

Analysis of Endocrine Disruptors Using a Thermo Scientific Accucore XL C8 4 μm HPLC Column

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Key Words

Accucore XL C8, solid core, core enhanced technology, endocrine disruptors, desethyl atrazine, simazine, atrazine, diuron, bisphenol A

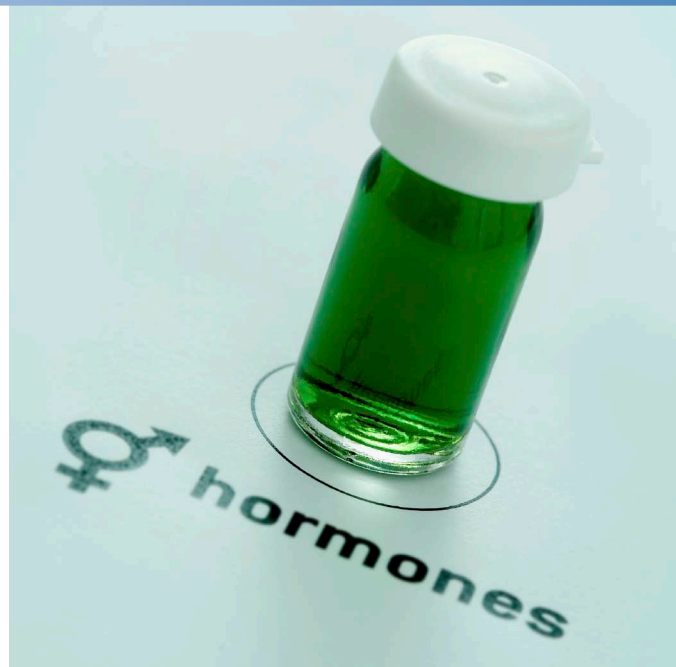
Abstract

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

Introduction

Based on Core Enhanced Technology™ using 4 μm solid core particles, Accucore™ XL HPLC columns allow users of conventional HPLC methods to enjoy performance far beyond that of columns packed with 5 μm or even 3 μm 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.

Desethyl atrazine, simazine, atrazine, diuron and bisphenol A are endocrine disruptors. Endocrine disruptors are classed as substances that can alter the endocrine system and by doing so cause serious health defects. This application note demonstrates the improvement in efficiency, sensitivity and resolution for the analysis of five endocrine disruptors on an Accucore XL C8 4 μm HPLC column compared to a conventional fully porous 5 μm column under 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 desethyl atrazine, simazine, atrazine, diuron and bisphenol A 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 Fully porous C8 5 µm, 150 x 4.6 mm	74204-154630
Mobile phase A:	water	
Mobile phase B:	acetonitrile	
Gradient:	Time (minutes)	%B
	0.0	25
	20.0	70
	20.1	25
	25.0	25
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

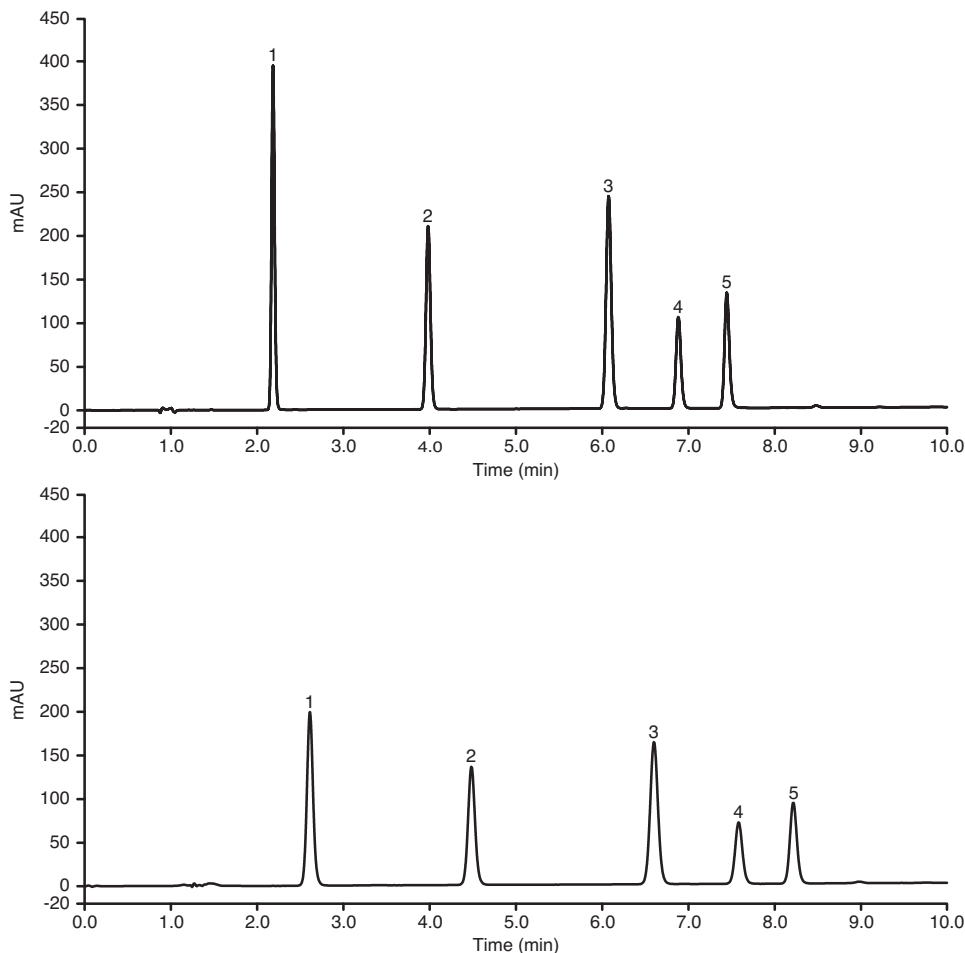


Figure 1: Chromatogram of desethyl atrazine (1) simazine (2) atrazine (3) diuron (4) bisphenol A (5) analyzed using an Accucore XL C8 4 µm, 150 x 4.6 mm column (top trace) compared to a fully porous C8 5 µm, 150 x 4.6 mm column (bottom trace)

Results

Analysis of the five endocrine disruptors 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 last two peaks (peaks 4 and 5) on the fully porous column was 4.12 which improved by 31% to 5.41 with the Accucore XL C8 HPLC column (Figure 1).

Peak widths for the endocrine disruptors improve significantly (by 37%) when using the Accucore XL HPLC column compared to the fully porous column (Table 1). Signal to noise ratio also increased improving sensitivity (on average signal/noise increased by 226%).

Compound	Peak Width		Resolution		Signal to Noise Ratio	
	Accucore XL	Fully Porous	Accucore XL	Fully Porous	Accucore XL	Fully Porous
Desethyl Atrazine	0.084	0.173	N/A	N/A	12498	3317
Simazine	0.122	0.193	22.11	13.39	7235	2261
Atrazine	0.143	0.216	20.02	13.36	8276	2722
Diuron	0.135	0.203	7.43	6.04	3527	1177
Bisphenol A	0.135	0.195	5.41	4.12	4418	1547

Table 1: Efficiency, resolution and signal to noise ratio data for five endocrine disruptors

The backpressure for the Accucore XL C8 4 µm HPLC column was measured at 220 bar, and the fully porous 5 µm column backpressure was measured at 170 bar. The increase in performance was gained with only a small increase in backpressure and was still within the operating limits of a conventional HPLC system.

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 last two peaks improved by 31% and peak widths were reduced by 37%. This application demonstrates that Accucore XL C8 is an ideal HPLC column for the analysis of endocrine disruptors.

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