

CHROMTECH

Tech Note 1

Single Magnet Mixer

The new Single Magnet Mixer (SMM) was tested for reproducibility on SPME applications. The system is designed to avoid aggressive handling with the SPME fiber. Equilibrium is reached with stirring instead of shaking. This protects the fiber on the barrel, which easily can break off if it is immersed in liquid that has been shaken. The 2cm fiber is especially vulnerable to breakage.

Additionally, the SMM is gentle with the needle, which will show signs of weakening after approximately 60 to 80 injections. Using the SMM increases the physical lifetime of fibers. This is especially interesting for PDMS. This fiber adsorbent is known for having a longer lifetime all other fiber adsorbents.

Following Parameters were used:

Instrumentation, parts:

- Agilent GC 6890 with Split/Splitless Injector and FID detector, 0.32 x 30 m HP5 column.
- CTC Combi PAL, Single Magnet Mixer SMM.
- 100 μ m PDMS fiber, 20mL vials, metal caps, purified H₂O, Benzene, Ethylbenzene, Toluene, o-, m-, p-Xylene (BTEX) Standard 2000ppm from Restek, pre-bored septa, SPME liner.

Combi PAL Parameters:

Pre Incubation time: 20min
Incubation Temperature: 50°C
Speed: 750rpm, 60s on time, 2s off time
Vial penetration: 22mm
Extraction time: 15min
Injector Penetration: 54mm
Desorbition Time: 5min
Needle Penetration: 30mm

GC Parameters:

Splitless Injection 1.2min
35.5mL flow after 1.2min
Constant flow 1.8mL
Oven:
40°C @ 3 min,
8°C Ramp to 80°C 0min,
30°C Ramp to 200°C 3 min.
FID 250°C
33.0mL/min H₂/ 380mL/min O₂

Sample Preparation

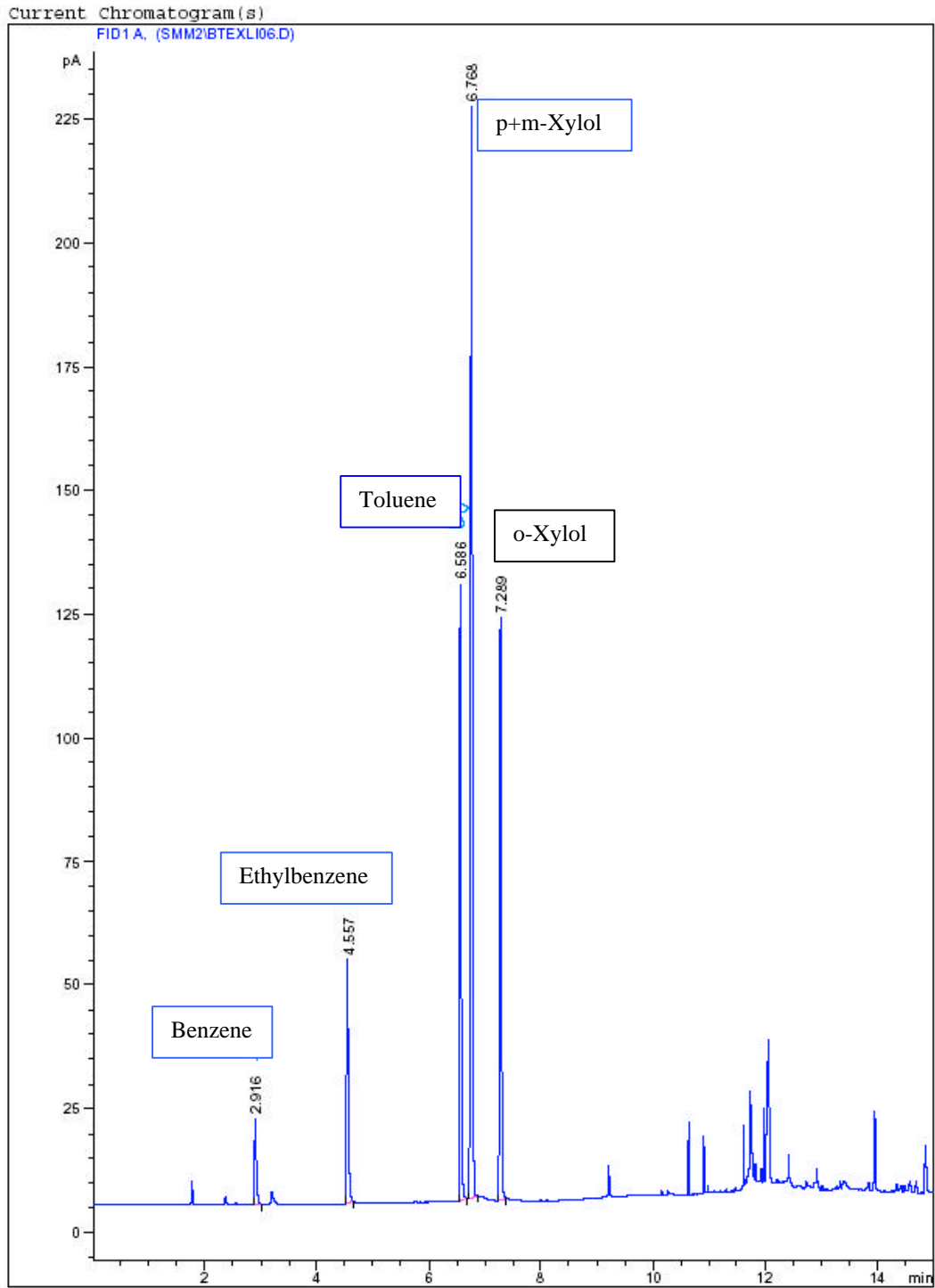
One vial was prepared. Purified H₂O was poured into the vial, so that there was only 3-5mm air above the liquid. 10uL 2000ppm of BTEX was added to the water. The vial was crimped with a blue buthyl-rubber and natural teflon-coated septa, and a metal cap for magnetic transport capability.

Analyses

Multiple extractions were done out of the vial. The sample concentration was reduced with each injection by the amount which equilibrates into the fiber.

Result and Discussion

The result shows a component-specific reduction between 1.2 to 2.7%, depending on the affinity of each component toward the PDMS fiber. After an interpolation of the area counts, the reproducibility of each component was less than **1%** (table 1)



Chromatogram: BTEX in water

Table 1

Comonent	RetTime	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	
Benzene	2.9	36.3	36.2	35.7	34.8	35.2	34.6	34.8	33.7	33.3	32.6			
Ethylbenzene	4.6	113.3	112.3	110.2	107.7	107.5	104.7	104.6	100.9	100.8	98.4			
Toluene	6.6	290.9	282.7	275.5	266.5	261.9	256.4	248.7	238.6	235.9	229.5			
p+m Xylol	6.8	569.2	551.7	536.9	518.4	508.8	497.7	482.7	462.3	456.7	443.6			
o-Xylol	7.3	258.3	253.0	247.8	241.1	238.4	233.8	228.4	219.9	218.2	212.9			
		Reduction										Average	Absolut	
		Benzene	-0.36%	-1.27%	-2.65%	1.22%	-1.65%	0.55%	-3.18%	-1.08%	-2.19%	-1.18%	-10.2%	
		Ethylbenzene	-0.83%	-1.87%	-2.26%	-0.25%	-2.54%	-0.17%	-3.51%	-0.12%	-2.35%	-1.54%	-13.1%	
		Toluene	-2.80%	-2.57%	-3.27%	-1.70%	-2.11%	-3.00%	-4.04%	-1.14%	-2.72%	-2.60%	-21.1%	
		p+m Xylol	-3.08%	-2.69%	-3.44%	-1.85%	-2.17%	-3.02%	-4.22%	-1.22%	-2.87%	-2.73%	-22.1%	
		o-Xylol	-2.07%	-2.04%	-2.69%	-1.14%	-1.94%	-2.31%	-3.72%	-0.77%	-2.42%	-2.12%	-17.6%	
RetTime	Area	Area Adjust	Area Adjust	Area Adjust	Area Adjust	Area Adjust	Area Adjust	Area Adjust	Area Adjust	Area Adjust	Area Adjust	Average	STDEV	RSD%
2.9	36.3	36.6	36.6	36.0	36.8	36.6	37.3	36.5	36.5	36.1	36.5	36.5	0.37	1.01%
4.6	113.3	114.1	113.6	112.7	114.1	112.8	114.2	111.8	113.2	112.0	113.2	113.2	0.85	0.75%
6.6	290.9	290.1	289.8	287.2	289.1	289.7	287.5	282.1	285.0	283.2	287.5	287.5	3.08	1.07%
6.8	569.2	566.7	566.2	560.8	564.4	565.7	561.8	550.7	556.4	552.6	561.4	561.4	6.30	1.12%
7.3	258.3	258.3	258.3	256.5	258.6	258.6	257.4	252.5	255.2	253.5	256.7	256.7	2.25	0.87%