APPLICATION OF LARGE VOLUME SPME FIBERS

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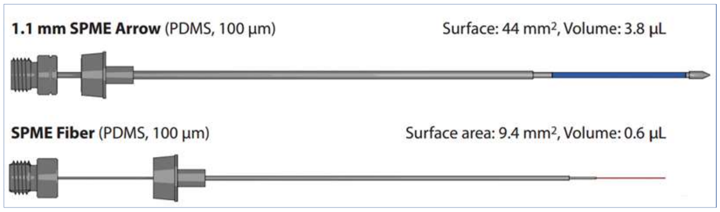
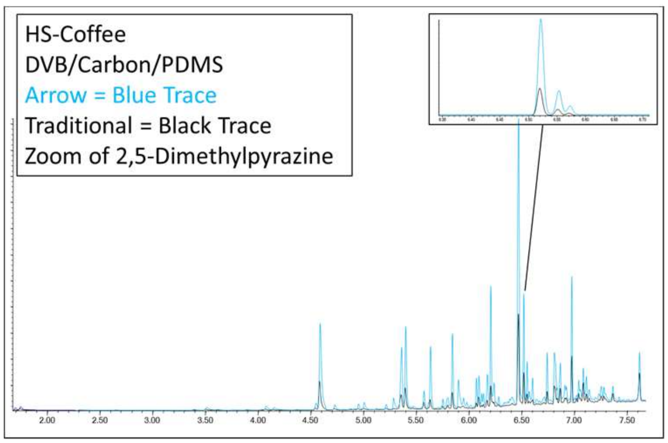
The SPME Arrow was designed to overcome 2 major short-comings associated with traditional SPME fibers: small phase volumes and limited mechanical robustness. The following figure provides a side-by-side comparison:

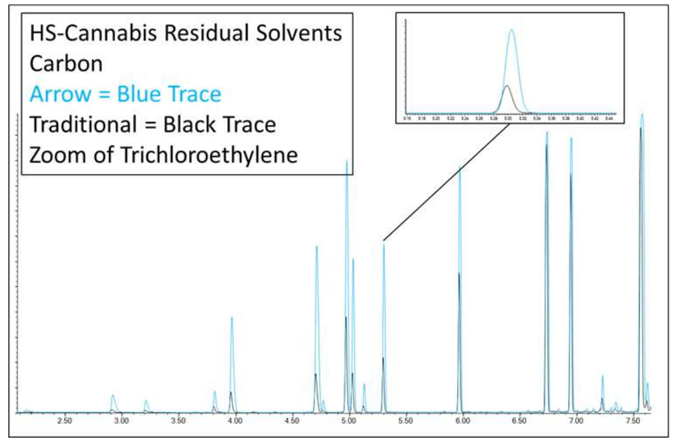


With over 4x the phase surface area and 6x the volume, SPME Arrows were compared head-to-head with traditional SPME fibers for the following applications:

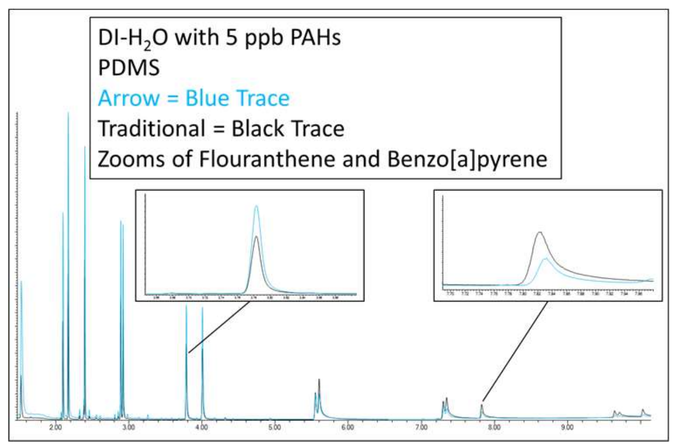


CTC RTC Parameters		Agilent 7890B/5977B GC-MS Parameters	
HS-SPME		**Inlet**	
SPME	DVB/Carbon/PDMS	250 °C	
Agitator Speed	250 rpm	Split 50:1	
Agitator Temperature	30 °C	Topaz 1.8 mm ID Straight/SPME Liner (cat.# 23280)	
Incubation Time	120 s		
Heatex Stirrer Speed	1000 rpm	**Column**	
Heatex Stirrer Temperature	30 °C	Rtx-VMS, 40 m, 0.18 mm ID, 1.00 µm (cat.# 49915)	
Extraction Time	480 s		
Vial Penetration Depth	35 mm	**Oven**	
Injector Penetration Depth	50 mm	Insert	GC Accelerator (cat.# 23849)
Desorption Time	10 s	Ramp	40 °C (hold 3 min) to 240 °C at 60 °C/min
Pre Conditioning	True		
Post Conditioning	False	**Carrier Gas**	
Conditioning Time	60 s	Type	Helium
Conditioning Temperature	280 °C	Mode	Constant Flow
Pre Conditioning	True	Flow Rate	1.44 mL/min
Post Conditioning	False		
Conditioning Time	60 s	**Detector**	
Conditioning Temperature	280 °C	Type	Single Quadrupole MS
		Mode	Scan 12.1 scans/sec (35 to 226 amu)
		Transfer Line Temp.	250 °C
		Source Temp.	230 °C
		Quad Temp.	150 °C
		Electron Energy	70 eV
		Tune Type	BFB
		Ionization Ode	EI

The SPME Arrow generated 4 – 6x the response of the traditional SPME fiber, which is consistent with the increase in phase surface area and volume. In addition, after hundreds of samples the SPME Arrow does not suffer the same fate as traditional SPME fibers:



CTC RTC Parameters		Agilent 7890B/5977B GC-MS Parameters	
HS-SPME		**Inlet**	
SPME	Carbon	250 °C	
Agitator Speed	250 rpm	Split 100:1	
Agitator Temperature	30 °C	Topaz 1.8 mm ID Straight/SPME Liner (cat.# 23280)	
Incubation Time	120 s		
Heatex Stirrer Speed	1000 rpm	**Column**	
Heatex Stirrer Temperature	30 °C	Rtx-VMS, 40 m, 0.18 mm ID, 1.00 µm (cat.# 49915)	
Extraction Time	240 s		
Vial Penetration Depth	35 mm	**Oven**	
Injector Penetration Depth	50 mm	Insert	GC Accelerator (cat.# 23849)
Desorption Time	5 s	Ramp	35 °C (hold 2 min) to 185 °C at 30 °C/min
Pre Conditioning	True		
Post Conditioning	True	**Carrier Gas**	
Conditioning Time	60 s	Type	Helium
Conditioning Temperature	280 °C	Mode	Constant Flow
		Flow	1.60 mL/min
		Detector	
		Type	Single Quadrupole HES-MS
		Mode	Scan 6.1 scans/sec (29 to 250 amu)
		Transfer	250 °C
		Source	230 °C
		Quad	150 °C
		Electron	70 eV
		Tune	BFB
		Ionization	EI



CTC RTC Parameters		Agilent 7890B/5977B GC-MS Parameters	
DI-SPME		**Inlet**	
SPME	100 µm PDMS	280 °C	
Agitator Speed	250 rpm	Split 10:1	
Agitator Temperature	30 °C	Topaz 1.8 mm ID Straight/SPME Liner (cat.# 23280)	
Incubation Time	120 s		
Heatex Stirrer Speed	1000 rpm	**Column**	
Heatex Stirrer Temperature	30 °C	Rxi-5 Sil MS, 20 m, 0.15 mm ID, 0.15 µm (Restek cat.# 43816)	
Extraction Time	480 s		
Vial Penetration Depth	35 mm	**Oven**	
Injector Penetration Depth	50 mm	Insert	GC Accelerator (cat.# 23849)
Desorption Time	60 s	Ramp	70 °C to 115 °C at 95 °C/min, to 175 °C at 65 °C/min
Pre Conditioning	True	to 225 °C at 45 °C/min to 300 °C at 10 °C/min (hold 1.0 min)	
Post Conditioning	False		
Conditioning Time	60 s	**Carrier Gas**	
Conditioning Temperature	280 °C	Type	Helium
		Mode	Constant Flow
		Flow	1.20 mL/min
		Detector	
		Type	Single Quadrupole HES-MS
		Mode	Scan 12.7 scans/sec (100 to 280 amu)
		Transfer	280 °C
		Source	300 °C
		Quad	200 °C
		Electron	70 eV
		Tune	DFTPP
		Ionization	EI

For all 3 applications, the SPME Arrow generally demonstrated an increase in response over the traditional SPME fiber. There was a consistent trend that as molecular weight increased, the SPME Arrow's advantage diminished. Regardless, the Arrow's mechanical robustness never lessened.