General Information for Agilent Smart SPME Fibers

PDMS - 7 µm

PDMS - 30 µm

PDMS - 100 µm

Acrylate - 85 µm

Carbon WR - 95 µm

DVB/PDMS - 65 µm

DVB/PDMS/Carbon WR - 80 µm (50 µm/30 µm)

This user guide contains important notes for the operator. It is highly recommended for operators to become familiarized with the product before use.

– PAL3 Firmware 3.1 or higher is required for the use of Smart SPME Fibers with the complete scope of functions.

– The use of the SPME Arrow Conditioning Module (also compatible with SPME fibers) and the Agitator is essential

Table 1. Ordering information. All Agilent Smart SPME fibers have a standard length of 10 mm. The core material is fused silica.

No.	Stationary Phase	Color Code	Set of 3 Smart Fibers Description Part Number
PDMS Smart SPME Fiber			
1	7 µm	Green	5610-5870
2	30 µm	Golden	5610-5871
3	100 µm	Red	5610-5872
Acrylate Smart SPME Fiber			
4	85 µm	Gray	5610-5876
Carbon WR/PDMS SPME Smart Fiber			
5	95 µm	Dark blue	5610-5875
DVB/PDMS Smart SPME Fiber			
6	65 µm	Violet	5610-5873
DVB/PDMS/Carbon WR Smart SPME Fiber			
7	80 µm (50 µm/30 µm)	Dark gray	5610-5874
Smart Fiber Selections for Method Development			
Fiber Selection of Smart SPME Fiber No. 3, 4, 5, 6 and 7			5610-5878
Fiber Selection of Smart SPME Fiber No. 1, 2, 3, 4 and 5			5610-5879

PDMS = Polydimethylsiloxane; Acrylate = Polyacrylate; Carbon WR = Carbon Wide Range; DVB = Divinylbenzene

Using Agilent Smart SPME fibers

– Set the PAL gas input pressure to 2 bar when using Conditioning Module(s). This enables a conditioning gas flow above 15 mL/min to be reached.

– Do not extend conditioning times longer than necessary.

– The lifetime of SPME fiber phase will decrease if exposed to maximum temperature for longer periods. Depending on your application, choose the lowest necessary temperature, not the highest possible.

– Operating temperatures include conditioning and desorption temperatures in the injector.

– Conditioning times can be applied for pre- and postconditioning.

– For liquid immersion sampling, a liquid wash step may help to reduce carryover.

– Prevent permanent storage at conditioning temperatures.

– For Agilent GCs, injector penetration depth is defaulted to 40 mm. Note that the optimal penetration depth may vary depending on other injector types.

– Early leakage of septa may occur if injector nuts are not tight enough or overtightened.

– Please refer to Table 3 for recommended consumables for use with Smart SPME fibers.

Conditioning and cleaning for Agilent Smart SPME fibers

Caution: Without gas protection, the Smart SPME fiber surface will be damaged if exposed to elevated temperatures.

Smart SPME fiber preconditioning

Before analytical use, it is mandatory to precondition each Smart SPME fiber at a specified temperature in an inert gas phase environment.

Generally, it is recommended to precondition the Smart SPME fiber 20 °C above the planned operating temperature, but not above the maximum allowed temperature of the specific Smart SPME fiber. The life span of the fiber can be extended if the fiber is not unnecessarily preconditioned at maximum temperature. Recommended temperatures and conditioning times are provided in Table 2.

Running a preconditioning step is highly recommended if the Smart SPME fiber has been stored without protection, been unused for a prolonged period, or if obvious dust particles are sticking to the Smart SPME fiber.

Table 2. Operational parameters.

No.	Phase Thickness	Max. Temp. (°C)	Recommended Operating Temperature (°C)	Preconditioning Temperature (°C) Min | Max	Preconditioning Time (min) Min | Max | Recom.	Conditioning Temperature (°C) Min | Max	Conditioning Time (min) Min | Max | Recom.	Fiber Rinsing Solvent	Fiber Rinsing Time (min) Min | Max | Recom.
PDMS Smart SPME Fiber									
1	7 µm	340	200 to 340	200 | 340	15 | 120 | 30	200 | 340	1 | 60 | 5	MeOH | EtOH | IPA	0.5 | 10 | 2
2	30 µm	280	200 to 280	180 | 280	15 | 120 | 30	180 | 280	1 | 60 | 5	MeOH | EtOH | IPA	0.5 | 10 | 2
3	100 µm	280	200 to 280	180 | 280	15 | 120 | 30	180 | 280	1 | 60 | 5	MeOH | EtOH | IPA	0.5 | 10 | 2
Polyacrylate Smart SPME Fiber									
4	85 µm	280	200 to 250	180 | 280	15 | 120 | 30	180 | 280	1 | 30 | 5	MeOH | aliphatic HC	0.5 | 2 | 1
Carbon WR / PDMS Smart SPME Fiber									
5	95 µm	300	220 to 300	200 | 300	15 | 120 | 60	200 | 300	1 | 60 | 10	MeOH | EtOH | IPA	0.5 | 10 | 2
DVB / PDMS Smart SPME Fiber									
6	65 µm	300	220 to 300	200 | 300	15 | 120 | 60	180 | 280	1 | 60 | 10	MeOH | EtOH | IPA	0.5 | 10 | 2
DVB / Carbon WR / PDMS Smart SPME Fiber									
7	80 µm (50 µm/30 µm)	300	220 to 300	200 | 300	15 | 120 | 60	180 | 280	1 | 60 | 10	MeOH | EtOH | IPA	0.5 | 10 | 2

MeOH = Methanol; EtOH = Ethanol; IPA = Isopropanol (2-propanol); aliphatic HC = aliphatic hydrocarbons (e.g. *n*-Hexane)

Smart SPME fiber conditioning

It is highly recommended to condition the Smart SPME fiber after thermal desorption of the analytes has been completed. This conditioning is a preparatory step for the next analytical run. This helps to eliminate all possible contaminants from the fiber that have not been desorbed and transferred to the GC column.

To avoid contamination of the GC inlet system and/or the GC column, it is recommended to remove the Smart SPME fiber after the thermal desorption step from the GC injector and move the SPME Tool to a SPME Conditioning Module for the conditioning step.

The sorption phase surface area of the Smart SPME fiber can trap impurities from the ambient atmosphere if a fiber has been left in the open. Agilent recommends running a blank prior to running a series of analytical samples. Evaluating the baseline level of the GC detector helps to ensure that the entire system, such as the Smart SPME fiber, the GC inlet, the GC column, and detector, is free from any contaminants.

Smart SPME fiber rinsing

It is possible to clean the Smart SPME fiber using an organic solvent. The recommended types of solvents are listed in Table 2. Only use the referenced solvents, as other solvents can cause a swelling of the PDMS phase, which would lead to significant damage.

It is important that a Smart SPME fiber is not cleaned mechanically by any means; do not touch the fiber with fingers, not even when wearing gloves. The cleaning process can be done manually by dipping the fiber into a container filled with the appropriate solvent or in an automated manner by defining a vial for cleaning.

To avoid potential solvent mix-ups, do not use the wash or waste solvents from the PAL System wash module.

General remarks for Smart SPME fiber conditioning and cleaning

Table 2 summarizes the various parameters for conditioning and cleaning. The values provided are empirical values, which are suitable for a number of applications and give reliable results. The lifespan of a Smart SPME fiber depends greatly on the technique used and the type of application.

It is not possible to visually judge the Smart SPME fiber quality if there are no obvious signs of major mechanical damage, such as a fiber fracture.

Any sign of staining, caused by a starting vitrification of the surface in case of a PDMS fiber, or signs of a yellowish discoloration in the case of a polyacrylate fiber, does not give any indication on the remaining life span of the particular fiber.

To extend the lifetime of a Smart SPME fiber, exposure to high temperatures should be minimized. Do not exceed the maximum temperature for each fiber type, as shown in Table 2.

Mandatory tool and modules for the use of Smart SPME fibers

Agilent Smart SPME Fibers are compatible with the following tool and modules:
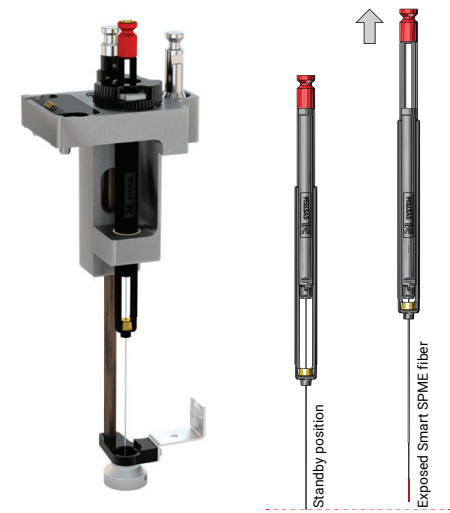
SPME Fiber Tool

Agilent Smart SPME fibers are fully functional with the PAL3 Series II System. The SPME Fiber Tool is compatible with both traditional SPME fibers and Smart SPME fibers. Smart SPME fibers do not require the use of a separate fiber holder. For the PAL3 System, the Smart SPME fibers allow a maximum needle penetration depth of 70 mm.

Note: This tool cannot be used with SPME Arrows, and is not compatible with previous PAL and PAL-xt Systems.

Agitator

An Agitator is mandatory to incubate, equilibrate, and extract samples either from headspace or liquid phase (direct immersion).

SPME Arrow Conditioning Module

The SPME Arrow Conditioning Module can be used for Smart SPME Arrows as well as for Smart SPME fibers. It offers the functionality to clean (bake-out) the inserted Smart SPME fiber in an inert gas phase after the analytical process to prepare it for the next analysis. This module is strongly recommended since it will help to protect the GC injection port from contamination and free up the port after thermal desorption.

Comparison between Smart SPME fiber and Smart SPME Arrow 1.1 mm and 1.5 mm

SPME Arrow is the enhanced version of SPME, offering higher robustness, larger surface and larger volume of the stationary phases. A comparison between a Smart SPME fiber and two Smart SPME Arrows with different diameters is shown in Figure 1.
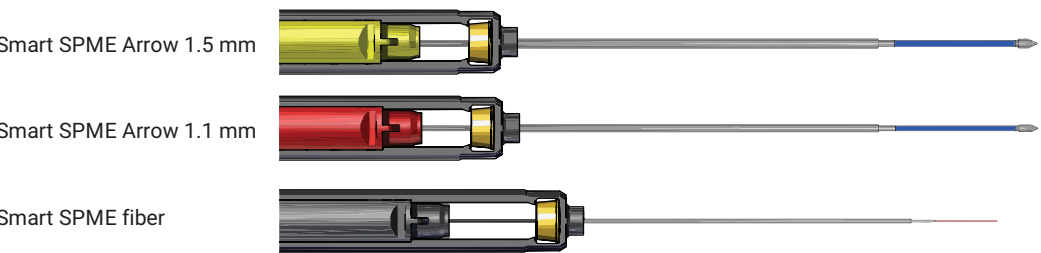

Figure 1. Agilent Smart SPME Arrows with 1.5 mm and 1.1 mm outer diameters, and Smart SPME fiber.

Table 3. Additional consumables for use with Agilent Smart SPME fibers.

Part Number	Description
5188-6537	Vial, screw top, headspace, amber, round bottom, 20 mL, 23 × 75 mm, 100/pk
5188-2753	Vial, screw top, headspace, clear, 20 mL, 23 × 75 mm, 100/pk
5188-2759	Caps/septa, screw, headspace, steel, high temperature septa, certified, 18 mm, 100/pk
5190-6168	Inlet liner, ultra inert, splitless, straight, 2 mm id
5183-4757-100	Inlet septa, bleed and temperature optimized (BTO), nonstick, 11 mm
5183-4759-100	Inlet septa, Advanced Green, nonstick, 11 mm
5182-3442	Merlin Microseal starter kit, general purpose (100 psi), includes nut and Microseal
5182-3445	Merlin Microseal 100 psi nut
5182-3444	Merlin Microseal general purpose (100 psi) replacement Microseal

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