Analysis of Polycyclic aromatic hydrocarbons in water using AttractSPE® Disks – C18 according to EPA method 550.1– and AttractSPE® Disks – HLB SPE disks

Polycyclic aromatic hydrocarbons (PAHs) are a large group of organic compounds with two or more fused aromatic rings and suspected to be carcinogenic. PAHs are known as priority pollutants, they are generally produced by incomplete combustion. Smoke from solid fuels like wood is a large source of PAHs globally. Via atmospheric deposition, PAHs reach soil and water although PAHs are typically at low concentrations in drinking water.

PAHs analysis is an important means to environmental quality and purity assessment. Sample preparation is required for enrichment and clean up before analysis. This application note describes **two new products AttractSPE Disks**. These SPE disks are thin, dense, soft and uniform extraction SPE membranes allowing the best interactions with analytes even with high flow rate without any channeling. AttractSPE® Disks are available with a broad variety of sorbents such as anion or cation exchanges, SDB to meet the needs of main applications requiring an enrichment of water or air samples. Several diameters are also available 25mm, 47mm and 90mm. They can be used for environmental monitoring of contaminants by concentrating the sample in the lab or as passive sampler sorbents for Chemcatcher or POCIS use.

In this application, two different disks of 47mm diameter have been tested for the analysis of several PAHs (including regulated ones) according to EPA method 550.1. AttractSPE® Disks – C18 and AttractSPE® Disks – HLB contain respectively more than 90% of C18 and HLB particle beads. AttractSPE® Disks – HLB **is the first SPE disks available as soft and thin membranes for the extraction or for passive sampler uses**. Both sorbents have been evaluated and compared to 3M Empore SPE disks C18. Seven PAHs were spiked in water at a concentration of 20ng/L each. 1L of the solution was loaded with a high flow rate.

Loading solution: Load with 1L of spiked water (optionally pH<2 with HCl) **within 10min**.

CONDITIONNING

For AttractSPE® Disks – HLB	For AttractSPE® Disks – C18
10 mL Acetone	10 mL Ethyl acetate
10 mL Isopropanol	10 mL Methanol
10 mL Methanol	50 mL reagent water
50 mL reagent water	

LOADING

1 L of loading solution

ELUTION

10 mL Methanol
4x10 mL Ethyl Acetate

ANALYSIS

Evaporate the elution solution and reconstitute with 5mL Acetonitrile prior to analysis

Analytical conditions by LC Fluorescence:
Column: Zorbax eclipse PAH 4,6*50mm (1,8µm), at 30°C.
Injection volume: 50 µL.
Isocratic: Water / Acetonitrile 15 / 85.
Flow rate: 0.5 mL/min, run of 25min.
Fluorescence detection: $\lambda_{exc/em}$ 252nm / 400nm

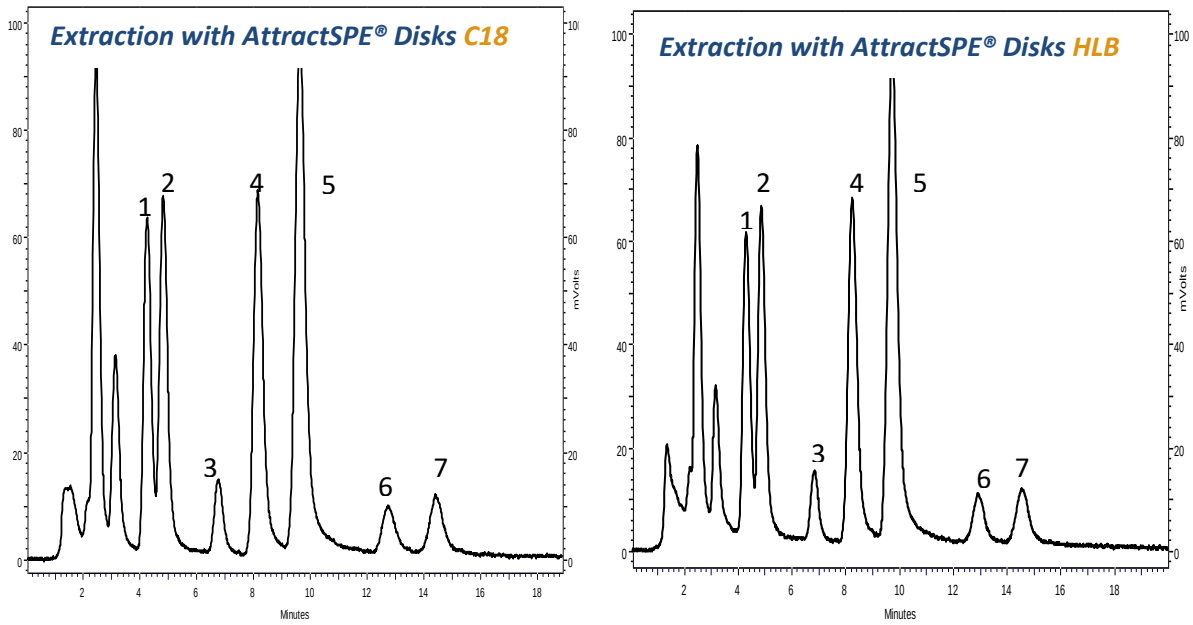

*Figure: These chromatograms have been obtained after the extraction of 1L of water (spiked with 20ng/L PAHs each) on the respective SPE disks **AttractSPE® Disks C18** and **AttractSPE® Disks HLB**.*

Table : Retention time on the chromatogram for each compound

Number	**Compound**	**Retention time (min)**
1	Benzo[a]anthracene (BaA)	4,2
2	Chrysene (CHR)	4,9
3	benzo[b]fluoranthene (BbFA)	6,8
4	benzo[k]fluoranthene (BjFA)	8,2
5	Benzo[a]pyrene (BaP)	9,7
6	Dibenz[a,h]anthracene (DBahA)	12,8
7	Benzo[g,h,i]perylene (BghiP)	14,4

Table: Recovery yields obtained for the loading of 1L of water spiked with 7 PAHs at 20 ng/L each

	AttractSPE® Disks HLB		AttractSPE® Disks C18		3M Empore SPE disks C18	
	Blank	Spiked	Blank	Spiked	Blank	Spiked
Benzo[a]anthracene (BaA)	0	90%	0	96%	0	96%
Chrysene (CHR)	0	90%	0	98%	0	96%
benzo[b]fluoranthene (BbFA)	0	90%	0	94%	0	93%
benzo[k]fluoranthene (BjFA)	0	96%	0	98%	0	100%
Benzo[a]pyrene (BaP)	0	91%	0	91%	0	94%
Dibenz[a,h]anthracene (DBahA)	0	92%	0	88%	0	96%
Benzo[g,h,i]perylene (BghiP)	0	99%	0	97%	0	97%

CONCLUSION

AttractSPE® Disks C18 and **HLB** have been used for the enrichment of 7 PAHs according to EPA method 550.1. They have shown an excellent hold giving a great ease to handle. In addition, excellent performances were obtained at a high flow rate as recoveries are mostly higher than 90%. They behave similarly to 3M Empore SPE Disks C18.

However, as expected, the flow rate for **AttractSPE® Disks HLB** was higher than for C18 SPE disks and in addition, due to the hydrophilic hydrophobic properties, these HLB membranes can be used for the extraction of more polar molecules such as drug residues.

This experiment shows that **AttractSPE®Disks C18** and **HLB** are an excellent alternative to 3M Empore SPE Disks C18 for the analysis of PAHs in water samples.

Part number of products used in this application note:

Product:	Quantity:	Part number:
AttractSPE® Disks HLB for environmental applications- 47mm diameter	20/pk	SPE-Disks-HLB-47.T1.20
AttractSPE® Disks C18 for environmental applications - 47mm diameter	20/pk	SPE-Disks-C18-47.T1.20