

Analysis of Triazines Using a Thermo Scientific Accucore XL C8 4 μ m HPLC Column

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Key Words

Accucore XL C8, solid core, core enhanced technology, triazines, simazine, simetryn, atrazine, prometon, ametryn, propazine, prometryn

Abstract

This application note compares the performance of the solid core Thermo Scientific Accucore XL C8 4 μ m HPLC column with that of a fully porous 5 μ m traditional HPLC column for the analysis of triazines under gradient mobile phase conditions.

Introduction

Based on Core Enhanced Technology™ using 4 μ m solid core particles, Accucore™ XL HPLC columns allow users of conventional HPLC methods to enjoy performance far beyond that of columns packed with 5 μ m or even 3 μ m fully porous particles. Very high separation efficiencies using standard HPLC instruments and conditions provide increased peak resolution and lower limits of detection. An ultra-stable packed bed results in exceptionally robust columns that demonstrate excellent retention and response reproducibility.

Simazine, simetryn, atrazine, prometon, ametryn, propazine and prometryn belong to the triazine class of compounds. They are commonly used as herbicides. This application note demonstrates the improvement in efficiency, sensitivity and resolution for the analysis of seven triazines on an Accucore XL C8 4 μ m HPLC column compared to a conventional 5 μ m fully porous column using the same experimental conditions.



Experimental Details

Consumables	Part Number
Fisher Scientific HPLC grade water	W/0106/17
Fisher Scientific HPLC grade acetonitrile	A/0626/17
Thermo Scientific Borosilicate glass vials (2 mL, 12 mm x 32 mm) with 8 mm black screw cap fitted with a silicone/PTFE seal	60180-600

Sample Preparation

A mixed working standard containing 50 µg/mL each of simazine, simetryn, atrazine, prometon, ametryn, propazine and prometryn was prepared in water.

Separation Conditions

Part Number

Instrumentation:	Thermo Scientific Dionex UltiMate 3000 RSLC system	
Columns:	Accucore XL C8 4 µm, 150 x 4.6 mm	74204-154630
	Fully porous C8 5 µm, 150 x 4.6 mm	
Mobile phase A:	water	
Mobile phase B:	acetonitrile	
Gradient:	Time (minutes)	%B
	0.0	20
	10.0	60
	10.1	20
	15.0	20
Flow rate:	1.5 mL/min	
Column temperature:	25 °C	
UV detection:	220 nm	
Injection volume:	5 µL	

Data Processing

Software: Thermo Scientific Dionex Chromeleon 7.0
Chromatography Data System

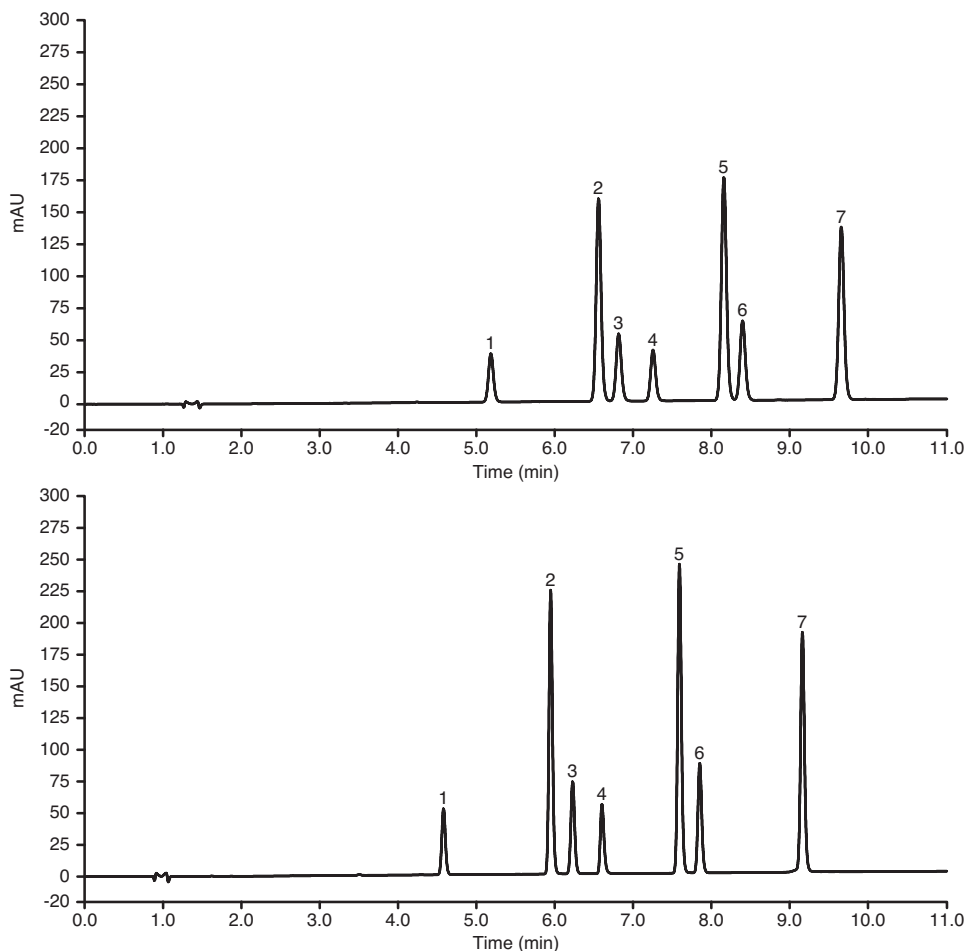


Figure 1: Chromatogram of simazine (1) simetryn (2) atrazine (3) prometon (4) ametryn (5) propazine (6) and prometryn (7) analyzed using an Accucore XL C18 4 µm, 150 x 4.6 mm column (bottom trace) compared to a fully porous C18 5 µm, 150 x 4.6 mm column (top trace)

Results

Analysis of the seven triazines was performed on an Accucore XL C8 4 μm HPLC column and a 5 μm fully porous C8 column using the same experimental conditions. Resolution between the critical pair (peaks 5 and 6) on the fully porous column was 1.92 which improved by 54% to 2.95 with the Accucore XL C8 HPLC column (Figure 1).

Peak widths for the triazines improve significantly (on average by 29%) when using the Accucore XL HPLC column compared to the fully porous column (Table 1). Signal to noise ratio increased by 140% on average, improving sensitivity.

Compound	Peak Width		Resolution		Signal to Noise Ratio	
	Accucore XL	Fully Porous	Accucore XL	Fully Porous	Accucore XL	Fully Porous
Simazine	0.108	0.151	N/A	N/A	3453	1468
Simetryn	0.106	0.151	16.42	11.75	14790	6109
Atrazine	0.112	0.160	3.31	2.13	4828	2027
Prometon	0.112	0.153	4.30	3.61	3603	1534
Ametryn	0.111	0.158	11.56	7.49	16170	6718
Propazine	0.114	0.163	2.95	1.92	5745	2390
Prometryn	0.115	0.162	14.64	9.98	12363	5200

Table 1: Peak width, resolution and signal to noise ratio data for seven triazines

The backpressure for the Accucore XL C8 4 μm HPLC column was measured at 215 bar and the 5 μm fully porous column backpressure was measured at 165 bar. The increase in performance was gained with a small increase in backpressure which was still within the operating limits of a conventional HPLC system.

In addition, excellent reproducibility was demonstrated for the retention time of the seven triazines (Table 2).

Compound	Accucore XL		Fully Porous	
	t_R /min	%RSD n=6	t_R /min	%RSD n=6
Simazine	4.58	0.03	5.19	0.03
Simetryn	5.95	0.03	6.56	0.02
Atrazine	6.23	0.03	6.82	0.03
Prometon	6.60	0.02	7.26	0.03
Ametryn	7.59	0.02	8.16	0.02
Propazine	7.85	0.02	8.40	0.02
Prometryn	9.16	0.10	9.65	0.01

Table 2: Retention time and precision data calculated from 6 replicate injections

Conclusion

The use of an Accucore XL C8 4 μm HPLC column gave significant performance improvement over a conventional 5 μm fully porous column under the same chromatographic conditions with no changes in system configuration.

Resolution of the critical pair improved by 54% and peak widths were reduced by 29% on average. Excellent reproducibility was also observed. This application demonstrates that the Accucore XL C8 is an ideal HPLC column for the analysis of triazines.

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