MERCK

SPME for GC Analysis

Getting Started with Solid Phase Microextraction

Supelco®
Analytical Products

Did you know...

- SPME is an innovative, solvent free technology that is fast, economical, and versatile.
- SPME is a fiber coated with a liquid (polymer), a solid (sorbent), or a combination of both. The fiber coating removes the compounds from your sample by absorption in the case of liquid coatings or adsorption the case of solid coatings.
- SPME has gained widespread acceptance as the technique of preference for many applications.

Our experts can help you utiliz SPME technology to maximize t benefits for virtually any application.

Supelco services include...

- Custom Capabilities

If you have special needs beyond what is listed, please inquire about a custom order. We can honor many special requests for custom gauges, coatings, field samplers, etc.

- Available When You Need It
- Easy Ordering
- On-Time Delivery
- Superior Support

Solid Phase Microextraction

TechTip

Be sure to avoid overtightening GC injection port septa to avoid breaking or stripping the SPME fiber.

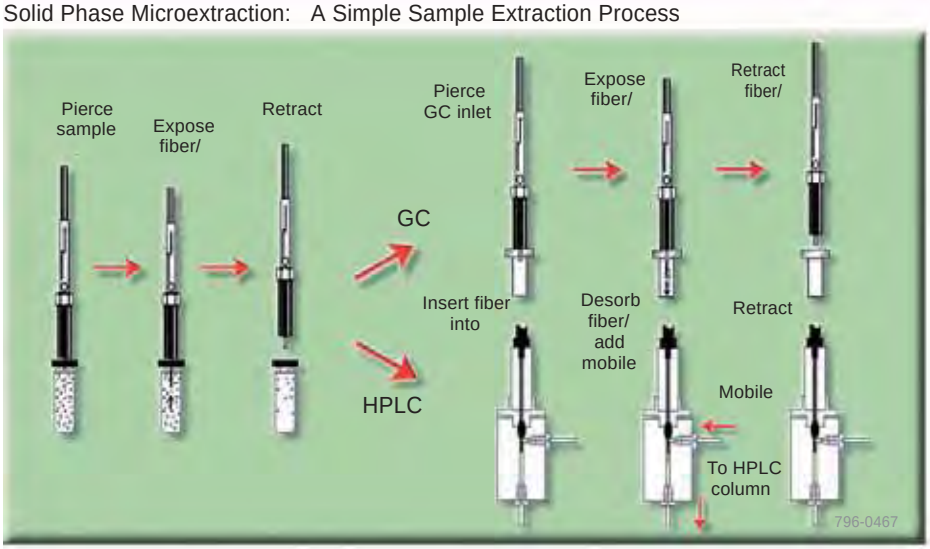
We recommend the use of... pre-drilled septa or a septumless injector system.

Solid Phase Microextraction

Getting Started in SPME

Introduction to SPME

Solid Phase Microextraction: A Simple Sample Extraction Process



The extraction of organic compounds from a sample matrix usually consists of purge-and-trap or headspace methods for concentrating volatiles; and liquid-liquid extraction, solid phase extraction, or supercritical fluid extraction for semivolatiles and nonvolatiles. These methods have various drawbacks, including high cost and excessive preparation time. A unique sample preparation technique, SPME, eliminates most drawbacks to extracting organics.

SPME requires no solvents or complicated apparatus. It can concentrate volatile and nonvolatile compounds, in both liquid and gaseous samples, for analysis by GC, GC/MS, or HPLC.

SPME offers some important advantages:

- Fast – reduces sample preparation time by 70%
- Solvent reduction – minimizes the use of solvents, and their disposal
- Economical and reusable – more than 50 extractions per fiber on average
- Versatile – adapts to any GC or HPLC system, can be automated with Varian autosamplers

An SPME unit consists of a length of fused silica fiber coated with a polymer material, in some cases mixed with a solid adsorbent (e.g., a divinylbenzene polymer or porous carbon). The fiber is attached to a stainless steel plunger sheathed by a protective needle.

The SPME operating steps are simple:

Sample Extraction

- With the fiber retracted, pass the needle through the sample vial septum.
- Depress the plunger to expose the fiber to the liquid sample or the headspace above the sample.
- Analytes adsorb to the fiber in 2 to 30 minutes.
- Retract the fiber into the needle and remove the needle from the sample vial.

GC Analysis

- Insert the needle into the GC injector port.
- Depress the plunger, exposing the fiber in the heated zone of the injector to desorb the analytes onto the column.
- Retract the fiber and remove the needle.

HPLC Analysis

- Insert the needle into the SPME/HPLC interface desorption chamber (injection valve in load position).
- Expose the fiber and close the sealing clamp.
- Switch the injection valve to “inject.” Mobile phase will flow through the chamber, desorb the analytes and carry them to the c
- Switch the injection valve to “load,” retract the fiber, and remove the needle.

[1] US patent no. 5,691,206. European patent #0523092. Technology licensed exclusively to Supelco.

Getting Started in SPME
Introduction to SPME

Choose a Fiber According to the Analytes You Want to Extract

In SPME, you can adsorb analytes from a liquid sample, by immersion or headspace extraction, or a solid sample, by headspace extraction, using a polymer-coated fused silica fiber. Analytes are desorbed from the fiber by exposing the fiber in the injection port of a GC or in the desorption chamber of an SPME/HPLC interface.

Determine the type of fiber you need according to the molecular weights and polarity of the analytes.

- Low molecular weight or volatile compounds usually require a 100µm polydimethylsiloxane (PDMS)-coated fiber.
- Larger molecular weight or semivolatile compounds are more effectively extracted with a 30µm PDMS fiber or a 7µm PDMS fiber.
- To extract very polar analytes from polar samples, use an 85µm polyacrylate-coated fiber.
- More volatile polar analytes, such as alcohols or amines, are adsorbed more efficiently and released faster with a 65µm polydimethylsiloxane/divinylbenzene (PDMS/DVB)-coated fiber.
- A 60µm PDMS/DVB fiber is a general purpose fiber for HPLC.
- For trace-level volatiles analysis, use a 75µm PDMS/Carboxen fiber.
- For an expanded range of analytes (C3-C20), use a 50/30 divinylbenzene/Carboxen on PDMS fiber.

Most of these fibers are compatible with HPLC solvents, but the 100µm, 30µm, and 7µmPDMS-coated fibers cannot be used with hexane.

SPME fiber holders are available in two versions, one for manual use and one for use with autosamplers or with our SPME/HPLC interface. Both versions include the following features:

- A handtight needle hub assembly for quick interchange of fibers.
- A window in the barrel, to identify the fiber by its color-coded hub.

The manual holder has an adjustable needle gauge that controls the depth of fiber introduction into the sample vial or injection port. A spring retracts the fiber into the protective needle and a locking mechanism secures the fiber in the exposed position during extraction or desorption.

The automated holder is similar in design to the manual version. The autosampler controls fiber movement, allowing automatic sample extraction.

The automated holder also is required for use with an SPME/HPLC interface.

A specialized type of manual SPME holder, the SPME portable sampler, allows you to concentrate organics from air or water, in the field, then store them for transport to the laboratory.

Some typical applications for SPME are:

- Surfactants, other industrial applications
- Headspace analysis of trace impurities in polymers and solid samples
- Environmental analyses of water samples
- Flavor analyses of food products
- Forensic analyses of arson/explosives samples
- Toxicology analyses: blood alcohol or drugs in urine/serum
- ppt odor analyses

SPME Products and Accessories
Fiber Assemblies and Holders

SPME Fiber Assemblies

SPME fiber assemblies can be reused for up to 100 analyses, or more, depending on the application and the care they are given. For reuse, simply condition with solvent or heat before and after every analysis. Each assembly has a color-coded or notched hub in the type of coating on the fiber. Choose the assembly that is appropriate for the holder: manual or autosampler/HPLC. SPME users must order both a holder and a fiber assembly.

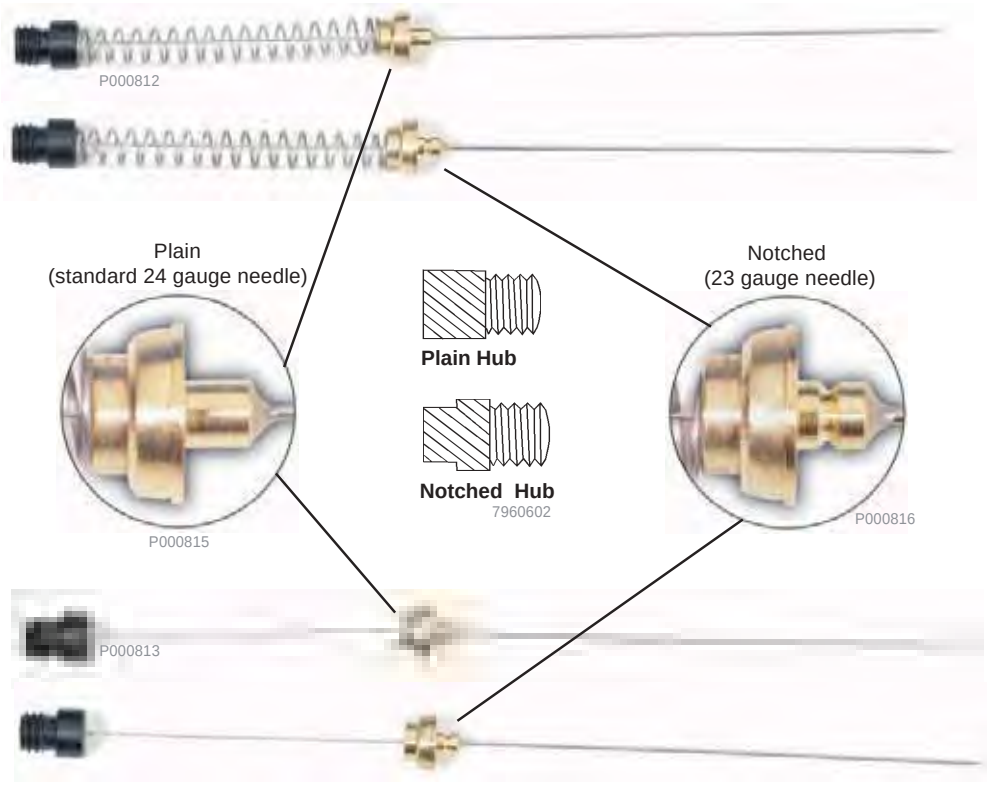
SPME Fiber Assemblies (pk. of 3)

Fibers are 1cm long unless noted otherwise.

DESCRIPTION	FIBER GAUGE	MANUAL, USED WITH FIBER HOLDER 57330-U CAT. NO.	PRICE	AUTOMATIC/HPLC, USED WITH FIBER HOLDER 57331 OR 57347 CAT. NO.	PRICE
FOR GASES AND LOW MOLECULAR WEIGHT COMPOUNDS (MW 30-225)					
75µm Carboxen/polydimethylsiloxane [3]	24	57318		57319	
75µm Carboxen/polydimethylsiloxane [3]	23[4]	57344-U		57343-U	
85µm Carboxen/polydimethylsiloxane on a StableFlex fiber [6]	24	57334-U		57335-U	
FOR VOLATILES (MW 60-275)					
100µm polydimethylsiloxane [1]	24	57300-U		57301	
100µm polydimethylsiloxane [1]	23[4]	57342-U		57341-U	
FOR VOLATILES, AMINES, AND NITROAROMATIC COMPOUNDS (MW 50-300)					
65µm polydimethylsiloxane/divinylbenzene [3]	24	57310-U		57311	
65µm polydimethylsiloxane/divinylbenzene [3]	23[4]	57346-U		57345-U	
65µm polydimethylsiloxane/divinylbenzene on a StableFlex fiber [5]	24	57326-U		57327-U	
FOR POLAR SEMIVOLATILES (MW 80-300)					
85µm polyacrylate [3]	24	57304		57305	
FOR NONPOLAR HIGH MOLECULAR WEIGHT COMPOUNDS (MW 125-600)					
7µm polydimethylsiloxane [2]	24	57302		57303	
FOR NONPOLAR SEMIVOLATILES (MW 80-500)					
30µm polydimethylsiloxane [1]	24	57308		57309	
FOR ALCOHOLS AND POLAR COMPOUNDS (MW 40-275)					
65µm Carbowax/divinylbenzene [3]	24	57312		57313	
70µm Carbowax/divinylbenzene on a StableFlex fiber [5]	24	57336-U		57337-U	
70µm Carbowax/divinylbenzene on a StableFlex fiber [5]	23[4]	57338-U		57339-U	
FOR FLAVORS (VOLATILES AND SEMIVOLATILES, C3-C20) (MW 40-275)					
50/30µm divinylbenzene/Carboxen on polydimethylsiloxane on a StableFlex fiber [5]	24	57328-U		57329-U	
FOR TRACE LEVEL (MW 40-275)					
50/30µm divinylbenzene/Carboxen on polydimethylsiloxane on a 2cm StableFlex fiber [5]	24	57348-U		—	—
FOR AMINES AND POLAR COMPOUNDS (HPLC USE ONLY)					
60µm polydimethylsiloxane/divinylbenzene [3]	24	—	—	57317	
FOR SURFACTANTS AND OTHER POLAR ANALYTES (HPLC USE ONLY)					
50µm Carbowax/templated resin [3]	24	—	—	57315	

[1] Nonbonded phase.
[2] Bonded phase.
[3] Partially crosslinked phase.
[4] Designed for use with Merlin Microseal sealing system; also can be used with other septumless systems.
[5] Coating bonded to a flexible fused silica core, yielding a more stable coating on a less breakable fiber. There may be a slight difference in extraction selectivity compared to the same coating on a standard fused silica core. 2cm fiber assembly contains no spring.
[6] High retention for trace analysis.

Fiber Assembly Used With SPME Holder 57330-U (For Manual Use)



Fiber Assembly Used With SPME Holders 57331 and 57347-U

SPME Fiber Assortment Kits – 24-gauge fibers, 1 fiber of each type as listed.

DESCRIPTION	USED WITH FIBER HOLDER 57330-U CAT. NO.	PRICE	USED WITH FIBER HOLDER 57331 or 57347-U CAT. NO.	PRICE
SPME StableFlex Fiber Assortment Kit 65µm PDMS/DVB coating 50/30µm DVB/Carboxen/PDMS coating 85µm Carboxen/PDMS coating 70µm Carbowax/DVB coating	57550-U		57551-U	
Kit 1 – For Volatiles and Semivolatiles 85µm polyacrylate coating 100µm polydimethylsiloxane coating 7µm polydimethylsiloxane coating	57306		57307	
Kit 2 – For Volatile or Polar Organics in Water 75µm Carboxen/polydimethylsiloxane coating 65µm polydimethylsiloxane/divinylbenzene coating 65µm Carbowax/divinylbenzene coating	57320-U		57321-U	
Kit 3 – For SPME/HPLC Analysis 60µm polydimethylsiloxane/divinylbenzene coating 50µm Carbowax/templated resin coating 100µm polydimethylsiloxane coating	—	—	57323-U	
Kit 4 – For Flavors and Odors 100µm polydimethylsiloxane coating 65µm polydimethylsiloxane/divinylbenzene coating 75µm Carboxen/polydimethylsiloxane coating	57324-U		57325-U	

RELATED INFORMATION

Applications involving SPME are included in the Applications section at the end of this chapter. Titles of our SPME publications appear before the Applications section. For a list of SPME journal articles, contact our Technical Service chemists, or visit our web site: www.sigma-aldrich.com/supelco

SPME Products and Accessories

SPME Samplers

SPME Fiber Holders

The holder protects the coated fiber, and controls exposure of the fiber during analyte adsorption and desorption. The holder is reusable indefinitely and accepts the replaceable fiber assembly. First time users must order both a holder and a fiber assembly.

Fiber Holder for Manual Sampling

An adjustable depth guide positions the fiber for sampling and for correct placement in the heated zone of the GC injection port. The fiber can be locked in the exposed position.

Fiber Holder for Automated Sampling or HPLC Analysis

Use this fiber holder with a Varian 8100/8200 AutoSampler or with our SPME/HPLC interface. An SPME upgrade kit is necessary for operation with the Varian AutoSampler – contact Varian Instrument Division for information concerning system requirements.

Fiber Holder for CTC Combi PAL Autosampler*

Use this holder with SPME fiber assemblies that are designed for automated sampling.

SPME Portable Field Sampler

Concentrate and Store Analytes from Water; Sample Indoor Air - The SPME portable field sampler is an efficient and economical way of extracting and transporting volatile and semivolatile compounds from field samples. Extracted compounds are safely sealed behind a replaceable septum. Table 1 shows that storage losses for pesticides extracted and stored using a portable field sampler were significantly lower than losses from stored whole water samples. The sampler can be reused 50-100 times, and is disposed of when the fiber is no longer usable.

The portable field sampler also efficiently detects organic compounds in air. In our studies, the sampler allowed us to monitor typical HPLC and GC solvents at ppb levels in laboratory air. Four fibers are available: a polydimethylsiloxane (PDMS)/Carboxen fiber for trace levels of volatiles, a general purpose PDMS fiber, a PDMS/DVB fiber for semi-volatiles and larger volatiles, and a Carbowax/DVB fiber for polar semivolatiles.

Five slots in the needle guide/depth gauge control the depth of needle insertion into a sample container, or into the injection port during fiber desorption.

* Autosampler distributed by Varian, Leap, and Gerstel

DESCRIPTION	CAT. NO.	PRICE
Fiber Holder		
For Manual Sampling	57330-U	
For Varian Autosampler or HPLC Analysis	57331	
For CTC Autosampler	57347-U	
SPME Portable Field Samplers (pk. of 2)		
75µm PDMS/Carboxen Fiber	504831	
100µm PDMS Fiber	504823	
65µm PDMS/DVB StableFlex Fiber	57359-U	
70µm Carbowax/DVB	57340-U	
Replacement Septa (pk. of 100)	20638	
SPME Septum Removing Tool	504858	

Fiber holder disassembles for fiber replacement

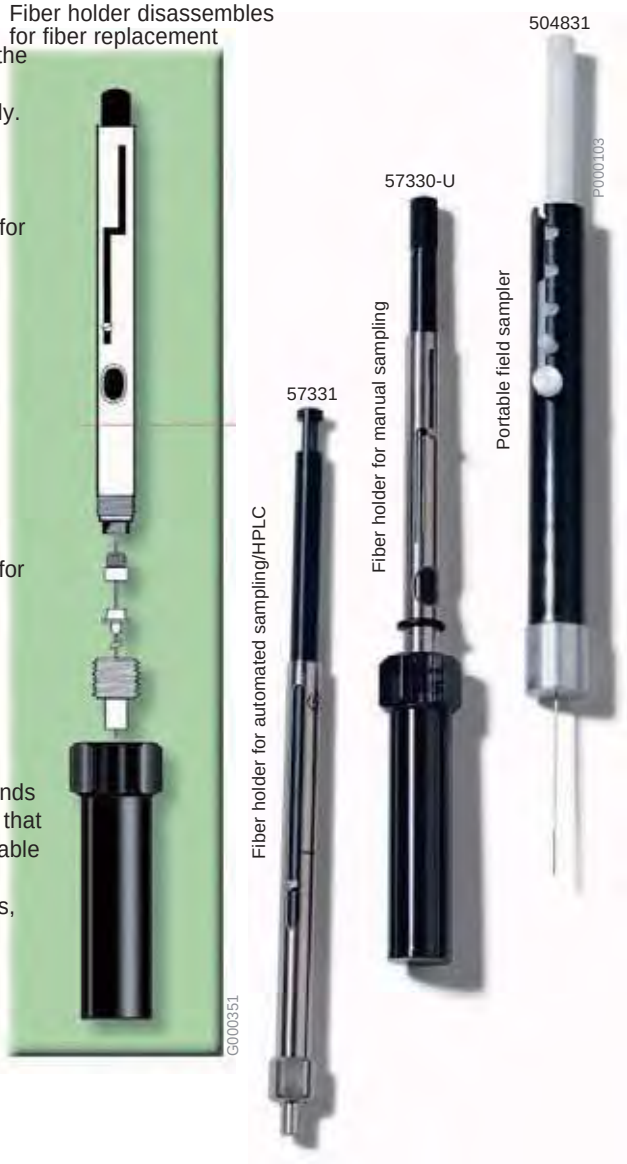


Table 1. Recovery of Pesticides Extracted/Stored in SPME Field Sampler is Much Higher than for Stored Water Samples

	% LOSS ON STORAGE[1]			% LOSS ON STORAGE	
ANALYTE	SPME FIBER[2]	STORED WATER[3]	ANALYTE	SPME FIBER	STORED WATER
Atrazine	-15	-57	Methoxychlor	-14	-88
DDE	-12	-98	Methyl parathion	-7	-68
Disulfoton	-8	-93	Parathion	-15	-83
Endrin ketone	-10	-82	Phorate	-3	-84
Famphur	-3	-60	Simazine	-10	-53
Heptachlor epoxide	-12	-83	Sulfotep	+4	-81
Lindane	-2	-74	TEPP	-8	-54
Malathion	-6	-74	Thionazin	-3	-68
			Mean	-8%	-75%

[1] Relative to immediate analysis. 10ppb each pesticide in water.

[2] Pesticides extracted by SPME and stored on PDMS fiber (24 hours / 4°C).

[3] Water sample stored in a silanized vial (24 hours / 4°C), then extracted by SPME.

SPME/HPLC Interface for Easy HPLC Analyses with SPME

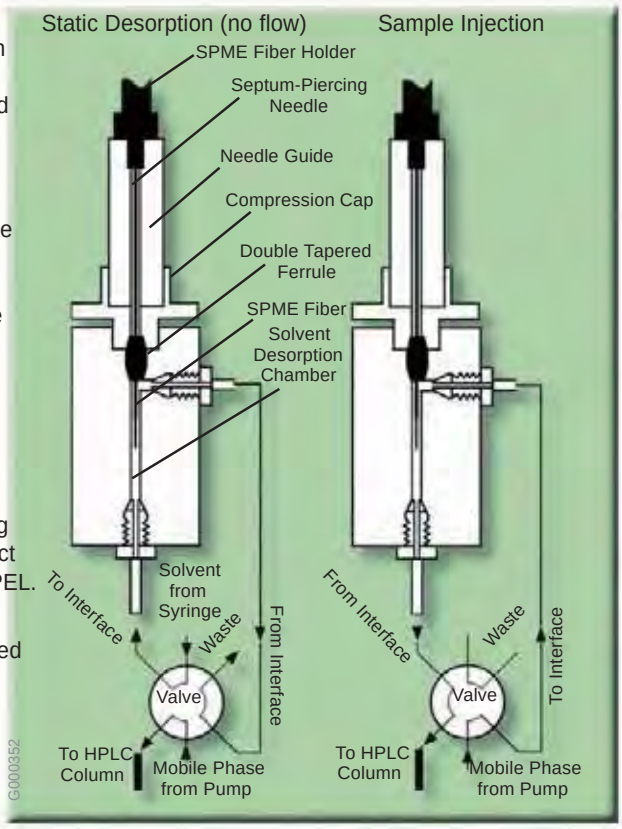
Investigators in several laboratories have shown that SPME can be effective for monitoring drugs and drug metabolites in biological fluids – and SPME also has pharmacological and food and beverage applications.

The SPME/HPLC interface enables HPLC analysts to take advantage of the time and cost savings offered by SPME. The interface allows mobile phase to contact the SPME fiber, remove the adsorbed analytes, and deliver them to the column for separation. The interface consists of a six-port injection valve and a desorption chamber that replaces the injection loop in the HPLC system. Easily installed and removed, the desorption chamber includes a PEEK (polyetheretherketone) needle guide, a stainless steel body and compression cap, a double-tapered VESPEL ferrule, and a sealing clamp.

The SPME fiber is introduced into the desorption chamber with the injection valve in the "load" position. The unit is made leak-tight (to 5000psi/35mPa) by closing the clamp and compressing the ferrule against the SPME needle. All surfaces which contact the SPME fiber or the mobile phase are stainless steel or VESPEL.

Analytes often can be removed via a stream of mobile phase (dynamic desorption). When analytes are more strongly adsorbed to the fiber, the fiber can be soaked in mobile phase before the material is injected onto the column (static desorption).

SPME/HPLC Interface: Operation



SPME/HPLC Interface, Replacement Parts, and Accessories

DESCRIPTION	CAT. NO.	PRICE
SPME/HPLC Interface (includes 2 ferrules)		
Rheodyne valve version	57353	
Ferrules (pk. of 10)	57351	
Rotor seal for Rheodyne valve 7125	58830-U	
Rhebuild kit for Rheodyne valve 7125	55045	
SPME holder for HPLC use[1]	57331	
Fiber assemblies for HPLC use[1]		
60µm polydimethylsiloxane/divinylbenzene, for drugs, vitamins, preservatives, general purpose	57317	
50µm Carbowax/templated resin, for surfactants	57315	
85µm polyacrylate, for polar semivolatiles	57305	
100µm polydimethylsiloxane, for volatiles	57301	
Fiber Kit 3 (one fiber of each)		
50µm Carbowax/templated resin, 60µm polydimethylsiloxane/divinylbenzene, 100µm polydimethylsiloxane	57323-U	

[1] First time users must order both holder and fiber assembly. Holder is reusable indefinitely.

RELATED INFORMATION

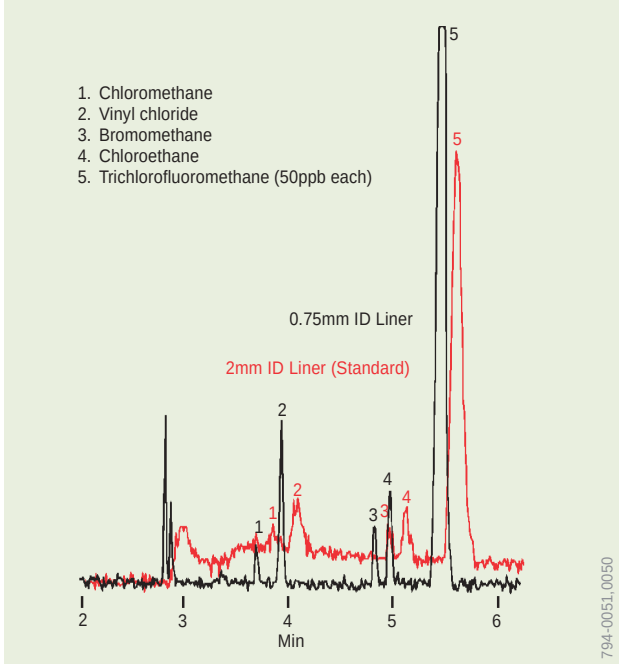
For more information about SPME/HPLC analyses, request the following publications:

No.	Title
T396098	SPME for Explosives
T396099	SPME for PAHs
T396106	SPME for Surfactants
T396110	SPME for Food Antioxidants and Preservatives
T397121	SPME for Carbamates

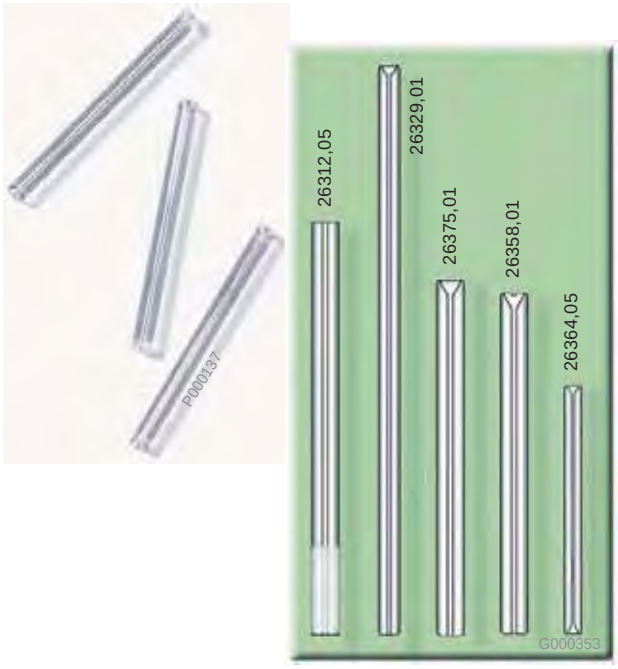
SPME Products and Accessories

SPME / GC Inlet Liners

FIGURE A. NARROW BORE INLET LINERS MAKE SPME/GC PEAKS SHARPER



Fiber: PDMS, 100µm
Cat. No.: 57300-U
Column: VOCOL, 60m x 0.25mm ID x 1.5µm ID
Cat. No.: 24154
Oven: 35°C
Carrier: helium, 40cm/sec
Inj.: 230°C



Achieve Sharper Peaks with SPME/GC Analyses, Using Supelco Inlet Liners

GC injection port liners are designed for optimum sample introduction for specific injection techniques. When analyzing by SPME/GC, a 0.75mm ID inlet liner increases linear velocity, compared to a conventional, larger volume 2mm ID liner, and rapidly introduces analytes onto the column in a narrow band. The sharp peaks obtained with the 0.75mm ID liner also demonstrate that the compounds are rapidly desorbed from the fiber (Figure A).

To minimize sample loss or peak tailing, the inlet liner must be inert. Our proprietary, high-temperature silanization technique thoroughly deactivates Supelco inlet liners to minimize adsorption of active sample components. Using the appropriate inlet liner, combined with efficient, solvent-free sample introduction by SPME, helps to achieve excellent chromatography.

Inlet Liners for SPME

DESCRIPTION	CAT. NO.	PRICE
AGILENT/HP (5880, 5890 SERIES, 6890)		
Each	26375,01	
pk. of 5	26375,05	
pk. of 25	26375,25	
VARIAN 1075/1077 INJECTORS		
Each	26358,01	
pk. of 5	26358,05	
pk. of 25	26358,25	
VARIAN 1078/1079 SPLITLESS		
Each	26378,01	
pk. of 5	26378,05	
VARIAN 1093/1094 SPI INJECTORS		
Each	26364,01	
pk. of 5	26364,05	
pk. of 25	26364,25	
PERKIN-ELMER		
(Auto System Split/Splitless Injector)		
pk. of 5	26312,05	
SHIMADZU GC MODELS 9A/15A/16		
(SPL-G9/15 Injector)		
Each	26329,01	
pk. of 5	26329,05	
pk. of 25	26329,25	
SHIMADZU GC MODELS 14/15A/16 (SPL-14 INJECTOR)		
Each	26335,01	
pk. of 5	26335,05	
pk. of 25	26335,25	
SHIMADZU GC MODELS 17A (SPL-17 INJECTOR)		
Each	26339,01	
pk. of 5	26339,05	
pk. of 25	26339,25	
SPME INSERTS		
Flash On-Column, Varian SPME Injector		
pk. of 5	26364,05	

RELATED INFORMATION

For more information about analysis of VOCs by SPME/GC, request Application Note T394056. For more information on inlet liners, request T196899.

SPME Products and Accessories

SPME Accessories

Manual SPME Sampling Stand

Holds eight vials while supporting the SPME syringe for consistent fiber immersion depth. Cat. No. 57333-U accommodates 4mL vials only; Cat. No. 57357-U accommodates 15mL vials. Order the 15mL vial puck (Cat. No. 57358-U) as a replacement for the 15mL unit, or to use 15mL vials with the 4mL unit. Not for use with automated / HPLC fiber holders.

Heat/Stir Plate

Fits compactly on the base of the SPME sampling stand. Heating range is 40-550°C, stirring range is 60-1200rpm.

40mL Vial Holder

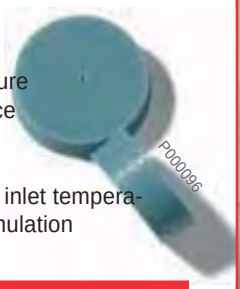
Use this aluminum block for heating/stirring during headspace SPME sampling of odors or other volatiles. Holds six 40mL vials.

Thermometer

For monitoring sample temperature when using the SPME sampling stand and a heat/stir plate.

DESCRIPTION	CAT. NO.	PRICE
SPME sampling stand for 4mL vials	57333-U	
SPME sampling stand for 15mL vials	57357-U	
Vial puck for 15mL vials	57358-U	
40mL Vial Holder	33313-U	
Corning heat/stir plate, 120VAC	Z262129-1EA	
Thermometer, 5”	57332	

Pre-Drilled Thermogreen LB-2 Septa for SPME



Easier needle penetration and high puncture tolerance – ideal for autosamplers. Reduce septum coring that can cause extraneous peaks. Already conditioned, ready-to-use. Extremely low bleed over a wide range of inlet temperatures – from 100°C to 350°C. Rubber formulation exclusive to Supelco.

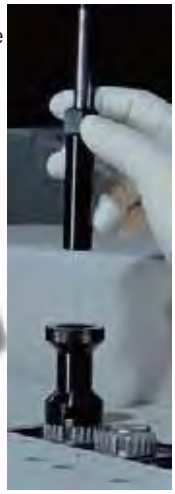
DESCRIPTION	CAT. NO.	PRICE
9.5mm (pk. of 25)	23161	
9.5mm (pk. of 50)	23162-U	
11mm (pk. of 25)	23167	
11mm (pk. of 50)	23168	

SPME Inlet Guide

Secures the SPME fiber holder in the injection port during the thermal desorption process. Interchangeable among Merlin Microseal sealing system and most Varian and Hewlett-Packard chromatographs.

DESCRIPTION	CAT. NO.	PRICE
SPME inlet guide	57356-U	

SPME Inlet Guide



P000047

Merlin Microseal High Pressure Septa

Eliminate siloxane background, prolong septum lifetime. To eliminate septum coring during SPME injections, use the Merlin Microseal system, a patented long-life replacement for the standard septum and septum nut on a capillary or purged packed inlet system. Two sequential seals provide a much longer life than conventional septa. The new high pressure units allow operation at 2-100psi. Use only with 23 gauge SPME fiber assembly.

DESCRIPTION	CAT. NO.	PRICE
FOR AGILENT/HP GC MODELS 5800, 5900 SERIES, 6890		
1 nut and 2 septa	24814-U	
1 nut and 1 septum	24815-U	
1 replacement septum	24816-U	
FOR VARIAN GC MODELS 3400, 3800 (1078, 1079 INJECTORS)		
1 Varian nut, 1 septum, & 1 inlet adapter	24817-U	
1 replacement septum	24818-U	

SPME Products and Accessories

SPME Accessories

Vials for Varian 8200 Autosampler

DESCRIPTION	QTY.	CAT. NO.	PRICE
LARGE OPENING 2ML VIALS (12MM OD X 32MM) WITH POLYPROPYLENE CAPS, PTFE/SILICONE SEPTA			
Clear, 2mL	100	27531	
Amber, 2mL	100	27532	
10ML SAMPLE HEADSPACE VIALS 24.5MM X 50MM (FOR THIN SEALS DESIGNED FOR SPME)			
Clear vials only, 10mL Crimped top	36	27385	
Clear vials only, 10mL Crimped top	144	27286	
CLOSURES FOR 10ML VIALS			
20mm seal with thin Viton septa (0.030")	36	33146-U	
20mm seal with thin Viton septa (0.030")	100	27245	
20mm PTFE/silicone septa (0.030")	100	27539	

Headspace Vials for CTC Autosampler (Combi PAL)*

DESCRIPTION	QTY.	CAT. NO.	PRICE
FLAT BOTTOM			
10mL clear glass (23mm x 46mm)	100	27198	
20mL clear glass (23mm x 75mm)	100	27199	
ROUND BOTTOM			
10mL clear glass (22.6mm x 46mm)	100	27294	
10mL clear glass (22.6mm x 46mm)	1000	27295	
20mL clear glass (22.6mm x 75mm)	100	27296	
20mL clear glass (22.6mm x 75mm)	1000	27297	
CLOSURES AND ACCESSORIES FOR BOTH 10mL AND 20mL VIALS			
Closures (Tin Plate, Magnetic Seals) with PTFE lined silicone	100	27300	
Adjustable crimper for 20mm seals (5-100mL)	1	22316-U	

*Autosampler distributed by Leap, Varian and Gerstel

Vials for SPME Sampling Stand

DESCRIPTION	QTY.	CAT. NO.	PRICE
WITH 4ML VIAL HOLDER PUCK			
4mL screw top vials (15mm x 45mm)			
Clear, preassembled, phenolic caps & PTFE/silicone	100	27136	
Amber, preassembled, phenolic caps & PTFE/silicone	100	27006	
Vials only, clear	100	27111	
Vials only. clear	1000	27031	
Vials only, amber	100	27115-U	
Vials only, amber	1000	27032	
Vials only, clear silanized	100	27114	
Vials only, clear silanized	1000	27220-U	
Vials only, amber silanized	100	27217	
Open closures and septa for 4mL vials			
Phenolic cap with hole	100	27120-U	
White PTFE silicone septa (11mm)	100	27356	
White PTFE silicone septa	1000	27369-U	
Viton Septa (11mm)	100	27351	
Viton Septa	1000	27364	
WITH 15ML VIAL HOLDER PUCK			
15mL screw top vials (21mm x 70mm)			
Clear, preassembled, phenolic caps & PTFE /silicone	100	27159	
Amber, preassembled, phenolic caps & PTFE/ silicone	100	27008	

Vials for 40mL Heating Block

DESCRIPTION	QTY.	CAT. NO.	PRICE
40ML SCREW TOP VIALS(29MM X 81MM ONLY)			
Clear, preassembled, phenolic cap and PTFE/silicone	100	27180	
Amber, preassembled, phenolic cap and PTFE/silicone	100	27010-U	
Vial only, clear	100	27184	
Vial only, amber	100	27185-U	
CLOSURES FOR 40ML VIAL			
Phenolic caps with hole	100	27187	
Viton septa (22mm)	100	27355	
PTFE/Silicone septa	100	27188-U	

RELATED INFORMATION

No. Title

Biochemical / Food and Beverage

T195869 Solid Phase Microextraction: Solventless Sample Preparation for Monitoring Flavor Compounds by Capillary Gas Chromatography (AYM)
T196901 Solid Phase Microextraction/Capillary GC Analysis of Drugs, Alcohols, and Organic Solvents in Biological Fluids (AYY)
T396110 SPME Reduces Extraction Time in HPLC Analyses of Food Antioxidants and Preservatives
T397140 Analysis of Fat Soluble Vitamins from Tablets, Using SPME/HPLC (BKK)
T398147 Solid Phase Microextraction of Odors in Drinking Water, for Analysis by GC/MS (BRG)

Pharmaceutical

T394062 Monitor Organic Volatile Impurities (OVIs) in Pharmaceutical Products, Using Solid Phase Microextraction/Capillary GC (AQX)

Forensic

T196901 Solid Phase Microextraction/Capillary GC Analysis of Drugs, Alcohols, and Organic Solvents in Biological Fluids (AYY)
T198922 SPME/GC for Forensic Applications: Explosives, Fire Debris, and Drugs of Abuse (BQS)
T394061 Solid Phase Microextraction/Capillary GC: Rapid, Sensitive Detection of Gasoline in Fire Debris (AQW)
T396098 SPME / HPLC Interface Combines Fast Sample Extraction with Efficient Analysis for Explosives (ASE)

Environmental

T394011 Solid Phase Microextraction of Volatile Compounds in US EPA Method 524.4 (AOM)
T394017 Polyacrylate Film Fiber for Solid Phase Microextraction of Polar Semivolatiles from Water (AOS)
T394056 Fast Analysis of Volatile Organic Compounds by Solid Phase Microextraction/Capillary GC (AQL)
T394058 Fast Screening for Chlorinated Pesticides by Solid Phase Microextraction/Capillary GC (AQN)
T395081 Monitor BTEX Compounds and Fuels in Water, Using Solid Phase Microextraction and Capillary GC (ARO)
T395085 Solid Phase Microextraction/Capillary GC Analysis of Nitrogen-Containing Herbicides in Water (ARS)
T396094 Solid Phase Microextraction of Organophosphate Insecticides and Analysis by Capillary GC/MS (ASB)
T396099 SPME / HPLC: A Rapid and Sensitive Analysis of Polynuclear Aromatic Hydrocarbons in Water (ASF)
T396106 Analysis of Surfactants in Water by SPME/HPLC
T397121 Solid Phase Microextraction for HPLC Analysis of Carbamate and Urea Pesticides (BGU)
T397141 Air Sampling of VOCs Using SPME for Analysis by Capillary GC (BKF)
T397143 Field Sampling for Pesticides, Using Solid Phase Microextraction/Capillary GC (BJT)
T398147 Solid Phase Microextraction of Odors in Drinking Water, for Analysis by GC/MS (BRG)

Lab Hints and Selection Guides

T101928 SPME Troubleshooting Guide
T101929 A Practical Guide To Quantitation with SPME
T198923 Solid Phase Microextraction: Theory and Optimization of Conditions
T199925 SPME Applications CD-ROM
T396098 SPME / HPLC Interface Combines Fast Sample Extraction with Efficient Analysis for Explosives (ASE)
T413019 Solid Phase Microextraction – Fiber Assemblies and Accessories (AIM)
T496037 Solid Phase Microextraction Sampling Stand (AWS)
T496049 SPME / HPLC Interface (AWV)
T497105 SPME Portable Field Sampler with Carboxen/PDMS Fiber (BIZ)
T497174 SPME Portable Field Sampler with 100µm PDMS Fiber (BKL)

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