Easy Method Transfer from UHPLC to HPLC to PREP LC Leveraging the Scalability of Kinetex® Core-shell Technology Particles

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The scalability of the 1.7, 2.6, and 5 µm Kinetex® core-shell particles is illustrated in this study. This flexibility makes Kinetex the only core-shell particles in the market that are optimized for different system platforms and are transferable from UHPLC systems to conventional HPLC systems to preparative applications.

Introduction

With the performance advancements in Ultra High Performance Liquid Chromatography (UHPLC) and High Performance Liquid Chromatography (HPLC) during the last decade, the differences in performance between various instruments has become more evident and new requirements have been identified. The Kinetex 1.7 µm, 2.6 µm and 5 µm core-shell particles are fully scalable across the particle size range by precisely maintaining their core-to-shell ratio. Each particle size in the Kinetex core-shell family is specifically engineered and optimized for UHPLC and/or conventional HPLC platforms. The sub-2 µm core-shell particles, designed to be used for the UHPLC systems, are capable of delivering extremely high resolving power that exceeds the performance of fully porous sub-2 µm silica sorbents. The 2.6 µm core-shell particles are designed as a bridge between the UHPLC and HPLC platforms, and are able to achieve UHPLC level performance on optimized conventional HPLC systems. The newly introduced 5 µm Kinetex core-shell media is particularly useful as a "plug-and-play" replacement that delivers immediate improvement for existing separation methods that employ 3 µm and 5 µm fully porous sorbents. Kinetex 5 µm core-shell particles are also available in the award-winning AXIA™ preparative column format and is the first core-shell sorbent available on the market for small-scale preparative applications. Therefore, the family of Kinetex core-shell sorbents, available in various bonded phases, particle sizes, and column formats, is designed to be a complete, effective and scalable set of solutions for any separation challenge, on any system platform.

Material and Methods

Columns

1. Kinetex 1.7 µm C18, 50 x 2.1 mm
2. Kinetex 2.6 µm C18, 50 x 2.1 mm
3. Kinetex 5 µm C18, 50 x 2.1 mm

Sample Preparation:

The sample of steroid mixtures is made neat in MeOH at 500 µg/mL for each analyte. Components: (1) Estriol (2) Hydrocortisone (3) Corticosterone (4) Cortisone Acetate (5) β-estradiol (6) 21-Hydroxyprogesterone (7) Estrone (8) Deoxycorticosterone (9) Progesterone.

HPLC Conditions:

The mobile phase consisted of deionized water (mobile phase A) and acetonitrile (mobile phase B) in gradient conditions (see **Table 1**). The method is run at 30 °C and the detection is done using a UV detector at 220 nm. Volume of 0.5 µL prepared sample is injected.

Table 1.
LC Gradient Program

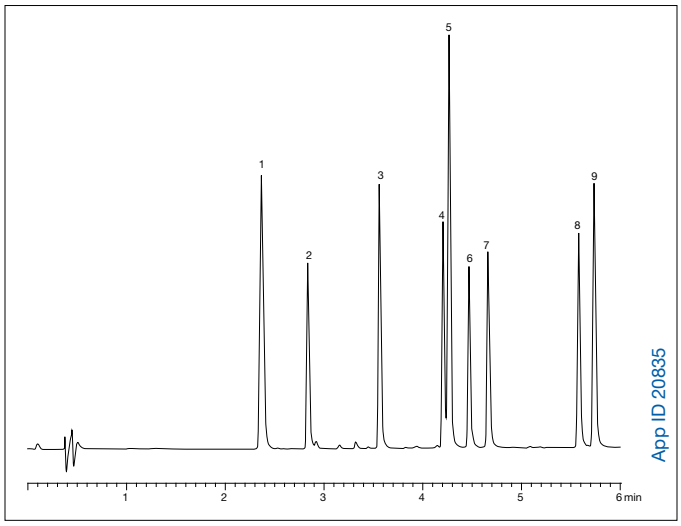
Step	Time (min)	Flow rate (mL/min)	% B
0	0	0.3	20
1	6	0.3	80
2	6.1	0.3	20
3	8	0.3	20

Results and Discussion

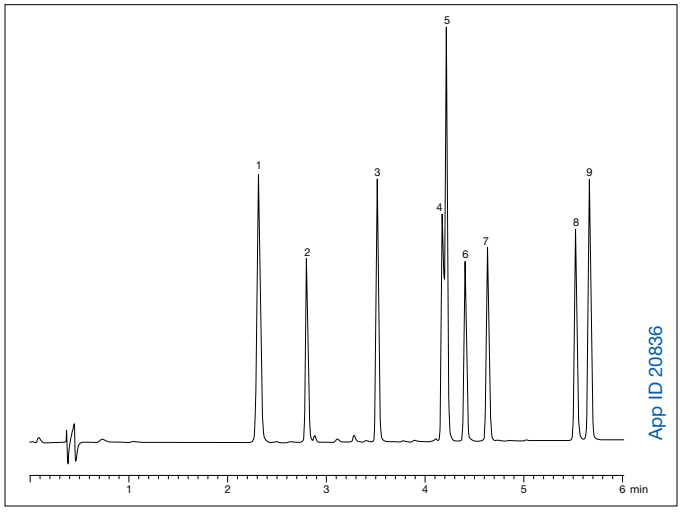
As illustrated in **Figure 1**, the Kinetex® C18 sorbent in three different particle sizes (1.7, 2.6, and 5 µm) are scalable in retention and selectivity in this separation of nine steroids related analytes. The higher resolving power of the smaller core-shell particle is noted by the increased resolution between peak 4 and peak 5 (see **Table 2**) despite the linear flow rate used is less than the optimal of the 1.7 µm particles. The backpressures generated by the different particle sizes are also given in **Table 2**.

Figure 1.
Separation of nine steroid related analytes on Kinetex C18 core-shell columns of different particle sizes: (a) 1.7 µm, (b) 2.6 µm and (c) 5 um.

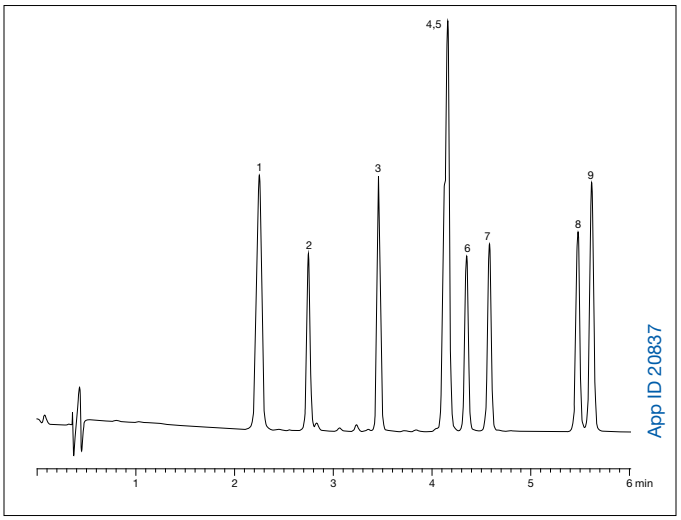
a. Kinetex **1.7 µm** C18



b. Kinetex **2.6 µm** C18



c. Kinetex **5 µm** C18



Conditions for all columns:

Column: Kinetex C18 (particle sizes noted in chromatogram)
Dimensions: 50 x 2.1 mm
Mobile Phase: A: Water
B: Acetonitrile

Gradient:

Time (min)	% B
0	20 %
6	80 %
6.1	20 %
8	20 %

Flow Rate: 0.3 mL/min
Temperature: 30 °C
Detection: UV @ 220 nm
Sample: 1. Estriol
2. Hydrocortisone
3. Corticosterone
4. Cortisone Acetate
5. β-estradiol
6. 21-Hydroxyprogesterone
7. Estrone
8. Deoxycorticosterone
9. Progesterone

Table 2.
Retention time window, resolution of Peak 4 and Peak 5, and the back pressure generated by Kinetex C18 columns in different particle size.

Kinetex C18 (particle size, µm)	Retention Time Window (min, Peak 1 and 9)	Resolution (4,5)	Back Pressure (bar)
1.7	3.370	1.33	198
2.6	3.352	0.73	130
5	3.366	0.41	50

Conclusion

It is demonstrated in this study that the various particle sizes (1.7, 2.6, and 5 µm) of the Kinetex core-shell family are fully scalable in retention and selectivity. This enables methods developed on Kinetex technology to be easily transferred to and from different system platforms in different laboratories at different stages of development.

APPLICATIONS

Kinetex® Ordering Information

5 µm Columns (mm)	50 x 2.1	SecurityGuard™ ULTRA Cartridges* 3/pk	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	SecurityGuard ULTRA Cartridges* 3/pk
XB-C18	00B-4605-AN	AJ0-8782	00B-4605-E0	00D-4605-E0	00F-4605-E0	00G-4605-E0	AJ0-8768
C18	00B-4601-AN	AJ0-8782	00B-4601-E0	00D-4601-E0	00F-4601-E0	00G-4601-E0	AJ0-8768
PFP	00B-4602-AN	AJ0-8787	00B-4602-E0	00D-4602-E0	00F-4602-E0	00G-4602-E0	AJ0-8773
Phenyl-Hexyl	00B-4603-AN	AJ0-8788	00B-4603-E0	00D-4603-E0	00F-4603-E0	00G-4603-E0	AJ0-8774
		for 2.1 mm ID					for 4.6 mm ID

* SecurityGuard ULTRA cartridges require holder, Part No. AJ0-9000.

5 µm Axia™ Packed Preparative Columns (mm)

	50 x 21.2	100 x 21.2	150 x 21.2	250 x 21.2
XB-C18	00B-4605-P0-AX	00D-4605-P0-AX	00F-4605-P0-AX	00G-4605-P0-AX
C18	00B-4601-P0-AX	00D-4601-P0-AX	00F-4601-P0-AX	00G-4601-P0-AX
PFP	00B-4602-P0-AX	00D-4602-P0-AX	00F-4602-P0-AX	00G-4602-P0-AX
Phenyl-Hexyl	00B-4603-P0-AX	00D-4603-P0-AX	00F-4603-P0-AX	00G-4603-P0-AX

guarantee

If you are not completely satisfied with Kinetex core-shell columns, send in your comparative data to a similar product with the Kinetex column within 45 days for a FULL REFUND.

APPLICATIONS

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