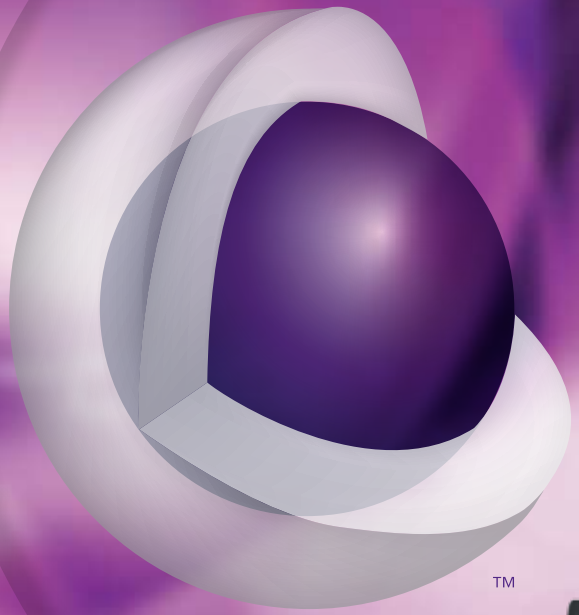


Kinetex®
Core-Shell Technology

Ultra-High Performance from HPLC to UHPLC

TM

phenomenex®
. . . breaking with tradition℠

Ultra-High Performance from

HPLC to UHPLC

Introducing Kinetex®- a leap in column particle technology that will change the way you think about HPLC and UHPLC (Ultra-High Performance Liquid Chromatography). You can immediately improve resolution, throughput, and sensitivity as well as reduce solvent consumption.

Prepare to transform the performance of your HPLC instrument into UHPLC results by harnessing the power of core-shell technology. No longer restricted by the HPLC/UHPLC system divide, you can develop high performance LC methods on any instrument and transfer them anywhere.

Kinetex 1.7 µm core-shell technology typically produces higher efficiencies than other sub-2 µm columns on the market, yielding remarkable chromatographic resolution, sensitivity, and breakthrough UHPLC performance.

KINETEX™

Advanced in Every Way

TECHNOLOGY

TM

Optimized for

Ultra-High Performance

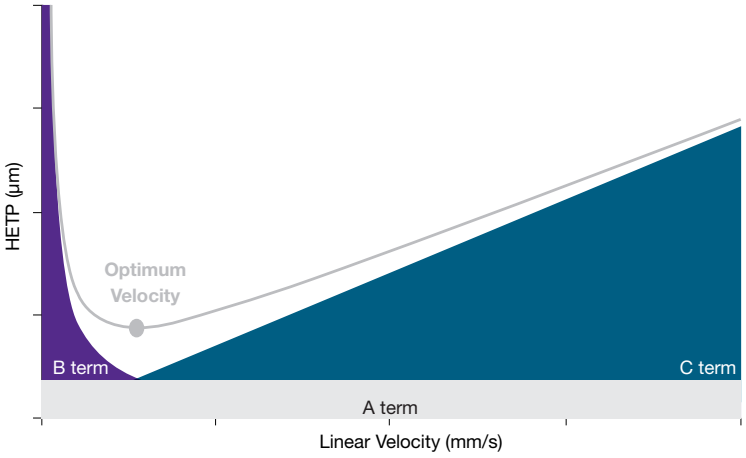
Innovations in LC particle technology are driven by the demand for better chromatographic performance and higher productivity. To achieve performance improvements of greater sensitivity, higher resolution, and faster analysis times, a column requires lower plate height (higher efficiency) at a wide range of linear velocities. With traditional fully porous 3 µm and 5 µm particles, efficiency decreases significantly as flow rate increases. In most cases, loss of resolution and sensitivity prevents faster analysis times. Smaller fully porous particles (< 2 µm) provide faster chromatographic separations at low plate heights (HETP) but require higher pressure capable instrumentation. Kinetex 2.6 µm core-shell technology offers the ultra-high efficiency of sub-2 µm particles over an extended range of linear velocity without generating excessive column backpressure by reducing Eddy Diffusion (multi-path effect) and allowing for faster mass transfer. As a result of this innovative design, Kinetex® 2.6 µm columns provide roughly 3x the efficiency of 5 µm fully porous particles and 2x the efficiency of 3 µm fully porous particles without the need for specialized, high pressure instrumentation.

van Deemter Equation

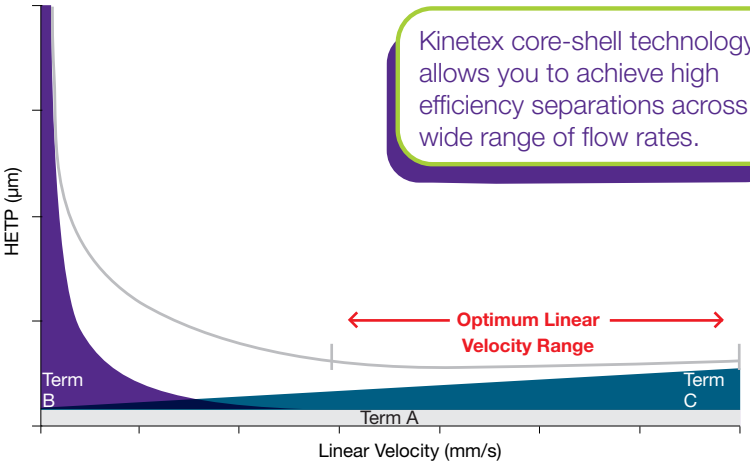
$$H = 2\lambda d_p + \frac{2GD_m}{\mu} + w(d_e)^2\mu/D_m + Rd^2{}_e\mu/D_s \;*$$

A: Eddy Diffusion B: Longitudinal Diffusion C: Mass Transfer

Traditional Chromatography



Ultra-High Performance



Kinetex core-shell technology allows you to achieve high efficiency separations across a wide range of flow rates.

* d_e refers to the effective particle size. For Kinetex 1.7 µm particles, d_e = 1.5 µm and for Kinetex 2.6 µm particles, d_e = 1.7 µm. For fully porous particles, $d_e = d_p$.

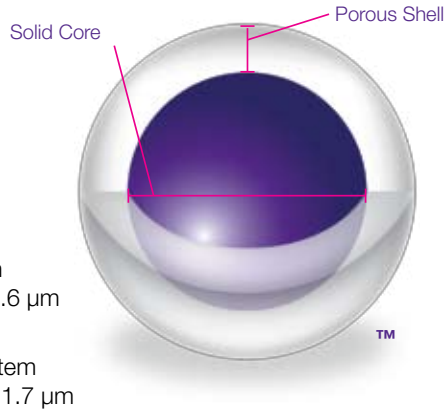
Innovation in Particle Technology

The Kinetex core-shell particle is not fully porous. Using sol-gel processing techniques that incorporate nano structuring technology, a durable, homogeneous porous shell is grown on a solid silica core. This highly optimized process combined with uniform particle size distribution produces a column that generates extremely high plate counts.

Traditional Fully Porous Particle

- Diffusion path limits efficiencies
- Ultra-high performance limited to UHPLC systems with traditional fully porous sub-2 µm columns

Kinetex Core-Shell Particle

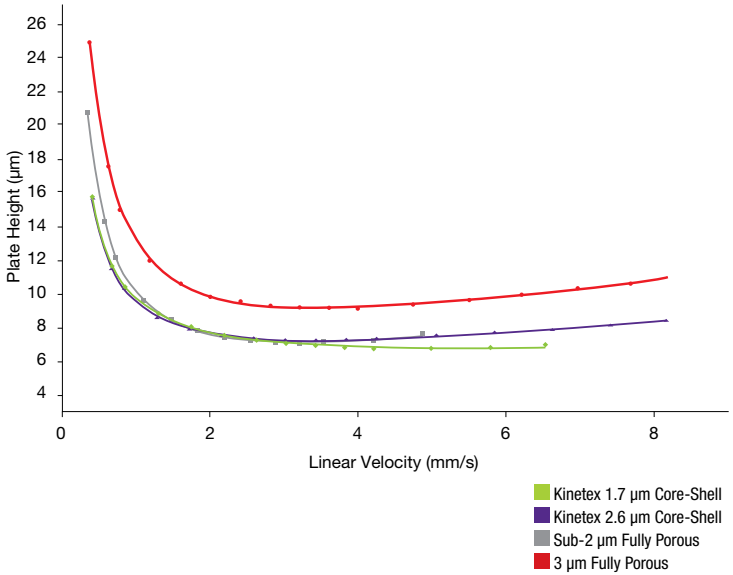


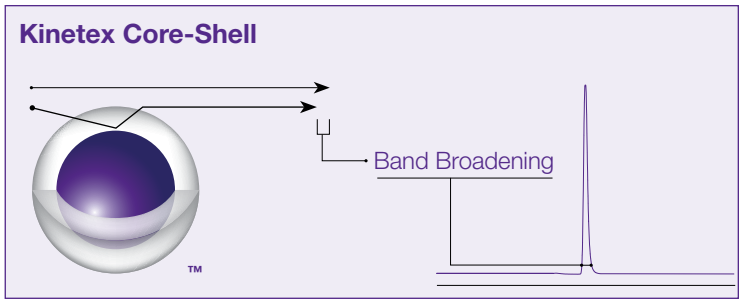
- Reduced diffusion path maximizes efficiency
- Ultra-high performance on any system with Kinetex 2.6 µm columns
- Breakthrough UHPLC system performance with Kinetex 1.7 µm columns

Faster
Mass Transfer

Since the Kinetex® particle is not fully porous, analytes spend less time diffusing into and out of the pores as they travel through the column. This shorter diffusion path allows for faster mass transfer. The result is less band broadening for higher peak efficiency comparable to or better than sub-2 µm fully porous particles.

Performance of Kinetex Core-Shell Particles
Compared to Fully Porous Sub-2 µm and 3 µm Particles





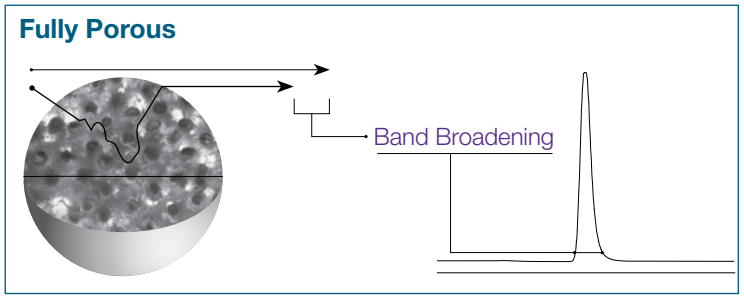


Illustration - not actual test data.

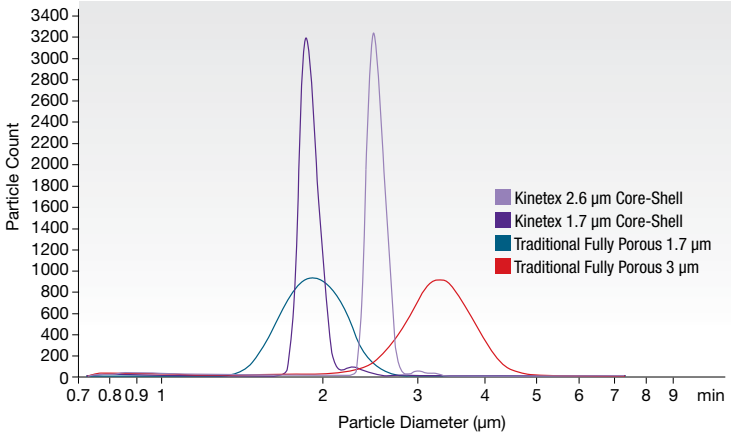
van Deemter Equation

$$H = \underbrace{2\lambda d_p}_{\text{A: Eddy Diffusion}} + \underbrace{2GD_m/\mu}_{\text{B: Longitudinal Diffusion}} + \underbrace{w(d_e)^2\mu/D_m + Rd^2{}_e\mu/D_s}_{\text{C: Mass Transfer}}$$

Narrow
Particle Size Distribution

Kinetex particles are nearly monodispersed. This extremely narrow particle size distribution reduces the band broadening effects of Eddy Diffusion (multi-path effect-the A term of the van Deemter equation) since the interstitial space between the particles is virtually homogeneous. This results in ultra-high column efficiency and excellent reproducibility.

Uniform Particle Size Distribution



$$H = \underbrace{2\lambda d_p}_{\text{A: Eddy Diffusion}} + \underbrace{2GD_m/\mu}_{\text{B: Longitudinal Diffusion}} + \underbrace{w(d_e)^2\mu/D_m + Rd^2{}_e\mu/D_s}_{\text{C: Mass Transfer}}$$

Illustration of Eddy Diffusion Effects

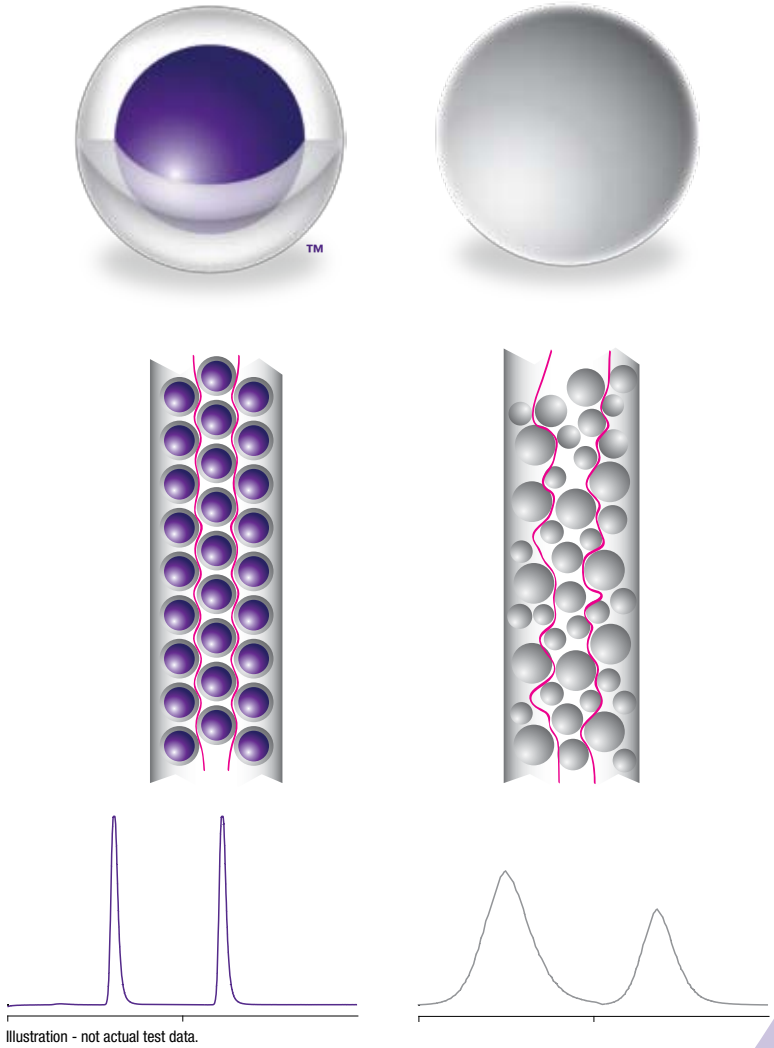
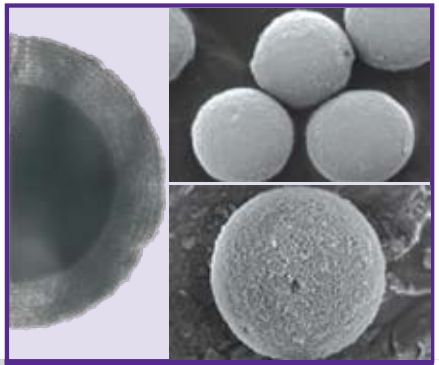
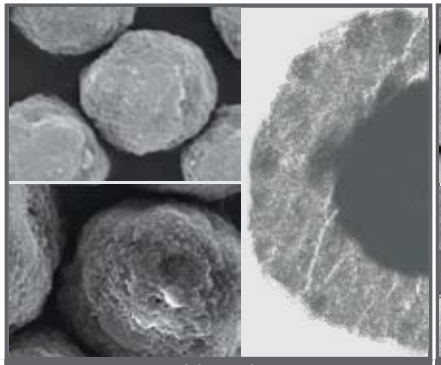
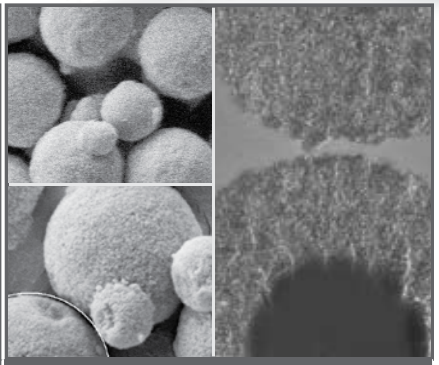


Illustration - not actual test data.

A Superior Quality

Core-Shell Particle

	Phenomenex® **Kinetex®**	Advanced Materials Technology **HALO®**	Agilent Technologies® **Poroshell® 120**
			
Sub-3 µm Particle	Phenomenex **Kinetex**	Advanced Materials Technology **HALO®**	Agilent Technologies® **Poroshell® 120**
Total Particle Size	2.6 µm	2.7 µm	2.7 µm
Porous Shell	0.35 µm	0.5 µm	0.5 µm
Solid Core	1.9 µm	1.7 µm	1.7 µm
Pressure Limit	1000/600 bar*	600 bar	600 bar
Pore Size	100 Å	90 Å	120 A
pH Range	1.5 – 10**	2 – 9	2.0 – 8.0
Sub-2 µm Particle			
Total Particle Size	1.7 µm	-	-
Porous Shell	0.23 µm	PRODUCT DOES NOT EXIST	PRODUCT DOES NOT EXIST
Solid Core	1.25 µm	-	-
Pressure Limit	1000 bar	-	-
Pore Size	100 Å	-	-
pH Range	1.5 – 10**	-	-

* 2.1 mm ID Kinetex columns are pressure stable up to 1000 bar.
** Columns are pH stable from 1.5 - 10 under isocratic conditions.
Columns are pH stable from 2 - 8 under gradient conditions.
HALO is a registered trademark of Advanced Materials Technology, Inc. Poroshell is a registered trademark of Agilent Technologies, Inc.
Phenomenex is not affiliated with any of the above listed companies. Comparative images may not be representative of all particles.

A Superior Performing

Core-Shell Particle

> "Never had such a low reduced HETP value been achieved in column manufacturing technology."

F. Gritti et al. / J. Chromatogr. A 1217 (2010) 1589-1603

> "The highest peak capacity was obtained with the Kinetex column which is in good agreement with the theory."

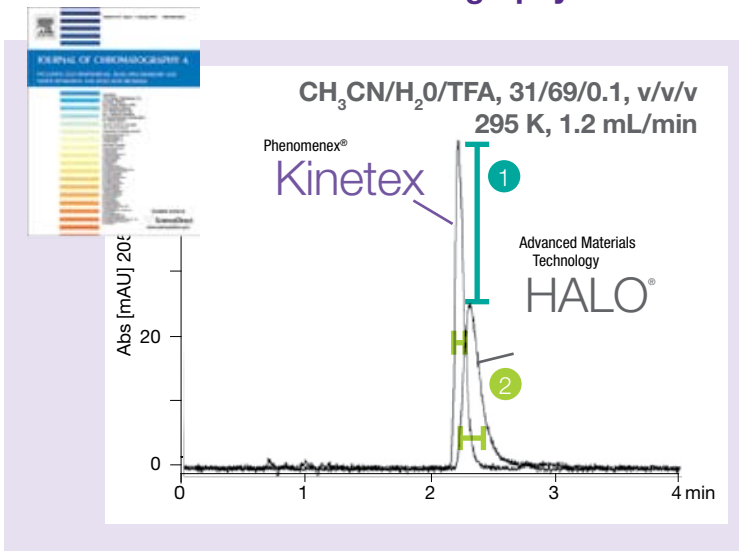
S. Fekete, J. Fekete / Talanta 84 (2011) 416-423

1 Increased Sensitivity, S/N Ratio

2 Narrower Peak Widths

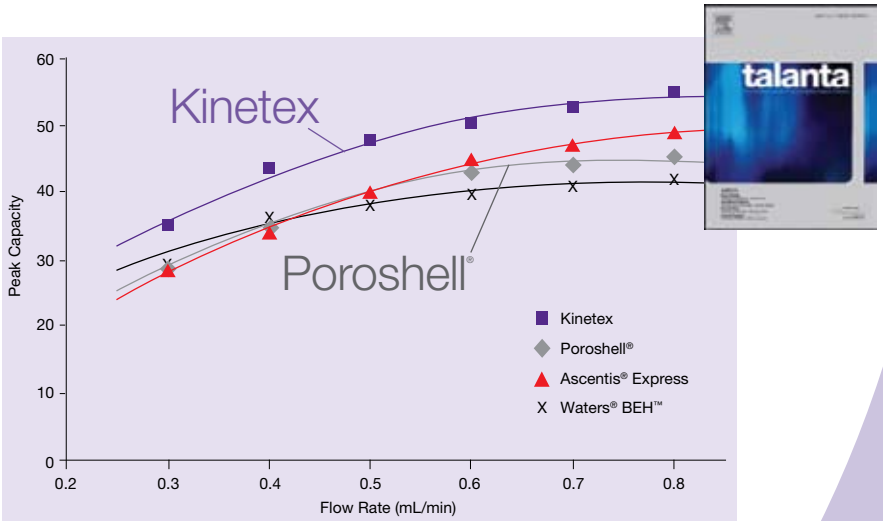
25 % Greater Peak Capacity

From the Journal of Chromatography A



Comparison between the peak shapes of insulin recorded on the Kinetex and HALO columns.
Reprinted from *Journal of Chromatography A*, Volume 1217, Issue 10, with permission from Elsevier. "Performance of columns packed with the new shell particles, Kinetex-C18," page 1598, copyright 2010. By Fabrice Gritti, Irene Leonardis, David Shock, Paul Stevenson, Andrew Shalliker, and Georges Guiochon.

From Talanta

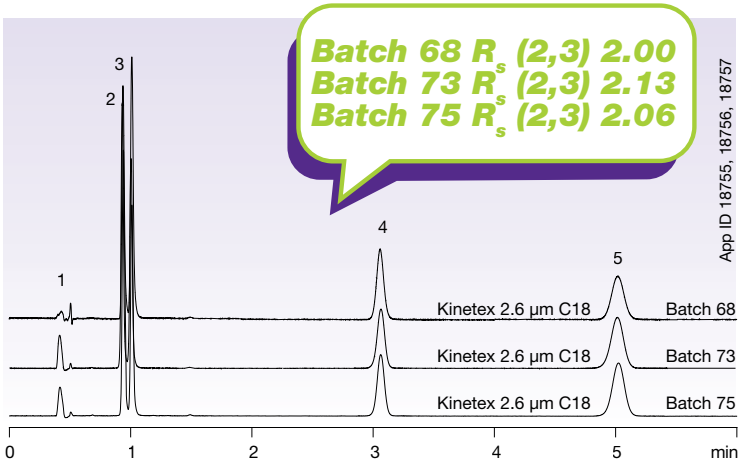


Peak capacity plots as function of flow rate at 3 min gradient time.
Reprinted from *Talanta*, Volume 84, Issue 2, with permission from Elsevier. "Fast gradient screening of pharmaceuticals with 5 cm long, narrow bore reversed-phase columns packed with sub-3 µm core–shell and sub-2 µm totally porous particles," page 416, copyright 2011. By Szabolcs Fekete and Jenõ Fekete.

Reproducible
Batch-to-Batch

Each individual Kinetex® column and batch of media undergoes a battery of quality assurance tests for particle size distribution (both solid core and shell thickness), surface coverage, carbon load, pore diameter distribution, and many other parameters to ensure exceptional reproducibility.

C18 Batch-to-Batch Overlay

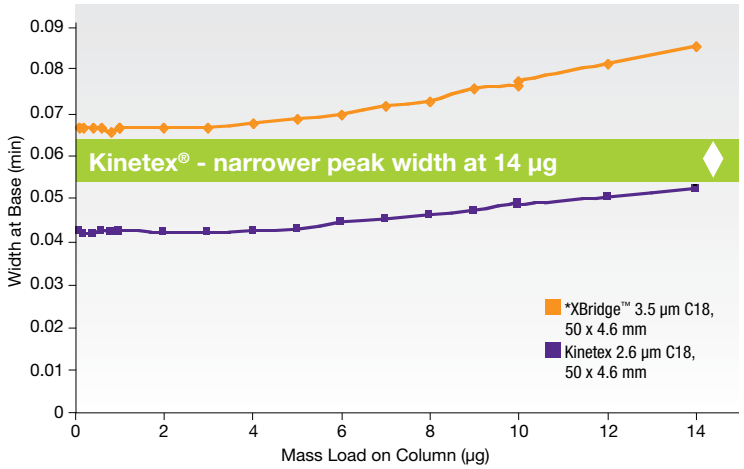


Conditions same for all batches:
Columns: as noted
Dimensions: 50 x 4.6 mm
Part No.: 00B-4462-E0
Mobile Phase: Water / Acetonitrile (65:35)
Flow Rate: 1.0 mL/min
Temperature: ambient
Detection: UV @ 254 nm
Sample: 1. Uracil
2. Hydroxycortisone
3. Cortisone
4. Cortisone acetate
5. 17-Hydroxyprogesterone

High Analytical
Loading

With Kinetex core-shell technology, analytical loading is comparable to or better than competitive columns. In the study below, the change in peak width was measured with increased loading on column. Kinetex exhibited excellent analytical loading capacity.

Analytical Loading - Ethylparaben in formic acid buffer



Conditions for both columns:
Mobile Phase: 0.1 % Formic acid in Water / Acetonitrile (65:35)
Flow Rate: 1.85 mL/min
Temperature: 30 °C
Instrument: Agilent 1200SL

* XBridge is a trademark of Waters Corporation. Comparative separations may not be representative of all applications. Phenomenex is not affiliated with Waters Corporation.

KINETEX™

Advanced in Every Way

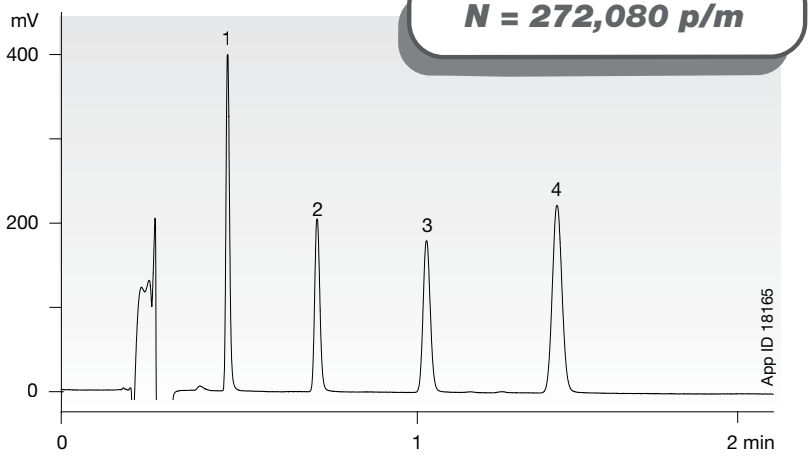
UHPLC

Trade-up to 1.7 µm Kinetex® Columns

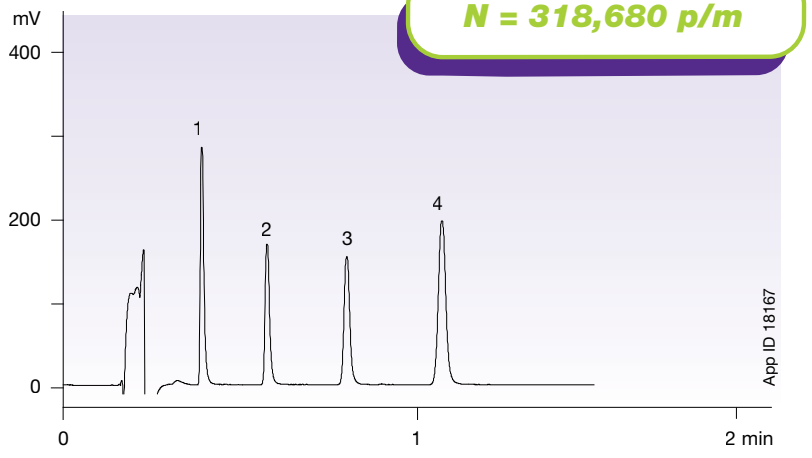
For Higher Efficiency

For users of high pressure capable instruments who want excellent efficiency, we introduce the Kinetex 1.7 µm column - the first sub-2 µm core-shell particle available on the market.

Traditional 1.7 µm



Kinetex 1.7 µm



Conditions for both columns:

Column: Kinetex 1.7 µm C18
Traditional 1.7 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: Acetonitrile / Water (50:50)
Flow Rate: 0.6 mL/min
Temperature: 25 °C
Detection: UV @ 254 nm
Instrument: *Waters® ACQUITY® UPLC®
Sample: 1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene

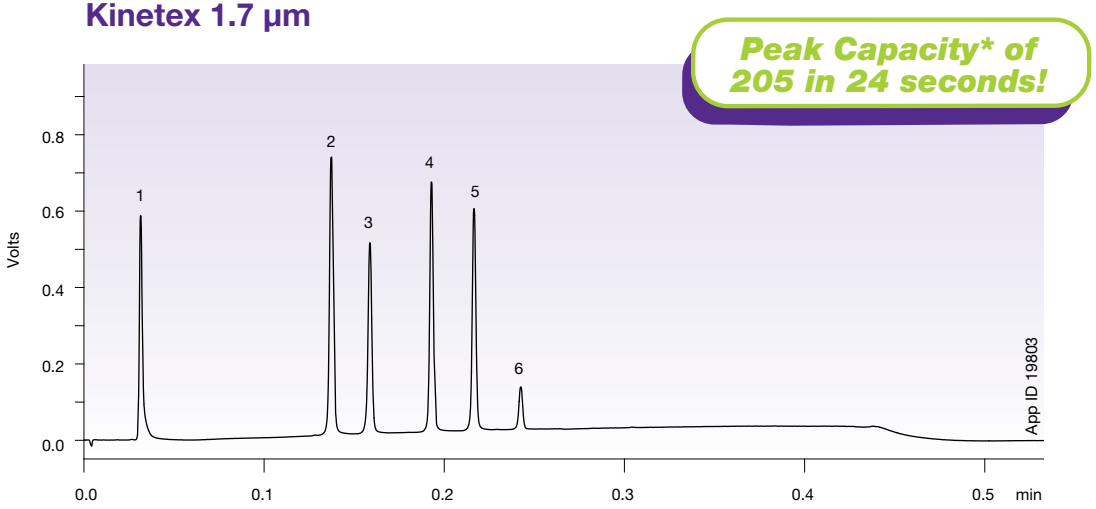
* Waters, ACQUITY, and UPLC are registered trademarks of Waters Corporation. Phenomenex is not affiliated with Waters Corporation.Comparative separations may not be representative of all applications.

Kinetex 1.7 µm

Sets Records for Peak Capacity

Kinetex 1.7 µm has record setting peak capacity in under 30 seconds. Take your methods to a level of separating power never achieved on your UHPLC system.

Kinetex 1.7 µm



Column: Kinetex 1.7 µm XB-C18
Dimensions: 30 x 2.1 mm
Part No.: 00A-4498-AN
Mobile Phase: Acetonitrile / Water (50:50)

Gradient:	**Time (min)**	**% B**
	0.0	2
	0.4	98
	0.53	98

Flow Rate: 3 mL/min
Temperature: 80 ºC
Detection: UV @ 254 nm

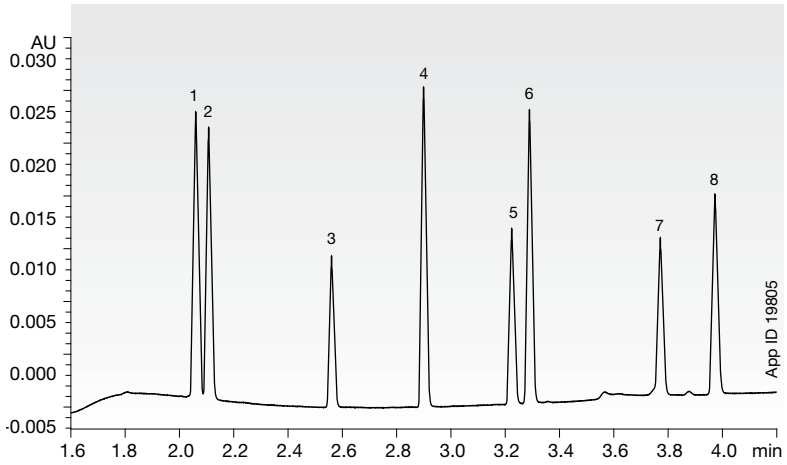
Instrument: **Shimadzu® Nexera®
Sample: 1. Uracil
2. Methyl Paraben
3. Acetophenone
4. Propyl Paraben
5. Butyl Paraben
6. Naphthalene

* Peak capacity based on average peak width of all peaks at $W_{1/2}$
** Shimadzu and Nexera are registered trademarks of Shimadzu Corporation. Phenomenex is not affiliated with Shimadzu Corporation.

Kinetex® 1.7 µm
for Higher Resolution

Do everything you can to make sure you are achieving the resolution needed by using a powerful sub-2 µm column.

*Waters® ACQUITY® 1.7 µm



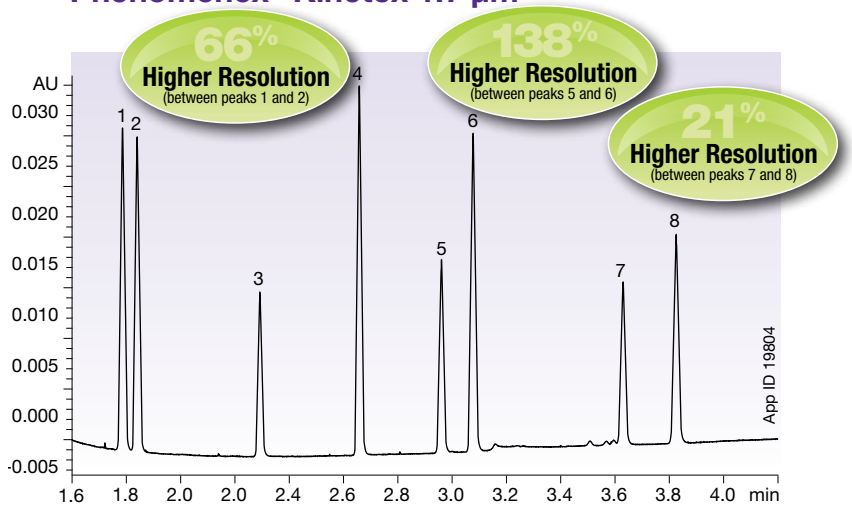
Conditions for both columns:
Column: Kinetex 1.7 µm XB-C18
*ACQUITY® UPLC® BEH™ 1.7 µm C18
Dimensions: 150 x 2.1 mm
Mobile Phase: A: MilliQ Water
B: Acetonitrile
Gradient:

Time (min)	% B
0	30
5	100

Flow Rate: 0.5 mL/min
Temperature: Ambient
Detection: UV @ 210 nm (ambient)
Backpressure: 981 bar (Kinetex)
935 bar (ACQUITY®)
Instrument: *Waters® ACQUITY® UPLC®

Sample:
1. Hydrocortisone
2. Cortisone
3. Corticosterone
4. Cortisone-21-Acetate
5. DHEA (Dehydroepiandrosterone)
6. 17-Hydroxprogesterone
7. Deoxycorticosterone
8. Progesterone

Phenomenex® Kinetex 1.7 µm



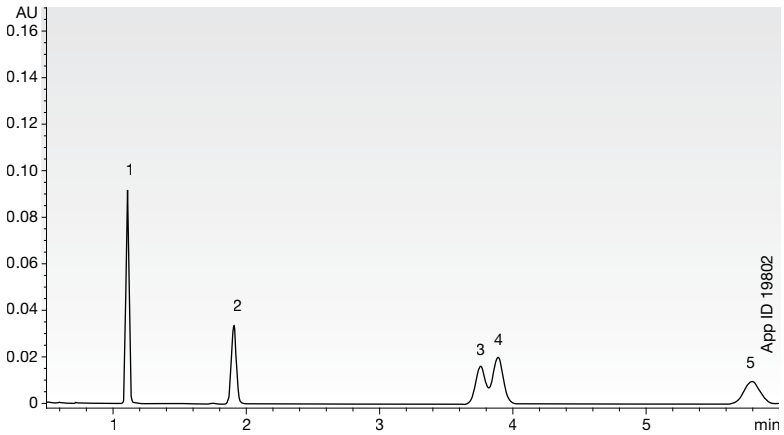
Column	Resolution between Hydrocortisone and Cortisone	Resolution between DHEA (Dehydroepiandrosterone) and 17-Hydroxyprogesterone	Resolution between Deoxycorticosterone and Progesterone
Kinetex 1.7 µm XB-C18 150 x 2.1 mm	2.5 (66 % increase)	5.0 (138 % increase)	7.4 (21 % increase)
ACQUITY® 1.7 µm BEH™ C18 150 x 2.1 mm	1.5	2.1	6.1

* Waters, ACQUITY, and UPLC are registered trademarks, and BEH Technology is a trademark of Waters Corporation. Phenomenex is not affiliated with Waters Corporation. Comparative separations may not be representative of all applications.

Kinetex 1.7 µm
for Increased Sensitivity

Can your column ever have too much sensitivity? Ensure you see everything you need by using the column that will give you the greatest peak heights possible.

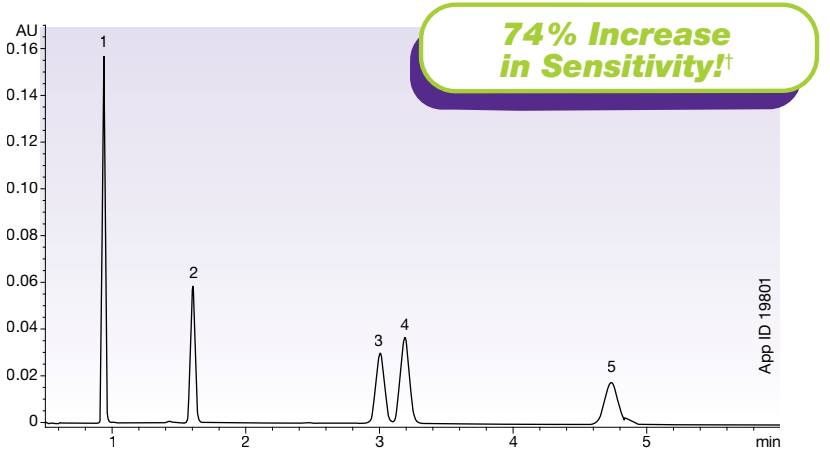
*Waters® ACQUITY® 1.7 µm



Conditions for both columns:

Column: Kinetex 1.7 µm XB-C18
*ACQUITY® 1.7 µm BEH™ C18
Dimensions: 50 x 2.1 mm
Mobile Phase: 5 mM Ammonium acetate pH 6.7 / Acetonitrile (85:15)
Flow Rate: 0.9 mL/min
Temperature: 50 °C
Detection: UV @ 214 nm
Instrument: *Waters® ACQUITY® UPLC®
Sample: 1. Phenobarbital
2. Butalbital
3. Pentobarbital
4. Amobarbital
5. Secobarbital

Phenomenex® Kinetex 1.7 µm



† Based on peak heights of peaks 1 and 2.

* Waters, ACQUITY, and UPLC are registered trademarks, and BEH Technology is a trademark of Waters Corporation. Phenomenex is not affiliated with Waters Corporation. Comparative separations may not be representative of all applications.

Kinetex® 1.7 µm and 2.6 µm

Compatible with All UHPLC Instruments

Using highly efficient Kinetex core-shell technology columns on your Waters® ACQUITY® UPLC® system is as easy as 1… 2… 3.

STEP 1 Loosen the Collet

Place the tool between the gold compression screw and collet – a quick turn will release the unit.

STEP 2 Adjust Tubing

Set the tubing to the correct port depth for your Kinetex column.

STEP 3 Attach Kinetex Column

Attach your Kinetex column to the end-fitting and tighten.

TIP

See how easy it is to bring the power of Kinetex to your Waters® ACQUITY® system in a 1-minute video demonstration at *www.phenomenex.com/kinetex*

Kinetex 1.7 µm and 2.6 µm

Compatible with All UHPLC Instruments

No matter which UHPLC system you have in your lab, it is easy to harness the most powerful sub-2 µm column on the market.

Agilent® 1290

Kinetex on Agilent® 1290

Shimadzu® Nexera®

Kinetex on Shimadzu® Nexera

JASCO® X-LC

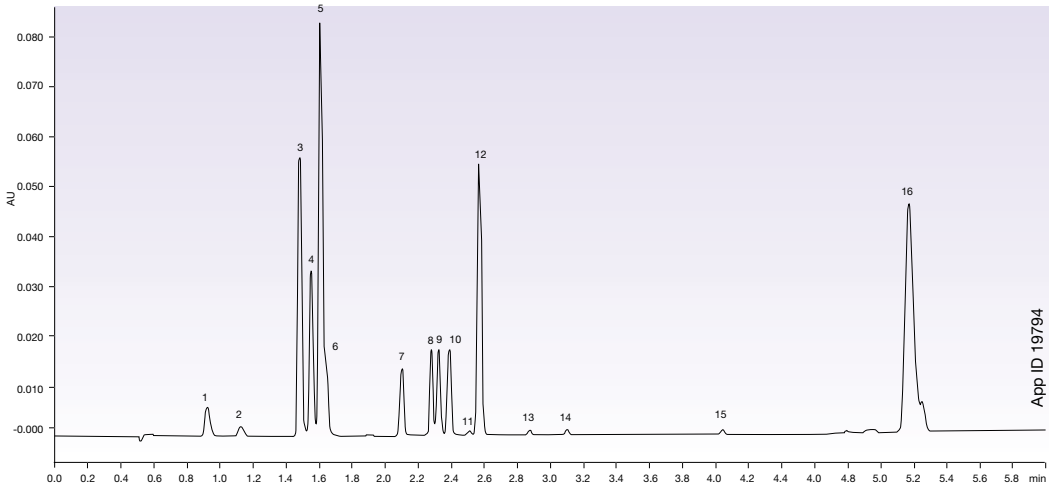
Kinetex on JASCO® X-LC

Laboratory Case Study

Kinetex® 1.7 µm in a QC Application

> It has been shown that the **1.7 µm Kinetex 100 x 2.1 mm column** was capable of resolving 16 different chemical entities with a 6 minute run time. This new analytical method will be used to replace 16 older methods thereby facilitating an **annualised cost saving for the site of €320,000 (US $460,000).**

A. Charles, et. al., Pfizer Grange Castle, Grange Castle Business Park, Clondalkin, Dublin Republic of Ireland



Column: Kinetex 1.7 µm C18
Dimensions: 100 x 2.1 mm
Part No.: 00D-4475-AN
Mobile Phase: A: 5 mM Ammonium formate pH 3.25 / Acetonitrile (95:5)
B: 5 mM Ammonium formate pH 3.25 / Acetonitrile (10:90)

Gradient:

Time (min)	% A	% B	Curve
0.0	70	30	6
1.5	50	50	6
3.0	43.7	56.3	6
5.0	5	95	6
6.0	5	95	6
6.1	70	30	6

Flow Rate: 0.4 mL/min
Temperature: 50 °C
Detection: PDA 210-300 nm, extracted channel 280 nm
Instrument: *Waters® ACQUITY® equipped with PDA

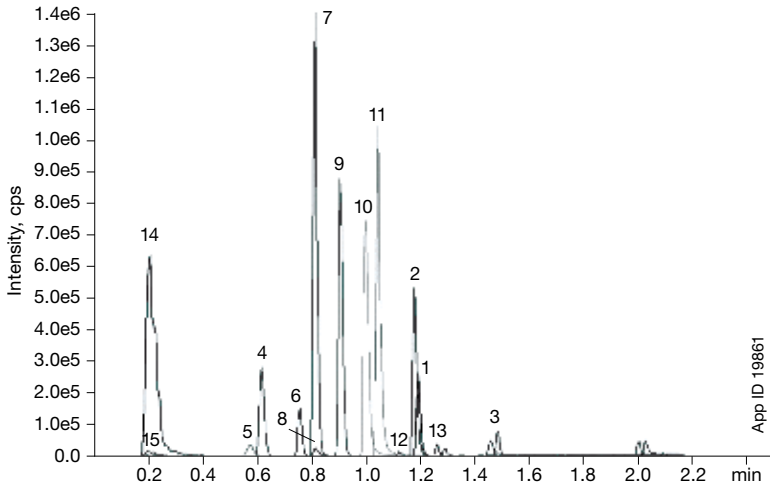
Sample:
1. Antidepressant drug (containing an HCl salt)
2. Hormone therapy #1 (containing a salt)
3. SERM drug (containing basic functional group)
4. CNS drug (containing basic functional group)
5. PPI drug (containing basic functional group)
6. CNS drug (containing basic functional group)
7. CNS drug (containing basic functional group)
8. Hormone therapy #2 (neutral)
9. Oral contraceptive hormone #1 (neutral)
10. Hormone therapy #3 (neutral)
11. Oral contraceptive hormone #2 (neutral)
12. Hormone therapy #4 (neutral)
13. Oral contraceptive hormone (neutral)
14. Hormone therapy #5 (neutral)
15. Hormone therapy #6 (acetate salt of 14)
16. Immunosuppressant drug (macromolecule, containing basic functional group)

The Kinetex 2.6 µm Advantage

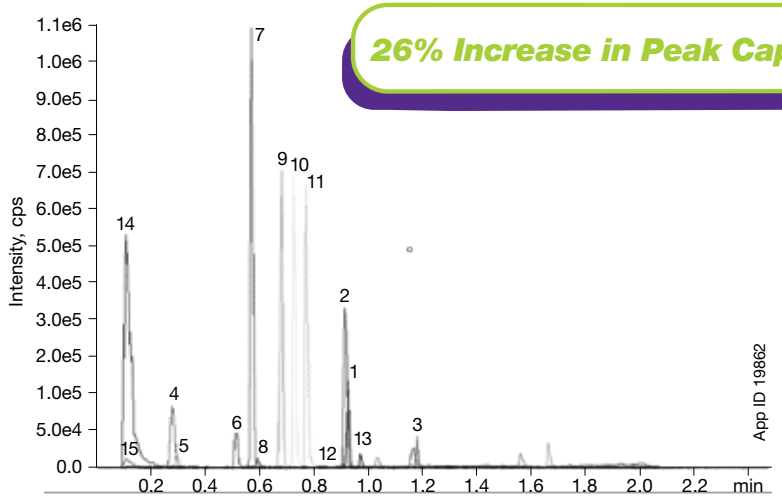
On Your UHPLC System

Increased peak capacity is achieved with Kinetex 2.6 µm when compared to sub-2 µm columns at the same pressure. Take full advantage of your UHPLC system with Kinetex 2.6 µm columns.

Traditional 1.7 µm C18
Peak Capacity: 34.4 @ 7700 psi (531 bar)*



Kinetex 2.6 µm C18
Peak Capacity: 43.5 @ 7700 psi (531 bar)*



26% Increase in Peak Capacity*

Conditions for both columns:

Dimensions: 50 x 2.1 mm
Mobile Phase: A: 0.1% Formic acid in Acetonitrile
B: 0.1% Formic acid (aq)

Gradient:

Time (min)	% B
0.00	95
0.25	95
1.80	10
1.90	10
1.91	95
2.50	95

Temperature: 40 ºC
Detection: MS
Instrument: **Waters ACQUITY® Binary UPLC®
**API 5000™ QQQ
Flow Rate: Kinetex: 1.4 mL/min
Traditional: 0.8 mL/min

Sample:
1. Haloperidol
2. Diltiazem
3. Terfenadine
4. Cimetidine
5. Acetaminophen
6. Sulfathiazole
7. Pindolol
8. Quinidine
9. Acebutolol
10. Chlorpheniramine
11. Tripolidine
12. Prednisolone
13. Nortriptyline
14. 2-hydroxy-5-methyl benzaldehyde
15. Hexanophenone

It Doesn't Stop Here!

34% increase in peak capacity and a 3.5 x's increase in sensitivity was achieved!
Request Technical Note TN-1104 and learn how.

Data generated by Quotient Bioresearch, U.K.
** ACQUITY and UPLC are registered trademarks of Waters Corporation. API 5000 is a trademark of AB SCIEX.
Phenomenex is not affiliated with Waters Corporation or AB SCIEX.
* Comparative separations may not be representative of all applications.

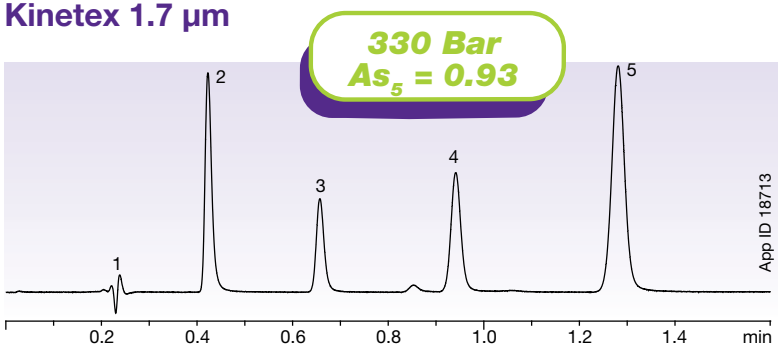
Scalable

Across Particle Sizes

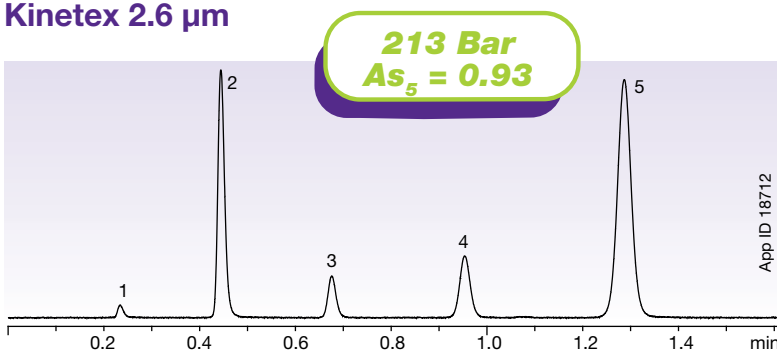
Kinetex® 1.7 µm columns are completely scalable to Kinetex 2.6 µm columns. If your method developed on Kinetex 1.7 µm needs to transfer to a traditional HPLC system, simply switch the method over to Kinetex 2.6 µm for reproducible selectivity at lower backpressure.

Scalable

Kinetex 1.7 µm



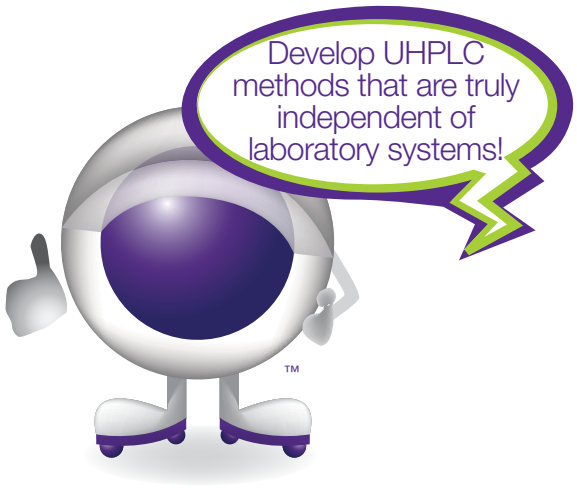
Kinetex 2.6 µm



Conditions for both columns:

Column: Kinetex 1.7 µm C18
Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: Acetonitrile / Water (50:50)
Flow Rate: 0.5 mL/min
Temperature: 30 °C
Detection: UV @ 254 nm

Backpressure: 330 bar (Kinetex 1.7 µm)
213 bar (Kinetex 2.6 µm)
Sample:
1. Uracil
2. Acetophenone
3. Benzene
4. Toluene
5. Naphthalene



SecurityGuard™ Ultra

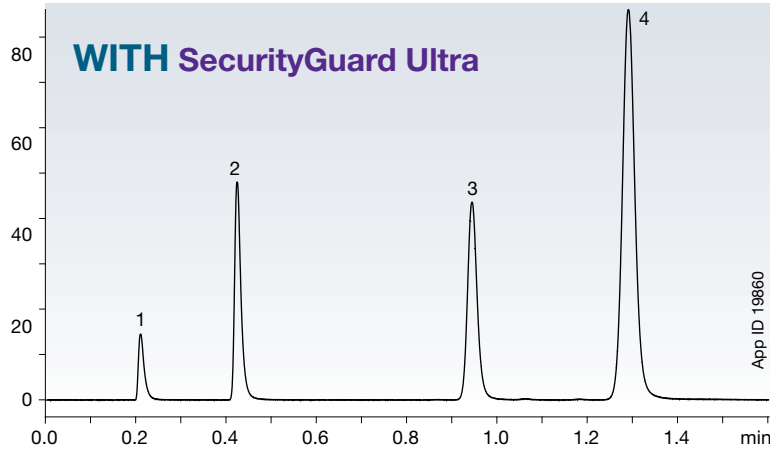
UHPLC Column Protection System for any sub-2 µm Column

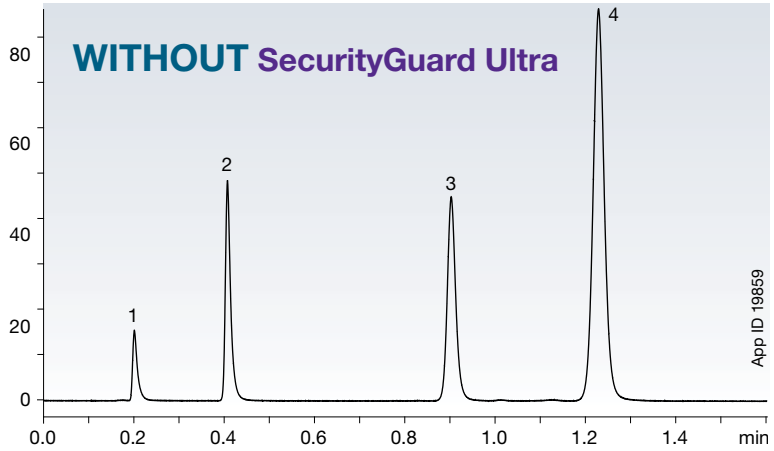
Protects with No Loss of Column Performance!

With SecurityGuard Ultra, contaminants and microparticulates are trapped within the guard cartridge instead of in your expensive UHPLC column. The extremely low dead volume (<0.3 µL) of this unique guard design minimizes sample peak dispersion to maintain column performance without altering your chromatography results.

- Increases column lifetime of virtually all manufacturers' UHPLC columns
- Offers more reproducible chromatography
- For pressures up to 20,000 psi

1.7 µm Kinetex column with and without the SecurityGuard Ultra cartridge system





Conditions for both columns:

Column: Kinetex 1.7 µm XB-C18
Dimensions: 50 x 2.1 mm
Guard Cartridge: SecurityGuard Ultra C18 (ODS) 2.1 mm ID
Part No.: AJ0-8768
Mobile Phase: Acetonitrile / Water (50:50)
Flow Rate: 0.5 mL/min
Detection: UV @ 254 nm

Sample: 1. Uracil
2. Acetophenone
3. Toluene
4. Naphthalene

Parameters	Without SG ULTRA	With SG ULTRA	Difference
Selectivity	1.35	1.36	-0.99%
Efficiency (Plates/Meter)	246,080	237,220	-3.60%
Backpressure	348	360	3.45%

For more details on the test methodology and results, contact Phenomenex.

* See p. 47-48 for SecurityGuard Ultra ordering information.

The Spark is Gone.

Trade your current sub-2 µm in for one that brings the passion back to UHPLC.

to the **FIRST** and **ONLY** sub-2 µm core-shell UHPLC column on the market.

Kinetex® 1.7 µm core-shell columns have been shown to **outperform** sub-2 µm fully porous columns by **20 %**.* Ready to trade up?

See the data and hear what customers are saying

www.phenomenex.com/TradeUp

Phenomenex products are available worldwide.
Email us at international@phenomenex.com.

* Dependent on application and running conditions as cited in Fekete et al., J. Pharm. Biomed. Analysis 54 (2011) 482

KINETEX™

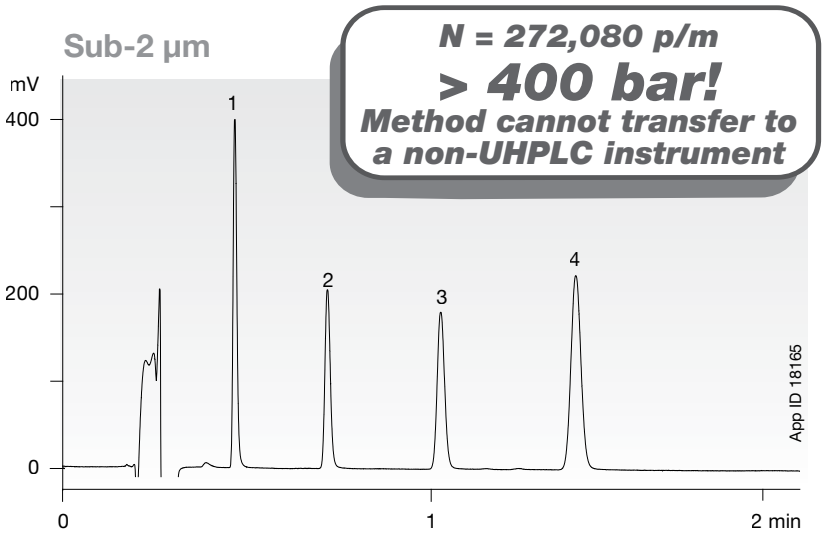
Advanced in Every Way

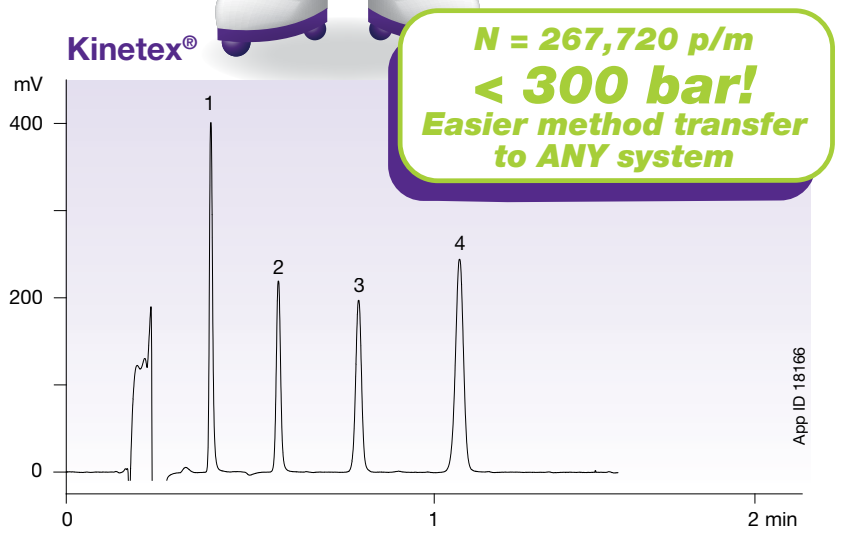
HPLC

Low Backpressure

Sub-2 µm Efficiency

With the efficiency of a fully porous sub-2 µm column and typical operating backpressure less than 400 bar†, you can achieve the promise of ultra-high performance on **any LC system**.





Conditions for both columns:
Column: Kinetex® 2.6 µm C18
Traditional 1.7 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: Acetonitrile / Water (50:50)
Flow Rate: 0.6 mL/min
Temperature: 25 °C
Detection: UV @ 254 nm

Instrument: *Waters® ACQUITY® UPLC®
Sample: 0.5 µL test mixture
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene

† Kinetex 2.6 µm columns are pressure rated to 600 bar for use on both HPLC and UHPLC instrumentation. 2.1 mm ID columns are pressure stable to 1,000 bar.
* Waters, ACQUITY, and UPLC are registered trademarks of Waters Corporation. Phenomenex is not affiliated with Waters Corporation.
Comparative separations may not be representative of all applications.

Decrease Run Time

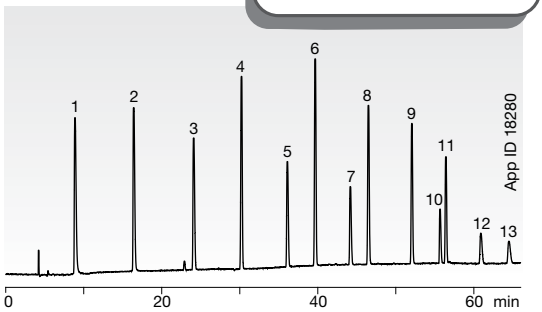
And . . .

In the past, the options for fast LC were limited to costly system upgrades, compromises in column performance, and only modest improvements in throughput. Now, Kinetex 2.6 µm core-shell technology delivers on the promise of UHPLC performance via dramatically faster analysis with similar or better resolution on **any LC system**.

Increase Resolution or Maximize Throughput

5 µm

$Rs_{10,11} = 3.11$



Conditions are same except as noted:

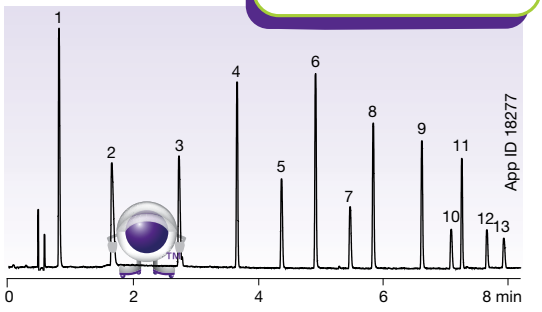
Column: Traditional 5 µm C18
Dimensions: 250 x 4.6 mm
Mobile Phase: A: Water
B: Acetonitrile

Gradient:	Time (min)	% B	Time (min)	% B
	0	5	66	95
	4.78	5	66.01	5
	51.52	95	86.38	5

Flow Rate: 0.714 mL/min
Temperature: 45 °C
Detection: UV @ 258 nm (ambient)
Sample:
1. Acetone
2. 2-Butanone
3. 2-Pentanone
4. Acetophenone
5. 2-Heptanone
6. Butyrophenone
7. 2-Nonanone
8. Hexanophenone
9. Octanophenone
10. 2-Tridecanone
11. Decanophenone
12. 2-Pentadecanone
13. 2-Hexadecanone

Kinetex

$Rs_{10,11} = 4.96$



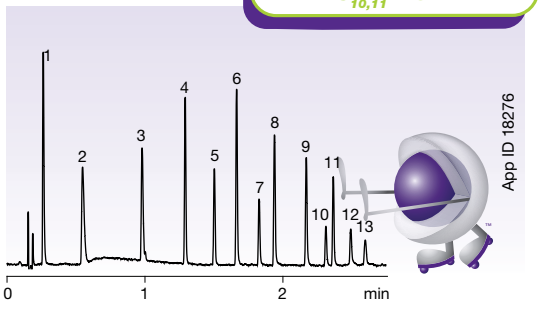
Column: Kinetex 2.6 µm C18
Dimensions: 100 x 4.6 mm
Part No.: 00D-4462-E0

Gradient:	Time (min)	% B	Time (min)	% B
	0	5	8.2	95
	0.65	5	8.21	5
	7.01	95	10.97	5

Flow Rate: 2.1 mL/min

Kinetex

< 3 min
Resolution maintained
$Rs_{10,11} = 3.12$



Column: Kinetex 2.6 µm C18
Dimensions: 50 x 4.6 mm
Part No.: 00B-4462-E0

Gradient:	Time (min)	% B	Time (min)	% B
	0	5	2.75	95
	0.23	5	2.76	5
	2.19	95	3.61	5

Flow Rate: 3.4 mL/min

Replace 3 µm and 5 µm Columns

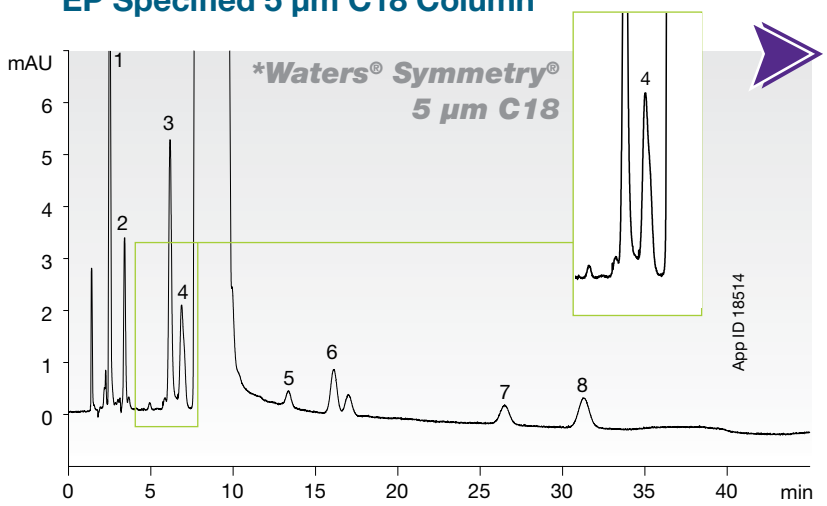
For Improved Speed, Resolution, and Sensitivity

Generating much lower backpressure (< 400 bar) at optimal linear velocities, you can now achieve 2-3x's the column efficiencies of traditional fully porous 3 µm and 5 µm columns on any LC instrument.

Optimization of Atenolol EP Method

This EP (European Pharmacopeia [*Ph. Eur.*]) monograph is an impurity profile that uses an isocratic method. As shown to the right, Kinetex® core-shell technology columns allow you to shorten run time to less than 12 minutes and still maintain the resolution of all impurities.

EP Specified 5 µm C18 Column

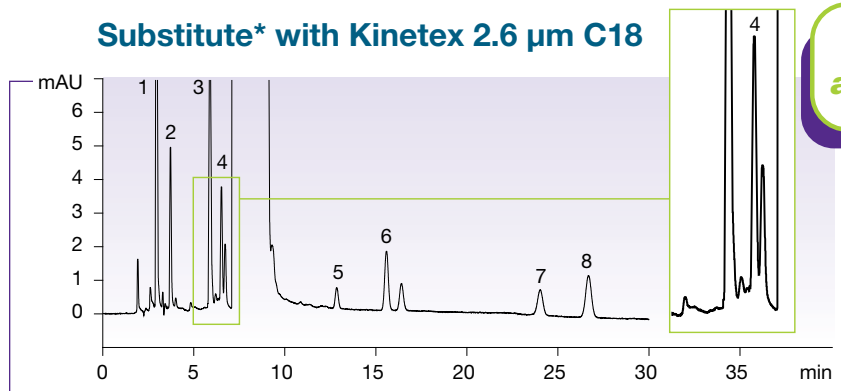


Dimensions: 150 x 3.9 mm
Mobile Phase: 12.5 mM Phosphoric acid in Water, pH 3.0 + 2.0 g Sodium octanesulfonate + 0.8 g Tetrabutyl ammonium hydrogen sulfate / Methanol / THF (80:18:2)
Flow Rate: 0.6 mL/min
Temperature: 22 ºC
Detection: UV @ 226 nm
Sample: Atenolol Related Substance

1. Impurity B
2. Impurity A
3. Impurity J
4. Impurity I
5. Impurities D and E
6. Impurity F
7. Impurity G
8. Impurity H

* Waters and Symmetry are registered trademarks of Waters Corporation. Phenomenex is not affiliated with Waters Corporation. Comparative separations may not be representative of all applications.

Substitute* with Kinetex 2.6 µm C18



Improved Resolution and Higher Sensitivity

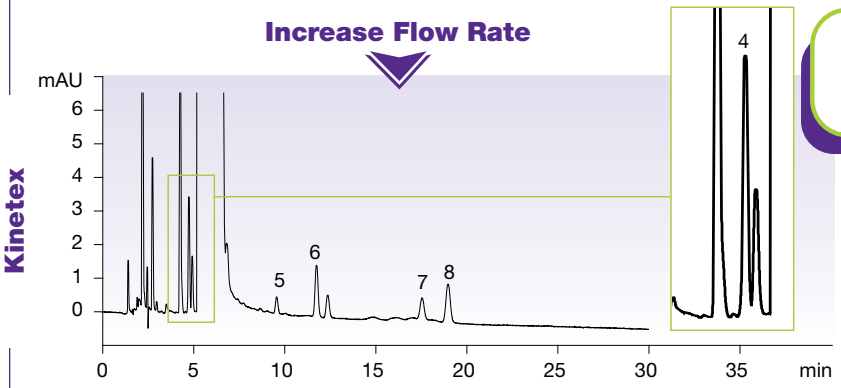
Column: Kinetex 2.6 µm C18
Dimensions: 150 x 4.6 mm
Part No.: 00F-4462-E0
Flow Rate: 0.6 mL/min

Conditions are same except as noted:
Mobile Phase: 12.5 mM Phosphoric acid in Water, pH 3.0 + 2.0 g Sodium octanesulfonate + 0.8 g Tetrabutyl ammonium hydrogen sulfate / Methanol / THF (80:18:2)
Temperature: 22 ºC
Detection: UV @ 226 nm
Sample: Atenolol Related Substance

1. Impurity B
2. Impurity A
3. Impurity J
4. Impurity I
5. Impurities D and E
6. Impurity F
7. Impurity G
8. Impurity H

Kinetex

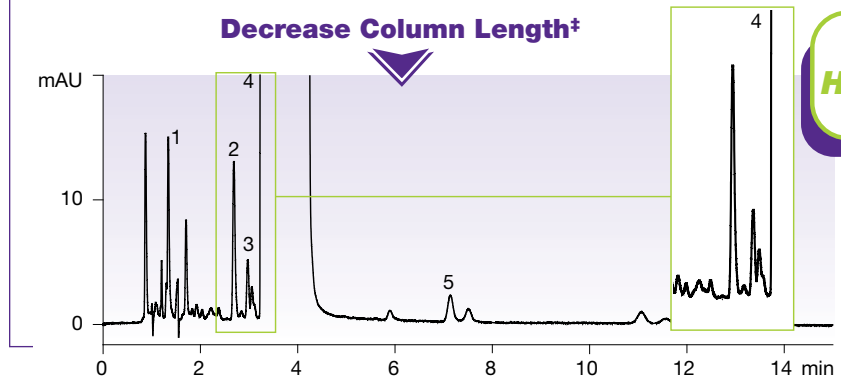
Increase Flow Rate



30% Faster Analysis

Column: Kinetex 2.6 µm C18
Dimensions: 150 x 4.6 mm
Part No.: 00F-4462-E0
Flow Rate: 0.8 mL/min

Decrease Column Length‡



64% Higher Throughput than Original EP Method

Column: Kinetex 2.6 µm C18
Dimensions: 100 x 4.6 mm
Part No.: 00D-4462-E0
Flow Rate: 0.9 mL/min

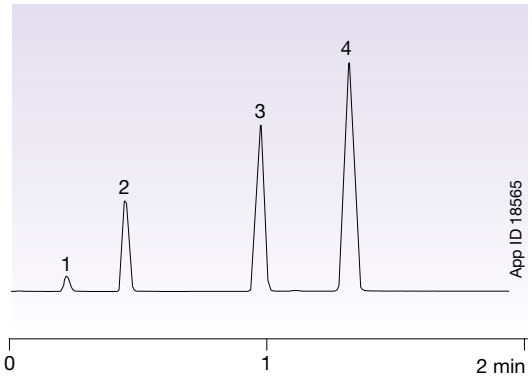
Access more optimized pharmacopeia methods at:
www.phenomenex.com/kinetex

* Decrease in column particle within allowable EP and USP pharma particles size change (+- 50 %)
‡ Decrease in column length within allowable EP and USP column length change (+- 70 %)

Easier Method Transfer
to ANY LC System

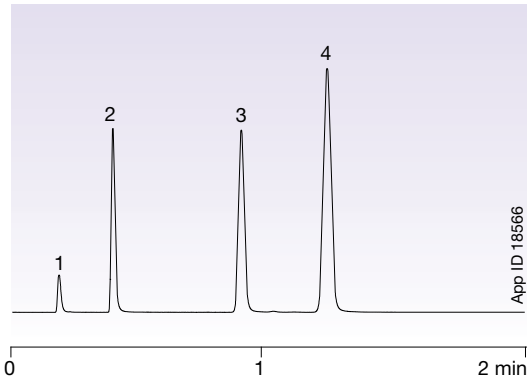
With Kinetex® 2.6 µm core-shell technology, you can develop high performance LC methods on **any system** and transfer them anywhere.

Kinetex 4.6 mm ID
on *Agilent® 1100

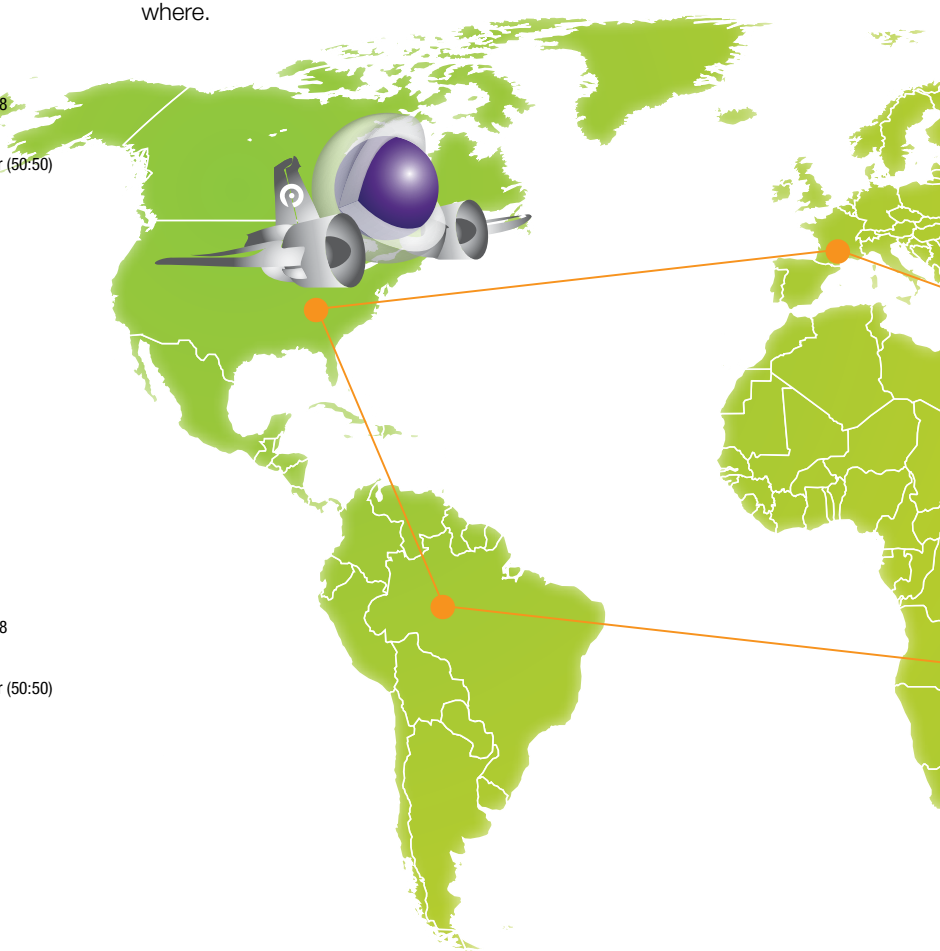


Column: Kinetex 2.6 µm C18
Dimensions: 50 x 4.6 mm
Part No.: 00B-4462-E0
Mobile Phase: Acetonitrile / Water (50:50)
Flow Rate: 2.35 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
Sample: 1. Uracil
2. Acetophenone
3. Toluene
4. Naphthalene

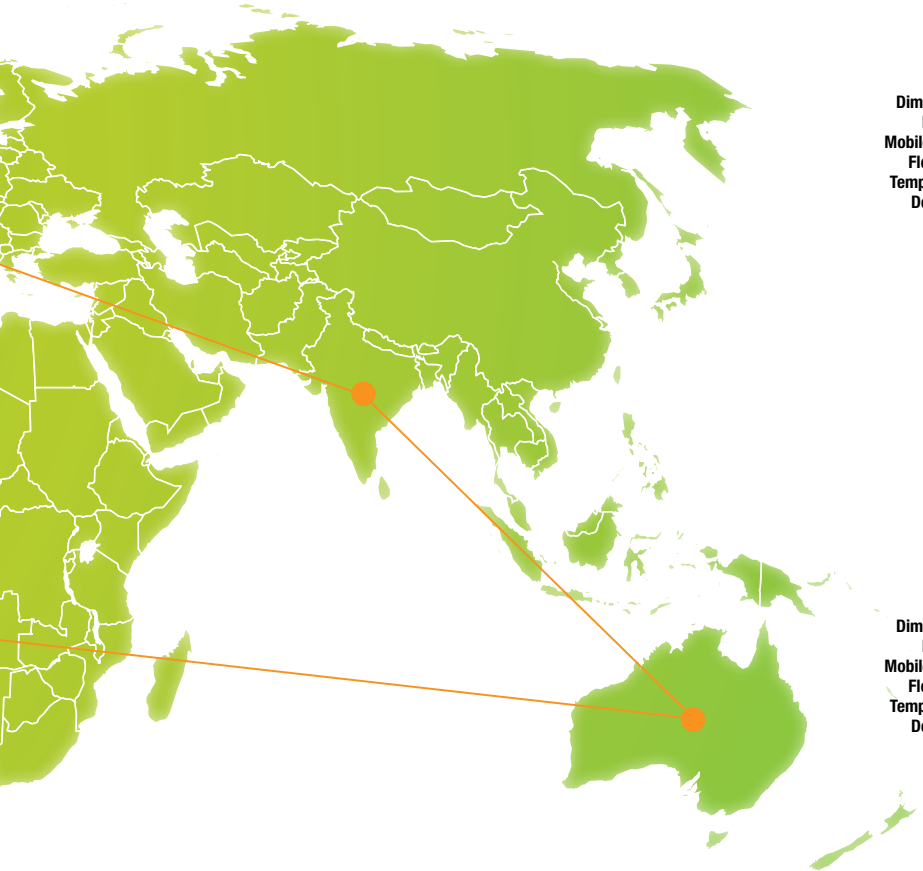
Kinetex 2.1 mm ID
on *Agilent® 1200SL



Column: Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4462-AN
Mobile Phase: Acetonitrile / Water (50:50)
Flow Rate: 0.49 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
Sample: 1. Uracil
2. Acetophenone
3. Toluene
4. Naphthalene

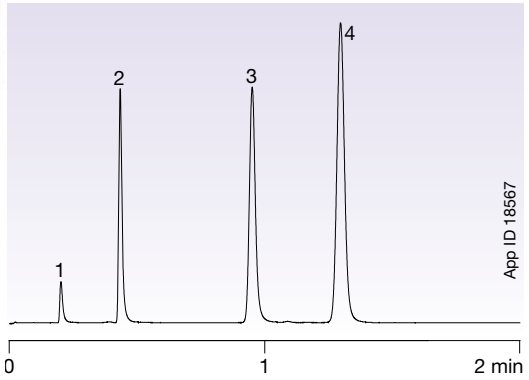


In these examples different internal diameters of Kinetex columns are used on various systems to illustrate the versatility of a method developed on Kinetex core-shell technology. Please note the flow rates are scaled to maintain the same linear velocity.



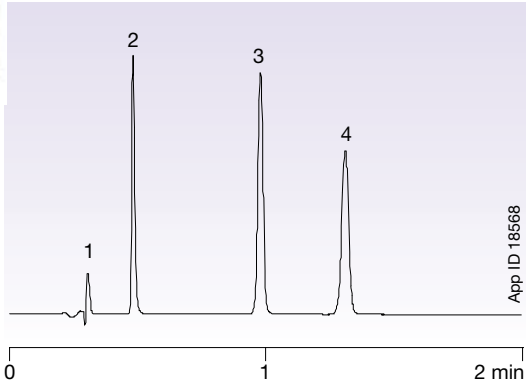
Kinetex 3.0 mm ID
on *Shimadzu® Prominence® UFLCXR™

Column: Kinetex 2.6 µm C18
Dimensions: 50 x 3.0 mm
Part No.: 00B-4462-Y0
Mobile Phase: Acetonitrile / Water (50:50)
Flow Rate: 1.0 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
Sample: 1. Uracil
2. Acetophenone
3. Toluene
4. Naphthalene



Kinetex 2.1 mm ID
on *Waters® ACQUITY® UPLC®

Column: Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4462-AN
Mobile Phase: Acetonitrile / Water (50:50)
Flow Rate: 0.49 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
Sample: 1. Uracil
2. Acetophenone
3. Toluene
4. Naphthalene



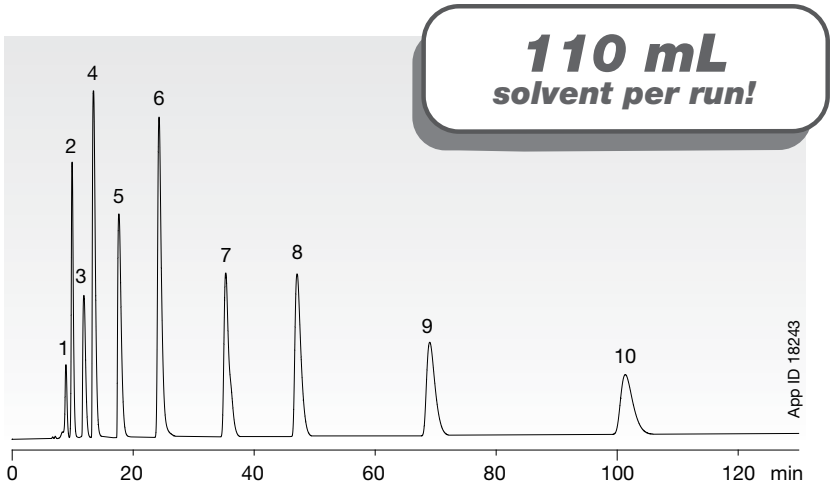
* Agilent is a registered trademark of Agilent Technologies, Inc. Waters, ACQUITY, and UPLC are registered trademarks of Waters Corporation. Shimadzu and Prominence are registered trademarks, and UFLC is a trademark of Shimadzu Corporation. Phenomenex is not affiliated with Agilent Technologies, Shimadzu Corp., or Waters Corp. Comparative separations may not be representative of all applications.

Improve Performance

Save Solvent

When chromatographic column performance improves you can decrease your analysis time and also decrease your overall solvent consumption without compromising your separations. Use Kinetex® core-shell technology to dramatically decrease the solvent consumption in your laboratory and increase sample throughput.

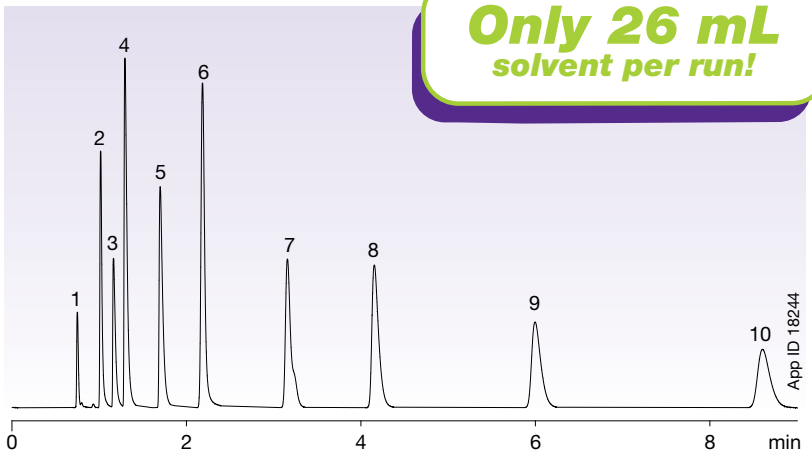
Example Method Consumption



Column: Traditional 5 µm C18
Dimensions: 250 x 4.6 mm
Mobile Phase: A: 20 mM Potassium phosphate pH 7
B: Methanol / Acetonitrile (50:50)
A/B (48:52)
Flow Rate: 1.0 mL/min
Temperature: 40 ºC
Detection: UV @ 254 nm
Sample:

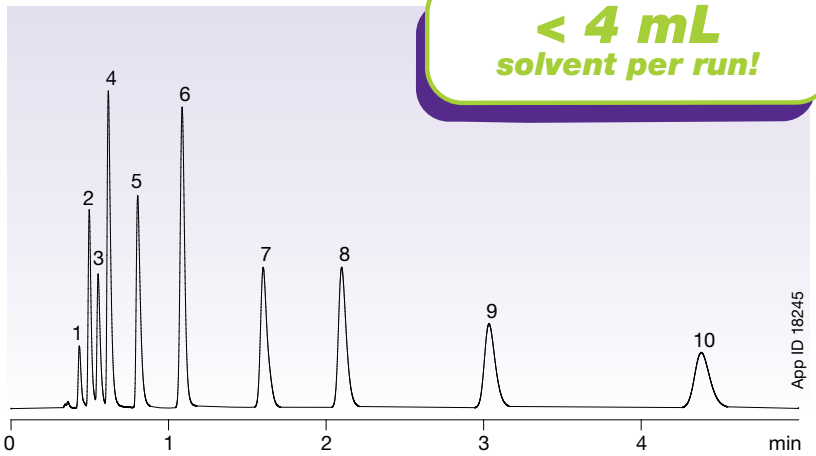
1. Tianeptine
2. Desmethyldoxepin
3. Protriptyline
4. Desipramine
5. Imipramine
6. Amoxapine
7. Doxepin
8. Nortriptyline
9. Amitriptyline
10. Clomipramine

Substitute with a shorter Kinetex column to reduce solvent consumption



Column: Kinetex 2.6 µm C18
Dimensions: 100 x 4.6 mm
Part No.: 00D-4462-E0
Mobile Phase: A: 20 mM Potassium phosphate pH 7
B: Methanol / Acetonitrile (50:50)
A/B (48:52)
Flow Rate: 2.9 mL/min
Temperature: 40 ºC
Detection: UV @ 254 nm
Sample:
1. Tianeptine
2. Desmethyldoxepin
3. Protriptyline
4. Desipramine
5. Imipramine
6. Amoxapine
7. Doxepin
8. Nortriptyline
9. Amitriptyline
10. Clomipramine

Further reduce column ID and length for even greater solvent savings!

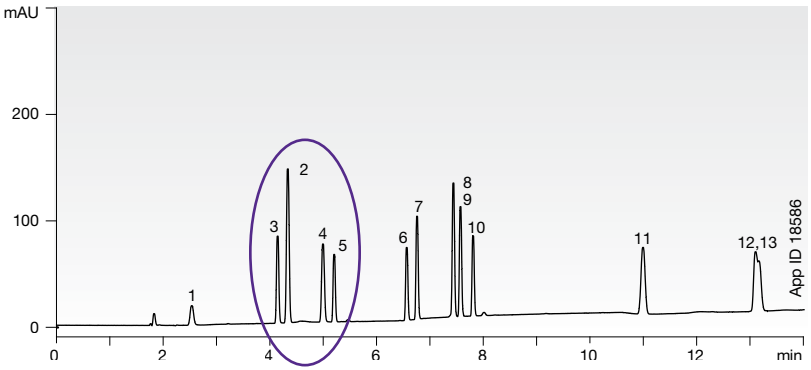


Column: Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4462-AN
Mobile Phase: A: 20 mM Potassium phosphate pH 7
B: Methanol / Acetonitrile (50:50)
A/B (48:52)
Flow Rate: 0.6 mL/min
Temperature: 40 ºC
Detection: UV @ 254 nm
Sample:
1. Tianeptine
2. Desmethyldoxepin
3. Protriptyline
4. Desipramine
5. Imipramine
6. Amoxapine
7. Doxepin
8. Nortriptyline
9. Amitriptyline
10. Clomipramine

Increased
Sensitivity

The combination of the uniform particle shape, narrow particle size distribution, and the significantly shorter diffusion path results in much higher column efficiencies and increased chromatographic resolution. The increased efficiencies provide an immediate benefit in sensitivity since higher chromatographic efficiencies translate into significantly narrower and taller peaks, making it easier to detect low level impurities.

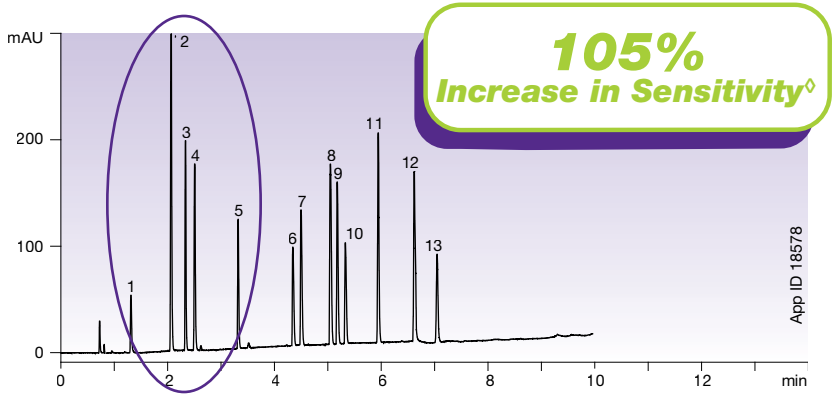
*GL Sciences Inertsil® 5 µm ODS-3 250 x 4.6 mm



Conditions same for both columns except where noted:
Columns: Kinetex 2.6 µm C18 100 Å
*Inertsil 5 µm ODS-3 100 Å
Dimensions: Kinetex: 150 x 4.6 mm
*Inertsil: 250 x 4.6 mm
Mobile Phase: A: 0.1 % Phosphoric acid in Water
B: 0.1 % Phosphoric acid in Acetonitrile
Gradient: 5 % to 95 % B in 9 min (150 x 4.6 mm)
5 % to 95 % B in 15 min (250 x 4.6 mm)
Flow Rate: 1.8 mL/min
Temperature: 50 °C

Detection: UV @ 215 nm (22 °C)
Sample: 1. Procainamide
2. Acetaminophen
3. Folic acid
4. Sulfathiazole
5. Acebutolol
6. Dextromethorphan
7. Diphenhydramine
8. Propafenone
9. Amitriptyline
10. Fluoxetine
11. Naproxen
12. Diflunisal
13. Indomethacin

Phenomenex® Kinetex® 2.6 µm C18 150 x 4.6 mm



◊ Signal-to-noise ratio of peak 2

* Inertsil is a registered trademark of GL Sciences Inc. Phenomenex is in no way affiliated with GL Sciences Inc. Comparative separations may not be representative of all applications.

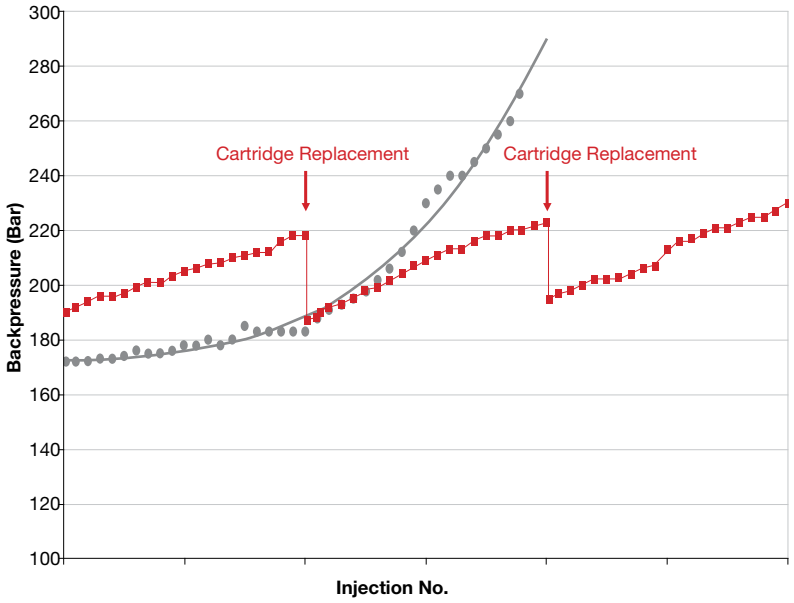
SecurityGuard™ Ultra

Guard Cartridge System for Your Ultra-High Performance Columns

Protect Your Investment

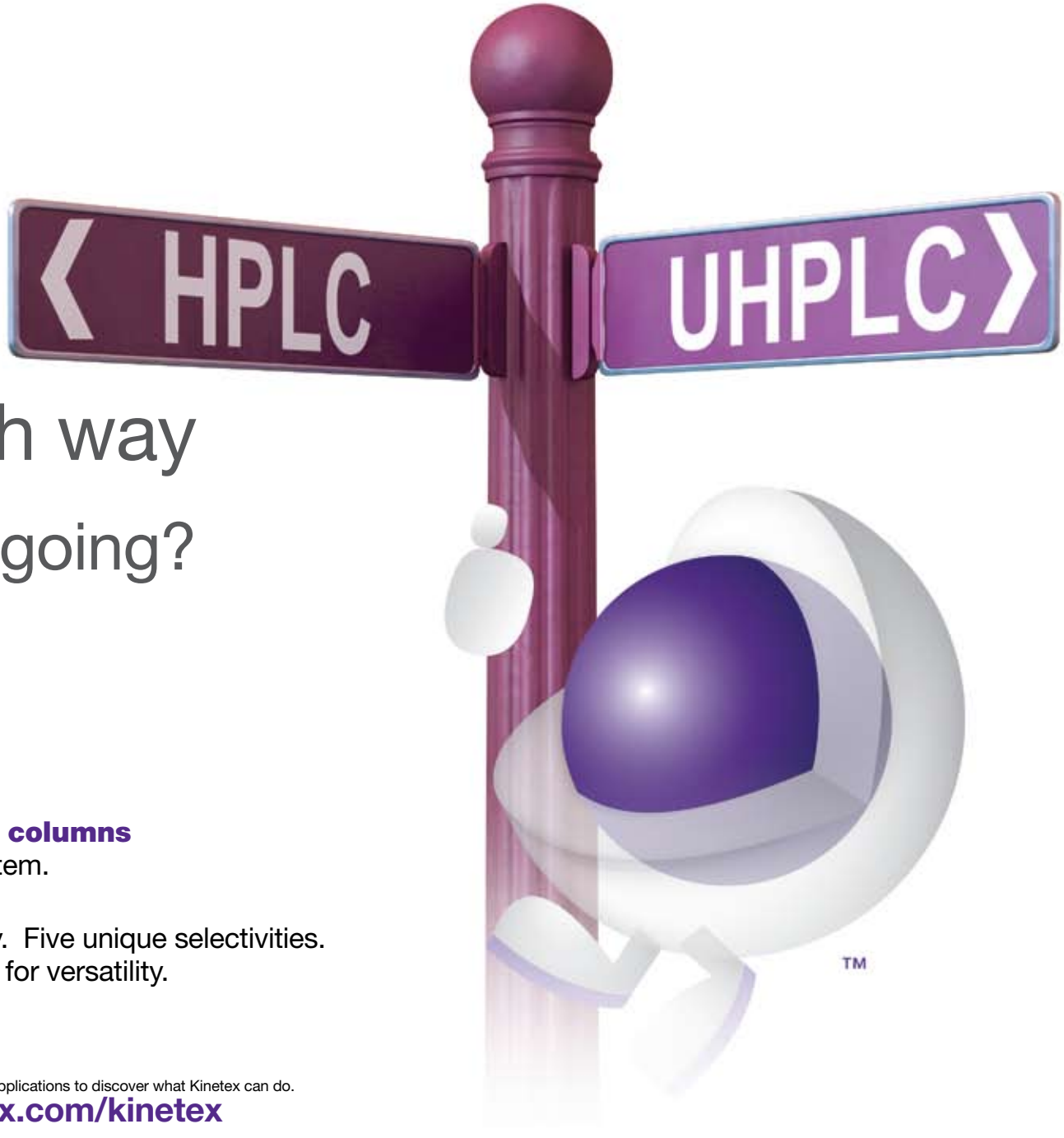
When contaminates and particulates build up at the head of your column, system backpressures can increase dramatically. By simply replacing the SecurityGuard Ultra cartridge, instead of your column, you are able to regain normal operating conditions and reclaim original column performance.

- Extends column lifetimes
- Virtually no change in chromatography
- Easy to use on virtually all manufacturers' UHPLC columns



Accelerated lifetime test using endogenous biological matrix on Kinetex 2.6 µm C18 50 x 4.6 mm ID

* See p. 47-48 for SecurityGuard Ultra ordering information.



Which way are YOU going?

It doesn't matter. **Kinetex® columns** put the 'ultra' into **ANY** system.

Core-shell technology. Five unique selectivities.
1.7 µm and **2.6 µm** for versatility.

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KINETEX™

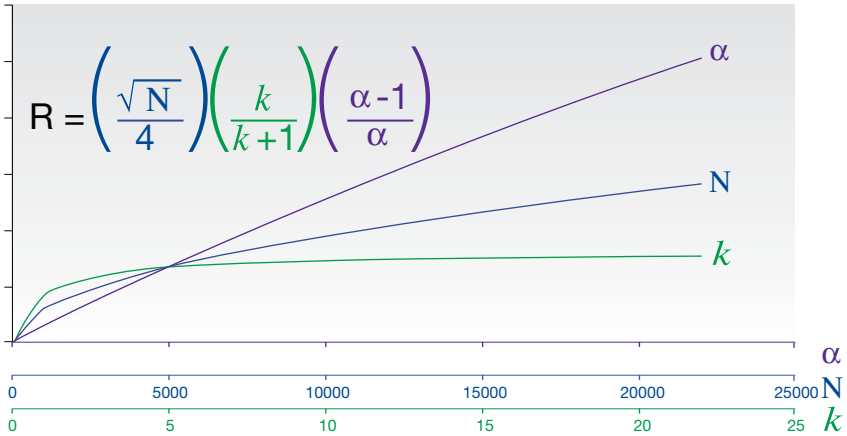
Advanced in Every Way

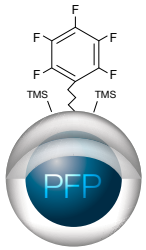
Achieve the Best Resolution

with the Right Selectivity

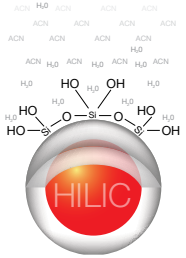
Even more than efficiency, selectivity is the most important parameter for obtaining increased resolution. Notice in the graph below that selectivity (**α**) is more influential than efficiency (**N**).

The Impact of Selectivity on Resolution

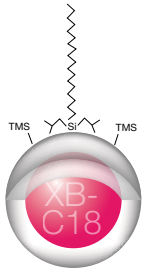




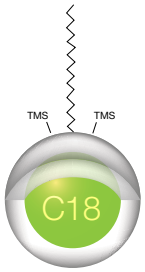
Pentafluorophenyl phase offers a high degree of steric interactions for improved separation of structural isomers, and the electronegative fluorine groups can offer increased retention of polar basic compounds



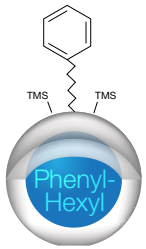
Used under HILIC running conditions, this phase provides the highest polar selectivity for retention and separation of hydrophilic compounds



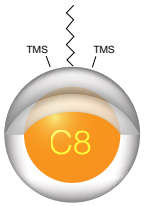
This unique C18 phase yields increased hydrogen bonding with hydrophobic selectivity, resulting in improved peak shape for basic compounds and increased retention of acidic compounds



Balanced C18 phase that provides the highest degree of hydrophobic selectivity relative to the other Kinetex® phases



Aromatic and moderate hydrophobic selectivity result in the great retention and separation of aromatic hydrocarbons



Moderate hydrophobic and steric selectivity is offered, bringing ultra-high performance to USP L7 and other octyl silane methods

Easy Pharmacopeia

Method Optimization

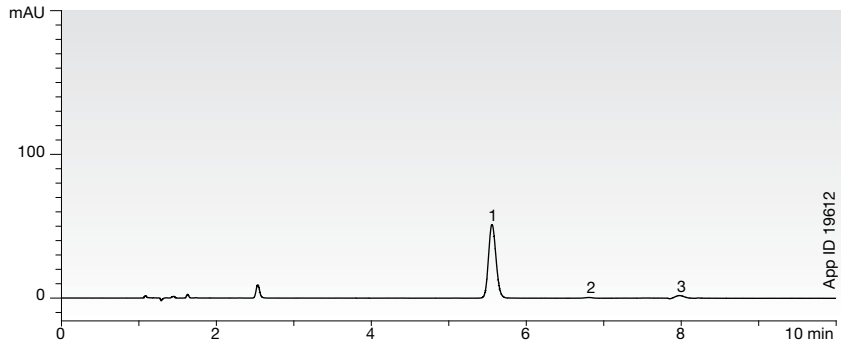
Some of the greatest laboratory cost savings can be realized when an older method is optimized to increase throughput and decrease solvent consumption. With the increased efficiency of Kinetex core-shell technology, EP or USP methods can yield dramatic performance improvements while staying within the allowable adjustments.

USP Monograph for the Assay of Ibuprofen

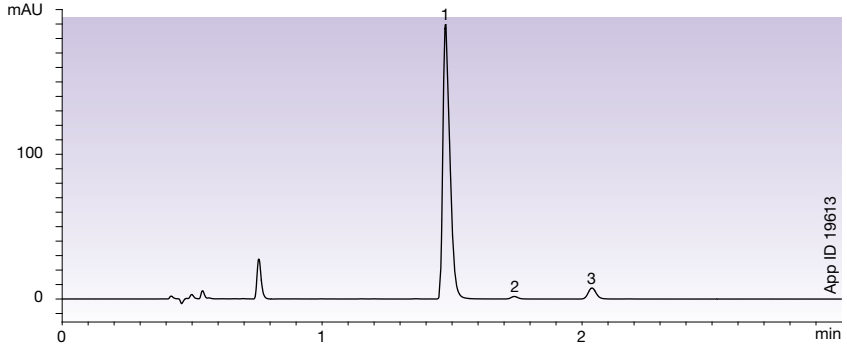
The monograph specifies using a 250 x 4.6 mm column packed with 5 µm media containing a C18 bonded phase under the isocratic conditions shown below. Using a Kinetex 100 x 4.6 mm column, you can stay within the allowable adjustments specified in USP General Chapter <621>, and still maintain the system suitability of resolution between peaks of no less than 2.5 and a tailing factor for all peaks of no more than 2.5.

USP Classification	Description	Kinetex Phase
L1	Octadecyl silane	C18
L1	Octadecyl silane	XB-C18
L3	Unbonded silica	HILIC
L7	Octyl silane	C8
L11	Phenyl	Phenyl-Hexyl
L43	Pentafluorophenyl	PFP

Traditional 5 µm C18



Kinetex 2.6 µm XB-C18



Conditions for both columns:

Column: Kinetex 2.6 µm XB-C18, 100 x 4.6 mm
Traditional 5 µm C18, 250 x 4.6 mm

Mobile Phase: Acetonitrile/Water with 4 g Chloroacetic acid adjusted to pH 3.0 with Ammonium hydroxide (60:40)

Flow Rate: 2.0 mL/min

Temperature: 30 °C

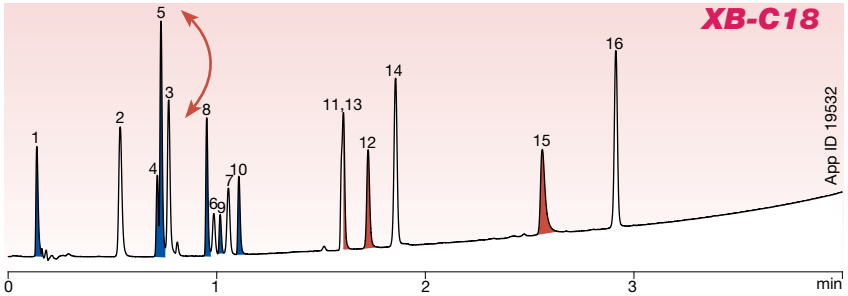
Detection: UV @ 254 nm

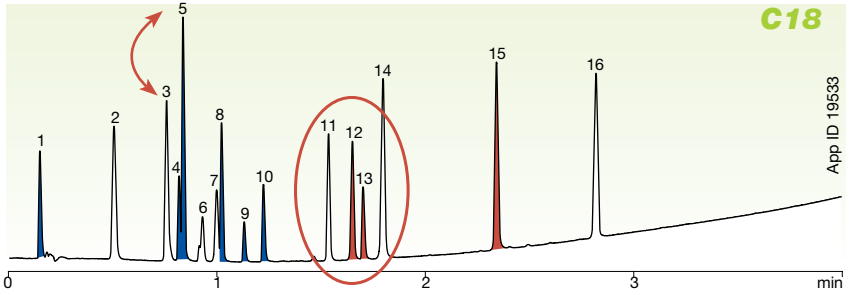
Sample: 1. Ibuprofen
2. Valerophenone
3. Ibuprofen related compound C

Complementary Selectivities

With complementary C18 and Phenyl phases you can screen for optimal resolution of complex sample mixtures. Manipulate acidic and basic compound elution by simply switching between the two column chemistries.

Change your peak elution profile





Conditions for both columns:

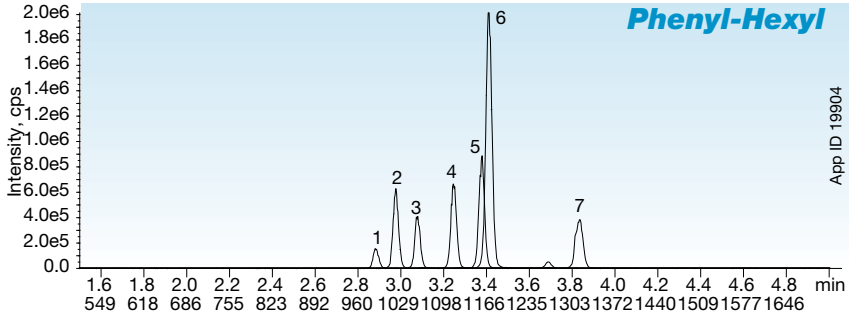
Column: Kinetex® 2.6 µm C18
Kinetex 2.6 µm XB-C18
Dimensions: 50 x 2.1 mm
Mobile Phase: A: 0.1% Formic acid in Water
B: 0.1% Formic acid in Acetonitrile

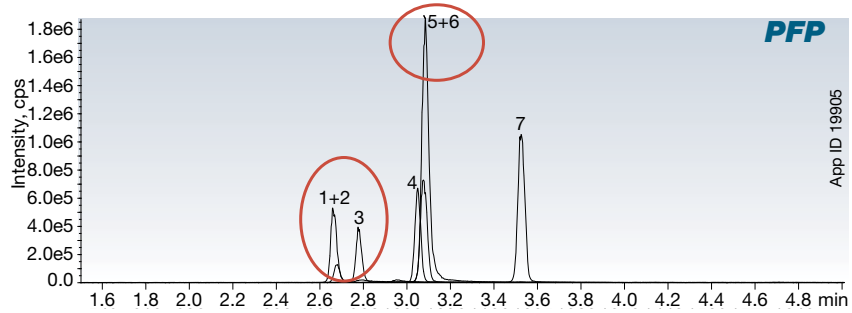
Gradient: Time (min)	**% B**
0.0	5
0.2	5
4.2	95
4.21	5
5.5	5

Flow Rate: 0.8 mL/min

Temperature: 30 °C
Detection: UV @ 254 nm (ambient)
Sample:
1. Pyridine
2. Acetaminophen
3. Pindolol
4. Quinidine
5. Sulfathiazole
6. Acebutolol
7. Benzyl alcohol
8. Chlorpheniramine
9. Phenol
10. Triprolidine
11. Nortriptyline
12. Prednisolone
13. 3-Methyl-4-nitrobenzoic acid
14. 2-Hydroxy-5-methylbenzaldehyde
15. Diflunisal
16. Hexanophenone

Increase resolution between compounds





Conditions for both columns:

Column: Kinetex 2.6 µm Phenyl-Hexyl
Kinetex 2.6 µm PFP
Dimensions: 50 x 2.1 mm
Mobile Phase: A: 10 mM Ammonium formate
B: Acetonitrile

Gradient: Time (min)	**% B**
0	15
4	55

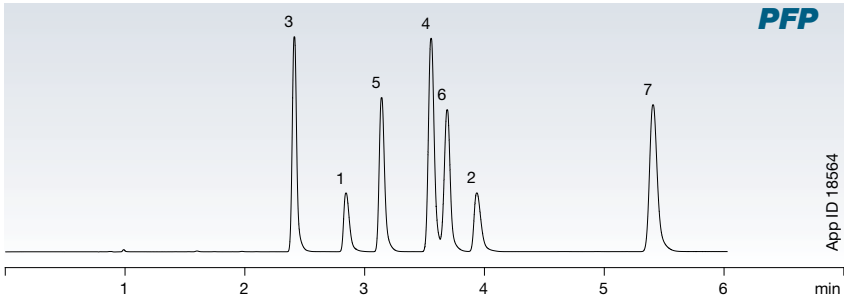
Flow Rate: 0.5 mL/min

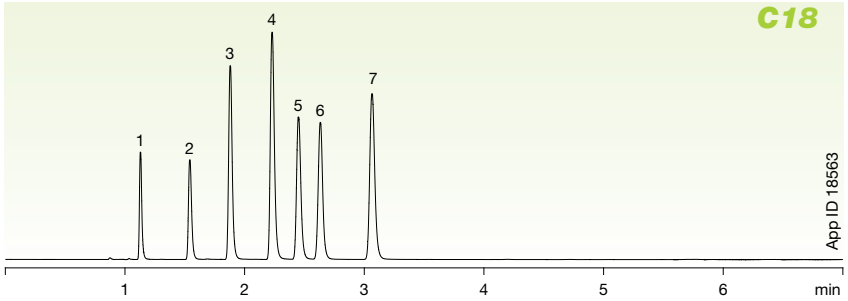
Temperature: 22 °C
Detection: Mass Spectrometer (MS)
Sample:
1. α-Hydroxyalprazolam
2. Oxazepam
3. Lorazepam
4. Clonazepam
5. Nordiazepam
6. Temazepam
7. Diazepam

Orthogonal Chemistries

Whether you are looking for a confirmation column, isomeric separation or increased retention of polar compounds, Kinetex PFP and HILIC offer orthogonal selectivity to alkyl chain phases.

Explosives



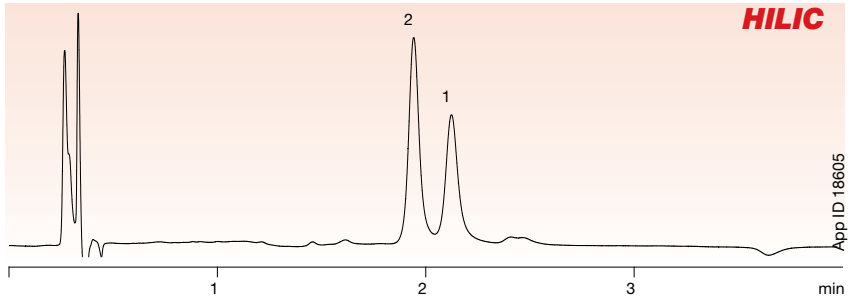


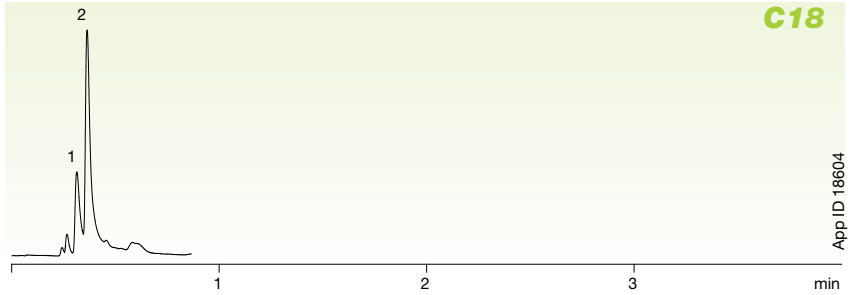
Conditions for both columns:

Columns: Kinetex 2.6 µm PFP
Kinetex 2.6 µm C18
Dimensions: 100 x 4.6 mm
Mobile Phase: A: Water
B: Methanol
Gradient: (45:55) A/B to (35:65) A/B over 6 min
Flow Rate: 1.2 mL/min
Temperature: 22 ºC
Detection: UV @ 254 nm

Sample: 1. HMX
2. RDX
3. 1,3,5-Trinitrobenzene
4. 1,3-Dinitrobenzene
5. Nitrobenzene
6. 2,4,6-Trinitrotoluene
7. 2,4-Dinitrotoluene

Norepinephrine and Epinephrine





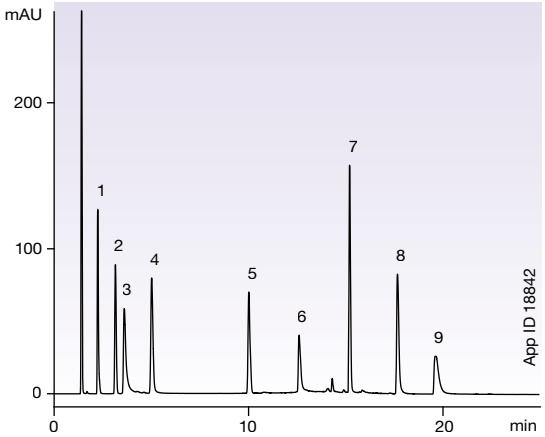
Conditions for both columns:

Columns: Kinetex 2.6 µm HILIC
Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase (HILIC): Acetonitrile / 100 mM Ammonium formate pH 3.2 (92:8)
Mobile Phase (C18): 5 mM Ammonium formate pH 3.2 / Methanol (97:3)
Flow Rate: 0.4 mL/min
Temperature: 30 °C
Detection: UV @ 210 nm (ambient)
Sample: 1. Norepinephrine
2. Epinephrine

Wide Applicability Across Many Industries

For Food Analysis

Water Soluble Vitamins

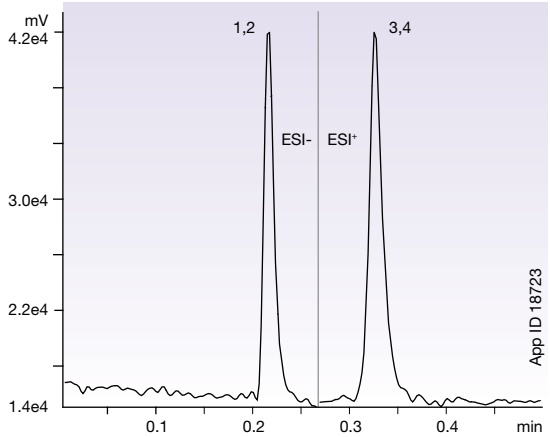


Column: Kinetex® 2.6 µm HILIC
Dimensions: 150 x 4.6 mm
Part No.: 00F-4461-E0
Mobile Phase: A: Acetonitrile
B: 100 mM Ammonium formate, pH 3.2
C: Water

Gradient: Time (min)	% A	% B	% C
0	90	10	0
5	90	10	0
20	50	10	40

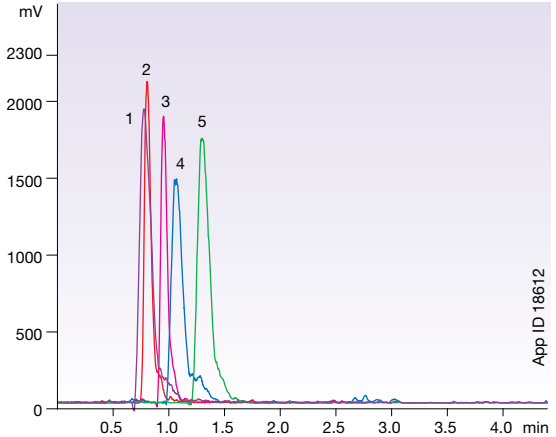
Flow Rate: 1 mL/min
Temperature: Ambient
Detection: UV @ 260 nm
Sample: 1. Nicotinamide
2. PABA
3. Pyridoxine
4. Riboflavin
5. Nicotinic Acid
6. Ascorbic Acid
7. Folic Acid
8. Vitamin B12
9. Thiamine

Melamine and Cyanuric Acid



Column: Kinetex 2.6 µm HILIC
Dimensions: 50 x 2.1 mm
Part No.: 00B-4461-AN
Mobile Phase: Acetonitrile / 100 mM Ammonium acetate, pH 5.8 (90:10)
Flow Rate: 1.0 mL/min
Temperature: 25 ºC
Detection: *API 3000™ MS
Backpressure: 190 bar
Instrument: † Waters® ACQUITY® UPLC® MS/MS
Sample : 1. Cyanuric acid 128-85.0 (quant ion),128.0-42.0 (qualifier ion)
2. Cyanuric acid-13C3 ISTD 131.1-87.0
3. Melamine 127.1-85 (quant ion), 127.1-68 (qualifier ion)
4. Melamine-13C3.15N3 ISTD 133.2-89.1

Aflatoxin from Peanut Butter



Column: Kinetex 2.6 µm PFP
Dimensions: 50 x 2.1 mm
Part No.: 00B-4477-AN
Mobile Phase: A: 0.1 % Formic acid and 5 mM Ammonium acetate in Water
B: 0.1 % Formic acid and 5 mM Ammonium acetate in Methanol

Gradient: Time (min)	% B	Time (min)	% B
0	50	2.5	95
0.25	50	2.51	50
2	70	4.4	50
2.01	95		

Flow Rate: 400 µL/min
Temperature: 25 ºC
Detection: MS
Sample: 1. Aflatoxin IS
2. Aflatoxin G2
3. Aflatoxin G1
4. Aflatoxin B2
5. Aflatoxin B1

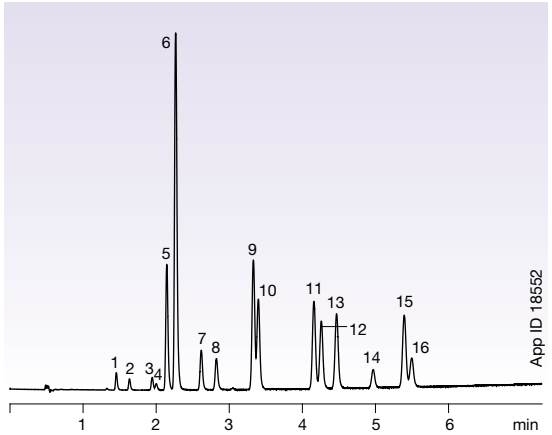
SPE Method: Strata® Florisil® (FL-PR) cartridge, 500 mg/3 mL, (Part No.: 8B-S013-HBJ)
Matrix: Peanut Butter
Condition: 3 mL of Methanol twice for conditioning, vacuuming at any rate.
Load: Sample loaded at 1-2 drops per second
Wash: 3 mL of Methanol / Water (80:20) twice at 1-2 drops per second
3 mL of 100 % Methanol twice at 1-2 drops per second
Elute: 3 mL Acetone / Water / Formic acid (96:3.5:0.5) twice at 1 drop per second
Blow all elution fractions down under Nitrogen to dryness and reconstitute in 1 mL mobile phase

* API 3000 is a trademark of AB SCIEX.
† Waters, ACQUITY, and UPLC are registered trademarks of Waters Corporation.
Phenomenex is not affiliated with AB SCIEX or Waters Corporation.
Comparative separations may not be representative of all applications.

Wide Applicability Across Many Industries

For Environmental

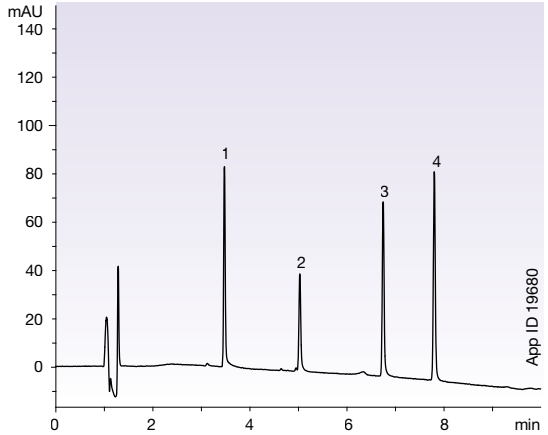
Polyaromatic Hydrocarbons (PAHs): EPA Method 610



Column: Kinetex 2.6 µm C18
Dimensions: 100 x 4.6 mm
Part No.: 00D-4462-E0
Mobile Phase: A: Water
B: Acetonitrile
Gradient: (30:70) A/B to (0:100) A/B over 10 min
Flow Rate: 1.5 mL/min
Temperature: 30 °C
Detection: UV @ 254 nm
Sample :

1. Naphthalene
2. Acenaphthylene
3. Fluorene
4. Acenaphthene
5. Phenanthrene
6. Anthracene
7. Fluoranthene
8. Pyrene
9. Chrysene
10. Benz[a]anthracene
11. Benzo[b]fluoranthene
12. Benzo[k]fluoranthene
13. Benzo[a]pyrene
14. Dibenz[a,h]anthracene
15. Indeno[1,2,3-cd]pyrene
16. Benzo[g,h,i]perylene

Estrone, Estradiol, and Estriol from Water



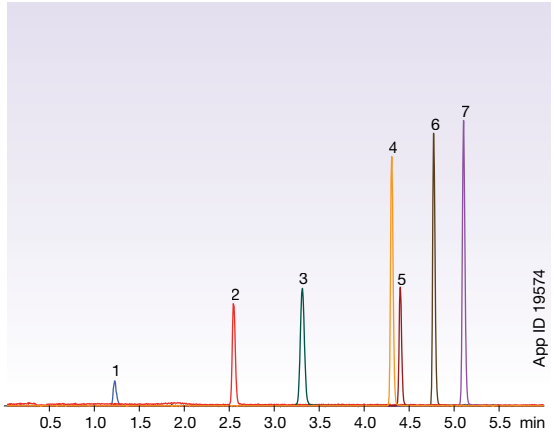
Column: Kinetex 2.6 µm XB-C18
Dimensions: 150 x 4.6 mm
Part No.: 00F-4496-E0
Mobile Phase: A: 6.9 mM Ammonium acetate pH 4.0 with 25 % Acetonitrile (v/v)
B: Acetonitrile
Gradient:

Time (min)	% B
0	0
10	65

Flow Rate: 1.2 mL/min
Temperature: 22 °C
Detection: UV @ 230 nm
Sample :

1. Estriol
2. Ethyl Paraben (ISS)
3. 17B Estradiol
4. Estrone

Triazine Pesticides: EPA Method 536



Column: Kinetex 2.6 µm C8
Dimensions: 50 x 2.1 mm
Part No.: 00B-4497-AN
Mobile Phase: A: 5 mM Ammonium acetate
B: Methanol
Gradient:

Time (min)	% B
0	5
0.25	40
2	40
3	75
4	75
4.1	5

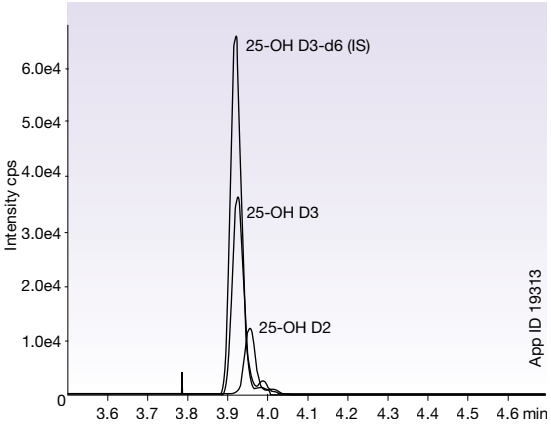
Flow Rate: 0.3 mL/min
Temperature: 25 °C
Detection: MS
Sample :

1. Atrazine-desethyl-desisopropyl
2. Atrazine-desisopropyl
3. Atrazine-desethyl
4. Cyanazine
5. Simazine
6. Atrazine
7. Propazine

Wide Applicability Across Many Industries

For Clinical Toxicology

25-OH Vitamin D2 and D3 from Serum

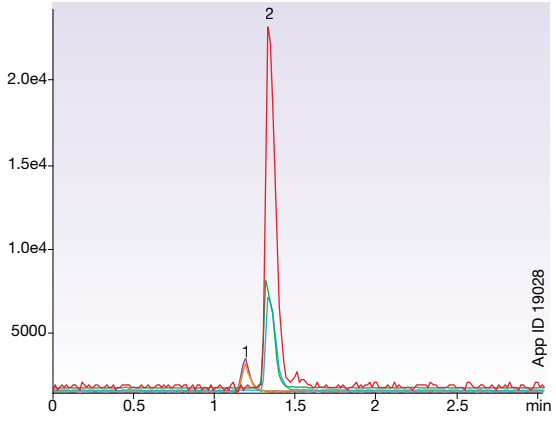


Column: Kinetex® 2.6 µm C18
Dimensions: 50 x 4.6 mm
Part No.: 00B-4462-E0
Mobile Phase: A: 0.05 % Formic acid
B: 5 mM Ammonium acetate + 0.1 % Formic acid in Methanol

Gradient:	Time (sec)	% B
	0	8
	5	8
	205	100
	290	100
	360	8

Flow Rate: 1 mL/min
Temperature: 35 ºC
Detection: MS (ambient)
Sample : 1. 25-hydroxyvitamin D3 (25-OH D3)
2. 25-hydroxyvitamin D3-d6 (25-OH D3-d6)
3. 25-hydroxyvitamin D2 (25-OH D2)

Ethyl Sulfate and Ethyl Glucuronide

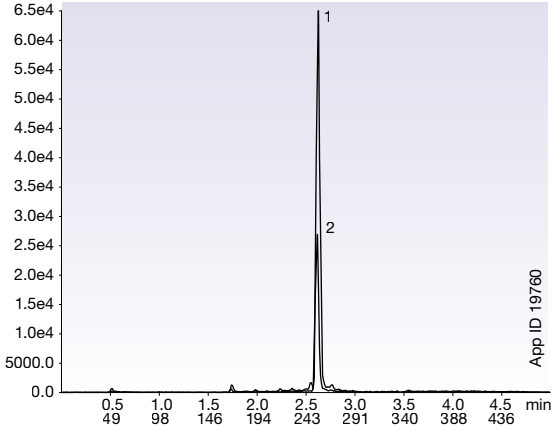


Column: Kinetex 2.6 µm C18
Dimensions: 100 x 2.1 mm
Part No.: 00D-4462-AN
Mobile Phase: A: 5 mM Ammonium formate
B: Methanol

Gradient:	Time (min)	% B
	0	5
	3	10
	4	95
	4.01	5

Flow Rate: 0.2 mL/min
Temperature: 25 ºC
Detection: MS (ambient)
Sample : 1. Ethyl Glucuronide (EtG) + IS (EtG-d5)
2. Ethyl Sulfate (EtS) + IS (EtS-d5)

Testosterone from Male Plasma



Column: Kinetex 1.7 µm C18
Dimensions: 30 x 2.1 mm
Part No.: 00A-4475-AN
Mobile Phase: A: 0.1 % Formic acid + 1 mM Ammonium Formate in Water
B: 0.1 % Formic acid + 1 mM Ammonium Formate in Acetonitrile

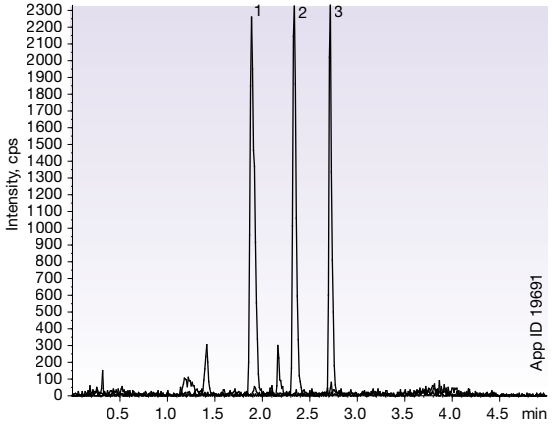
Gradient:	Time (min)	% B
	0	10
	2.5	90
	3.5	90
	3.6	10

Flow Rate: 0.4 mL/min
Temperature: 55 ºC
Detection: MS (ambient)
Sample : 1. Testosterone
2. Testosterone-d3

Wide Applicability Across Many Industries

For Clinical Toxicology

Digoxin and Digitoxin in Plasma



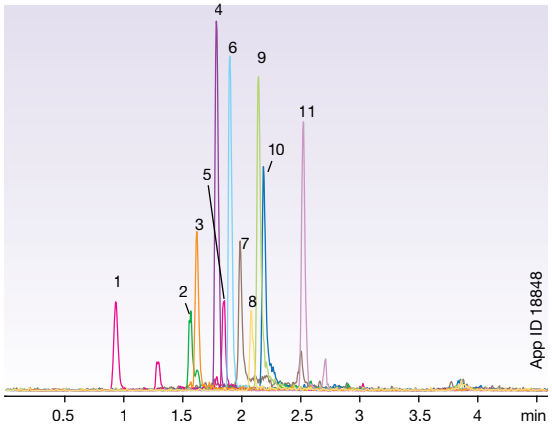
Column: Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4497-AN
Mobile Phase: A: 10 mM Ammonium acetate
B: 10 mM Ammonium acetate in Methanol

Gradient:

Time (min)	% B
0	50
2.5	100
2.51	50
5	50

Flow Rate: 0.4 mL/min
Temperature: 30 ºC
Detection: MS @ 350 ˚C
Sample : Concentration 0.25 mg/mL each
1. Digoxin
2. Oleandrin (IS)
3. Digitoxin

Steroids



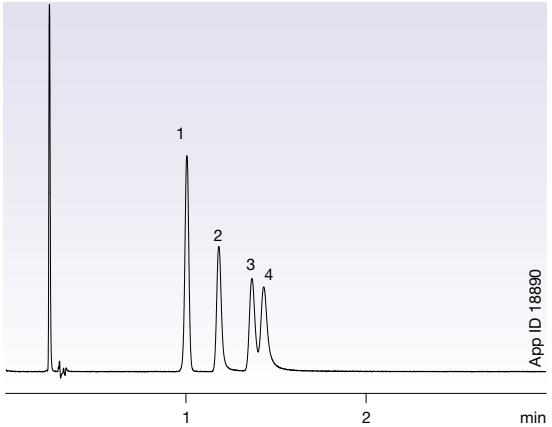
Column: Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4462-AN
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Acetonitrile

Gradient:

Time (min)	% B	Time (min)	% B
0	20	2.8	95
2.5	80	2.81	20
2.51	95	4.6	20

Flow Rate: 450 µL/min
Temperature: 25 ˚C
Detection: MS (ambient)
Sample:
1. Triamcinolone
2. Prednisolone
3. Cortisone
4. Betamethasone
5. Corticosterone
6. Triamcinolone acetonide
7. 11-α-Hydroxyprogesterone
8. Cortisone acetate
9. Testosterone
10. 11-Ketoprogesterone
11. Betamethasone 17-valerate

Catecholamines

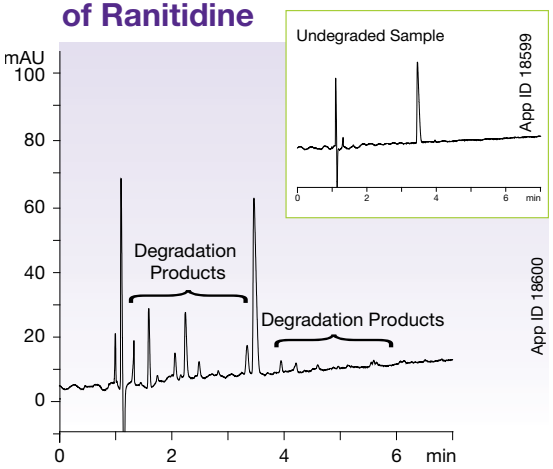


Column: Kinetex 2.6 µm HILIC
Dimensions: 50 x 4.6 mm
Part No.: 00B-4461-E0
Mobile Phase: Acetonitrile / 100 mM Ammonium formate pH 3.2 (90:10)
Flow Rate: 2 mL/min
Temperature: 25 ˚C
Detection: UV @ 270 nm
Sample :
1. Serotonin
2. Dopamine
3. Epinephrine
4. Norepinephrine

Wide Applicability Across Many Industries

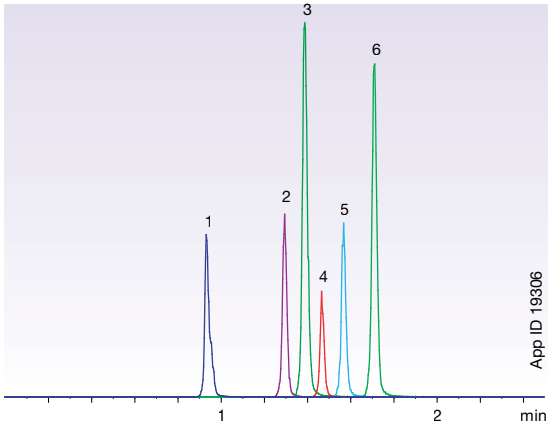
For Pharmaceutical

Forced Degradation of Ranitidine



Column: Kinetex® 2.6 µm C18
Dimensions: 150 x 4.6 mm
Part No.: 00F-4462-E0
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Acetonitrile
Gradient: 5 % to 20 % B in 7 min. 20 % to 95 % in 2 min
Flow Rate: 1.4 mL/min
Temperature: 30 ºC
Detection: UV @ 230 nm (22 ºC)
Sample: Ranitidine 1 mg/mL in Methanol. Heated at 65 ºC for 4 days.

Tricyclic Antidepressants

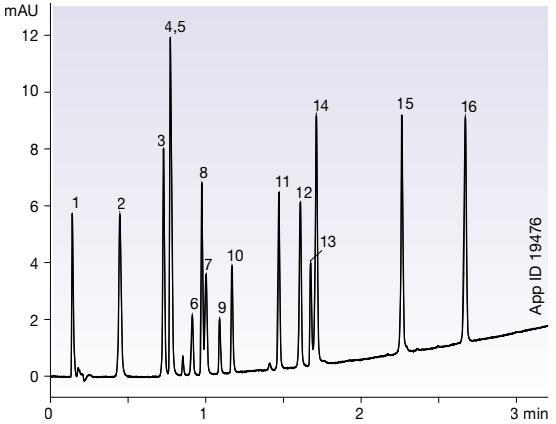


Column: Kinetex 1.7 µm C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4475-AN
Mobile Phase: A: Water with 0.05 % Formic acid
B: Acetonitrile with 0.05 % Formic acid
Gradient:

Time (min)	% B
0	30
2	40
3	95
3.1	30
4.5	30

Flow Rate: 0.6 mL/min
Temperature: 40 ºC
Detection: MS (ambient)
Sample : 1. Doxepin
2. Desipramine
3. Imipramine
4. Nortriptyline
5. Amitriptyline
6. Trimipramine

Pharmaceutical Mixture



Column: Kinetex 2.6 µm C8
Dimensions: 50 x 2.1 mm
Part No.: 00B-4497-AN
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Acetonitrile
Gradient:

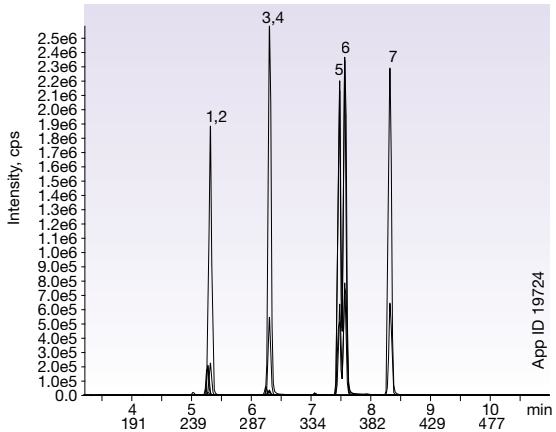
Time (min)	% B
0	5
0.2	5
4	95

Flow Rate: 0.8 mL/min
Temperature: 22 ºC
Detection: UV @ 254 nm (ambient)
Sample : 1. Pyridine
2. Acetaminophen
3. Sulfathiazole
4. Pindolol
5. Quinidine
6. Benzyl Alcohol
7. Phenol
8. Acebutolol
9. Chlorpheniramine
10. Triprolidine
11. Prednisolone
12. 3-Methyl-4-nitrobenzoic acid
13. Nortriptyline
14. 2-Hydroxy-5-methylbenzaldehyde
15. Diflunisal
16. Hexanophenone

Wide Applicability Across Many Industries

For Forensic Toxicology

Barbiturates in Urine



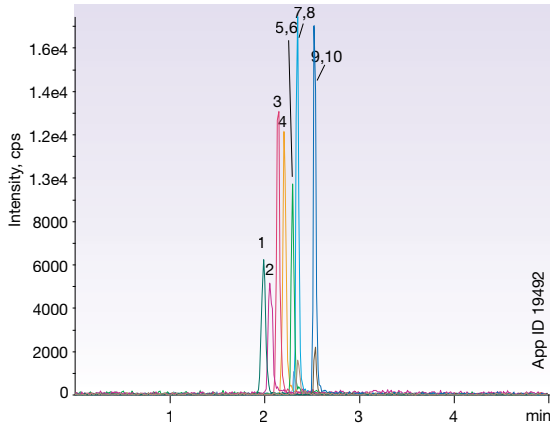
Column: Kinetex 2.6 µm C18
Dimensions: 100 x 2.1 mm
Part No.: 00D-4462-AN
Mobile Phase: A: 5mM Ammonium acetate
B: Acetonitrile

Gradient:

Time (min)	% B
0	10
10	45
10.01	90
12	90
12.01	10
16	10

Flow Rate: 0.4 mL/min
Temperature: 22 ºC
Detection: MS
Sample :
1. Phenobarbital-D5
2. Phenobarbital
3. Butalbital-D5
4. Butalbital
5. Pentobarbital
6. Amobarbital
7. Secobarbital

Amphetamines



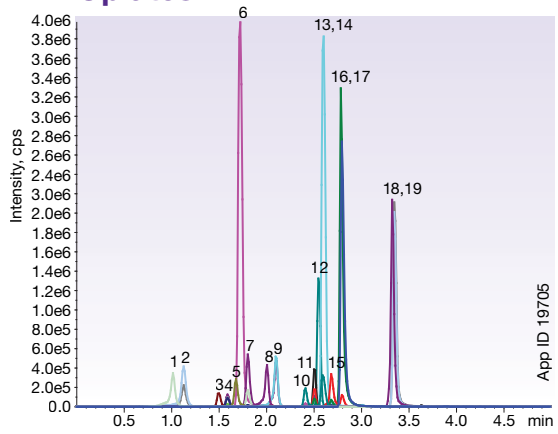
Column: Kinetex 2.6 µm XB-C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4496-AN
Mobile Phase: A: 5mM Ammonium formate with 0.1 % Formic acid
B: Methanol with 0.1 % Formic acid

Gradient:

Time (min)	% B
0	10
1	70
3	70

Flow Rate: 0.4 mL/min
Temperature: 22 ºC
Detection: MS
Sample :
1. Amphetamine-D11
2. Amphetamine
3. Methamphetamine-D14
4. Methamphetamine
5. MDA-D5
6. MDA
7. MDMA-D5
8. MDMA
9. MDEA-D5
10. MDEA

Opiates



Column: Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4462-AN
Mobile Phase: A: 5 mM Ammonium acetate
B: 5 mM Ammonium acetate in Methanol

Gradient:

Time (min)	% B
0	15
5.5	100
6.5	100
6.51	15
9	15

Flow Rate: 0.5 mL/min
Temperature: 22 ºC
Detection: MS
Sample :
1. Oxymorphone-D3
2. Oxymorphone
3. Morphine-D3
4. Morphine
5. Hydromorphone-D6
6. O-Desmethyltramadol
7. Hydromorphone
8. Oxycodone-D6
9. Oxycodone
10. Codeine-D6
11. Codeine
12. N-Desmethyltramadol
13. cis-Tramadol
14. Hydrocodone-D6
15. Hydrocodone
16. Normeperidine-D4
17. Normeperidine
18. Meperidine-D4
19. Meperidine

See How Kinetex® Works for
YOUR Methods!

PhenoLogix™ Method Development Services is our in-house analytical support laboratory for all your method development and optimization needs. Our customized and confidential approach to supporting your methods will ensure a successful project and your complete satisfaction.

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Your Method. Our Scientists.

Trust your samples in the hands of our experts!

LEVEL 1 Phase Screening

Identify the correct column stationary phase, particle type, and dimensions to give optimum performance.

LEVEL 2 Pre-Validation

Perform ICH validation parameters to demonstrate method accuracy, precision, and robustness.

LEVEL 3 On-site Method Transfer

A PhenoLogix representative will assist with method transfer and demonstrate that the method works in your laboratory. They will also provide training for your staff on important details of the new method.

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Don't Mask Ultra-High Performance with Excess Dwell Volume!

Tips and Tricks for Using Core-shell Columns on HPLC Instruments

Minimize the extra-column volume from the injector to the column

- Use a low-volume injection system if you are not using an autosampler
- Use 0.12 mm ID (0.005 in.) or 0.17 mm ID (0.007 in.) tubing whenever possible
- Minimize the length of all connection tubing
- Ensure tubing is seated properly at every connection
- Use extremely low dead-volume fittings (see page 47)
- Use an extremely low dead-volume in-line filter (see SecurityGuard™ Ultra on pages 19, 31, 47, and 48)

Minimize peak dispersion and detector contribution after the column

- To avoid extra column band broadening effects, check the flow cell volume to verify that it is no more than $^1/_3$ the peak volume
- Standard flow cells on conventional LC systems can be > 10 µL. For best results, replace standard flow cells with < 3 µL flow cells (< 2 µL when using 2.1 mm ID columns).
- Increase the detector scan rate. 0.1 seconds to 0.15 seconds is recommended for increased data collection.

Get the most out of your Kinetex Column! Go to www.phenomenex.com/verify

See how easy it is to optimize your system

TEST your column!

Ensure you are getting the best performance out of your Kinetex column.

Choosing the Best Kinetex® Column

Upgrade Your 3 µm or 5 µm Column

If Presently Using: (Length, Particle Size)	For Equivalent Resolving Power and Faster Analysis Use: (Length, Particle Size)	For Greater Resolving Power and Faster Analysis Use: (Length, Particle Size)
250 mm, 5 µm	75 mm 2.6 µm	100 mm, 2.6 µm
150 mm, 5 µm	50 mm, 2.6 µm	75 mm, 2.6 µm
150 mm, 3 µm	75 mm, 2.6 µm	100 mm, 2.6 µm
100 mm, 3 µm	50 mm, 2.6 µm	75 mm, 2.6 µm
50 mm, 3 µm	30 mm, 2.6 µm	50 mm, 2.6 µm

Upgrade Your Sub-2 µm Column

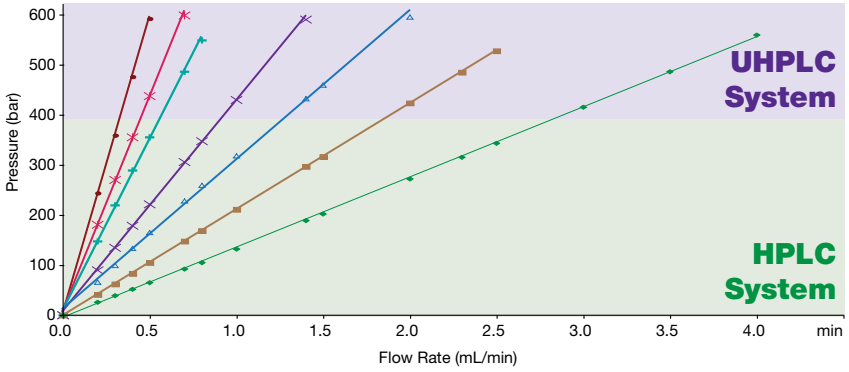
If Presently Using: (Length, Particle Size)	For Equivalent Resolving Power Use: (Length, Particle Size)	For Greater Resolving Power Use: (Length, Particle Size)
150 mm, sub-2 µm	150 mm, 2.6 µm	150 mm, 1.7 µm
100 mm, sub-2 µm	100 mm, 2.6 µm	100 mm, 1.7 µm or 150 mm, 2.6 µm
50 mm, sub-2 µm	50 mm, 2.6 µm	50 mm, 1.7 µm or 100 mm, 2.6 µm

Expected Backpressure at Different Flow Rates*

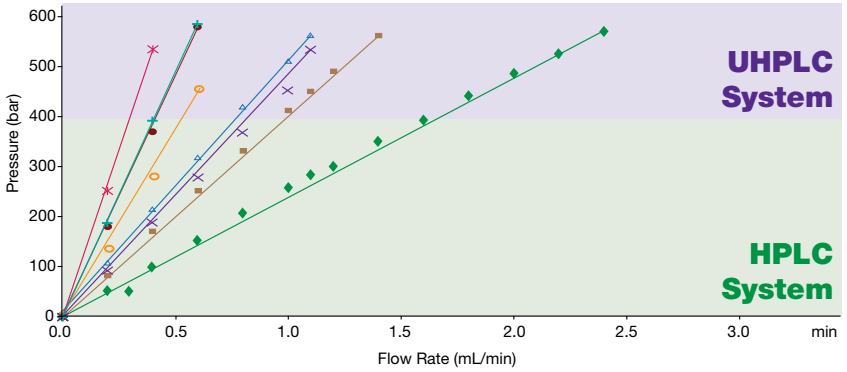
There is an optimal Kinetex column for your system and operating conditions. Use these graphs to determine the starting Kinetex particle size and dimension for your method.

- Kinetex 100 x 2.1 mm, 1.7 µm
- Kinetex 50 x 2.1 mm, 1.7 µm
- Kinetex 150 x 2.1 mm, 2.6 µm
- Kinetex 100 x 2.1 mm, 2.6 µm
- Kinetex 50 x 2.1 mm, 2.6 µm
- Kinetex 150 x 4.6 mm, 2.6 µm
- Kinetex 100 x 4.6 mm, 2.6 µm
- Kinetex 50 x 4.6 mm, 2.6 µm

50:50 (Acetonitrile / Water)



60:40 (Methanol / Water)



* Due to variation in system, sample and method parameters, graphs provided may not be representative of all applications.
Data generated on Agilent® 1200 SL.

Ordering Information

Phenex™ RC (Regenerated Cellulose) Syringe Filters

- Rapid filtration of HPLC and GC samples prior to analysis
- Particulated, PVC, and extractable-free filters
- Universal filter compatible with both aqueous and mixed organic solutions

Choose filter diameter based on sample volume

4 mm Diameter
for ≤ 2 mL sample volumes

15 mm Diameter
for 2 - 10 mL sample volumes

25 - 28 mm Diameter
for 10 - 100 mL sample volumes

Membrane Type/Size	Part No.	Unit	Price	Part No.	Unit	Price	Part No.	Unit	Price
0.20 µm (non-sterile)									
Phenex-RC (Regenerated Cellulose)	AF0-3203-12	100/ pk		AF0-2203-12	100/ pk		AF0-8203-12[1]	100/ pk	
	AF0-3203-52	500/ pk		AF0-2203-52	500/ pk		AF0-8203-52[1]	500/ pk	
0.20 µm (sterile)									
Phenex-RC (Regenerated Cellulose)	—	—	—	—	—	—	AF0-8459[2]	50/ pk	

Footnotes:
1. 26 mm diameter.
2. 25 mm diameter.
3. Additional dimensions and membrane types are available. Please contact your local Phenomenex technical consultant or distributor for availability or assistance.
4. Larger quantity purchases at significant savings are available.

UHPLC / HPLC Sure-Lok™ High Pressure PEEK™ Male Nut Fittings

- UHPLC / HPLC Sure-Lok High Pressure PEEK male nut fittings are recommended for installation of Kinetex columns
- Convenient one-piece design (AQ0-8503) is pressure rated to 12,000 psi (827 bar)
- A handy fitting tightening tool (AQ0-8530) is available to facilitate achievement of a leak-free connection

Part No.	Description	Unit	Price
AQ0-8503	Sure-Lok High Pressure PEEK 1-Pc Nut, 10-32, for $^{1}/_{16}$ in. Tubing, 12,000 psi (827 bar)	10/pk	
AQ0-8530	Sure-Lok Fitting Tightening Tool, Aluminum	ea	

SecurityGuard™ Ultra Cartridge System*

The patent pending SecurityGuard Ultra cartridge system protects ultra-high performance columns, like Kinetex, from damaging contaminants and microparticulates.

- Extend Kinetex column lifetime
- Simple to use
- Pressure rated to 20,000 psi (1,378 bar)
- Fits virtually all manufacturers' columns (2.1 to 4.6 mm ID)

SecurityGuard Ultra Guard Cartridge Holder	ea	Price
	AJ0-9000	

* See p. 48 for SecurityGuard Ultra Cartridges.

Ordering Information

2010 R&D 100 Award Recipient

2.6 µm Material Characteristics

Packing Material	Total Particle Size (µm)	Porous Shell (µm)	Solid Core (µm)	Pore Size (Å)	Effective Surface Area (m^2/g)	Effective Carbon Load %	pH Stability	Pressure Stability
Kinetex XB-C18	2.6	0.35	1.9	100	200	10	1.5 - 8.0**	1000/600* bar
Kinetex C18	2.6	0.35	1.9	100	200	12	1.5 - 8.0**	
Kinetex C8	2.6	0.35	1.9	100	200	8	1.5 - 8.0**	
Kinetex PFP	2.6	0.35	1.9	100	200	9	1.5 - 8.0**	
Kinetex HILIC	2.6	0.35	1.9	100	200	0	2.0 - 7.5	
Kinetex Phenyl-Hexyl	2.6	0.35	1.9	100	200	11	1.5 - 8.0**	

** Columns are pH stable from 1.5-10 under isocratic conditions. Columns are pH stable 1.5-8 under gradient conditions.
* 2.1 mm ID Kinetex columns are pressure stable up to 1000 bar.

1.7 µm Material Characteristics

Packing Material	Total Particle Size (µm)	Porous Shell (µm)	Solid Core (µm)	Pore Size (Å)	Effective Surface Area (m^2/g)	Effective Carbon Load %	pH Stability	Pressure Stability
Kinetex XB-C18	1.7	0.23	1.25	100	200	10	1.5 - 8.0**	1000 bar
Kinetex C18	1.7	0.23	1.25	100	200	12	1.5 - 8.0**	
Kinetex C8	1.7	0.23	1.25	100	200	8	1.5 - 8.0**	
Kinetex PFP	1.7	0.23	1.25	100	200	9	1.5 - 8.0**	
Kinetex HILIC	1.7	0.23	1.25	100	200	0	2.0 - 7.5	
Kinetex Phenyl-Hexyl	1.7	0.23	1.25	100	200	11	1.5 - 8.0**	

When using Kinetex 1.7 µm, increased performance can be achieved, however higher pressure-capable instrumentation is required.

Kinetex® Ordering Information

2.6 µm Analytical Columns (mm)

	30 x 4.6	50 x 4.6	75 x 4.6	100 x 4.6	150 x 4.6	SecurityGuard™ Ultra Cartridges* 3/pk
XB-C18	—	00B-4496-E0	00C-4496-E0	00D-4496-E0	00F-4496-E0	AJ0-8768
C18	00A-4462-E0	00B-4462-E0	00C-4462-E0	00D-4462-E0	00F-4462-E0	AJ0-8768
C8	—	00B-4497-E0	00C-4497-E0	00D-4497-E0	00F-4497-E0	AJ0-8770
PFP	00A-4477-E0	00B-4477-E0	00C-4477-E0	00D-4477-E0	00F-4477-E0	AJ0-8773
HILIC	00A-4461-E0	00B-4461-E0	00C-4461-E0	00D-4461-E0	00F-4461-E0	AJ0-8772
Phenyl-Hexyl	—	00B-4495-E0	—	00D-4495-E0	00F-4495-E0	AJ0-8774

2.6 µm MidBore™ Columns (mm)

	30 x 3.0	50 x 3.0	75 x 3.0	100 x 3.0	150 x 3.0	SecurityGuard Ultra Cartridges* 3/pk
XB-C18	00A-4496-Y0	00B-4496-Y0	00C-4496-Y0	00D-4496-Y0	00F-4496-Y0	AJ0-8775
C18	00A-4462-Y0	00B-4462-Y0	00C-4462-Y0	00D-4462-Y0	00F-4462-Y0	AJ0-8775
C8	00A-4497-Y0	00B-4497-Y0	00C-4497-Y0	00D-4497-Y0	00F-4497-Y0	AJ0-8777
PFP	00A-4477-Y0	00B-4477-Y0	00C-4477-Y0	00D-4477-Y0	00F-4477-Y0	AJ0-8780
HILIC	00A-4461-Y0	—	—	—	00F-4461-Y0	AJ0-8779
Phenyl-Hexyl	—	—	—	—	—	AJ0-8781

2.6 µm Minibore Columns (mm)

	30 x 2.1	50 x 2.1	100 x 2.1	150 x 2.1	SecurityGuard Ultra Cartridges* 3/pk
XB-C18	00A-4496-AN	00B-4496-AN	00D-4496-AN	00F-4496-AN	AJ0-8782
C18	00A-4462-AN	00B-4462-AN	00D-4462-AN	00F-4462-AN	AJ0-8782
C8	00A-4497-AN	00B-4497-AN	00D-4497-AN	00F-4497-AN	AJ0-8784
PFP	00A-4477-AN	00B-4477-AN	00D-4477-AN	00F-4477-AN	AJ0-8787
HILIC	00A-4461-AN	00B-4461-AN	00D-4461-AN	00F-4461-AN	AJ0-8786
Phenyl-Hexyl	—	00B-4495-AN	00D-4495-AN	—	AJ0-8788

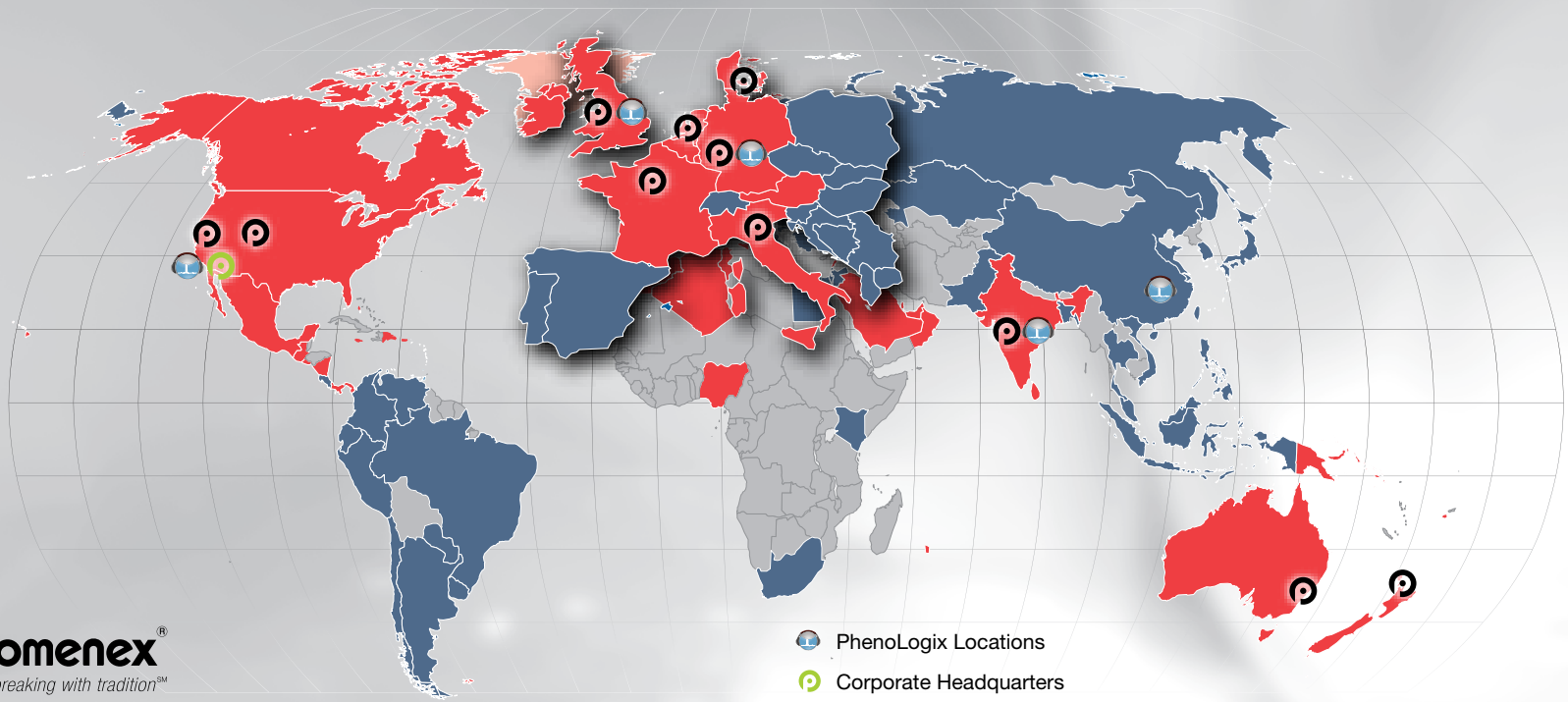
1.7 µm Minibore Columns (mm)

	30 x 2.1	50 x 2.1	100 x 2.1	150 x 2.1	SecurityGuard Ultra Cartridges* 3/pk
XB-C18	00A-4498-AN	00B-4498-AN	00D-4498-AN	00F-4498-AN	AJ0-8782
C18	00A-4475-AN	00B-4475-AN	00D-4475-AN	00F-4475-AN	AJ0-8782
C8	00A-4499-AN	00B-4499-AN	00D-4499-AN	00F-4499-AN	AJ0-8784
PFP	00A-4476-AN	00B-4476-AN	00D-4476-AN	00F-4476-AN	AJ0-8787
HILIC	00A-4474-AN	00B-4474-AN	00D-4474-AN	00F-4474-AN	AJ0-8786
Phenyl-Hexyl	—	00B-4500-AN	00D-4500-AN	00F-4500-AN	AJ0-8788

1.7 µm MidBore Columns (mm)

	30 x 3.0	50 x 3.0	100 x 3.0	SecurityGuard Ultra Cartridges* 3/pk
XB-C18	00A-4498-Y0	00B-4498-Y0	00D-4498-Y0	AJ0-8775
C18	—	00B-4475-Y0	00D-4475-Y0	AJ0-8775
C8	00A-4499-Y0	00B-4499-Y0	00D-4499-Y0	AJ0-8777
PFP	—	—	00D-4476-Y0	AJ0-8780
HILIC	—	00B-4474-Y0	—	AJ0-8779
Phenyl-Hexyl	—	—	—	AJ0-8781

* SecurityGuard Ultra cartridges require holder, Part No. AJ0-9000, see p. 47.



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Ultra-High Performance on

ANY LC System

	Core-Shell Particles		Traditional Fully Porous Particles		
	Kinetex® 1.7 µm	Kinetex 2.6 µm	sub-2 µm	3 µm	5 µm
Multiple Column Selectivities	√	√	√	√	√
Highest Efficiencies	√	√	√		
Highest Sensitivity	√	√	√		
Easy Method Transfer across LC systems		√		√	√
Provides sub-2 µm Performance on:					
400 Bar LC Instruments		√			
600 Bar LC Instruments	√	√	*		
1000 Bar LC Instruments	√	√	√		

guarantee

If you are not completely satisfied with Kinetex core-shell columns, send in your comparative data to a similar product within 45 days and KEEP THE COLUMN FOR FREE.

*Most traditional fully porous sub-2 µm columns > 50 mm length, operate at pressures higher than 600 bar for optimal linear velocities.

KINETEX™