	EA	5800-SPLT-OR-KIT





HSP Sorbent Pens, Vials, and Vacuum Sleeves

Description	Qty	Unit	Part #
Sorbent Pens™			
HS Sorbent Pen - Tenax TA	1	EA	SP-HSP-T3560
HS Sorbent Pen Tenax® + Carboxen 1000	1	EA	SP-HSP-TCBXN
HS Sorbent Pen Tenax® + Carbopack™ X	1	EA	SP-HSP-TCPX
HS Sorbent Pen - Blank	1	EA	SP-HSP-0
HS Sorbent Pen - PDMS Coated Glass Beads + Tenax TA	1	EA	SP-HSP-PDMST3560
HS Sorbent Pen O-Rings (upper) (10 pack)	4	Pack	SP-OR-SP1-2
HS Sorbent Pen O-Rings (lower) (10 pack)	2	Pack	SP-OR-SP3
Glassware, Caps, & Vacuum Sleeves			
20mL Clear Vials (72 ct.)	1	Box	39-75020
40mL Clear Vials (72 ct.)	1	Box	39-75040
Plastic Vial Caps for 20/40mL (144 ct)	1	Pack	39-76044B
Vacuum Sleeve Lid Liner for 20/40mL, 24mm Screw Top Vials	1	EA	SP-VSLL024S
White Viton O-Rings for 20/40mL vials (10 ct) <small>Low Bleed</small>	1	Pack	SP-OR-L024
Sorbent Pen Ejection Tool	1	EA	SP-PEN-EJECT-TOOL



5600 SPES and Cold Tray Dehydration

The 5600 Sorbent Pen™ Extraction System agitates the samples at 30-300 RPM to speed up transfer of volatiles to the headspace, while optionally heating the sample from ambient +4°C to 70°C. Extractions are generally complete in 1–48 hours depending on the application. A 30 position cold tray that is pre-cooled in a lab freezer at about -18° C can be used to draw any moisture back out of the Pens prior to Pen removal, isolation, and then GCMS analysis.

Description	Qty	Unit	Part #
Agitation, Extraction, Water Management			
5600 Sorbent Pen Extraction System (120VAC)	1	EA	5600-SPES
5600 Sorbent Pen Extraction System (230VAC)	1	EA	5600-SPES-HV
30 Position Tray for 20/40/60mL Vials	1	EA	5600-040TRAY30
30-Position Cold Tray for 20/40/60mL Vials	1	EA	SP-HSCOLDTRAY30



Sample Preparation & Extraction

Description	Qty	Unit	Part #
Essential Preparation			
30 Position Sorbent Pen Isolation Tray	1	EA	SP-HSP-TRAY30
Vial Evacuation Unit	1	EA	SP-VIAL-EVAC
VXB Vial Evacuation Unit (VXB - Vacuum X-traction Bar)	1	EA	SP-VXB-PV-EVAC
30-0"Hg Vacuum Test Gauge (w/ Female Micro-QT)	1	EA	29-70010QT
Double-Ended Micro-QT Valve	1	EA	MQT-2S
2-Stage Oilless Diaphragm Pump (120VAC)	1	EA	10-20030
2-Stage Oilless Diaphragm Pump (230VAC)	1	EA	10-20034



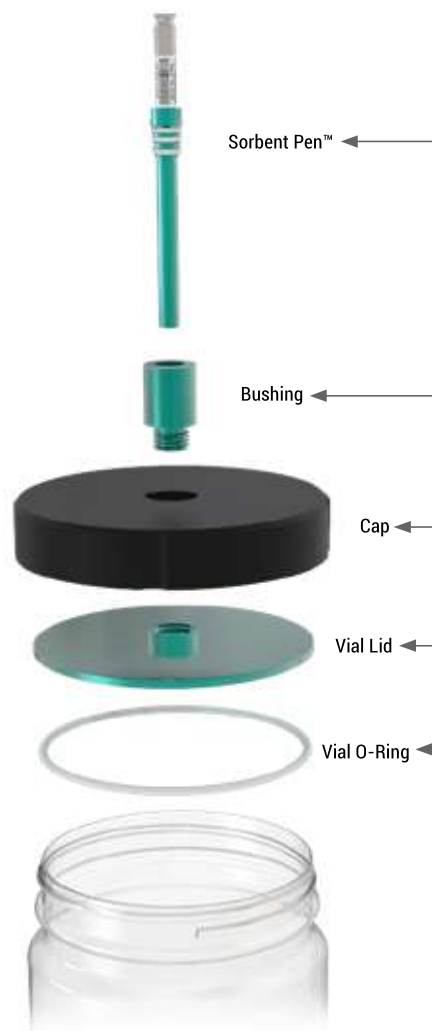
3801A Sorbent Pen Thermal Conditioner

Description	Qty	Unit	Part #
Sorbent Pen Conditioning			
3801A Sorbent Pen Thermal Conditioner (120VAC)	1	EA	3801A-SPTC
3801A Sorbent Pen Thermal Conditioner (230VAC)	1	EA	3801A-SPTC-HV

Sorbent Pen™ Thermal Conditioner

Glassware, Caps, Lids, & Misc Parts

Description	Unit	Qty. Incl.	Part #
Headspace Vials (vial caps and lids sold separately)			
20mL Clear Vials	Pack	72	39-75020
20mL Amber Vials	Pack	72	39-75020A
40mL Clear Vials	Pack	72	39-75040
40mL Amber Vials	Pack	72	39-75040A
60mL Clear Vials	Pack	72	39-75060
60mL Amber Vials	Pack	72	39-75060A
125mL LVSH Vials	Pack	12	39-75125BW
250mL LVSH Vials	Pack	24	39-75250BW
500mL LVSH Vials	Pack	12	39-75500W
1L LVSH Vials	Pack	12	39-75L1W
Headspace Bottles			
125mL Amber Bottles, deactivated*	Pack	24	39-75125AD
250mL Amber Bottles, deactivated*	Pack	12	39-75250AD
500mL Amber Bottles, deactivated	Pack	12	39-75500AD
Sorbent Pen Bushing for 125 / 250 / 500 / 1L Vials			
Bushing	EA	1	SP-L100S
Vial Caps			
Plastic Vial Caps for 20 / 40 / 60mL Vials	Pack	144	39-76044B
High Temp Vial Cap for 125mL Vials	EA	1	39-76812HS
High Temp Vial Cap for 250mL Vials	EA	1	39-76825HS
High Temp Vial Cap for 500mL Vials	EA	1	39-76850HS
High Temp Vial Cap for 1L Vials	EA	1	39-76894HS
Vial Lids			
Silonite Coated Sorbent Pen Receiver Lid for 20 / 40 / 60mL Vials + All Bottle-Vac Sizes	EA	1	SP-L024S
125mL Silonite™ Lid for Micro-QT Valve	EA	1	HS-76012S
250mL Silonite™ Lid for Micro-QT Valve	EA	1	HS-76025S
500mL Silonite™ Lid for Micro-QT Valve	EA	1	HS-76050S
1L Silonite™ Lid for Micro-QT Valve	EA	1	HS-76100S
Individual O-Rings			
White Viton O-Rings for 20 / 40 / 60mL vials (10 ct)	Pack	1	SP-OR-L024
Viton O-Rings for 125mL Vials	EA	1	39-20629
Viton O-Rings for 250mL Vials	EA	1	39-26M02-48
Viton O-Rings for 500mL Vials	EA	1	39-76508V
Viton O-Rings for 1L Vials	EA	1	39-26151
Viton O-Rings for Sorbent Pen Bushing	EA	1	39-26012



SPR

Sample Preparation Rail

VASE & Sorbent Pen™ Automation

Take productivity to a whole new level by combining the award winning VASE & Sorbent Pen™ extraction solution with Entech's new Sample Preparation Rail (SPR). The SPR40 delivers unattended sample prep options and unattended desorption of up to 120 pre-extracted Sorbent Pens.



Start Here.

Sample Preparation Rail Bundle

Description	Qty	Unit	Part #
Sample Preparation Rail Bundle (100-250VAC, 50-60Hz)	1	EA	SPR40-H01
- Base Sample Rail System	1	EA	SPR40
- 5800 Controller Platform with Rail Clamp	1	EA	SPR-PF-CTRL1
- 30 Position Sorbent Pen Isolation Tray	2	EA	SP-HSP-TRAY30
- SPRINT Control Software	1	EA	45-SPRINT
Rail Mounted Components			
Dual Sorbent Pen Isolation Tray Platform w/Legs & Magnetic Sensing Rail Clamps	2	EA	SPR-PF-TR2

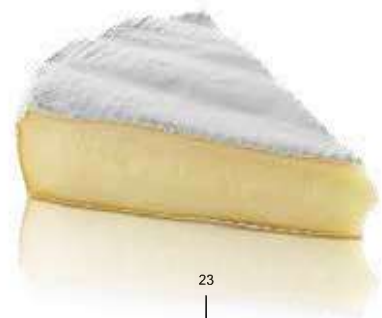
* Included only with order of High Voltage version.

Not Included in Bundle.

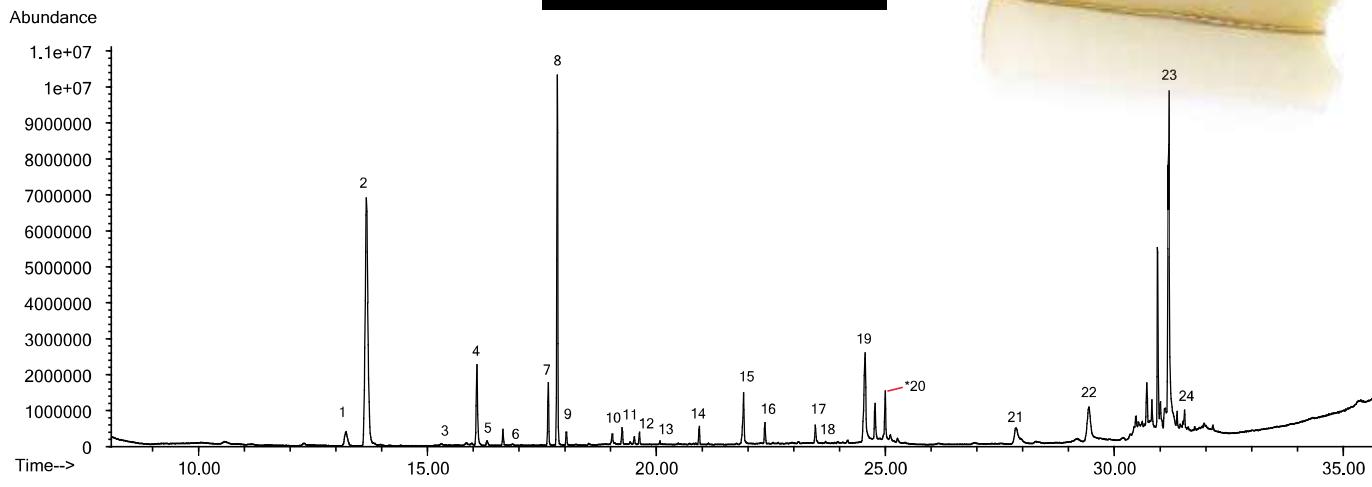
You must also select a GC Rail Mounting Kit with the bundle.

SPR40 GC Mounting Kits		
Rail Mounting Kit for Agilent® GC	EA	SPR-MNT-AG
Rail Mounting Kit for Thermo® GC	EA	SPR-MNT-TH
Rail Mounting Kit for Shimadzu® GC	EA	SPR-MNT-SH

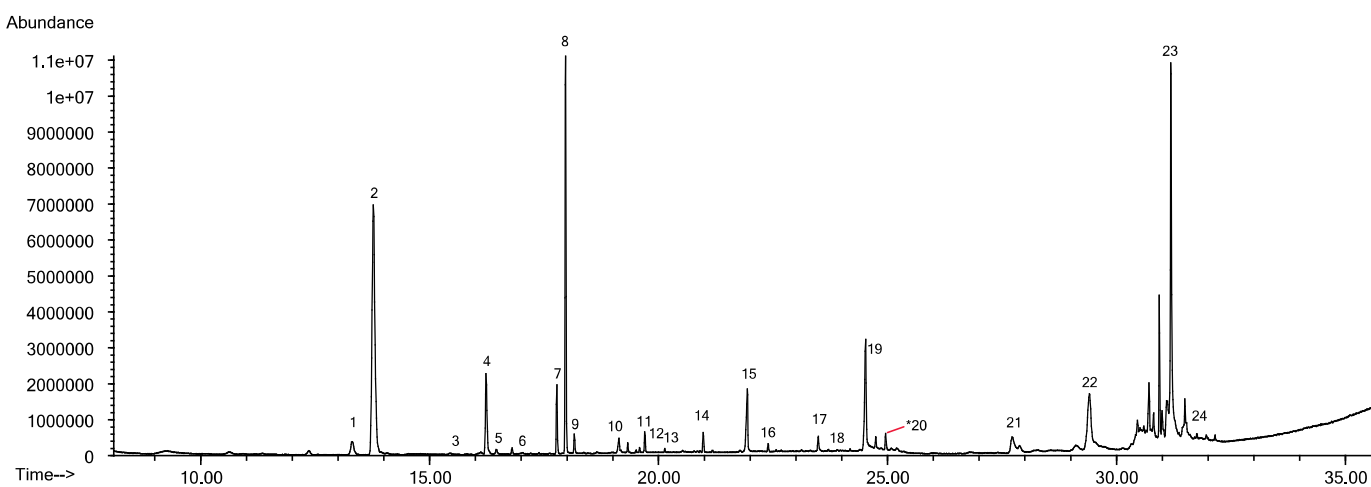
Brie Cheese Duplicate Analysis



SORBENT PEN™ #1



SORBENT PEN™ #2



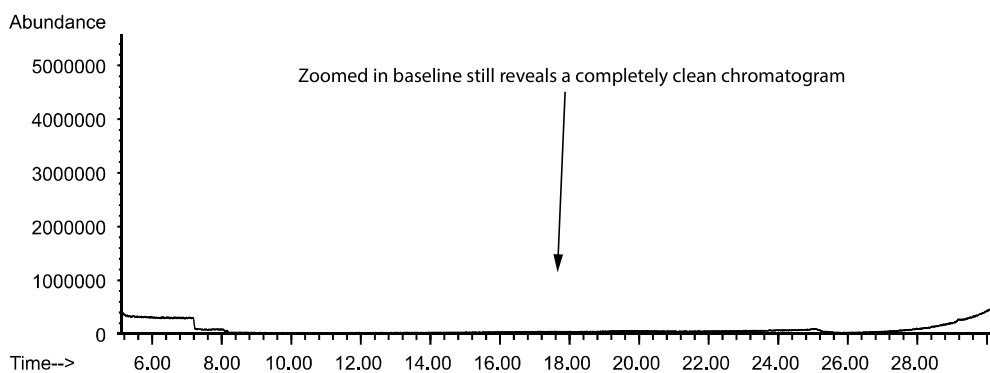
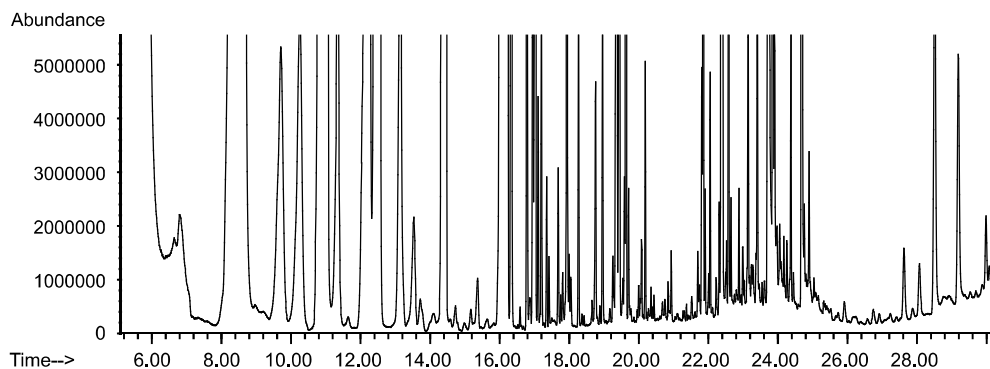
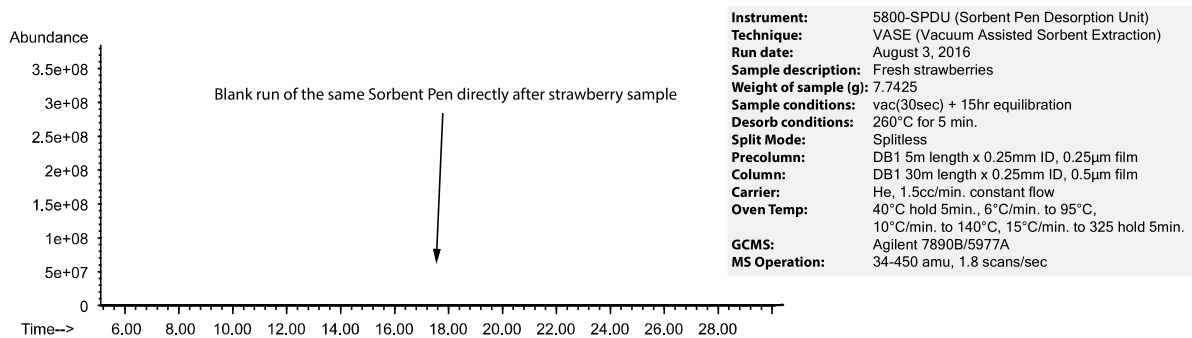
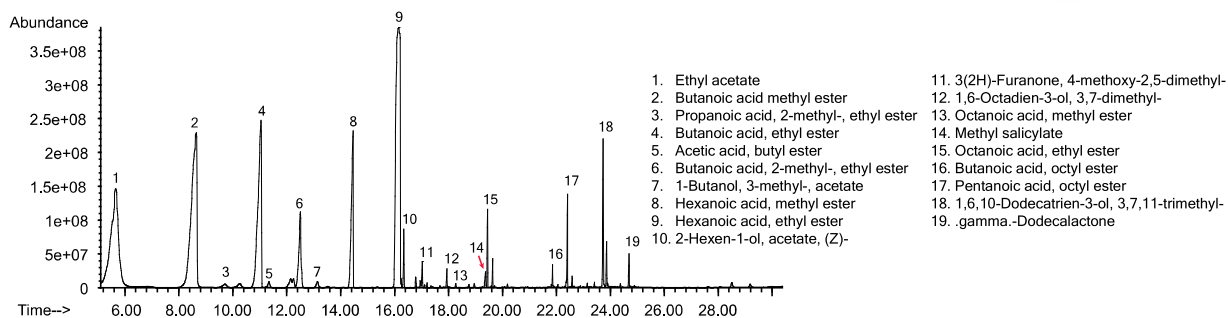
*Difference in Dodecanoic acid, ethyl ester caused by difficulty in maintaining exact amount of cheese sample oxidation from run to run, and expected variations in sample homogeneity.

<p>Instrument: 5800-SPDU (Sorbent Pen Desorption Unit) Technique: VASE (Vacuum Assisted Sorbent Extraction) Run date: August 15, 2016 Sample description: Brie Weight of sample (g): 70g cheese in 140mL water, blended, 10.1025g taken Sample conditions: blended + vac(30sec) + 50°C + 3 hr equilibration Desorb conditions: 260°C for 5 min. Split Mode: Splitless Precolumn: DB1 5m length x 0.25mm ID, 0.25µm film Column: DB1 30m length x 0.25mm ID, 0.5µm film Carrier: He, 1.5cc/min. constant flow Oven Temp: 40°C hold 5min., 6°C/min. to 95°C, 10°C/min. to 140°C, 10°C/min. to 325 hold 5min. GCMS: Agilent 7890B/5977A MS Operation: 34-450 amu, 1.8 scans/sec</p>	<p>1. 4-Heptanone 2. 2-Heptanone 3. Benzaldehyde 4. 2-Octanone 5. Hexanoic acid, ethyl ester 6. Benzeneacetaldehyde 7. 8-Nonen-2-one 8. 2-Nonanone 9. Nonanal 10. Octanoic acid 11. Octanoic acid, ethyl ester 12. Decanal 13. n-Octanoic acid isopropyl ester</p>	<p>14. 2-Undecanone 15. n-Decanoic acid 16. Decanoic acid, ethyl ester 17. 2H-Pyran-2-one, tetrahydro-6-pentyl- 18. 2-Tridecanone 19. Dodecanoic acid 20. Dodecanoic acid, ethyl ester 21. 2H-Pyran-2-one, 6-heptyltetrahydro- 22. Tetradecanoic acid 23. n-Hexadecanoic acid 24. Hexadecanoic acid, ethyl ester</p>
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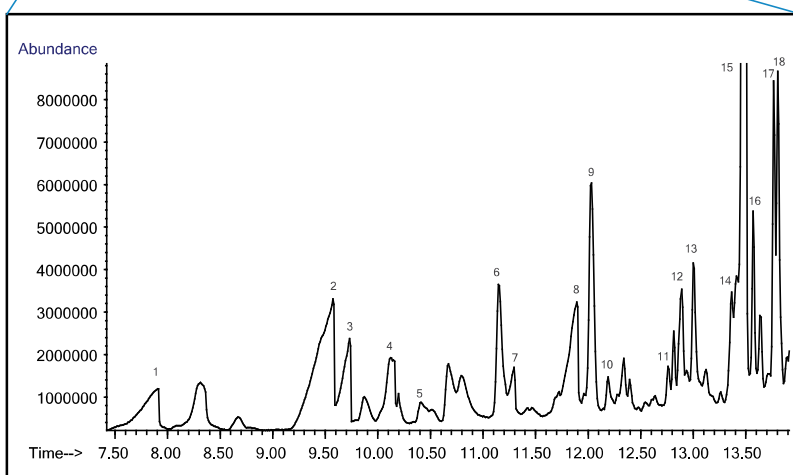
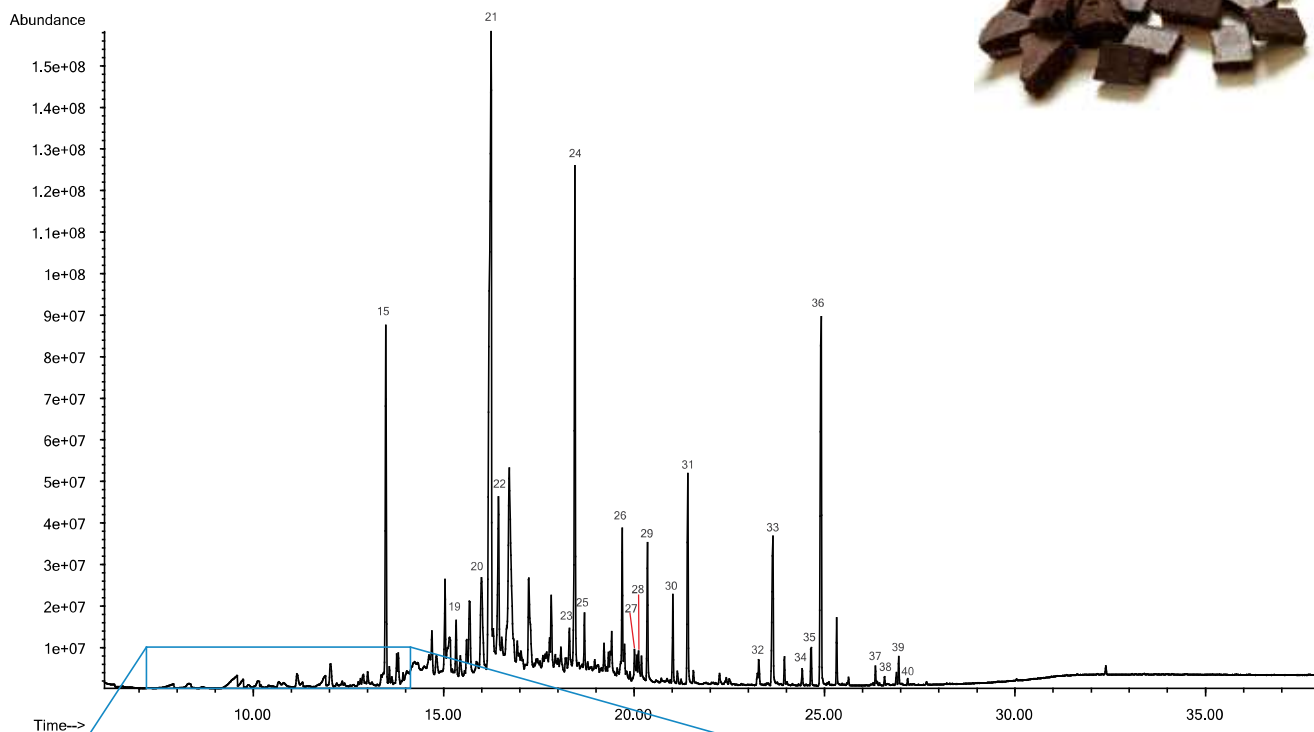
Extremely Clean Blank After Strawberry Analysis



TIC: 16080301.D\data.ms



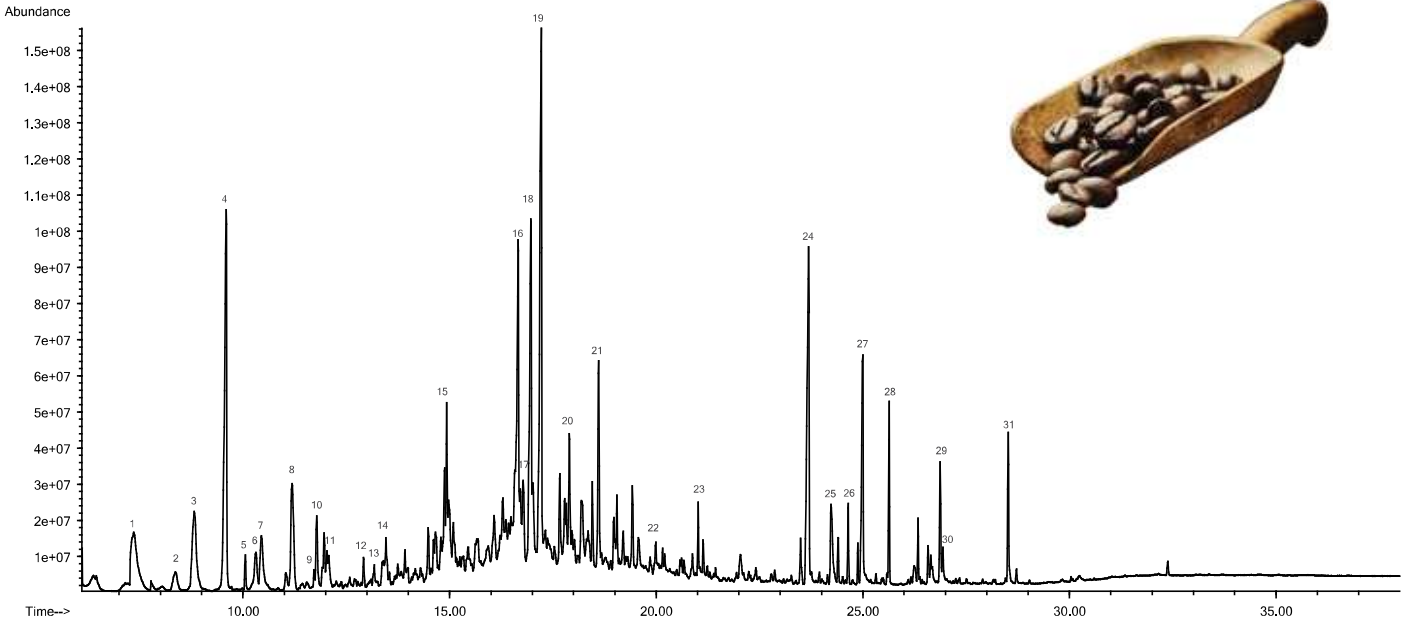
Dark Chocolate Analysis



Instrument: 5800-SPDU (Sorbent Pen Desorption Unit)
Technique: VASE (Vacuum Assisted Sorbent Extraction)
Run date: November 17, 2016
Sample description: Dark Chocolate
Amount of sample (g): 1
Sample conditions: 40 mL vial with 15hr equilibration at 25°C
Desorb conditions: 260°C for 5 min.
Split Mode: Splitless
Precolumn: DB1 5m length x 0.25mm ID, 0.25µm film
Column: DB1 30m length x 0.25mm ID, 0.5µm film
Carrier: He, 1.5cc/min. constant flow
Oven Temp: 40°C hold 5min., 10°C/min. to 325°C, 325 hold 5min. (solvent delay at 6 min.)
GCMS: Agilent 7890B/5977A
MS Operation: 34-450 amu, 1.8 scans/sec

- | | | | |
|---|--------------------------------------|--|---------------------------------------|
| 1. Propanoic acid, 2-methyl- | 11. D-Limonene | 21. Acetic acid, 2-phenylethyl ester | 31. Benzophenone |
| 2. Butanoic acid, 3-methyl- | 12. Ethanone, 1-(1H-pyrrol-2-yl)- | 22. Benzeneacetaldehyde, .alpha.-ethylidene- | 32. Tetradecanoic acid, ethyl ester |
| 3. Butanoic acid, 2-methyl- | 13. Acetophenone | 23. Vanillin | 33. Caffeine |
| 4. Heptanal | 14. Pyrazine, 3-ethyl-2,5-dimethyl- | 24. Benzoic acid, pent-2-yl ester | 34. 2-Heptadecanone |
| 5. Pyrazine, 2,5-dimethyl- | 15. Pyrazine, tetramethyl- | 25. Tetradecane | 35. Hexadecanoic acid, methyl ester |
| 6. Benzaldehyde | 16. 2-Nonanone | 26. 5-Methyl-2-phenyl-2-hexenal | 36. Di-sec-butyl phthalate |
| 7. Pentanoic acid, 4-methyl- | 17. Nonanal | 27. Pentadecane | 37. 9-Octadecenoic acid, methyl ester |
| 8. Hexanoic acid | 18. 1,6-Octadien-3-ol, 3,7-dimethyl- | 28. Butylated Hydroxytoluene | 38. Linoleic acid ethyl ester |
| 9. Pyrazine, trimethyl- | 19. Octanoic acid, ethyl ester | 29. 1H-2-Benzopyran-1-one, 3,4-dihydro-8-hydroxy-3-methyl- | 39. 9-Octadecenoic acid, (E)- |
| 10. Propanoic acid, 2-hydroxy-, butyl ester | 20. Benzeneacetic acid, ethyl ester | 30. Dodecanoic acid, ethyl ester | 40. Octadecanoic acid, ethyl ester |

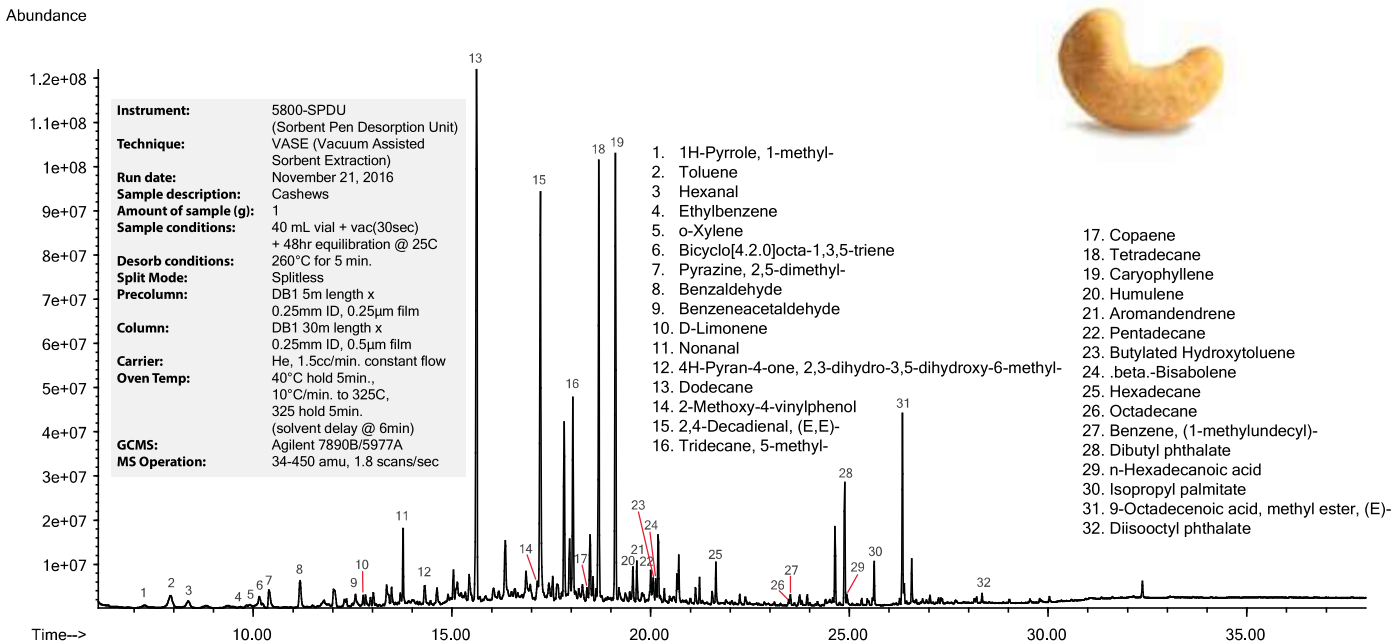
Coffee Analysis



Instrument: 5800-SPDU (Sorbent Pen Desorption Unit)
Technique: VASE (Vacuum Assisted Sorbent Extraction)
Run date: November 28, 2016
Sample description: Breakroom coffee
Amount of sample (g): 2
Sample conditions: 20 mL vial + vac(30sec) + 3hr equilibration @ 60C
Desorb conditions: 260°C for 5 min.
Split Mode: Splitless
Precolumn: DB1 5m length x 0.25mm ID, 0.25µm film
Column: DB1 30m length x 0.25mm ID, 0.5µm film
Carrier: He, 1.5cc/min. constant flow
Oven Temp: 40°C hold 5min., 10°C/min. to 325C, 325 hold 5min. (solvent delay @ 6min)
GCMS: Agilent 7890B/5977A
MS Operation: 34-450 amu, 1.8 scans/sec

1. Pyridine
2. 3(2H)-Furanone, dihydro-2-methyl-
3. 3-Furaldehyde
4. 2-Furanmethanol
5. Butyrolactone
6. Ethanone, 1-(2-furanyl)-
7. Pyrazine, 2,5-dimethyl-
8. 2-Furancarboxaldehyde, 5-methyl-
9. Phenol
10. 2-Furanmethanol, acetate
11. 1H-Pyrrole-2-carboxaldehyde
12. Ethanone, 1-(1H-pyrrol-2-yl)-
13. Ethanone, 1-(1-methyl-1H-pyrrol-2-yl)-
14. Phenol, 2-methoxy-
15. 1H-Pyrrole, 1-(2-furanylmethyl)-
16. Phenol, 4-ethyl-2-methoxy-
17. Indole
18. Furan, 2,2'-[oxybis(methylene)]bis-
19. 2-Methoxy-4-vinylphenol
20. Benzene, 4-ethenyl-1,2-dimethoxy-
21. 1H-Pyrrole, 1-(2-furanylmethyl)-
22. Phenol, 2,5-bis(1,1-dimethylethyl)-
23. Dodecanoic acid, ethyl ester
24. Caffeine
25. 1-Hexadecanol
26. Hexadecanoic acid, methyl ester
27. n-Hexadecanoic acid
28. Isopropyl palmitate
29. Octadecanoic acid
30. Hexadecanamide
31. 9-Octadecenamide, (Z)-

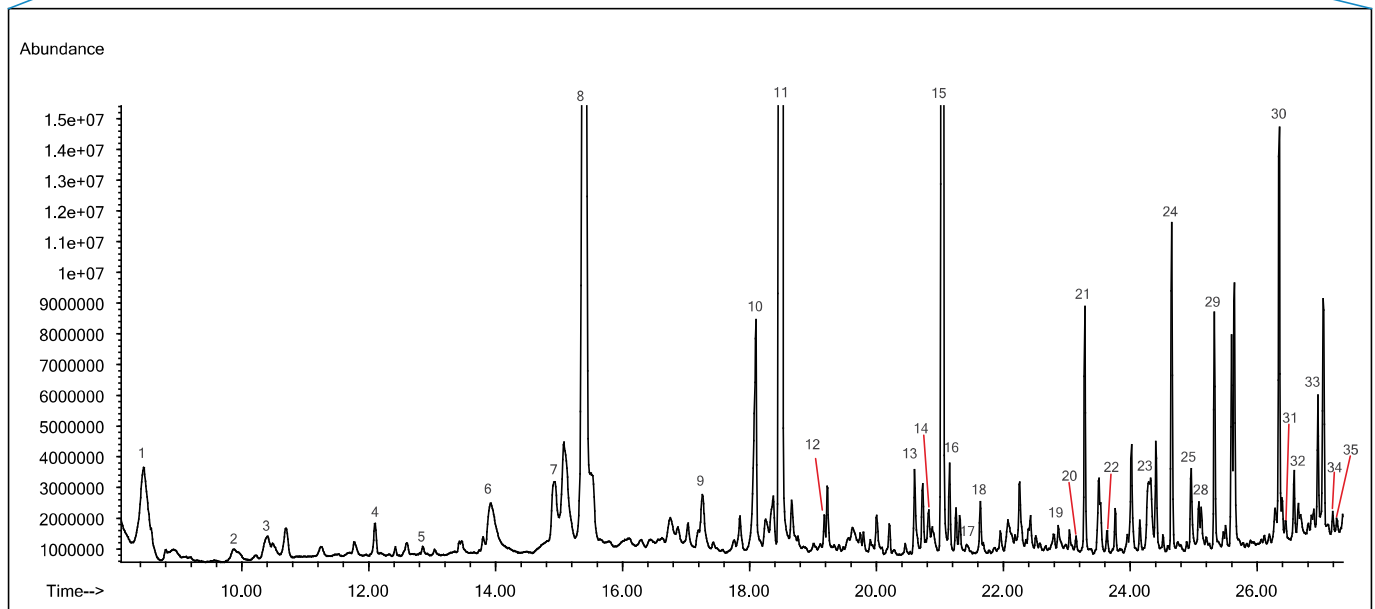
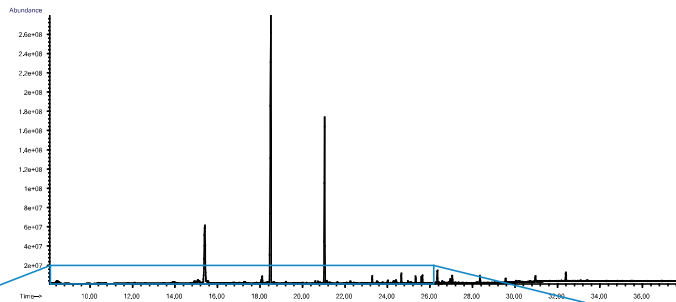
Cashew Analysis



Instrument: 5800-SPDU (Sorbent Pen Desorption Unit)
Technique: VASE (Vacuum Assisted Sorbent Extraction)
Run date: November 21, 2016
Sample description: Cashews
Amount of sample (g): 1
Sample conditions: 40 mL vial + vac(30sec) + 48hr equilibration @ 25C
Desorb conditions: 260°C for 5 min.
Split Mode: Splitless
Precolumn: DB1 5m length x 0.25mm ID, 0.25µm film
Column: DB1 30m length x 0.25mm ID, 0.5µm film
Carrier: He, 1.5cc/min. constant flow
Oven Temp: 40°C hold 5min., 10°C/min. to 325C, 325 hold 5min. (solvent delay @ 6min)
GCMS: Agilent 7890B/5977A
MS Operation: 34-450 amu, 1.8 scans/sec

1. 1H-Pyrrole, 1-methyl-
2. Toluene
3. Hexanal
4. Ethylbenzene
5. o-Xylene
6. Bicyclo[4.2.0]octa-1,3,5-triene
7. Pyrazine, 2,5-dimethyl-
8. Benzaldehyde
9. Benzeneacetaldehyde
10. D-Limonene
11. Nonanal
12. 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-
13. Dodecane
14. 2-Methoxy-4-vinylphenol
15. 2,4-Decadienal, (E)-
16. Tridecane, 5-methyl-
17. Copaene
18. Tetradecane
19. Caryophyllene
20. Humulene
21. Aromandrene
22. Pentadecane
23. Butylated Hydroxytoluene
24. beta-Bisabolene
25. Hexadecane
26. Octadecane
27. Benzene, (1-methylundecyl)-
28. Dibutyl phthalate
29. n-Hexadecanoic acid
30. Isopropyl palmitate
31. 9-Octadecenoic acid, methyl ester, (E)-
32. Diisooctyl phthalate

Rum Analysis

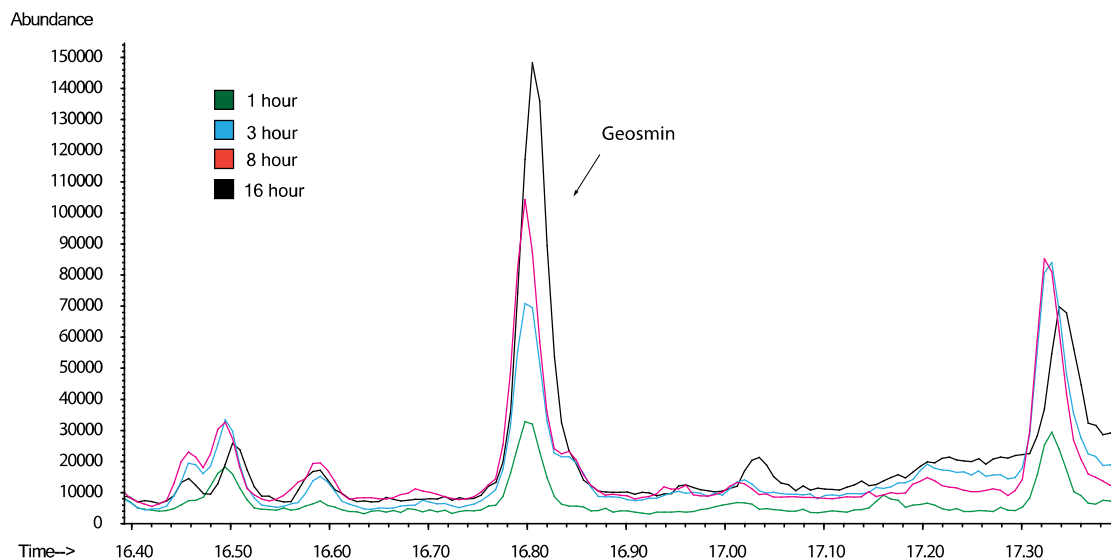
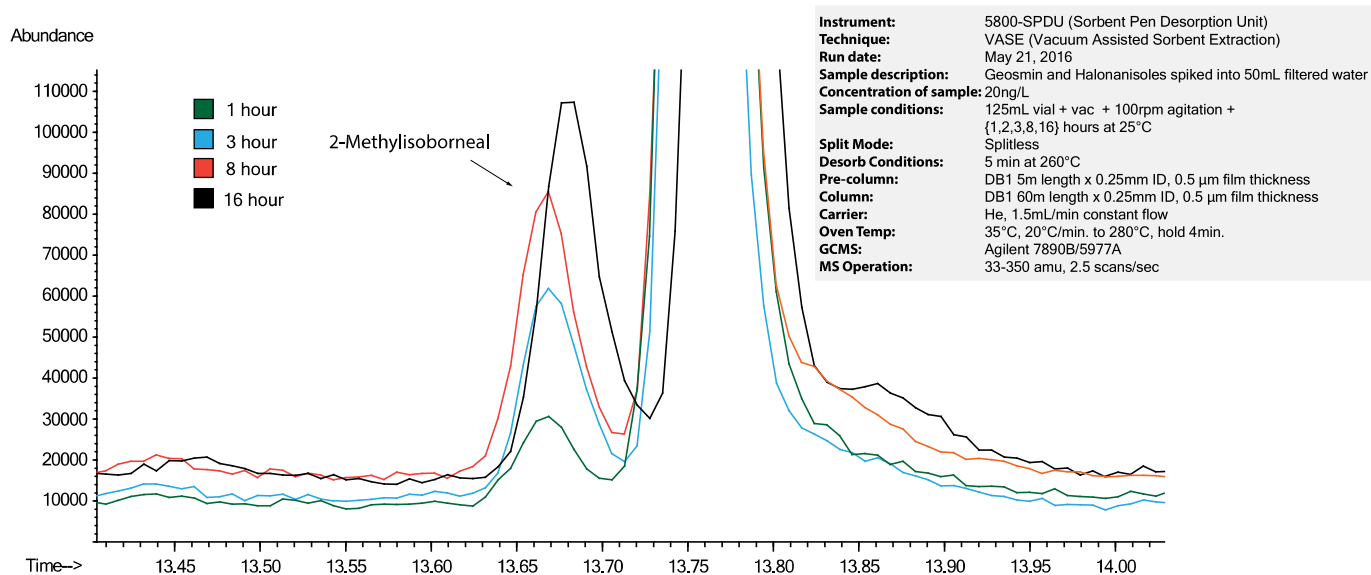


Instrument: 5800-SPDU (Sorbent Pen Desorption Unit)
Technique: VASE (Vacuum Assisted Sorbent Extraction)
Run date: November 16, 2016
Sample description: 1:1 Rum (50µl Rum + 50µl Water)
Amount of sample (mL): 50µl
Sample conditions: 20mL vial with 15hr equilibration @ 25°C
 260°C for 5 min.
Desorb conditions: Splitless
Split Mode: DB1 5m length x 0.25mm ID, 0.25µm film
Precolumn: DB1 30m length x 0.25mm ID, 0.5µm film
Column: He, 1.5cc/min, constant flow
Carrier: 40°C hold 5min., 10°C/min. to 300°C,
 hold 7min. (solvent delay @ 8min)
Oven Temp: Agilent 7890B/5977A
GCMS: 34-450 amu, 1.8 scans/sec

1. 3(2H)-Furanone, dihydro-2-methyl-
2. 1-Hexanol
3. Ethanone, 1-(2-furanyl)-
4. Hexanoic acid, ethyl ester
5. Pentanoic acid, 4-oxo-, ethyl ester
6. Phenylethyl Alcohol
7. Butanedioic acid, diethyl ester
8. Octanoic acid, ethyl ester
9. trans-3-Methyl-4-octanolide
10. n-Decanoic acid
11. Decanoic acid, ethyl ester
12. Octanoic acid, 3-methylbutyl ester
13. Dodecanoic acid
14. Benzoic acid, 4-hydroxy-3-methoxy-, ethyl ester
15. Dodecanoic acid, ethyl ester
16. Pentanoic acid, 2,2,4-trimethyl-3-carboxyisopropyl, isobutyl ester
17. Benzophenone
18. Pentadecanoic acid, 3-methylbutyl ester
19. Tetradecanoic acid
20. Ethyl 9-tetradecenoate
21. Pentadecanoic acid, ethyl ester
22. Isopropyl myristate
23. 1-Hexadecanol
24. Pentadecanoic acid, 14-methyl-, methyl ester
25. n-Hexadecanoic acid
26. Ethyl 9-hexadecenoate
27. Hexadecanoic acid, ethyl ester
28. 1-Tetradecyl acetate
29. Isopropyl palmitate
30. 9-Octadecenoic acid (Z)-, methyl ester
31. Heneicosane
32. Methyl stearate
33. Ethyl 9-hexadecenoate
34. Octadecanoic acid, ethyl ester
35. Benzoic acid, tridecyl ester

Sorbent Pen™ Vacuum Extraction of Odors Kinetics Study Comparing Recoveries of a 20 PPt Standard in Water After 1, 3, 8, 16 Hour Extraction Times

- Extractions performed without salting to prevent adsorbent damage via aerosol transport
- Temp = 25°C. Sorbent Pens™ heated to 30°C to prevent water condensation
- An overnight extraction appears to bring the Pens to near equilibrium with the sample



Figures 2,3 (above) – Relative responses for target compounds extracted from 20ng/L standards in 50cc filtered water at 25°C, no salt added, 100 rpm agitation, 1/30th atm vacuum, for 1,3,8, and 16 hours. A final extraction time of 20 hours was selected for this method with an extraction efficiency between 60-80%.