

Analysis of Ibuprofen and Valerophenone Using a Thermo Scientific Accucore XL C18 4 μm HPLC Column

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Key Words

Accucore XL C18, solid core, core enhanced technology, ibuprofen, valerophenone

Abstract

This application note compares the performance of the solid core Thermo Scientific Accucore XL C18 4 μm HPLC column with that of a fully porous 5 μm traditional HPLC column for the analysis of ibuprofen and valerophenone using an isocratic method based on the USP¹.

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.

Ibuprofen is a non-steroidal anti-inflammatory drug (NSAID) and is a commonly used painkiller. It is particularly useful for relieving the symptoms of inflammation. This application note demonstrates improved chromatographic performance in the analysis of ibuprofen and valerophenone on an Accucore XL HPLC column in relation to a fully porous traditional HPLC 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
Fisher Scientific HPLC grade orthophosphoric acid	O/0515/PB08
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 ibuprofen and valerophenone was prepared in water.

Separation Conditions

		Part Number
Instrumentation:	Thermo Scientific Dionex UltiMate 3000 RSLC system	
Columns:	Accucore XL C18 4 µm, 150 x 4.6 mm Fully porous C18 5 µm, 150 x 4.6 mm	74104-154630
Mobile phase:	water with phosphoric acid, pH 2.5/ acetonitrile (66.3:33.7 v/v)	
Flow rate:	2 mL/min	
Column temperature:	30 °C	
UV detection:	214 nm	
Injection volume:	5 µL	

Data Processing

Software:	Thermo Scientific Dionex Chromeleon 7.0 Chromatography Data System
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Results

Analysis of ibuprofen and valerophenone was performed on a Accucore XL C18 4 µm HPLC column and a 5 µm fully porous C18 column using the same experimental conditions. As shown in Figure 1, ibuprofen and valerophenone were well resolved with the USP criteria of resolution of not less than 2 being met on both columns.

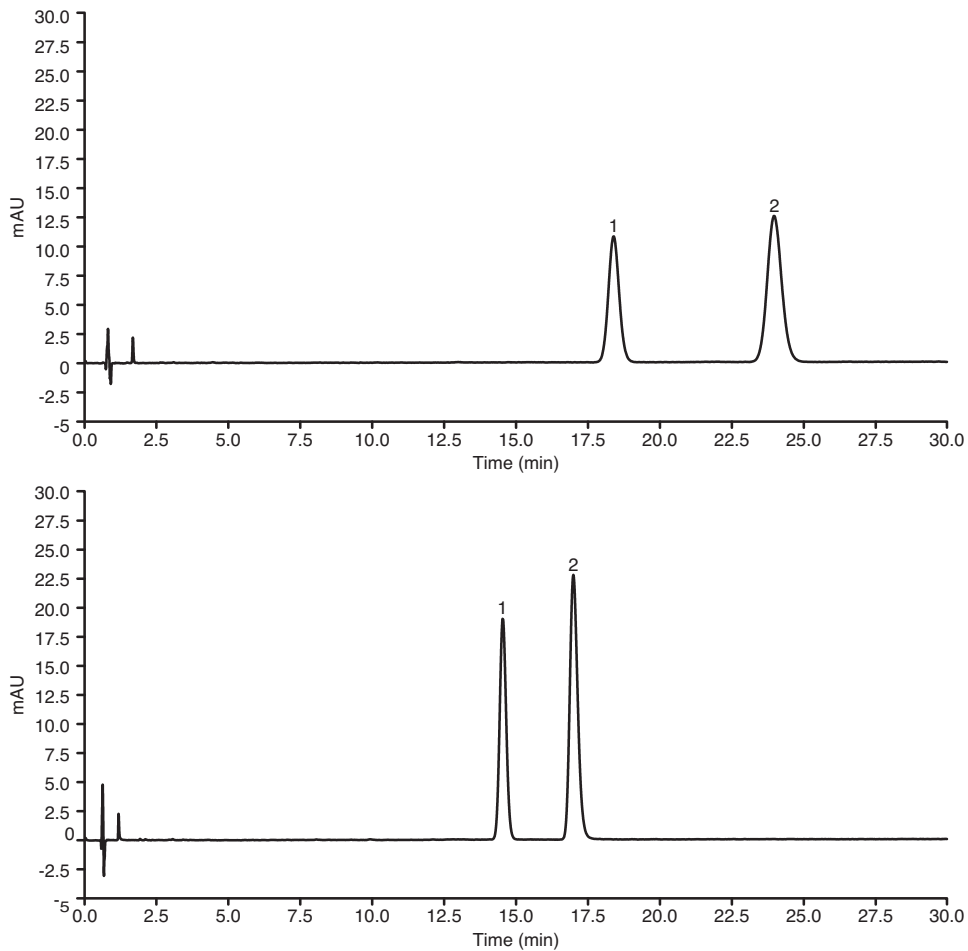


Figure 1: Chromatogram of valerophenone (1) and ibuprofen (2) analyzed using an Accucore XL C18 4 µm, 150 x 4.6 mm column (bottom trace) compared to a fully porous 5 µm C18, 150 x 4.6 mm column (top trace)

Efficiency for both compounds improve by greater than 70% when using the Accucore XL HPLC column compared to the fully porous column (Table 1). Signal to noise ratio also increased by 112% on average, improving sensitivity.

Compound	Plates (USP)		Signal to Noise Ratio	
	Accucore XL	Fully Porous	Accucore XL	Fully Porous
Valerophenone	19532	11218	908	462
Ibuprofen	18274	10538	1202	534

Table 1: Efficiency and signal to noise ratio data for valerophenone and ibuprofen

The backpressure for the Accucore XL C18 4 μm HPLC column was measured at 312 bar and the 5 μm fully porous column backpressure was measured at 239 bar. The increase in performance is gained with a small increase in backpressure and is still within the operating limits of a conventional HPLC system. In addition six replicate injections illustrated excellent reproducibility for both ibuprofen and valerophenone (Table 2).

Compound	Accucore XL		Fully Porous	
	t_r /min	%RSD n=6	t_r /min	%RSD n=6
Valerophenone	14.55	0.14	18.40	0.08
Ibuprofen	17.01	0.09	23.97	0.09

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

Conclusion

The use of an Accucore XL C18 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.

Efficiency improved by greater than 73% and signal to noise ratio by 112% on average. Excellent reproducibility was also demonstrated, illustrating that the Accucore XL C18 4 μm HPLC column is an ideal choice for the analysis of ibuprofen and valerophenone.

Reference

1. USP-32, Ibuprofen, Chromatographic purity

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