ENTECH INSTRUMENTS

See What's Really There™

7650HS-CTS
Large Volume Static
Headspace System

Agilent Technologies

7650HS-CTS
LARGE VOLUME STATIC
Headspace System

The Next Generation in GCMS Headspace Analysis.

The 7650HS-CTS

The most versatile & sensitive static headspace system available.

The all-new 7650HS-CTS is the only commercially available solution that can quantify the consumer experience by taking an equilibrium "snapshot" of the headspace to accurately determine its composition from the lightest through the heaviest compounds. The 7650HS-CTS is truly unique as it is the industries only system that uses multiple stages of true capillary columns to perform headspace preconcentration. This patent pending technology is creating a SPME like sampling, but in a way that obtains complete recovery of the lightest to the heaviest headspace compounds with virtually no reactive losses and no carryover. When sampling a large volume at static equilibrium, all compounds are quantitatively recovered at the same concentration as experienced by the consumer, giving the flavor or fragrance chemist remarkable insight into exactly what the consumer is smelling, at exactly the same relative concentrations. This avoids the reactivity and carryover associated with other thermal desorption systems on the market that still use packed traps to concentrate the sample.

The 7650HS-CTS 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˚C. The 7650HS-CTS maximizes throughput while offering state-of-the-art performance in quantitative accuracy, sensitivity, and low carryover. The 7650HS-CTS resides to the right of the GCMS system, with multiple trays supporting several different sample container sizes. The 7650HS-CTS is compatible with the latest 1D/2D chromatographic solutions for food, flavor, aroma, product testing, environmental, and clinical applications.

7650HS-CTS Features

The only true high sensitivity headpsace system available.

- **Direct Capillary Column Trapping**
  Capillary columns perform the sample enrichment, improving quantitative accuracy.
- **Sample Vial Sizes from 20 to 1000cc**
  Optimal sensitivity and statistical accuracy.
- **Micro-QT Septumless Sample Interface**
  Gas-tight seal down to full vacuum.
- **Recovers Thermally Labile Compounds**
  Analyze compounds containing sulfur, phosphorous, nitrogen.
- **Extremely Low Carryover**
  Capillary column traps have far less carryover relative to packed traps.
- **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 and the resolution of compounds boiling below 50°C.
- **Mixing and Agitating Oven**
  Rapid heating and sample equilibration.
- **Advanced Water Management**
  Capillary column traps have virtually zero water retention.

"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. This results 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***. Capillary Column Trapping with the 7650HS-CTS utilizes multiple capillary columns with increasing strength to recover all relevant compounds, allowing a known volume to be sampled for quantitative determination of headspace composition. Water and air pass through the traps almost unretained, eliminating the interferences associated with improper management of the matrix.

Popular Applications

- Food & Flavor – *Food / Flavor / Beverage Analysis.*
- Fragrance Analysis – *Botanicals, Extracts, Products.*
- Package Testing – *Improved Statistical Accuracy.*
- Product Testing – *Static Emission Determination.*
- Forensics – *Accelerants.*
- Odor Evaluation – *Consumer Productions.*

Food & Flavor / Beverage Analysis

The 7650HS-CTS performs Large Volume Static Headspace under equilibrium conditions. Samples are allowed to come to equilibrium over 30-60 minutes, with optional warming in a mixing oven prior to extracting the headspace into the capillary traps. 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 are managed either by flushing additional gas through the column traps in the forward flow direction, or by using a solvent delay in the mass spectrometer to let the ethanol clear the GC column prior to commencing with data collection.

Arson & Criminal Forensics

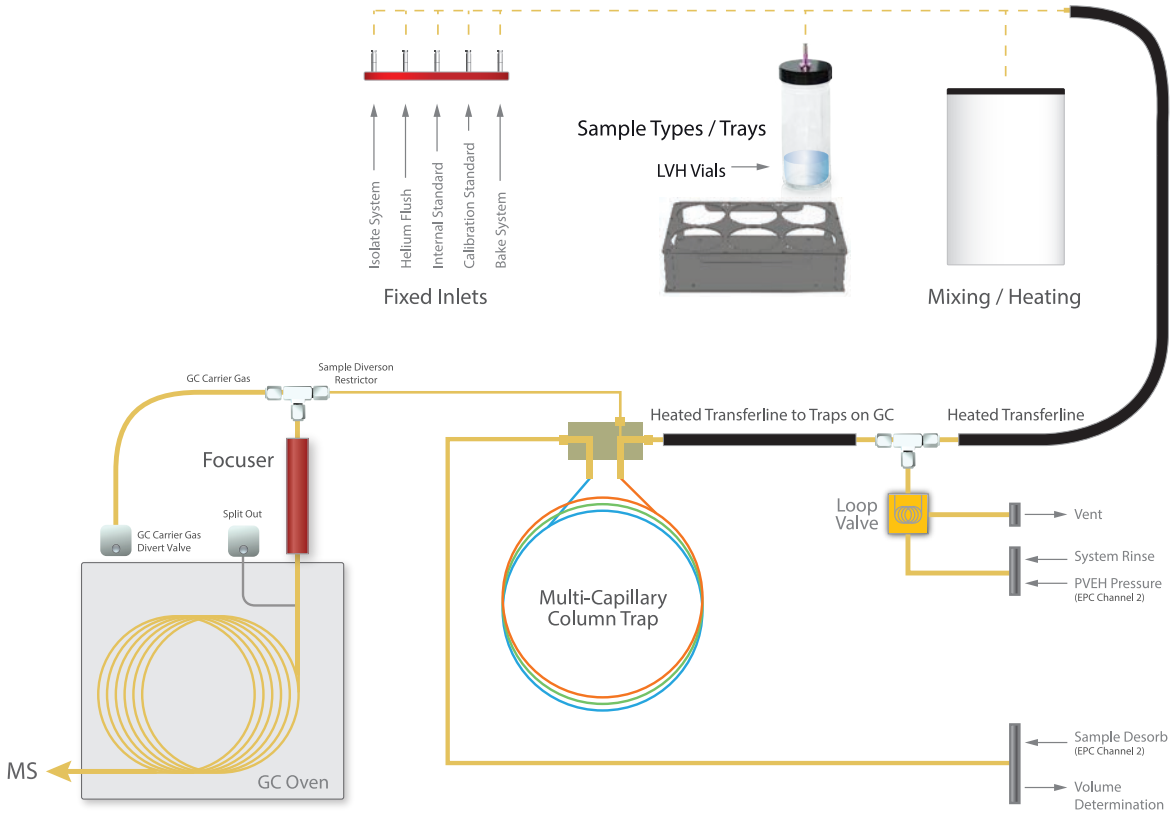
The detection of trace levels of accelerants during arson investigation, the presence of drugs of abuse, or simply the detection of a chemical signature of evidentiary nature is often limited by how well the chemical signal can be properly "amplified" to allow detection and identification by today's 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.

The 7650HS-CTS with Capillary Column Trapping decreases the vapor phase volume up to 1 million fold, reducing a 1 liter sample volume down to 1 microliter to allow rapid injection into GCMS systems optimized for trace analysis. If any accelerants are present, the 7650HS-CTS will see them, and at the correct ratios for multi-component accelerants.

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

7650HS-CTS Flow Diagram & Connections



Featuring the World's First Capillary Column Trapping System

Direct capillary column trapping.

Recovers thermally labile compounds.

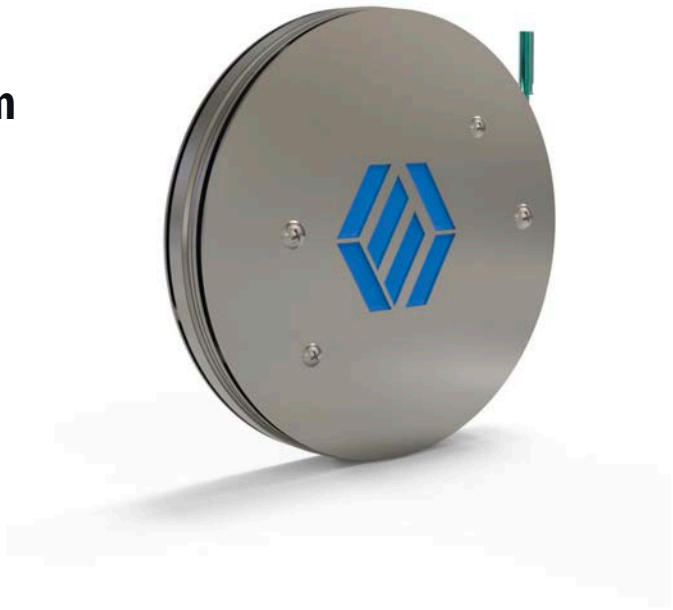
Light to heavy compounds equally represented.

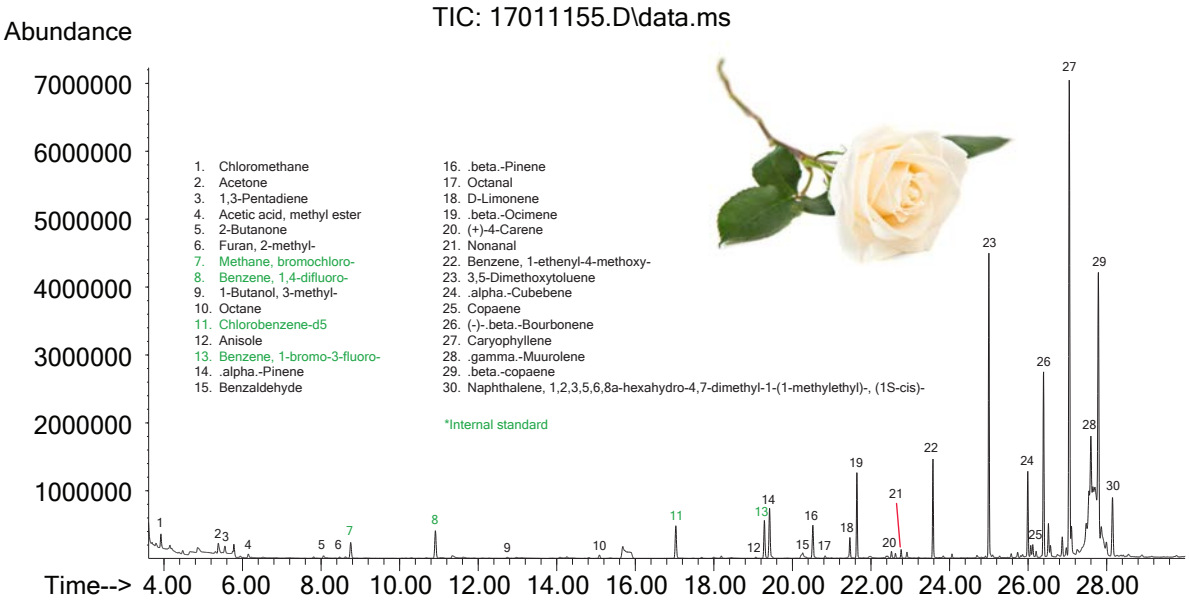
Detect up to C25 quantitatively.

Extremely low carry over.

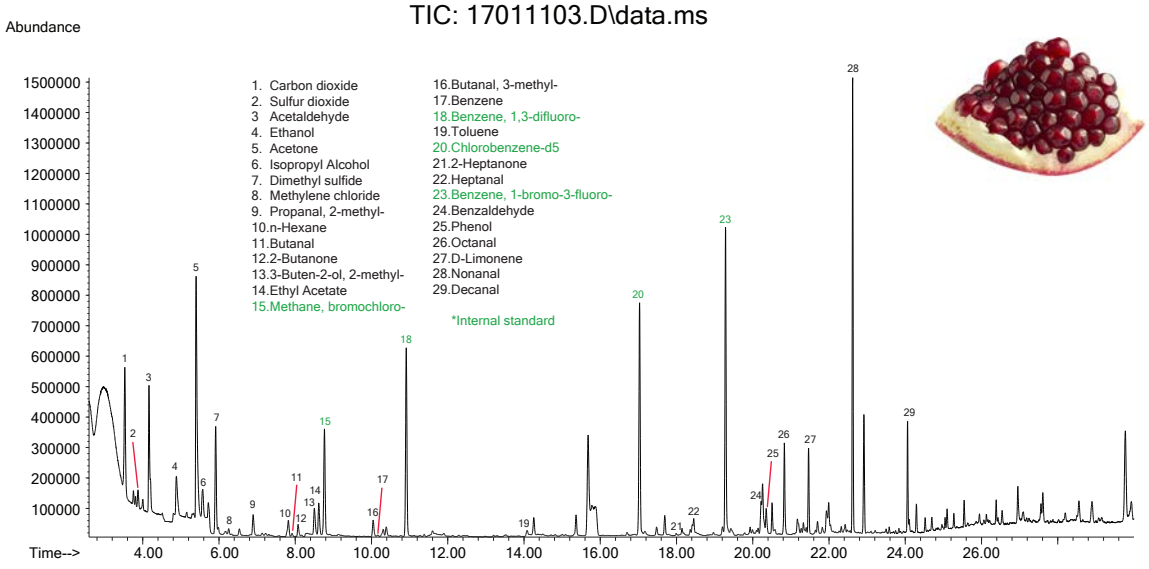
PPM to Sub-PPB level detection.

Easily handle high ethanol matrices.





Instrument:	7650HS-CTS
Technique:	LVSH (Large Volume Static Headspace)
Run date:	January 23, 2017
Sample description:	White Rose and Stem
Weight of sample (g):	NA
Sample conditions:	500mL vial with 4 hour equilibration at 25°C
Sample Amount:	100 cc
Split Mode:	Splitless
Column:	DB1 60m length x 0.32mm ID, 1.0 µm film
Carrier:	He, 2mL/min. constant flow
Oven Temp:	35°C hold 5min., 6°C/min. to 95°C, 10°C/min. to 140°C, 15°C/min. to 230 hold 4.5min.
MS Operation:	33-300 amu, 2.72 scans/sec



Instrument:	7650HS-CTS
Technique:	LVSH (Large Volume Static Headspace)
Run date:	January 11, 2017
Sample description:	Pomegranate Juice
Weight of sample (g):	10g
Sample conditions:	500mL vial with 2 hour equilibration at 25°C
Sample Amount:	250 cc
Split Mode:	Splitless
Column:	DB1 60m length x 0.32mm ID, 1.0 µm film
Carrier:	He, 2mL/min. constant flow
Oven Temp:	35°C hold 5min., 6°C/min. to 95°C, 10°C/min. to 140°C, 15°C/min. to 230 hold 4.5min.
MS Operation:	33-300 amu, 2.72 scans/sec

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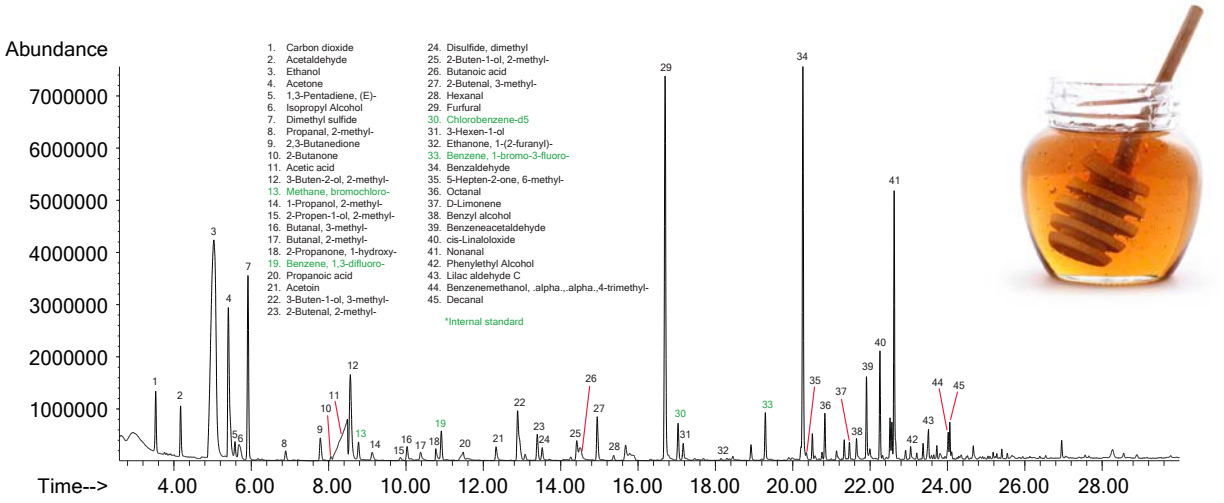

Instrument:	7650HS-CTS
Technique:	LVSH (Large Volume Static Headspace)
Run date:	January 11, 2017
Sample description:	Honey
Weight of sample (g):	10g
Sample conditions:	500mL vial with 2 hour equilibration at 25°C
Sample Amount:	250 cc
Split Mode:	Splitless
Column:	DB1 60m length x 0.32mm ID, 1.0 µm film
Carrier:	He, 2mL/min. constant flow
Oven Temp:	35°C hold 5min., 6°C/min. to 95°C, 10°C/min. to 140°C, 15°C/min. to 230 hold 4.5min.
MS Operation:	33-300 amu, 2.72 scans/sec

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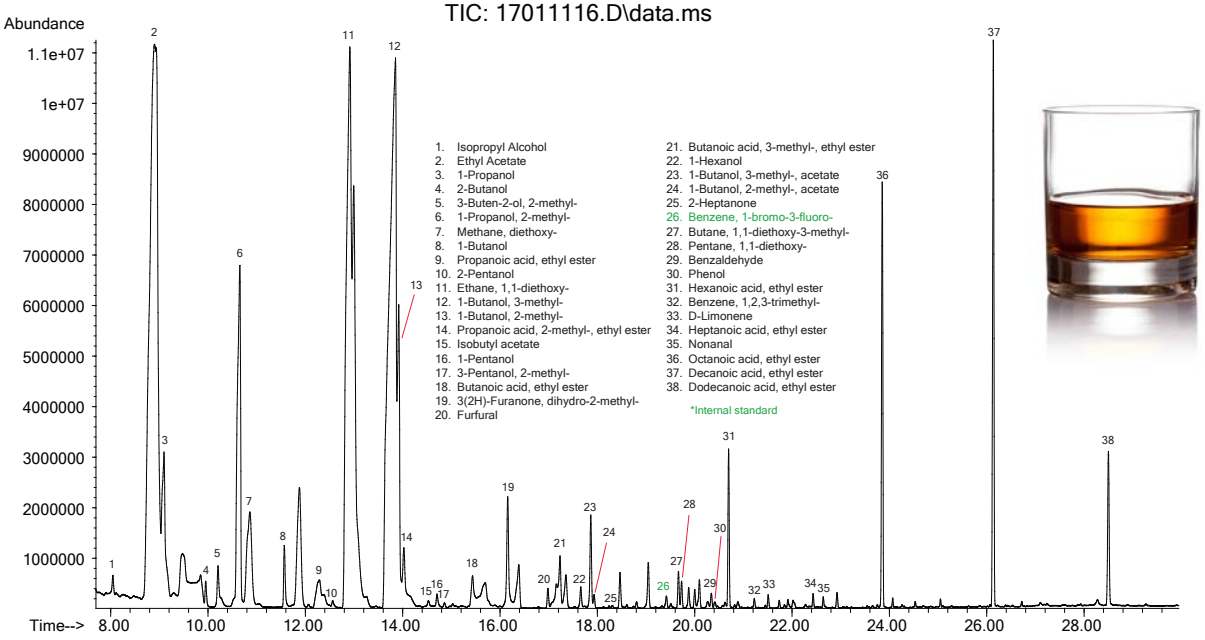


Instrument:	7650HS-CTS
Technique:	LVSH (Large Volume Static Headspace)
Run date:	January 13, 2017
Sample description:	Rum
Weight of sample (g):	5mL
Sample conditions:	500mL vial with 2 hour equilibration at 25°C
Sample Amount:	250 cc
Split Mode:	Splitless
Column:	DB1 60m length x 0.32mm ID, 1.0 µm film
Carrier:	He, 2mL/min. constant flow
Oven Temp:	35°C hold 5min., 6°C/min. to 95°C, 10°C/min. to 140°C, 15°C/min. to 230 hold 4.5min.
MS Operation:	33-300 amu, 2.72 scans/sec

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 coring and compound absorption found with these simple rubber seals. The micro-seal allows samples to be stored under vacuum for enhanced equilibration rates.

Multi-Capillary Column Trapping System

The most advanced and quantitative high sensitivity static headspace solution available. It traps all compounds boiling from -50˚C to >400˚C, except for water vapor which is almost unretained. Thermally labile, GC compatible compounds are virtually all recovered, because the headspace goes directly to capillary column traps, followed by backflushing right onto the GC analytical column.

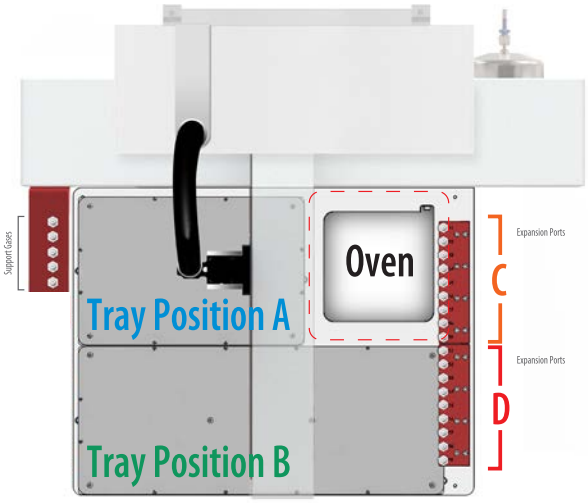
Sample Vials / Media

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

Ovens & Bushings

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

The 7650HS-CTS
One Instrument. Endless Possibilities.



7650-HS overhead view.

Description	Unit	Qty. Incl.	Part #
7650HS-CTS Bundles			
7650HS-CTS Bundle (120VAC/60Hz)	EA	1	7650HS-CTS-B01
7650HS-CTS Bundle HV* Version (220-240VAC/50Hz)	EA	1	7650HS-CTS-B01-HV
All Bundles Above Include			
7650HS-CTS LVSH Autosampler w/ MCCT** Technology	EA	1	7650HS-CTS
Trays			
11 Position 500mL Wide-Mouth LVSH Tray	EA	1	HS-ST280-011
10 Position 1L Wide-Mouth LVSH Tray	EA	1	HS-LT384-010
Vials			
500mL LVSH Vials (box of 12) Caps not included	EA	1	39-75500W
Vial Caps for 500mL vials (high temp)	Pack	12	39-76850HS
Silonite™ Liners for 500mL vials	Pack	12	HS-76050
1L LVSH Vials (box of 12)	EA	1	39-75L1W
Vials Caps for 1L vials (high temp)	Pack	12	39-76894HS
Silonite™ Liners for 1L vials	Pack	12	HS-761000
Micro-QT™ Valve	Pack	24	HS-LVSH-SMS
Oven			
Mixing Oven	EA	1	HS-OVEN-407-1M

*High Voltage
**Multi-Capillary Column Trapping

ENTECH INSTRUMENTS

The Next Generation in GCMS Headspace Analysis.

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