



ENTECH
INSTRUMENTS

See What's Really There™



LVSH6

LARGE VOLUME STATIC HEADSPACE

Complete analysis of SVOCs in water, solvent extracts, and other "low solid" containing matrices



A new method that evaporates the entire volatile fraction through the Sorbent Pen using only vacuum.

LVSH6 – Technique Selection Guide

Sample Type: Liquids/Solids/Consumer Products

Extraction Temperatures: 30° - 60° C

Operational Mode: Large Volume Static Headspace

BP Range: -50° C to >450° C

Vial Sizes: 1 Liter

Typical 5800 Mode: Split, Splitless VOC Thru SVOC

Water Management: Hydrophobic Media, Split injection



Introducing LVSH6 - What is it?

The LVSH6 solution from Entech is a next generation Large Volume Static Headspace (LVSH) technique that uses the SPR40 autosampler to carefully and quantitatively transfer the equilibrated headspace above a liquid or solid sample through an ASP Sorbent Pen in order to measure the composition of the equilibrated headspace. This equilibrated headspace is what a consumer experiences when they open a container of facial cream, or open a food package, or even when they apply a fragrance to their skin. Virtually all other headspace techniques perform extractions, leaving the fixed gases behind (air, nitrogen, etc), or they add more fixed gases to the headspace to flush compounds to an external sorbent, but in both cases the equilibrium is disturbed which ends up providing a compositional analysis of the liquid or solid sample, not what a consumer would be smelling. Stated another way, if a SPME extraction of a typical 10mL vial were to be performed over a 10-20 minute period to try to improve the sensitivity of the method, and then this fiber were desorbed into another inert container so that all compounds would be in the gas phase, the resulting aroma will almost certainly be different than what was present in the original, equilibrated headspace. As long as headspace is pulled from the container without being replaced by additional gases, the equilibrium that has been set up at a given temperature will not be affected very much, especially if we only collect about half of the volume of the vial. With a 1L vial where 900cc is headspace, that would be 450-500cc of fully equilibrated headspace, and when using a splitless injection technique, this could provide low to even sub part per trillion detection limits on some GCMS analyzers. This provides aroma/flavor/fragrance chemists with a whole new approach for "seeing what their customers are smelling". Knowing the composition in the liquid or solid is only half the challenge. Unless the partition coefficient for each compounds in each matrix is known (an near impossible task), the headspace at equilibrium must also be determined experimentally. That is what LVSH offers. Therefore, VASE to measure the composition of the liquid or solid samples, and LVSH to measure the equilibrated headspace concentrations. The LVSH6 module along with the volume measurement capabilities of the SPR-FM add on module makes the entire process automated for six 1L vials.

LVSH6 Process



1 Purge empty vial with UHP N2, then remove top fitting to introduce 10-100g of sample to be analyzed



2 Insert ASP Pen and place in Tray



3 SPR40/LVSH6 takes each sample one at a time, preheats it (optional), and then slowly draws the requested volume of headspace through the ASP Pen



4 ASP Pens are removed and analyzed by GCMS

The LVSH6 allows 4 different modes of operation, providing maximum flexibility for trace level equilibrated headspace analysis.

Mode 1: Non-Heated, Fully Static LVSH

LVSH jars with ASP Pens are placed into the 6 position tray, and a volume from 10 – 500 cc of headspace are slowly drawn through each ASP Pen. Pens are isolated for GCMS analysis.

Mode 2: Heated, Fully Static LVSH

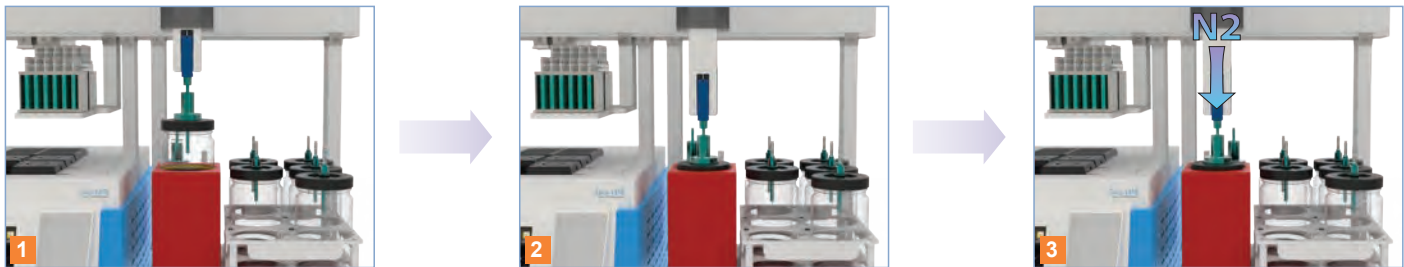
LVSH jars with ASP Pens are placed into the LVSH6 tray, and a transport tool is used to move the vials to a heated oven for a period of time, followed by drawing 10-500cc of headspace through the ASP Pens. Pens are isolated for GCMS Analysis.

Mode 3: Vacuum Equilibration / N2 Pulsed LVSH

LVSH jars with sample and ASP Pens are placed into a freezer to minimize volatiles presence in the headspace, then the headspace is evacuated through a separate port in the lid, followed by placement of samples under vacuum in the LVSH6 tray. Vial assemblies are moved to the heater for vacuum equilibration where equilibration will be reached far faster under vacuum than at atmospheric pressure. Afterwards, samples are pressurized with UHP Nitrogen, followed by ASP extraction of 10-500cc of sample. Pens are isolated for GCMS analysis.

Mode 4: Vacuum Equilibration / X-LVSH Extraction

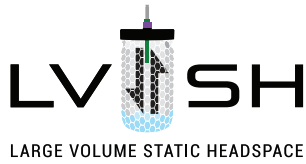
Extremely Large Volume Static Headspace (X-LVSH). Similar to Mode 3, except the UHP N2 Fill Tool remains connected to the sample vial during very slow sampling through the ASP, so N2 enters at the same rate as the flow through the ASP (2-10cc/min). N2 is introduced near the bottom of the vial, while ASP samples near the top, so introduced N2 has time to fully equilibrate with the headspace prior to collection through ASP. Sample volumes 100-2000cc.



Description	Qty	Unit	Part #
LVSH6 Modules			
Large Volume Static Headspace Platform and Heater, 120VAC/60Hz	1	EA	LVSH6
Large Volume Static Headspace Platform and Heater, 240VAC/50Hz	1	EA	LVSH6-HV
Kits			
1L Vial + Lid/Cap/Seal for Sorbent Pen Extraction	1	EA	SP-HS-V1L
Vials			
500mL LVSH6 Vial Caps not included	1	12pk	39-75500W
Vial Caps for 500mL vials (high temp)	1	12pk	39-76850HS
Silonite™ Liners for 500mL vials	1	12pk	HS-76050
1L LVSH6 Vials	1	12pk	39-75L1W
Vials Caps for 1L vials (high temp)	1	12pk	39-76894HS
Silonite™ Liners for 1L vials	1	12pk	HS-761000
Lid Bushing Sorbent Pen Interface	1	12pk	SP-L100S
Transport, Sampling, and Pressure Equilibration Tools			
Extraction Controller			
Controls MA-VASE10, 3700, and LVSH6 modules, 120VAC/60Hz	1	EA	SPR-EMC-VASE
Controls MA-VASE10, 3700, and LVSH6 modules, 240VAC/50Hz	1	EA	SPR-EMC-VASE-HV

ASP- Active Sorbent Pens

Part #	Adsorbent	Range BP	Label Color	Label	Packing Diagram
SP-ASP-0	Blank / Empty	NA	Yellow		
SP-ASP-PDGB-TNX	PDMS Glass Beads + Tenax® TA	100°C to >450°C	Red / White		
SP-ASP-TNX	Tenax® TA	100°C to >450°C	White		
SP-ASP-TNX-CPX	Tenax® TA + Carboxen™ X	80°C to >450°C	White / Blue		
SP-ASP-TNX-CXN10	Tenax® TA + Carboxen® 1000	-60°C to >450°C	White / Green		
SP-ASP-CPC-CPB-CXN10	Carboxen™ C & B + Carboxen® 1000	-60°C to 400°C	Blue (Light), Blue (Med), Green		



A new method that evaporates the entire volatile fraction through the Sorbent Pen using only vacuum.

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