

# Application Note



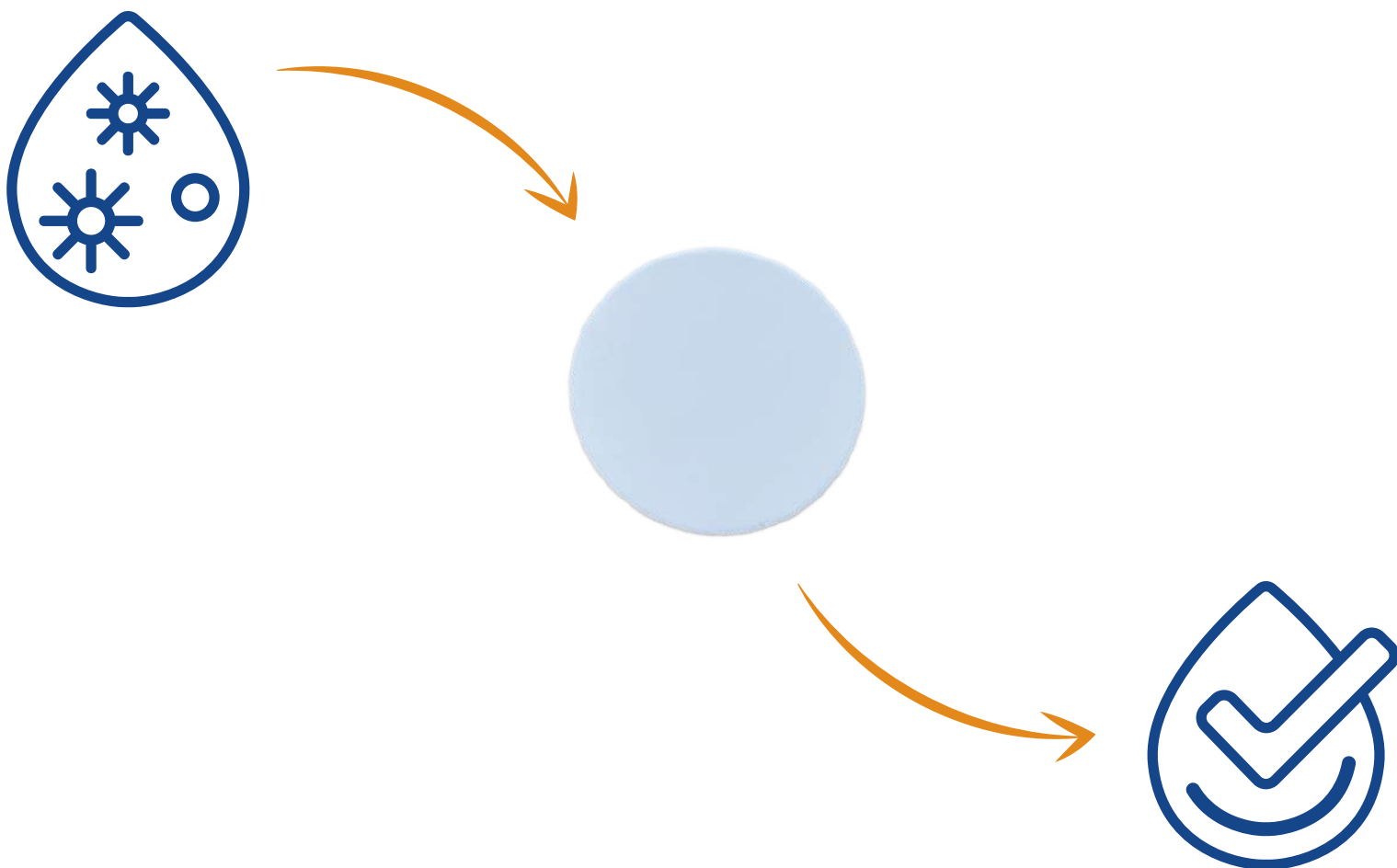
**Rapid and quantitative analysis of chlorinated acid herbicides in large water volumes using **AttractSPE®Disks****



**AttractSPE® Disks** make possible the loading of large water volume thanks to a fast flow rate and a high surface area of exchange. Our innovative SPE disks allow the best interactions with analytes and a maximal flow rates without any channeling. **Attract® SPE Disks** reduce extraction time while loading high volume of water. A high enrichment is obtained by our SPE disks with excellent recoveries (>90%). **AttractSPE® Disks** is also the perfect membrane to use for the passive sampler Chemcatcher® thanks to a very good hold and ease to use. This application note describes a rapid and quantitative analysis of chlorinated acid herbicides in large water volumes using **AttractSPE® Disks**.

## **47mm AttractSPE® Disks - Anion Exchange - SR (SAX) were used for this study**

Loading solution : For both ultrapure water and tap water, one liter is spiked at 1 µg/L with aminopyralid, clopyralid, and picloram. One liter of water (not spiked) was also performed as a blank control.



## PURIFICATION PROTOCOL

Place the **AttractSPE® Disks – Anion Exchange – SR** onto the SPE disk manifold.

*Note: A glass microfiber (1  $\mu\text{m}$  or 3  $\mu\text{m}$ ) can be added on top of the disk to prevent clogging from particulates in the water sample.*

### CONDITIONING/EQUILIBRATION

1. 50 mL methanol (soak disk for 1 minute)
2. 50 mL ultrapure water

### LOADING

1. For both ultrapure water and tap water, one liter is spiked at 1  $\mu\text{g/L}$  with several very common herbicides of Picolinic acid family such as aminopyralid, clopyralid, and picloram. One liter of water (not spiked) was also performed as a blank control.

### WASHING

1. 50 mL ultrapure water
2. Dry disk 1 minute under vacuum

### ELUTION

1. 50 mL 3% formic acid in methanol freshly prepared (soak disk for 1 minute )

### ANALYSIS

The eluate was then agitated and diluted (1:9 ratio) with ultrapure water prior to analysis.

*Note: The eluate can also be evaporated to concentrate the analytes and improve the limit of quantification.*



**SPE Disk manifold for  
AttractSPE® Disks**

After the cleanup procedure, the molecules were simultaneously analyzed by LC-MS/MS. The results obtained are presented in Table 1.

	PRESENCE IN BLANK CONTROL		% RECOVERY	
	Ultrapure water	Tap water	Tap water	Ultrapure water
<b>AMINOPYRALID</b>	<0.1 µg/L	<0.1 µg/L	<b>102%</b>	<b>80%</b>
<b>CLOPYRALID</b>	<0.1 µg/L	<0.1 µg/L	<b>102%</b>	<b>90%</b>
<b>PICLORAM</b>	<0.1 µg/L	<0.1 µg/L	<b>108%</b>	<b>87%</b>

Table 1. Percent recovery of Aminopyralid, Clopyralid and Picloram at a concentration of 1 µg/L in ultrapure water and in tap water after the **AttractSPE® Disks – Anion Exchange – SR (SAX)** cleanup.

Recoveries ranging from 80% to 108% for the three molecules were observed, demonstrating the success of the purification method using **AttractSPE® Disks – Anion Exchange – SR**

LC CONDITIONS	MS CONDITIONS
LC Dionex U3000	Qtrap 4000 ESI+ MS/MS
Column : Hypersil Gold 150*2.1 mm (3 µm) + guard Hypersil Gold 1 cm at 30°C	Curtain gas : 20
Injection volume : 20 µL	CAD: High
T° sampler : 10°C	IS : 4500 V
Flow rate : 0.3 mL/min	Temperature : 550°C
	GS1/GS2 : 50/50

TIME (MIN)	% WATER 0.1% FORMIC ACID	% ACETONITRILE 0.1% FORMIC ACID	ANALYTE	RETENTION TIME (MIN)	Q1	Q3	CE (V)
0	97	3	Aminopyralid	4.1	207.0	161.1	33
1	97	3			207.0	134.0	45
7	42	58	Clopyralid	5.9	192.0	146.1	33
9	42	58			192.0	110.1	51
10	97	3	Picloram	6.9	241.0	213.0	29
15	97	3			241.0	195.0	23

Table 2. Conditions of analysis with LC-MS/MS.

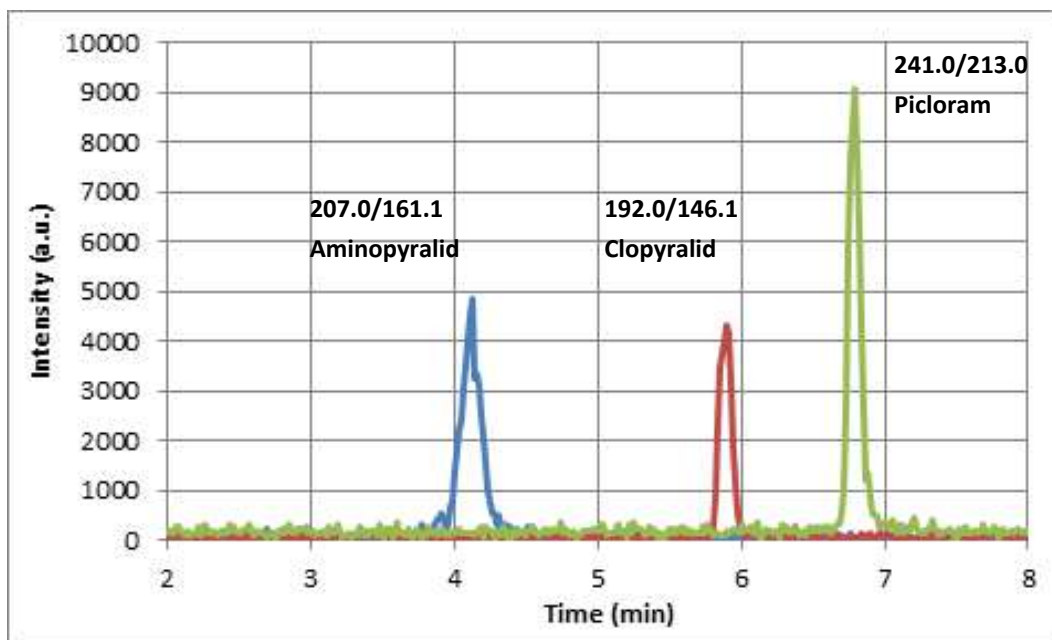


Figure 1. LC-MS/MS chromatogram of aminopyralid, clopyralid, and picloram at 5 µg/L after cleanup with **AttractSPE® Disks – Anion Exchange – SR (SAX)**.

## Conclusion

**AttractSPE® Disks – Anion Exchange - SR** have shown excellent performances in the detection of Aminopyralid, Clopyralid and Picloram with excellent recovery yields above 80%. SPE Disk format allowed a fast treatment of large sample volumes (~20-25 min). The method makes possible a 1000-times concentration of samples.

### **AttractSPE® Disks – Anion Exchange – SR**

- *SPE-Disks-AN-25.T1.40 for 40/pk – 25mm*
- *SPE-Disks-AN-47.T1.20 for 20/pk – 47mm*
- *SPE-Disks-AN-90.T1.10 for 10/pk – 90mm*

### **AttractSPE® Prefilter Glassfiber for 47mm disks**

*(also available for other diameters)*

- *PF-GF-50.T1.47.1 for 50/pk – 1µm*
- *PF-GF-50.T1.47.3 for 50/pk – 3 µm*

### **SPE Disks manifold 47mm (also available for 90mm):**

- *1 station ACC-DISKSPE-G47-1*
- *3 stations ACC-DISKSPE-G47-3*
- *6 stations ACC-DISKSPE-G47-6*

### **Related Products**

#### **AttractSPE® Disks Passive Sampler Anion exchange - SR - 10/pk**

- *DBPS.AN.90.40.kit.10*

#### **AFFINIMIP® SPE Picolonic herbicides**

- **6mL - 50/pk**
- *FS115-03B*