Fortis®
SpeedCore®

Now Includes
SpeedCore BIO
Peptide and Protein columns

Fortis®
Technologies Ltd.

New Core-Shell Technology

Fortis SpeedCore®

Fortis Speedcore® columns are the very latest in core-shell technology. Incorporating our optimised bonding and packing practices with a core-shell particle provides the analyst with the ability to speed up analysis and increase resolution over 'traditional' 3µ & 5µ particles even on normal 400bar systems.

Now includes new, extended pH

Fortis SpeedCore® pH+ C18

New Peptide and Protein options

Fortis SpeedCore® BIO

	Particle Size	Surface Area	Pore Size	% C	pH range	USP
SpeedCore C18	2.6µm and 5µm	140m²/g	80Å	10	1-9	L1
SpeedCore pH+ C18	2.6µm and 5µm	140m²/g	80Å	11	2-11	L1
SpeedCore RP18-Amide	2.6µm and 5µm	140m²/g	80Å	9	2-9	L60
SpeedCore Diphenyl	2.6µm and 5µm	140m²/g	80Å	7	2-9	L11
SpeedCore PFP	2.6µm and 5µm	140m²/g	80Å	6	2-9	L43
SpeedCore HILIC	2.6µm and 5µm	140m²/g	80Å	N/A	2-8	L3

	Particle Size	Surface Area	Pore Size	% C	pH range	USP
SpeedCore BIO Peptide C18	2.6µm	-	160Å	6	1-8	L1
SpeedCore BIO Protein C18	3.5µm	-	300Å	4	1-8	L1
SpeedCore BIO Protein C8	3.5µm	-	300Å	3	1-8	L7
SpeedCore BIO Protein C4	3.5µm	-	300Å	2	1-8	L26

Stationary Phase Choice

C18

- ◎ **C18 Hydrophobicity**
- ◎ **Ultra High Efficiency**
- ◎ **Method development starting point**

SpeedCore C18 is designed to provide characteristics which will enhance method development. It provides the ability to obtain sharp peak shapes whilst retaining and separating a wide variety of compounds both hydrophobic and hydrophilic.

pH+ C18

- ◎ **Increased high pH range**
- ◎ **Optimal peak shape and retention for bases**
- ◎ **Combined with Ultra High Efficiency particles**

SpeedCore pH Plus is designed to provide increased high pH stability. Excellent peak shape for basic analytes if they can be neutralised at higher pH values. Increase loading capacity for bases at high pH.

RP18-Amide

- ◎ **Orthogonal Selectivity**
- ◎ **Sharp peak shapes for basic analytes**
- ◎ **Excellent method development option**

SpeedCore RP18-Amide is designed to provide polar characteristics which will enhance resolution in method development. It provides orthogonal selectivity to alkyl chain phases due to its polar-embedded group. Sharp peak shapes, extra selectivity and retention can all be obtained.

DIPHENYL

- ◎ **Alternative selectivity**
- ◎ **Separate positional isomers**
- ◎ **Stable ligand, No "MS" bleed**

SpeedCore Diphenyl is designed to provide pi-pi, steric and hydrophobic characteristics which will enhance selectivity and the ability to develop methods. Particularly suited to positional isomers and other closely related species such as metabolites.

PFP

- ◎ **Reversed phase selectivity**
- ◎ **Separate metabolites**
- ◎ **Excellent resolution**

SpeedCore PFP (PentaFluoroPhenyl) is designed to provide characteristics which will enhance selectivity. It provides alternate selectivity to a hydrophobic stationary phase whilst still maintaining the key attributes of robustness and reproducibility.

HILIC

- ◎ **Hydrophilic Interaction Mode**
- ◎ **Separate polar species**
- ◎ **Excellent stability**

SpeedCore HILIC is designed to provide characteristics which will enhance retention of highly polar analytes. Reproducible surface characteristics provide robust separations.

Core-Shell
Particles

New Fused Core technology

- ⊙ **Provide high efficiency**
- ⊙ **Improve Resolution even at high speed**
- ⊙ **Applicable to HPLC and UHPLC systems**
- ⊙ **Selectivity Choices - Stationary phase**

Speedcore® increases efficiency over traditional porous particles, leading to high efficiency, resolution and sensitivity.

PARTICLE MORPHOLOGY - SEM

Based on a uniform monodisperse spherical core, Fortis Speedcore provides high efficiency due to reduced mass transfer as well as reduced dispersion between particles.

$$HETP = A + B/\mu + C\mu$$

Well ordered packed beds are a key feature of core-shell technology, leading to the high efficiency gains.

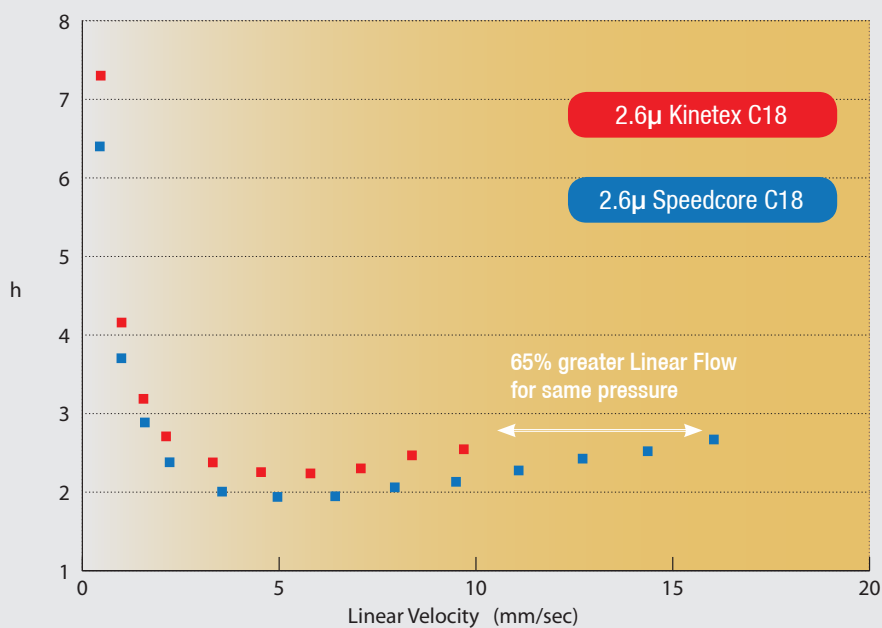spot 2.0 | 7/30/2013 9:39:56 AM | HFW 16.1 µm | 5 µm
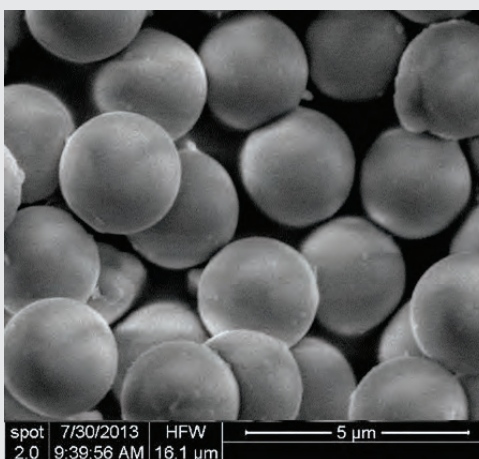
VAN DEEMTER CURVE

Fortis Speedcore columns will ensure that throughput is improved with no loss in resolution.

The van deemter equation highlights how the speedcore particles produce very low (*h*) reduced plate height.

- ⊙ Well packed beds
- ⊙ High efficiency even at greatly increased flow rates
- ⊙ Greater usable flow rate range

2.6µ Kinetex C18

2.6µ Speedcore C18

65% greater Linear Flow for same pressure

h

Linear Velocity (mm/sec)

BACKPRESSURE

Fortis Speedcore® has greatly reduced pressure, much closer to a traditional 3µm particle than competitor products. This means it can be run even on 400bar limited systems at a much higher flow rate than other core-shell products.
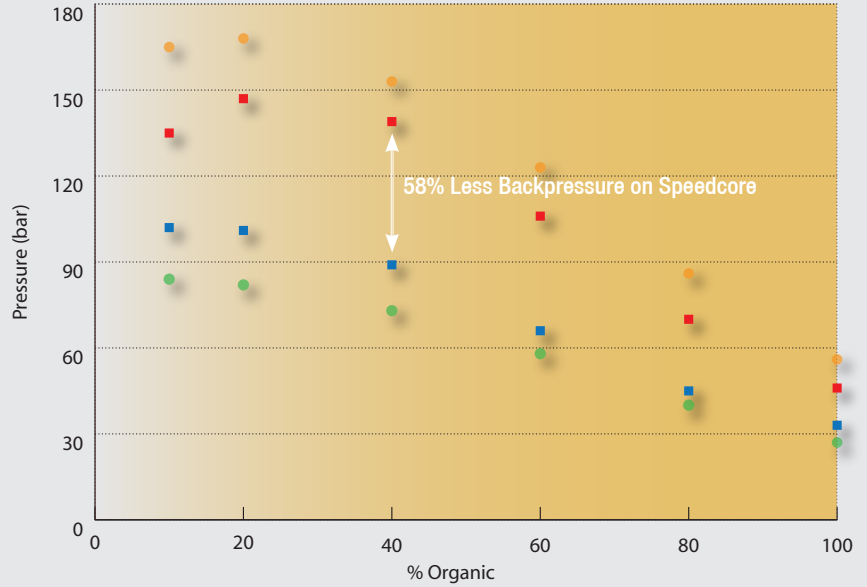
This aids in method development, if high flow rates can be used without significant loss in efficiency and resolution.

- 1.7µ Fortis C18
- 2.6µ Kinetex C18
- 2.6µ Speedcore C18
- 3µ Fortis C18

58% Less Backpressure on Speedcore

Pressure (bar) vs % Organic
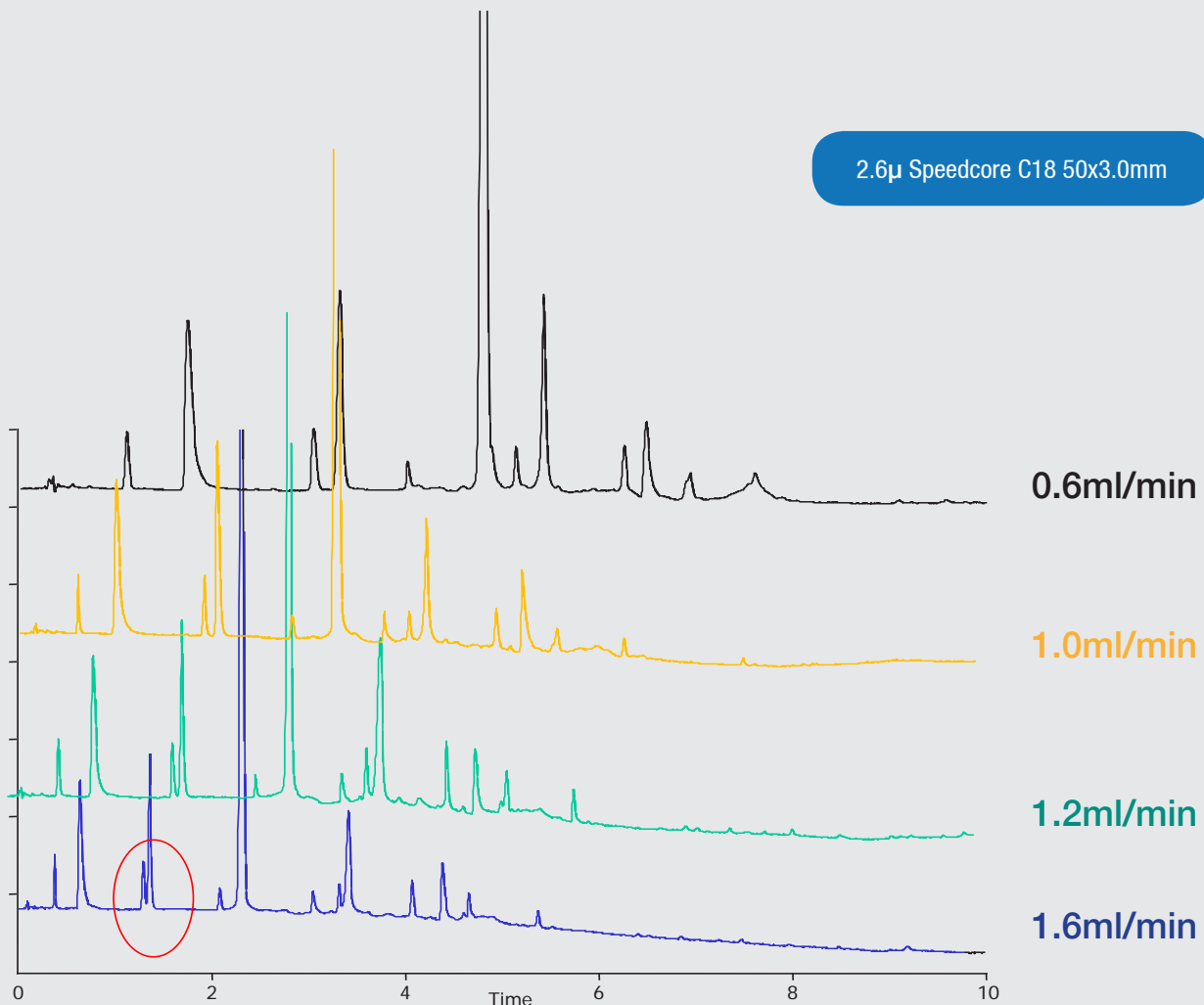
The ability to increase flow rate well beyond the normal with no discernible loss in efficiency, allows you to increase the speed of analysis, whilst still maintaining high levels of resolution between critical peaks.

METHOD DEVELOPMENT - INCREASE FLOW

2.6µ Speedcore C18 50x3.0mm

0.6ml/min

1.0ml/min

1.2ml/min

1.6ml/min

Time

Kinetex®, is a registered trademarks of Phenomenex. Fortis is not associated with this company. Comparative separations/results may not be representative of all applications. All columns are original manufacturers own.

HPLC & UHPLC Compatibility

Fortis SpeedCore®

SIMPLE METHOD TRANSFER - IMPROVE THROUGHPUT

Fortis Speedcore® is compatible with all HPLC and UHPLC systems from Agilent, Jasco, Shimadzu and Waters.

Use our method transfer calculator to alter the gradient profile correctly. The enhanced efficiency of the Speedcore column will ensure that throughput is improved with no loss in resolution.

- ⊙ Increase throughput >75%
- ⊙ Resolution improved >60%
- ⊙ High Efficiency Separations

* Figures may not be representative of all separations

HPLC C18
20min

87% Reduced Retention Time

2.6µ Speedcore C18
3.5min
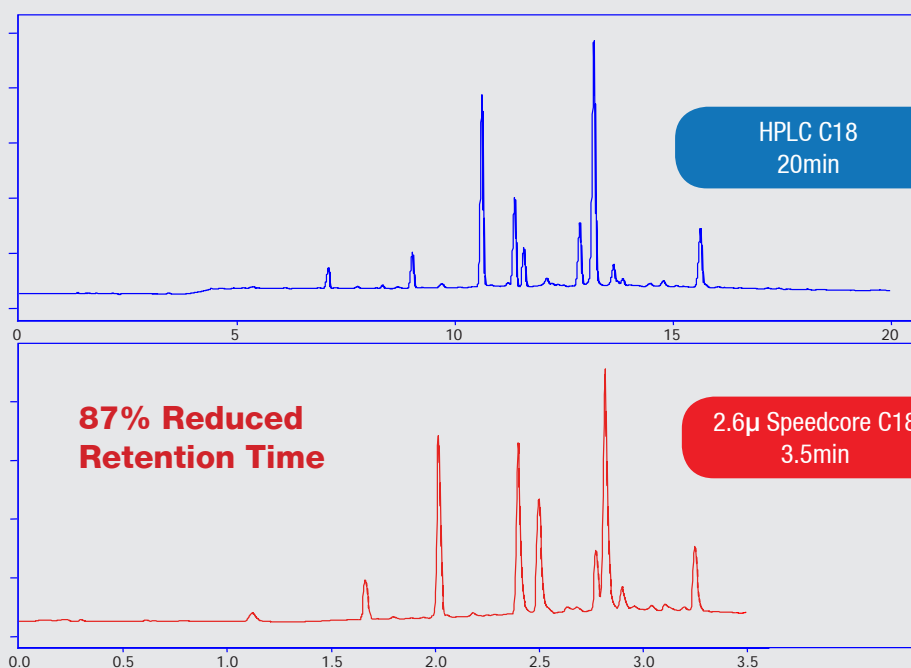
INCREASE RESOLUTION

Resolution is a factor affected by efficiency, retention and selectivity.

Since the new core-shell particles have much greater efficiency than traditional 3μm particles then resolution is naturally enhanced just by the switch in technology.
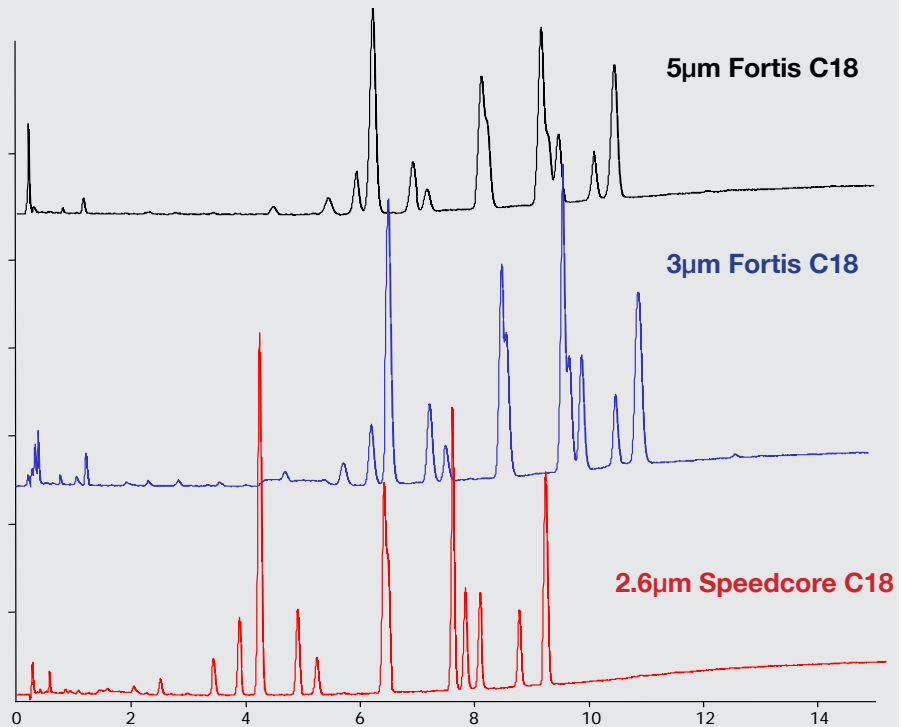
⊙ 2 fold efficiency gain over 3μm particles.

Sensitivity will be enhanced as long as the LC system is optimised for low dispersion. Resolution will be greatly improved due to the efficiency gains.

All columns : 50x3mm

50:50 - 100% ACN in 10mins hold to 15mins

0.6ml/min

254nm

5μm Fortis C18
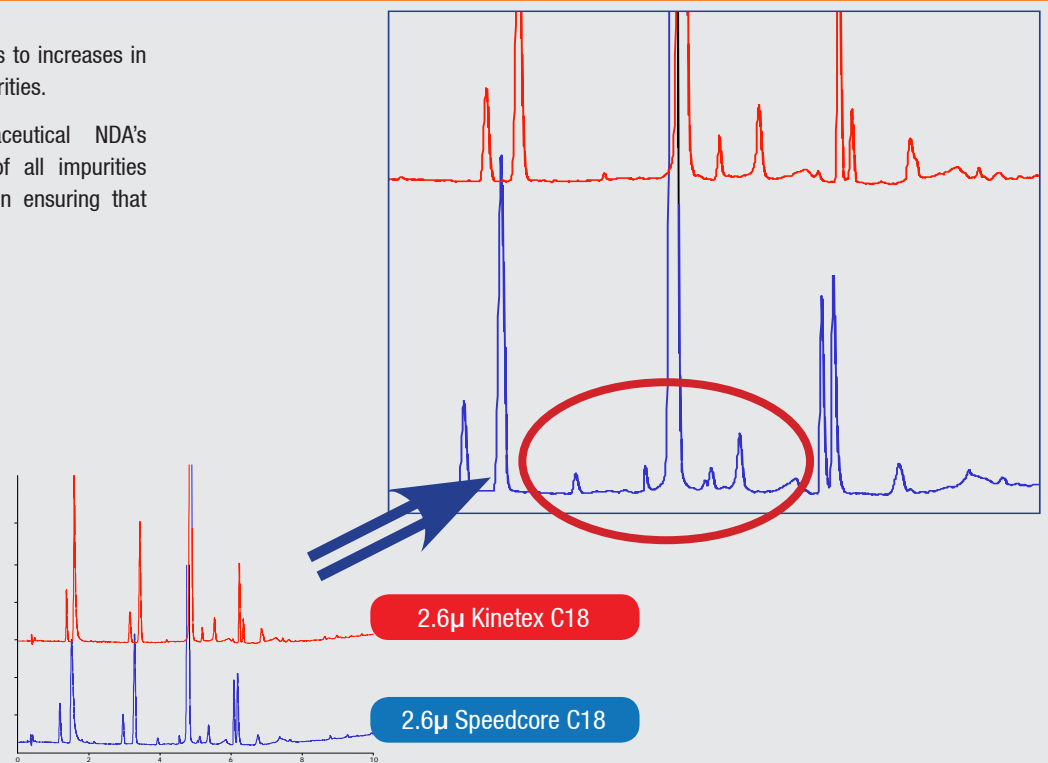
3μm Fortis C18

2.6μm Speedcore C18

INCREASE SENSITIVITY

Using Speedcore® particles leads to increases in sensitivity and resolution of impurities.

In measurement of pharmaceutical NDA's quantification and qualitation of all impurities is critical, Speedcore can aid in ensuring that accuracy of analysis is optimum.

⊙ More peaks

⊙ More sensitivity

2.6μ Kinetex C18

2.6μ Speedcore C18

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Method Transfer

The use of SpeedCore particles allows for analysis times to be significantly reduced whilst still maintaining resolution and increasing sensitivity. 'Older ' HPLC methods using 5um 250x4.6mm diameter columns are becoming an outdated option now that UHPLC and core-shell particles allow much faster method development or revalidation of methods to take place. Many method transfers are now taking place, such as :

- ⊙ **'Legacy Method' transferred to new core-shell technology**
- ⊙ **'New Method' scaled for production or preparative chromatography**
- ⊙ **Method transfer between differing systems**

METHOD TRANSFER - SIGNIFICANTLY IMPROVE THROUGHPUT

Fortis Speedcore® is compatible with all HPLC and UHPLC systems from Agilent, Jasco, Shimadzu and Waters.

Use our method transfer calculator to alter the gradient profile correctly. The enhanced efficiency of the Speedcore column will ensure that throughput is improved with no loss in resolution.

- ⊙ Increase throughput >75%
- ⊙ Resolution improved >60%
- ⊙ High Efficiency Separations

* Figures may not be representative of all separations

HPLC C18

20 mins

Faster run with equal or better Rs

SpeedCore 2.6µm

3.5min
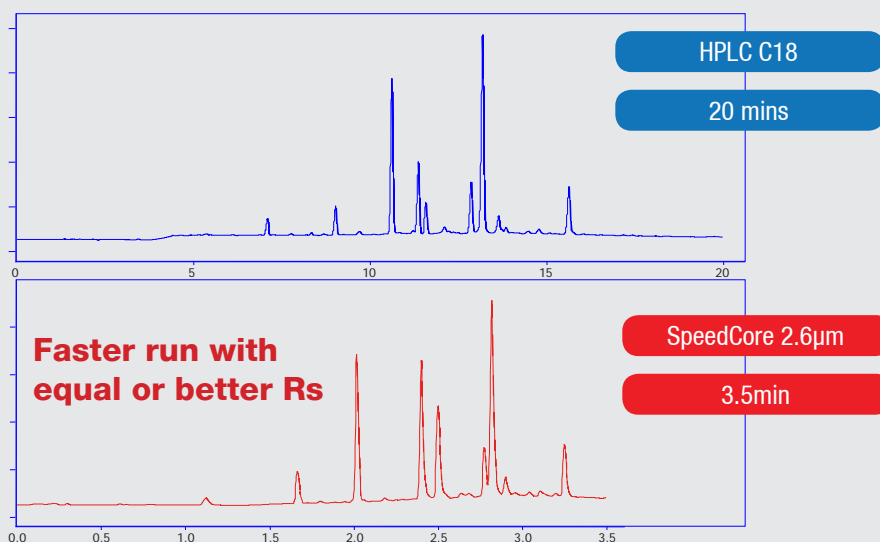
METHOD TRANSFER CALCULATOR

The method transfer calculator is available at www. fortis-technologies.com/core_shell_throughput

in order to automate the equations necessary.

It will provide a quick way of ensuring your method transfer from longer fully porous particle columns to core-shell particles is accurate. Ensuring that resolution of the method is not compromised, and provide a indication of the time and solvent savings that will be made in the process.

Download at:

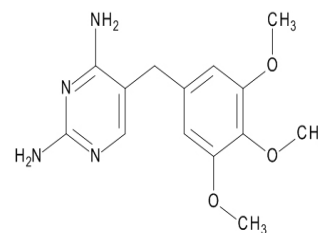www. fortis-technologies.com/core_shell_throughput

Fortis Technologies Ltd.

Method Transfer Calculator

Current HPLC Method

Adjust Column Length

Existing Column length	250	mm
Existing Particle Size	5	µm
Existing Column Diameter	4.6	mm

Adjust injection Volume

Existing Injection Volume	20	µl

Adjust Flow Rate

Existing flow rate	1.00	ml/min

Adjust Gradient Program

Existing Gradient Time	20	min

Backpressure

Existing Backpressure	195	bar

Solvent Consumption

Existing Solvent Used	20	ml

SpeedCore Core-Shell Meth

New Column Length	100	mm
New Particle Size	2.6	µm
New Column diameter	4.6	mm

New injection volume	8.00	µl

New flow rate	1.00	ml/min

New Gradient Time	6.5	min
If higher flow rate is required then please enter here	1.50	ml/min
New Gradient Time will be	4.3	min

New Backpressure @ 1.0ml/min	155	bar
New Backpressure @ 1.2ml/min	186	bar
New Backpressure @ 1.5ml/min	233	bar

New Solvent Usage	12	ml

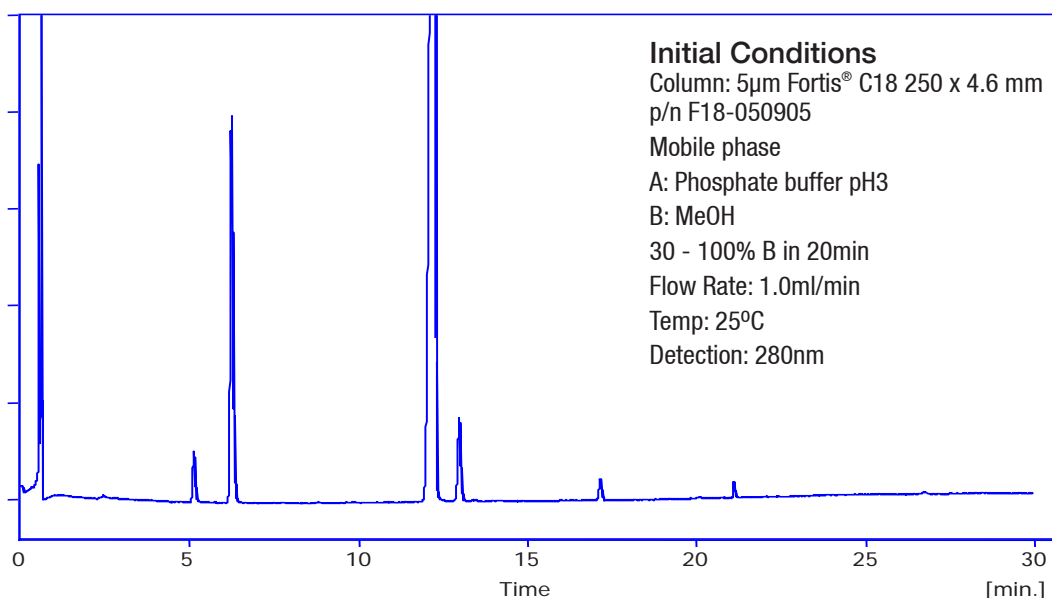|		
Saving in Time (%)	**67.65 %**	
Saving in Solvent (%	**38 %**	

Method Transfer Example

Example - Trimethoprim

Here we look at the analysis of Trimethoprim an antibiotic and how this 'legacy' method can be adapted to core-shell particles. In the original analysis of this compound resolution of Trimethoprim and its impurities can be achieved in approx 30mins using the 5μm Fortis C18 250x4.6mm columns. So along with re-equilibration time this represents a 40minute overall method turnaround.
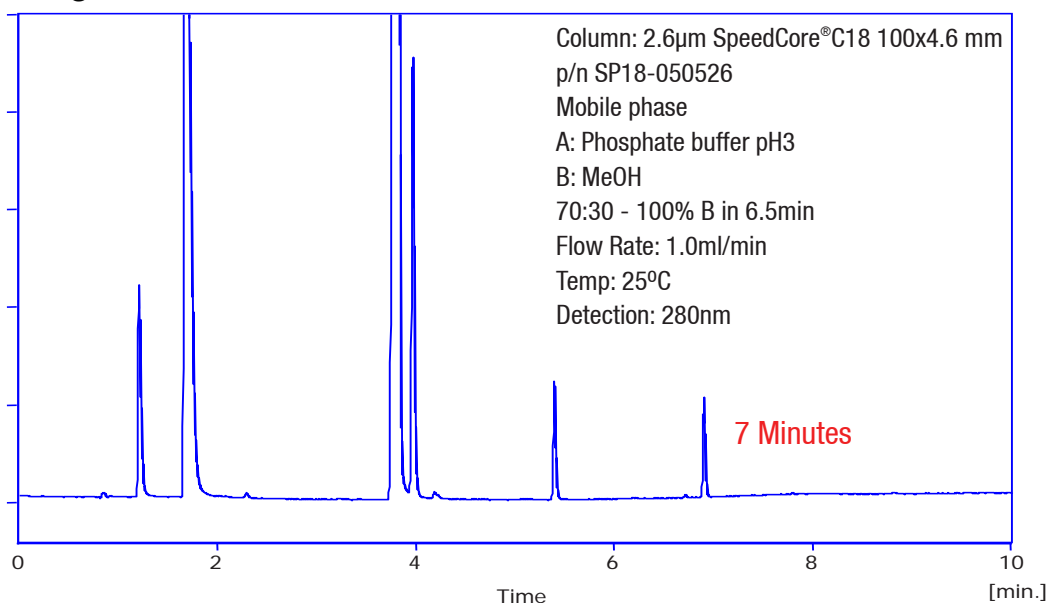
Stage 1 - Initial Method

Initial Conditions
Column: 5μm Fortis® C18 250 x 4.6 mm
p/n F18-050905
Mobile phase
A: Phosphate buffer pH3
B: MeOH
30 - 100% B in 20min
Flow Rate: 1.0ml/min
Temp: 25°C
Detection: 280nm

Stage 2 - Generate optimal conditions

By selecting a shorter column containing SpeedCore C18 stationary phase and inputting our original conditions into the method transfer calculator, we are able to generate new conditions for a faster throughput.

Stage 3 - Final Conditions of transfer

Column: 2.6μm SpeedCore®C18 100x4.6 mm
p/n SP18-050526
Mobile phase
A: Phosphate buffer pH3
B: MeOH
70:30 - 100% B in 6.5min
Flow Rate: 1.0ml/min
Temp: 25°C
Detection: 280nm

7 Minutes

Method transfer using core-shell particles has moved the method from a 30 minute run time down to a 10 minute run time. A significant saving in time, money and solvent, with no lose of resolution. With a wide range of stationary phase choices now available on core-shell the analyst can potentially move all historical methods to the newer particles and save time and money.

SpeedCore

C18

◉⟶ New Fused Core technology

- ⊙ **Provides high efficiency**
- ⊙ **Improve Resolution even at high speed**
- ⊙ **Applicable to HPLC and UHPLC systems**
- ⊙ **Excellent Method Development starting option**

Speedcore® C18 increases efficiency over traditional porous particles. Leading to high efficiency, resolution and sensitivity.

INCREASE RESOLUTION

Not all C18 core-shell particles act in the same manner, there will be changes in selectivity, peak shape and sensitivity of analysis.

Fortis SpeedCore C18 is designed to provide high efficiency and resolution for a wide variety of compound classes. Used under normal operating conditions changes in these factors can be clearly seen over other commercial phases.

SpeedCore C18 allows the analyst to be confident in the quality and reproducibility of the separation achieved.

2.6µ Kinetex® C18
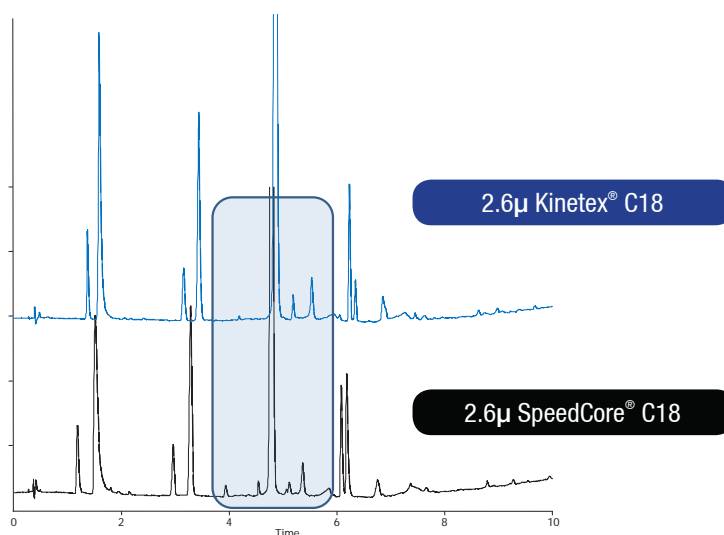
2.6µ SpeedCore® C18

IMPROVE PEAK SHAPE

The optimal bonding on the Speedcore C18 leads to excellent peak shapes for multiple compound classes.

Tricyclic antidepressants (TCA) are a fine example of basic analytes that show poor peak shape if the bonding process is not optimum. In this example resolution and peak shape are excellent for six of the TCA's.

High efficiency high speed separations are achievable by combining core-shell technology with the correct choice of stationary phase bonding.

2.6µm SpeedCore C18 50x2.1mm
Mobile Phase:
A: 0.1% TFA
B: 0.1% TFA in ACN
Gradient: 30-50%B in 10mins
Flow: 1ml/min
Wavelength : 210nm

1. Doxepin
2. Protriptyline
3. Imipramine
4. Nortriptyline
5. Amitriptyline
6. Trimipramine

/010
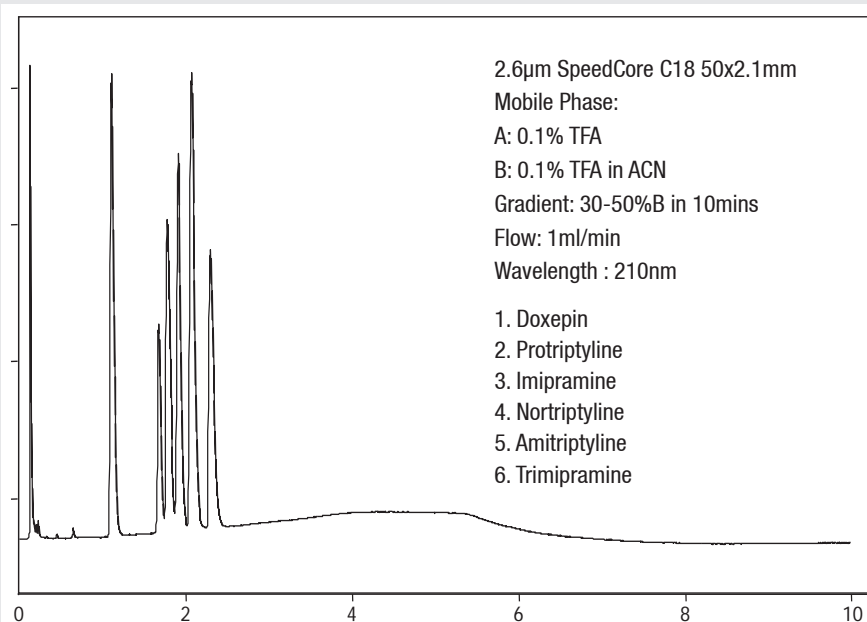
AZILECT - Rasagiline
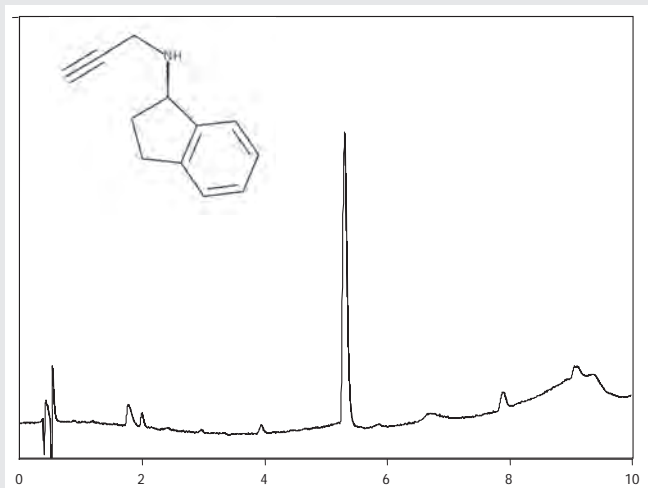
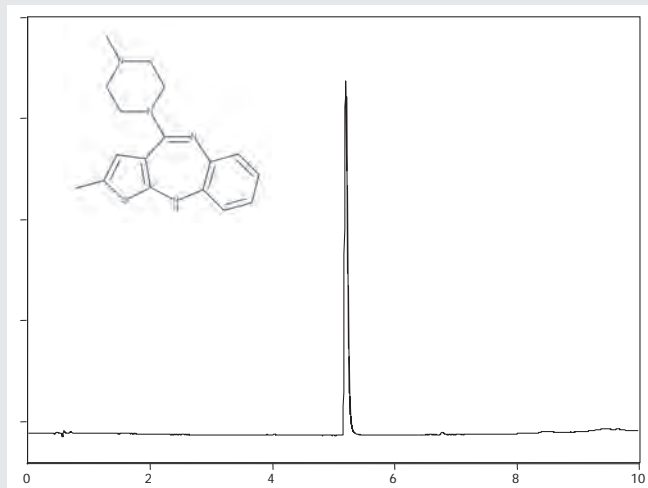Column: 2.6μm SpeedCore C18 100x2.1mm
Mobile Phase:
A: 0.1% Formic acid
B: ACN
Gradient: 10-90%B in 10mins
Flow: 0.4ml/min
Wavelength : 254nm

OLANZAPINE

Column: 2.6μm SpeedCore C18 100x2.1mm
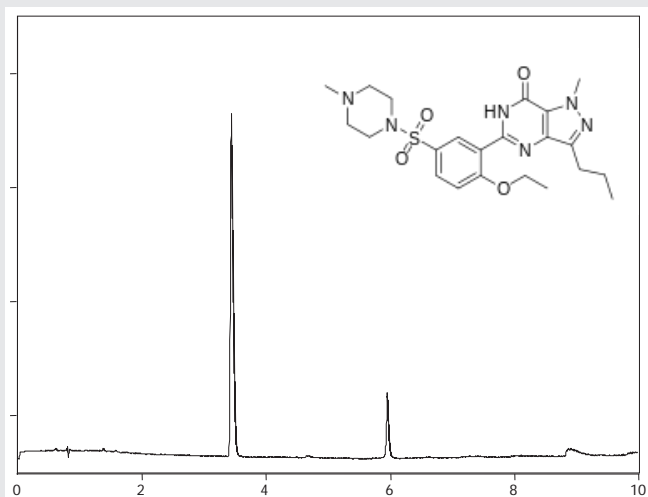Mobile Phase:
A: 25mM NH_4OAc
B: ACN
Gradient: 10-90%B in 10mins
Flow: 0.4ml/min
Wavelength : 254nm

VIAGRA - Sildenafil

Column: 5μm SpeedCore C18 100x4.6mm
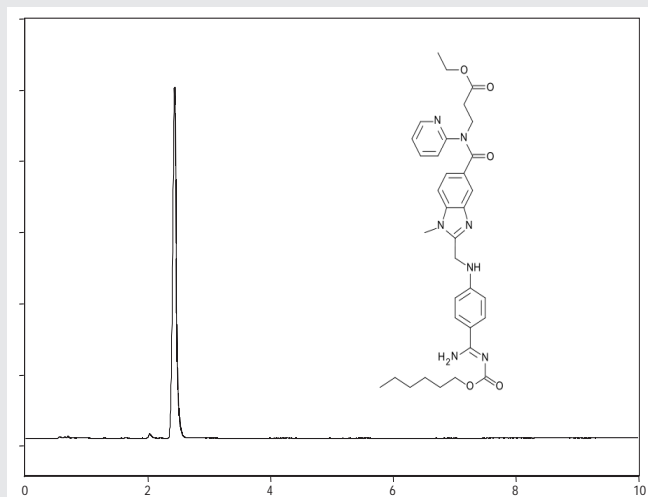Mobile Phase:
A: 0.1% Formic acid
B: ACN
Gradient: 20-80%B in 10mins
Flow: 1.2ml/min
Wavelength : 230nm

PRADAXA - Dabigatran

Column: 5μm SpeedCore C18 100x4.6mm
Mobile Phase: 50:50 25mM NH_4OAc : ACN

Flow: 1.2ml/min
Wavelength : 254nm

Fortis SpeedCore® pH+ C18

New Fused Core technology

- Extended pH operating range (pH 2-11)
- Optimal peak shape and retention for basic analytes
- Increased method development options
- Increased choice of buffer conditions

Speedcore® pH Plus features the latest Surface Grafting Technology (SGT) to improve particle pH stability and durability of the bonded phase ligand attached to its surface.

SURFACE GRAFTING TECHNOLOGY
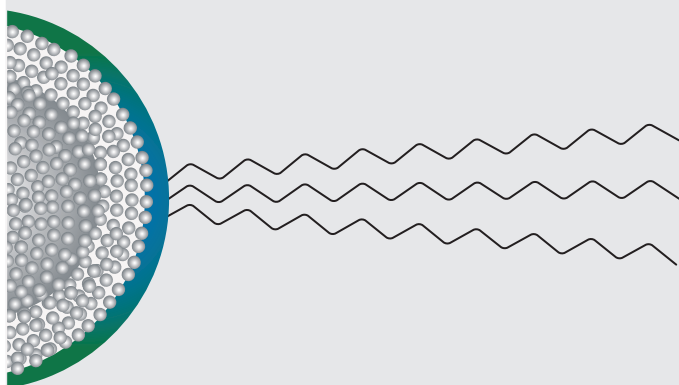
Crosslinked surface modification reduces the opportunity for silanol interaction as well as surface dissolution.
This provides extended pH stability for the core-shell particle

Surface grafting technology (SGT) extends the capability of core-shell technology to now allow for high pH use as well as low and mid pH stability. High efficiency core-shell technology combined with this improved ability to run at extremes of pH allow for excellent method development options. Peak capacity and sample loading of basic molecules is also increased.
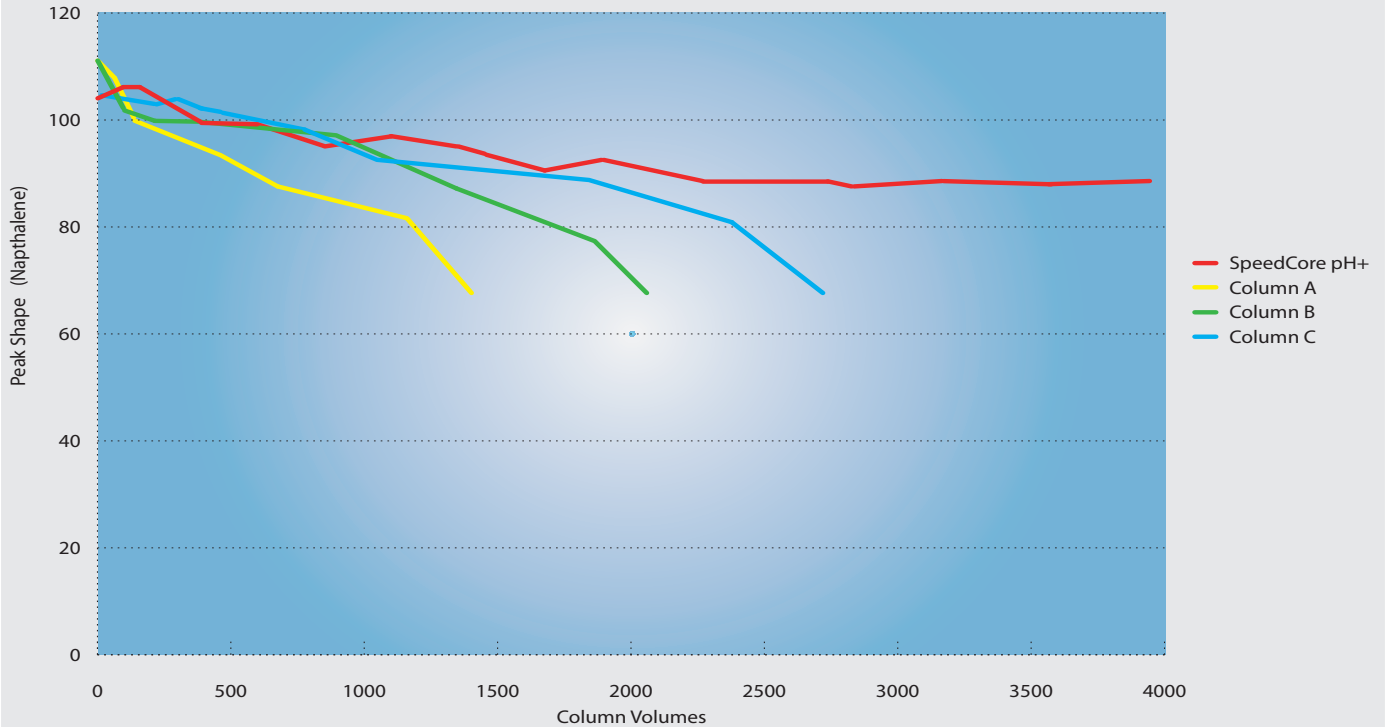
pH 2   **pH 11**

No buffer limitations

Fortis SpeedCore pH+ C18

Stability in - 50mM Ammonium Bicarbonate pH 10 Temperature 50oC

The first generation of core-shell particles suffered from short column lifetimes if run outside a moderate pH range of 2-8. As a result application of these columns was limited, as was the use of pH to achieve necessary selectivity and retention.

SpeedCore pH Plus can operate across an extended pH range (2-11) due to its protected surface. This leads to better peak shapes, higher loadability and enhanced selectivity along with the high efficiency expected from a core-shell particle.

The increased pH stability of SpeedCore pH Plus provides a more robust method development option giving confidence that methods will be reproducible. If a larger pH range is available then screening new compounds for the correct pH optimum becomes much simpler.
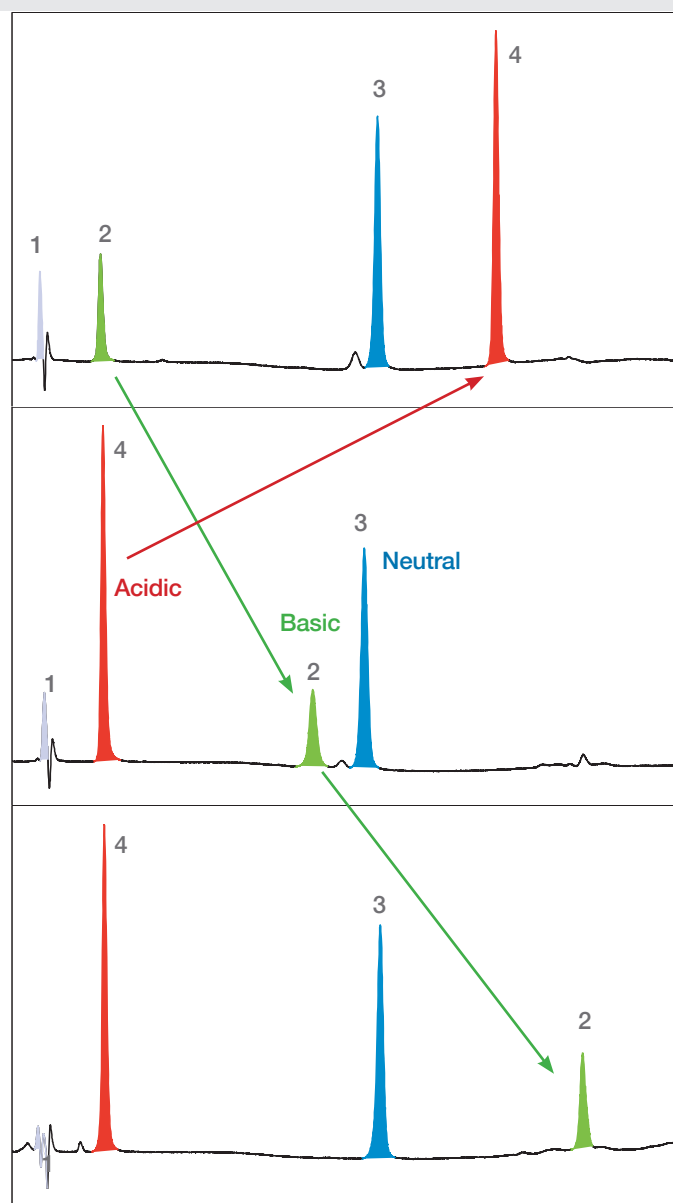
pH 2   **pH 11**

No buffer limitations

Fortis SpeedCore pH+ C18

- ⊙ **pH selectivity for method development**
- ⊙ **pH stable 2-11**
- ⊙ **Gives high speed equilibration**

2.6µm Fortis SpeedCore pH Plus can operate across a wide pH spectrum giving the analyst the ability to optimise the correct pH region for their separation. Quickly equilibrating from formic acid to ammonium acetate through to ammonia allows pH, as a method variable, to be rapidly evaluated. Resolution of compounds can be changed radically by altering pH to optimise separation between compound classes.

METHOD DEVELOPMENT

Column: 2.6µm SpeedCore C18 50x2.1mm
p/n: SP18-020326
Gradient: 10 - 50% in 5min
Buffer : **Potassium Phosphate**
Flow: 0.4ml/min
Temp: 20°C
Wavelength: 254nm

1. Uracil
2. Procaine
3. Fenuron
4. 3-Nitrobenzoic acid

pH 2.2

pH 7.2

pH 11.0

pH 2

pH 11

No buffer limitations
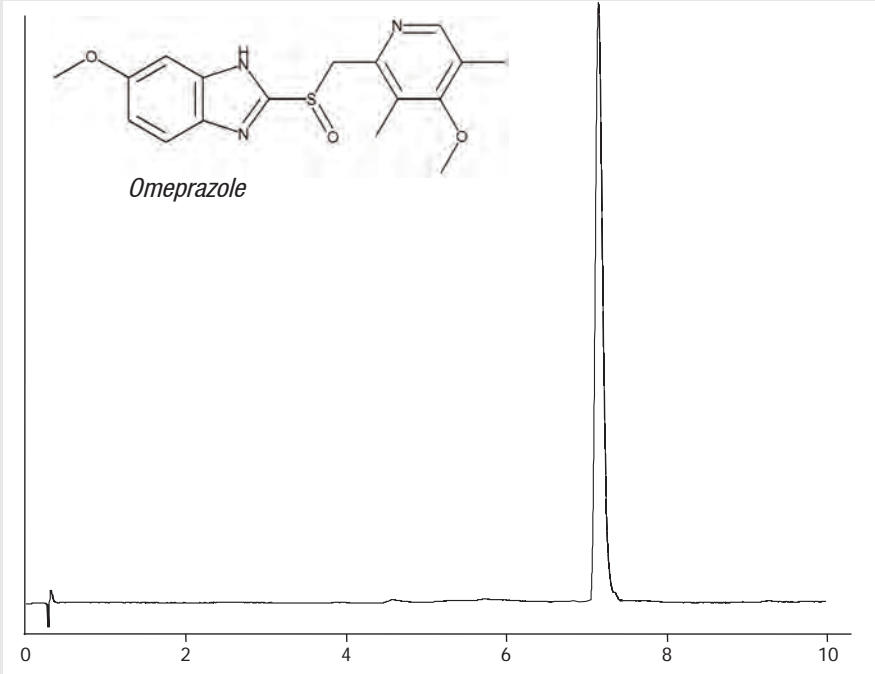
/014

OMEPRAZOLE
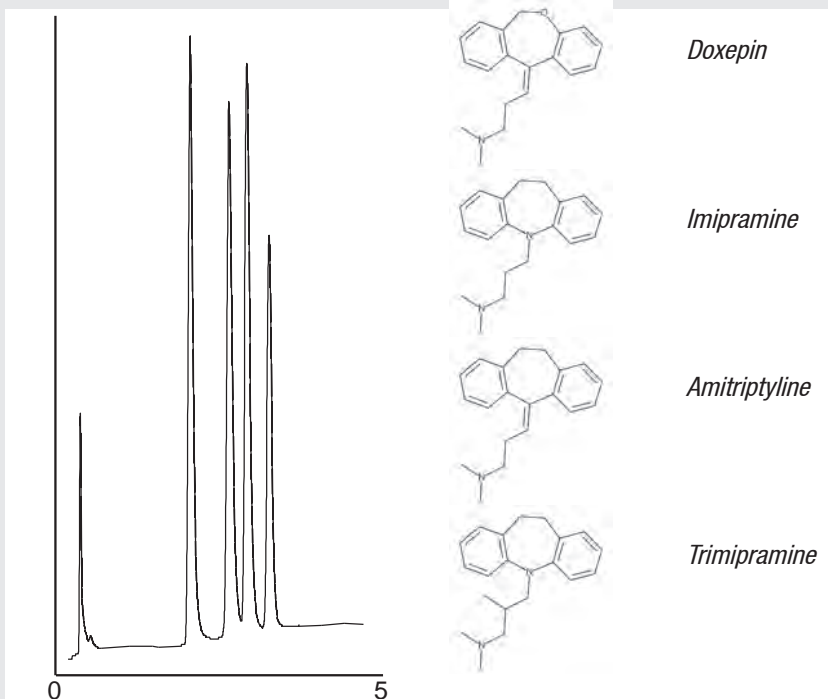

Omeprazole

2.6μm SpeedCore pH Plus 50x4.6mm
A: 10mM Ammonium bicarbonate pH 10
B: MeOH
Gradient: 60-80%B in 10mins
Flow: 1.0ml/min
Temp: 40°C
Wavelength : 254nm

TRICYCLIC ANTIDEPRESSANTS

Doxepin

Imipramine

Amitriptyline

Trimipramine

2.6μm SpeedCore pH Plus 50x4.6mm
A: 10mM Ammonium bicarbonate pH 10
B: MeOH
Gradient: 60-80%B in 10mins
Flow: 1.0ml/min
Temp: 40°C
Wavelength : 254nm

pH 2   **pH 11**

No buffer limitations

SpeedCore
RP18-Amide

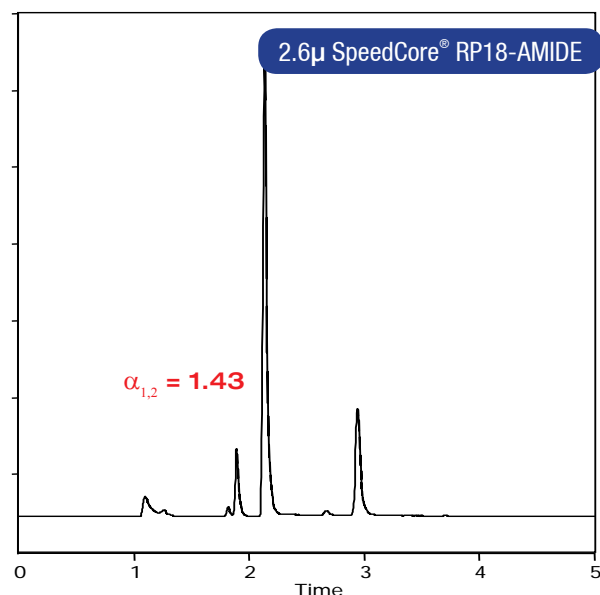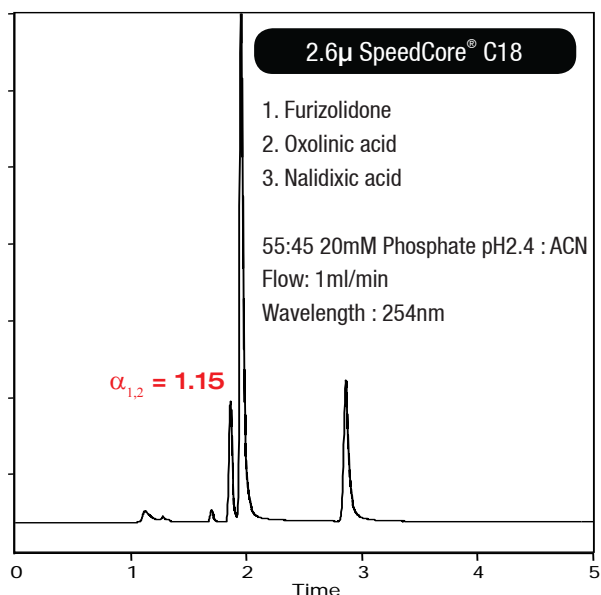**New Fused Core technology**

- Orthogonal Selectivity
- Improve Resolution even at high speed
- Provide high efficiency
- Excellent Method Development option

Speedcore® RP18-Amide increases resolution and efficiency over traditional porous particles. Orthogonal selectivity is provided by the polar-embedded group in the stationary phase.
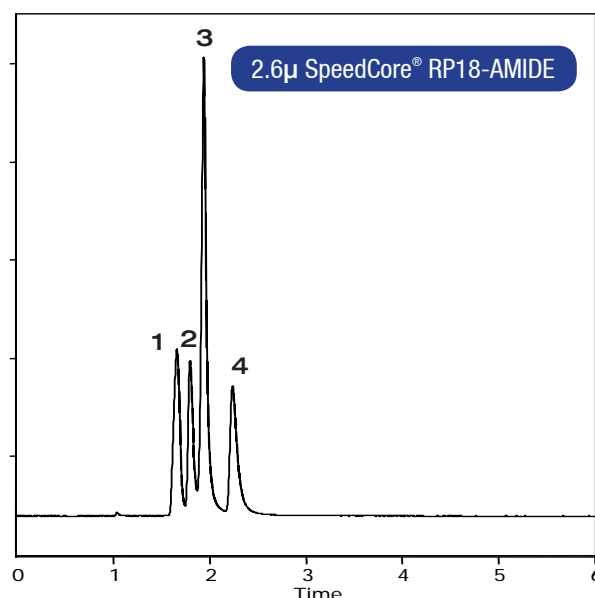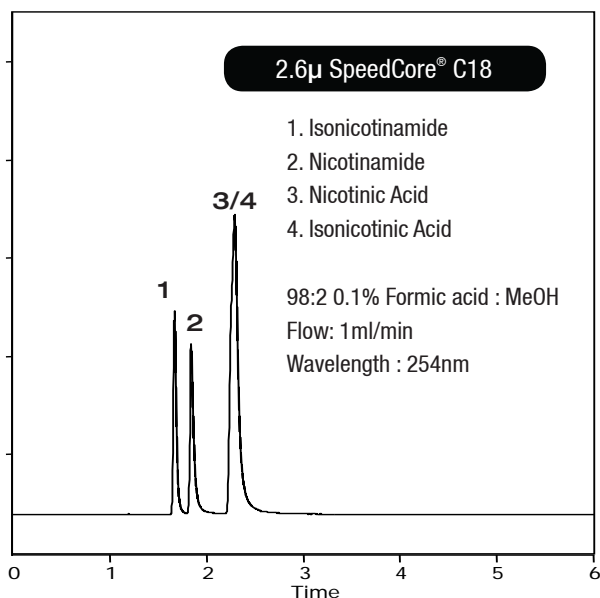
ORTHOGONAL SELECTIVITY - ACIDS

2.6µ SpeedCore® C18

1. Benzoic acid
2. Sorbic acid

80:20 20mM Phosphate pH2.4 : ACN
Flow: 1ml/min
Wavelength : 254nm

2.6µ SpeedCore® RP18-AMIDE
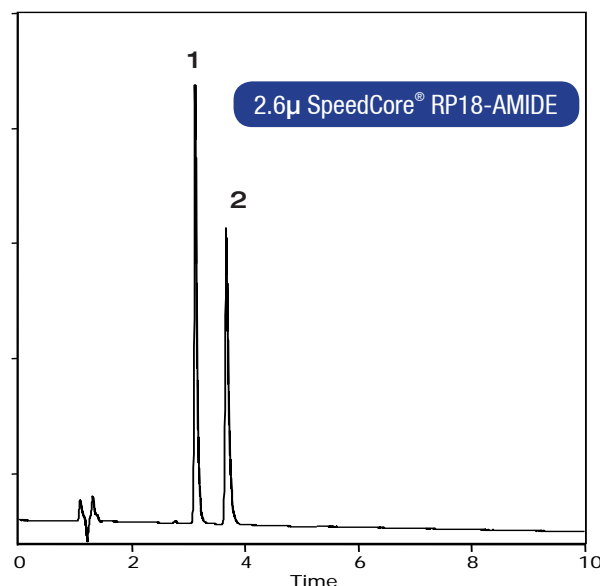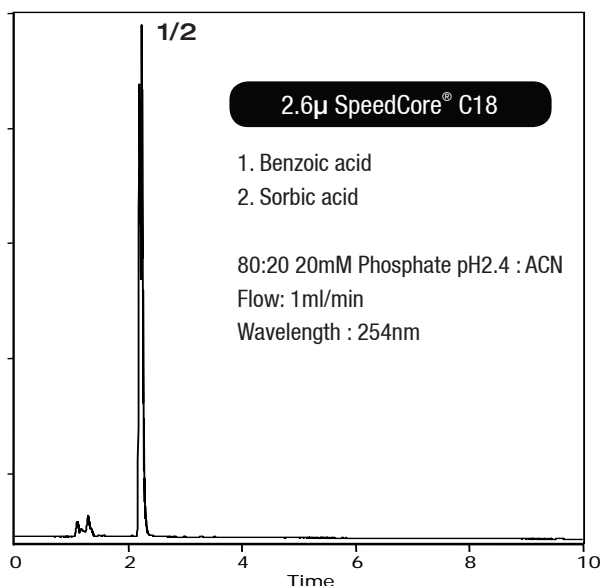
ORTHOGONAL SELECTIVITY - ANTIBACTERIALS

2.6µ SpeedCore® C18

1. Furizolidone
2. Oxolinic acid
3. Nalidixic acid

55:45 20mM Phosphate pH2.4 : ACN
Flow: 1ml/min
Wavelength : 254nm

$\alpha_{1,2} = 1.15$

2.6µ SpeedCore® RP18-AMIDE
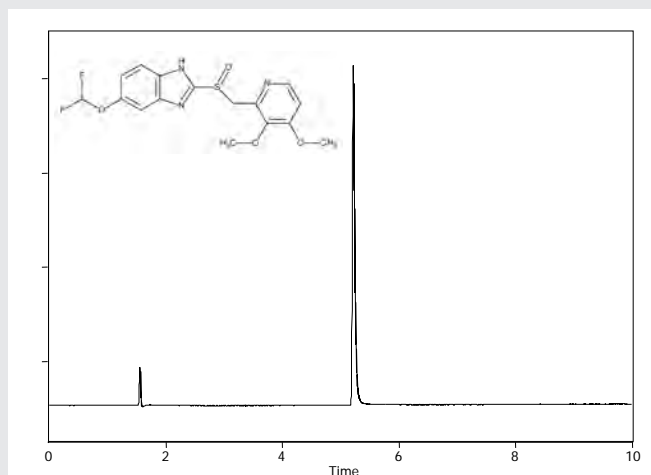
$\alpha_{1,2} = 1.43$

SpeedCore RP18-Amide features a single polar embedded stationary phase ligand, unlike some other commercial polar embedded phases produced by a multi-stage synthesis. As this is a single ligand bonding there are no uncontrolled secondary phase interactions. Therefore SpeedCore RP18-Amide provides highly reproducible performance from batch to batch.

Selectivity of the RP18-Amide is different to that of a traditional C18 ligand and allows for separations of complex pairs not easily achieved on standard C18 stationary phases.

ORTHOGONAL SELECTIVITY - NICOTINIC ACIDS

2.6μ SpeedCore® C18

1. Isonicotinamide
2. Nicotinamide
3. Nicotinic Acid
4. Isonicotinic Acid

98:2 0.1% Formic acid : MeOH
Flow: 1ml/min
Wavelength : 254nm

2.6μ SpeedCore® RP18-AMIDE

PANTOPRAZOLE

Column: 2.6μm SpeedCore RP18-Amide 150x4.6mm
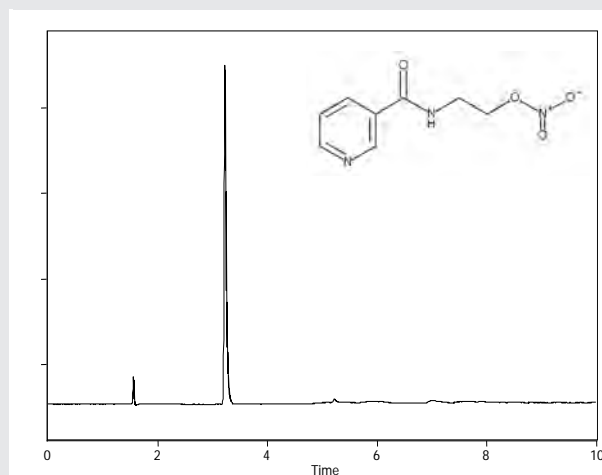Mobile Phase:
A: 10mM NH_4OAc
B: ACN
Gradient: 20-100%B in 10mins
Flow: 1.0ml/min
Wavelength : 285nm

NICORANDIL

Column: 2.6μm SpeedCore RP18-Amide 150x4.6mm
Mobile Phase:
A: 10mM NH_4OAc
B: ACN
Gradient: 20-100%B in 10mins
Flow: 1.0ml/min
Wavelength : 254nm

SpeedCore

Diphenyl

⟫ New Fused Core technology

- ⊙ **Unique Selectivity**
- ⊙ **Separate Positional Isomers**
- ⊙ **Applicable with all HPLC, UHPLC and MS systems**
- ⊙ **No "MS bleed", Stable hydrophobic ligand**

Speedcore® Diphenyl extends selectivity and can discriminate between closely related species, such as metabolites or excipients. The interactions specific to this stationary phase allow for separation of positional isomers as well as small atom or functional group changes to be resolved.

UNIQUE FUNCTIONALITY

SpeedCore Diphenyl is based upon a unique diphenyl functionality. Three controlled mechanisms of interaction can occur.

This allows for unique retention of closely related species and metabolites. No complex mobile phase additives are necessary simplifying method development.

- ⊙ π-π (High selectivity)
- ⊙ Steric selectivity (spacial arrangement)
- ⊙ Hydrophobicity (Highly stable)
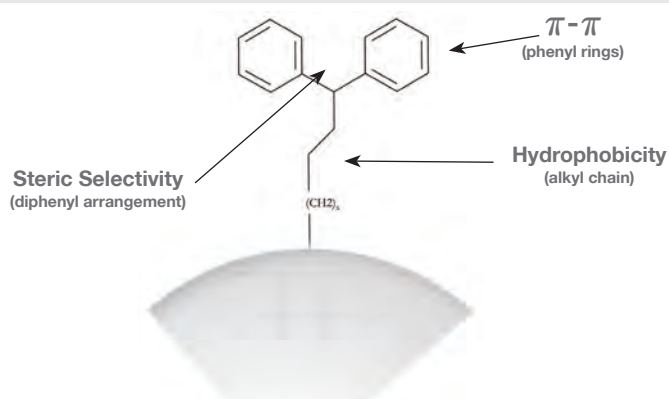
ALTERNATE SELECTIVITY

Selectivity of compounds is enhanced on the SpeedCore Diphenyl over RP C18 stationary phases due to the added steric selectivity and pi-pi interactions available.

This means you have the high efficiency of core-shell technology combined with increased selectivity to provide the ultimate in resolution capability.

Columns:

2.6μm Fortis SpeedCore C18 100x2.1mm

2.6μm Fortis SpeedCore Diphenyl 100x2.1mm

Mobile Phase:

A: 0.1% Formic acid in Water

B: 0.1% Formic acid in ACN

5 - 30 %B in 10mins
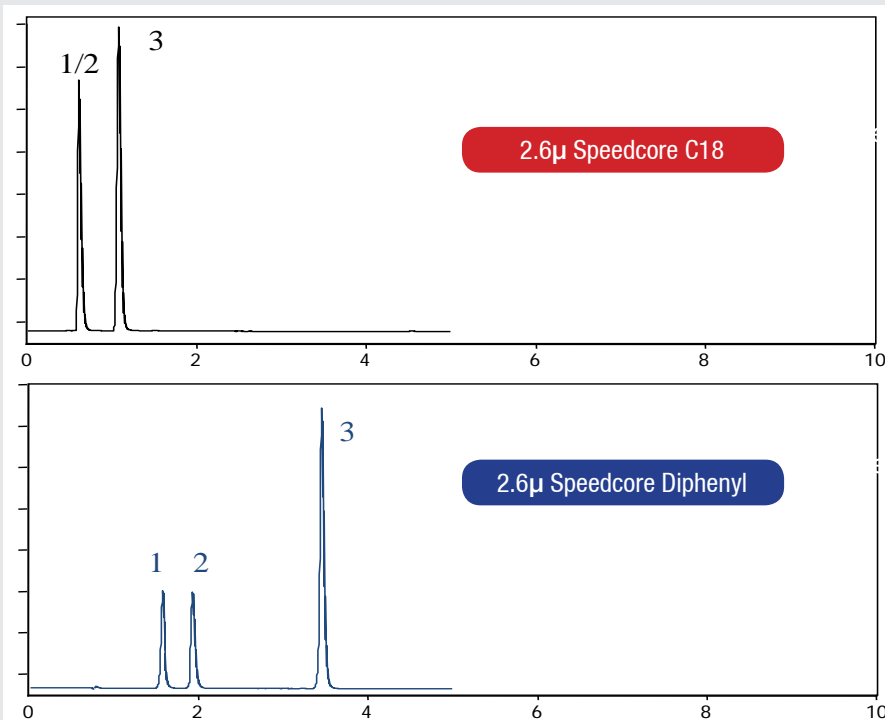
0.4ml/min

280nm

1. 1,3-Dimethyluric acid

2. Theobromine

3. Caffeine

ALTERNATE SELECTIVITY

Selectivity of isomers is critical in LC-MS due to the fact that the isomers will have the same molecular weight, and therefore not be detected as separate compounds if they are not resolved.

The use of a SpeedCore Diphenyl column allows the separation of isomeric species. This leads to better qualitative and quantitative results.

SpeedCore Diphenyl will separate a wide range of metabolite species that are not possible on alkyl chain phases due to its orthogonal nature.

Columns:

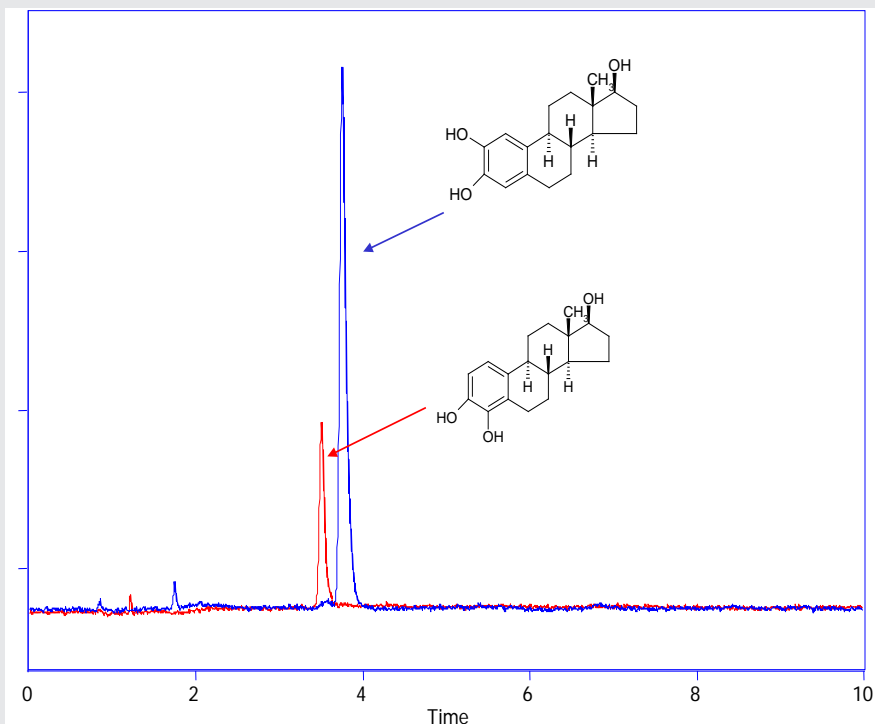2.6µm Fortis SpeedCore Diphenyl 150x4.6mm

Mobile Phase:

40:60   Water : MeOH

1.2ml/min

210nm

Temp: 40°C

1. 4-Hydroxyestradiol (mw=288.38)
2. 2-Hydroxyestradiol (mw=288.38)

EFFECT OF MOBILE PHASE CHOICE

Choice of mobile phase can be very important in a running a phenyl column. Whilst many people have standardised upon ACN as the organic modifier of choice, MeOH is a better choice in order to let the π-π interactions occur on the phenyl rings.
Using ACN can not only suppress retention but also selectivity.

It can be seen how maximum retention and resolution is obtained on SpeedCore Diphenyl in MeOH mobile phase, even greater than C18. Once the organic modifier is substituted for ACN not only is resolution reduced but also a large amount of retention is lost in relation to that lost on a C18.
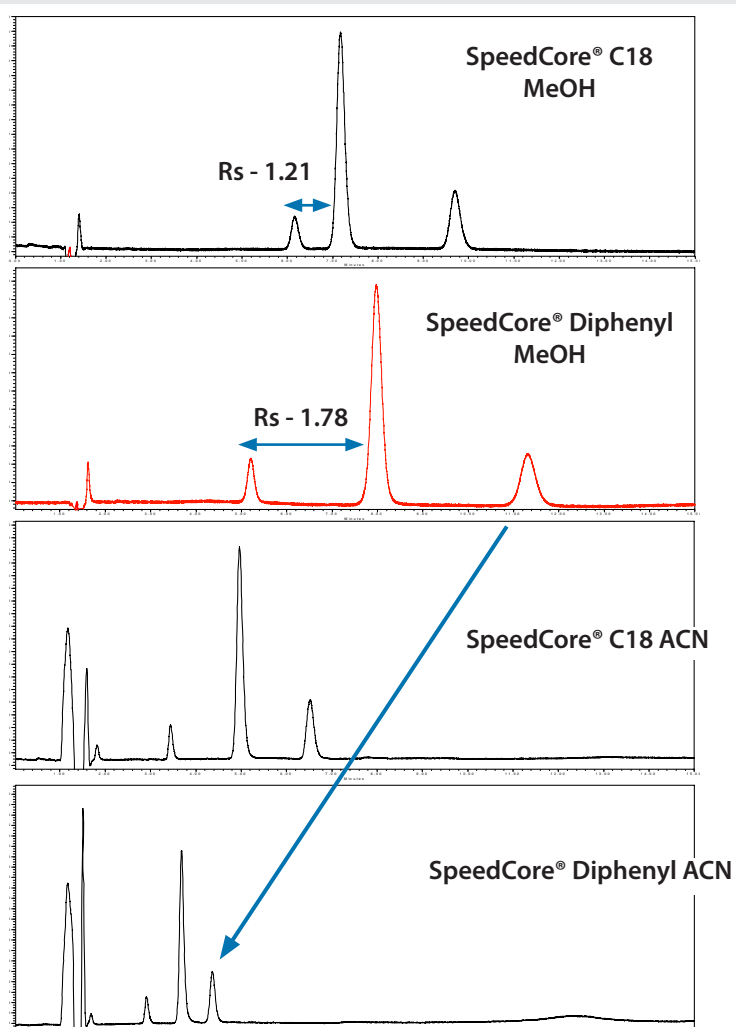
SpeedCore
PFP

⊙ New Fused Core technology

- ⊙ **Provides high efficiency**
- ⊙ **Improve Resolution even at high speed**
- ⊙ **Multi-mode resolution mechanisms**
- ⊙ **Isomer selectivity**

Speedcore® PFP increases efficiency over traditional porous particles. The extra selectivity of the fluoronated phenyl ring structure provides increased resolution of compounds that are closely related.

ORTHOGONAL SELECTIVITY - PFP vs C18

SpeedCore PFP will provide orthogonal selectivity for separations, combined with the SpeedCore particle technology offering high efficiency, high resolution separations.

It can be seen how the overall chromatographic run time can be similar but the selectivity of the peaks 2-5 vary greatly on the SpeedCore PFP stationary phase as opposed to the C18, with more resolution provided.

Columns:
2.6µm Fortis Speedcore® C18 50x3mm
2.6µm Fortis Speedcore® PFP 50x3mm
Mobile Phase:
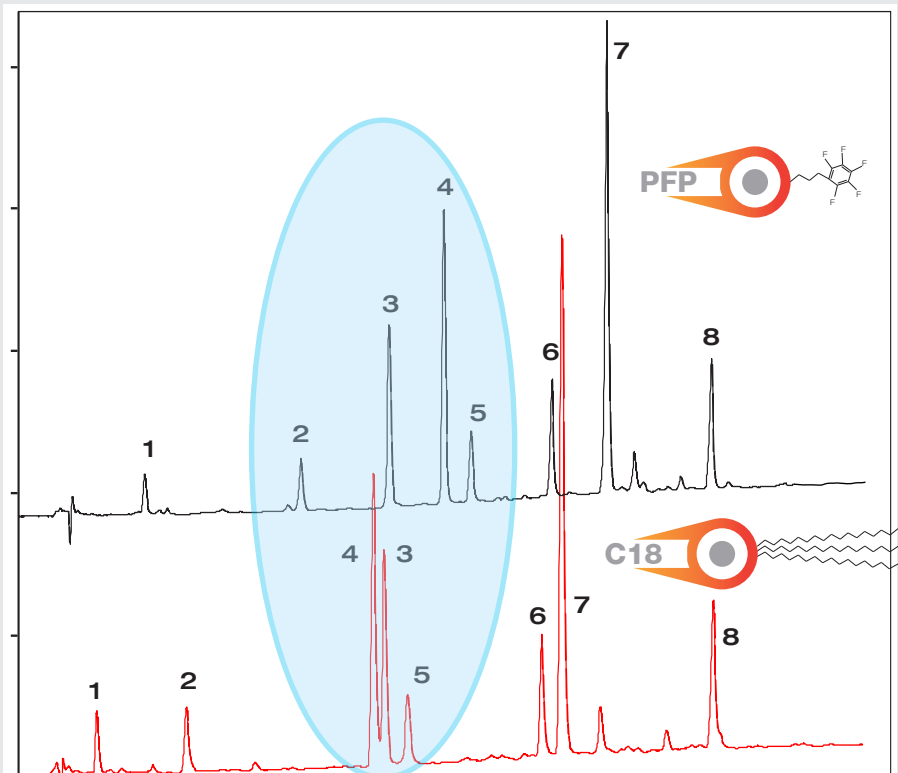A: 0.1% TFA
B: 0.1% TFA in MeCN
Gradient:
0 - 40% B in 10minutes

Flow Rate: 1.0ml/min
Temp: 25°C
Wavelength: 210nm

SpeedCore PFP columns will provide an alternative selectivity to that of traditional C18 reversed phased chemistries for the separation of basic, acidic and neutral species. PFP columns will retain by ion-exchange and shape selectivity mechanisms as well as both reversed and normal phase interactions. This makes them particularly useful for separation of closely related species such as isomers.

The analyst is able to use buffer concentration as well as organic modifier to control retention factors of these dual mode selectivities.

SELECTIVITY - PHTHALATES

SpeedCore PFP will allow the separation of basic, acidic and neutral compounds.

The separation of phthalates highlights the closely related species that can be optimised   by the multiple mechanisms of the PFP stationary phase.

2.6µm Fortis SpeedCore PFP 100x2.1mm
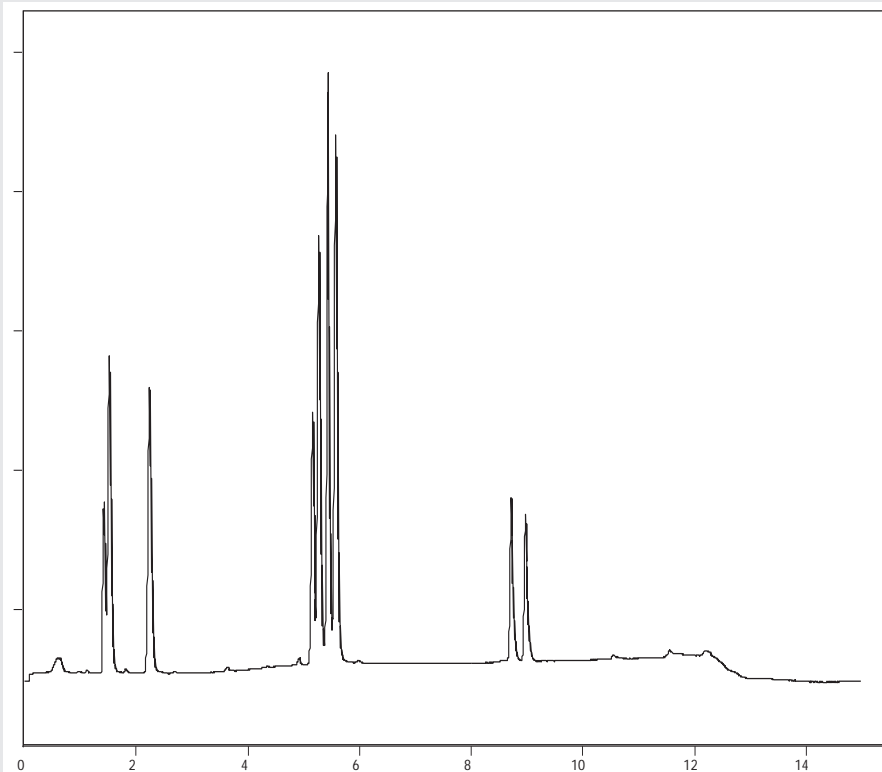
Mobile Phase:

A: Water

B: ACN

Gradient: 50 - 100 %B in 10mins hold to 15mins

Flow: 0.4ml/min

Wavelength: 210nm

1. bis(2-chloroethyl)ether

2. bis(2-chloroisopropyl)ether

3. Dimethyl phthalate

4. Diethyl phthalate

5. 4-Chlorophenylphenyl ether

6. 4-Bromophenylphenyl ether

7. Di-n-butyl phthalate

8. Di-n-octyl phthalate

SELECTIVITY - PFP VS DIPHENYL

SpeedCore PFP will show alternative selectivity to phenyl or diphenyl columns as the retention mechanisms involved will allow for differing analyte interactions.

Columns:

2.6µm Fortis Speedcore® PFP 50x3mm
2.6µm Fortis Speedcore® Diphenyl 50x3mm
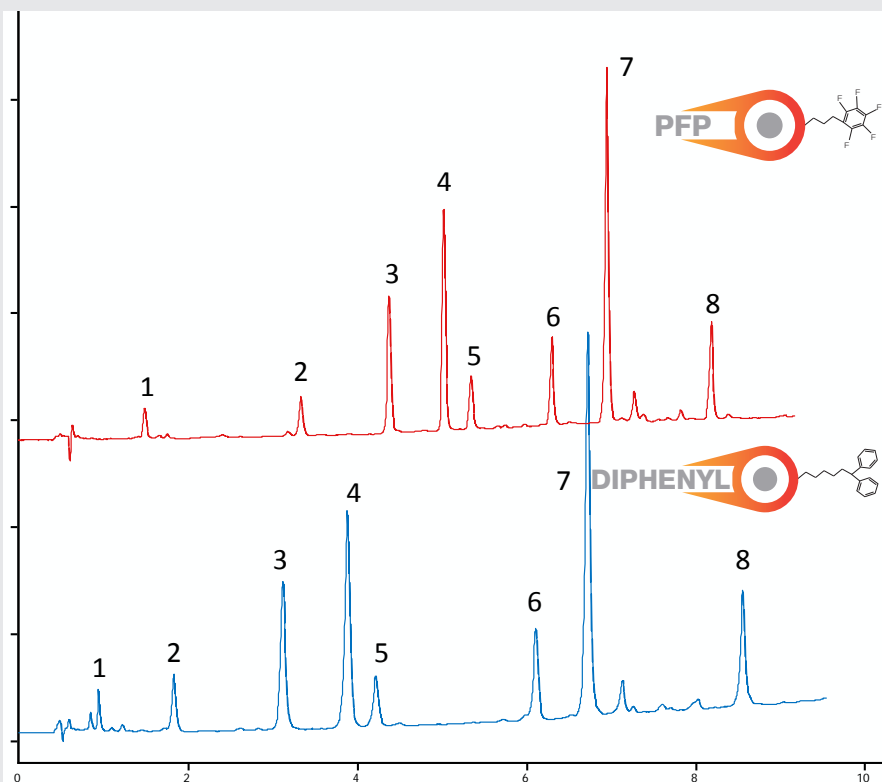Mobile Phase:
A: 0.1% TFA
B: 0.1% TFA in MeCN
Gradient:
0 - 40% B in 10minutes

Flow Rate: 1.0ml/min
Temp: 25ºC
Wavelength: 210nm

SpeedCore
HILIC

New Fused Core technology

- **Strong retention of polar analytes**
- **Increased MS sensitivity**
- **Alternative selectivity**
- **Ultra high efficiency**

Speedcore® HILIC increases efficiency and retention of polar analytes which do not retain well in reversed phase chromatography. Extended retention is obtained by the partitioning, ion-exchange and hydrogen bonding that can occur on a HILIC stationary phase.
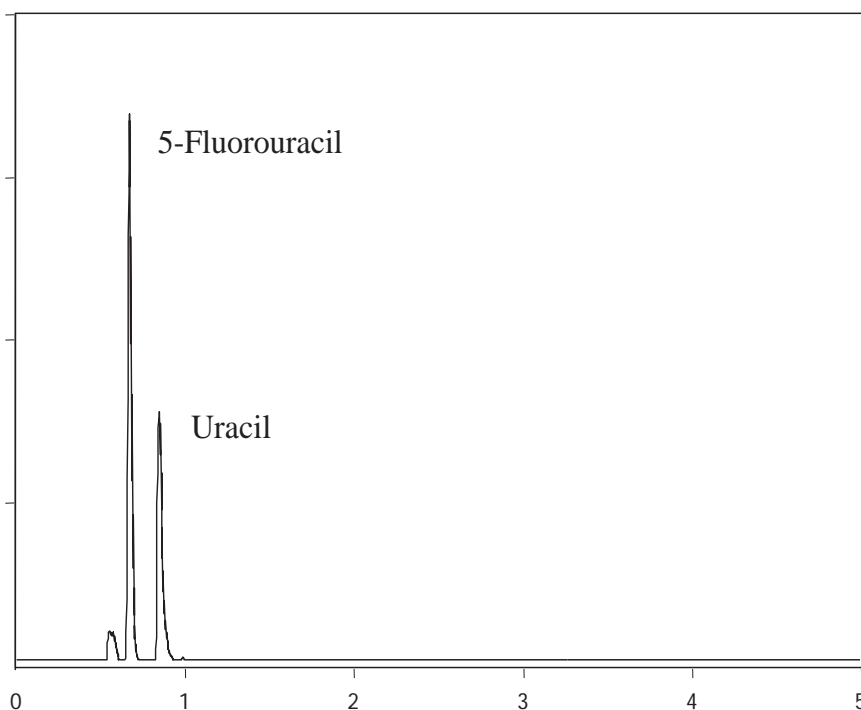
HYDROPHILIC INTERACTION CHROMATOGRAPHY

Hydrophilic Interaction Chromatography works in a similar way to normal phase chromatography. A polar surface combined with a non-polar mobile phase, typically ACN allows for partition of polar analytes. Retention and resolution are optimised by remembering that ACN is a weak solvent and Water is a strong solvent in HILIC mode.

Uracil is a compound historically used for measuring the unretained value of a HPLC analysis, whilst 5-fluorouracil is an anti cancer compound.

2.6µm Fortis SpeedCore HILIC 100x2.1mm

95 : 5 ACN : Water

0.4ml/min

210nm

1. 5-Fluorouracil

2. Uracil

SpeedCore Sample Filters

- **Low volume in-line filter for all Core-Shell/UHPLC columns**
- **Increase lifetime of columns**
- **Change over time seconds not minutes**
- **Pressure rated to 1000bar**

High pressure In-line Filters	
UHPSAV2	UHPLC In-line filter pk 2
UHPSAV4	UHPLC In-line filter pk 4
UHPSAV2-w	UHPLC In-line filter pk 2 Acquity® Compatible
UHPSAV4-w	UHPLC In-line filter pk 4 Acquity® Compatible

Acquity® is a registered trademark of Waters Corporation

Peptide and Protein Columns

Speedcore BIO columns utilise the same core-shell technology but with a smaller shell layer in order to make mass-transfer of peptide and larger proteins optimum for retention and separation. Biomolecules are a diverse range of compounds, amino acids, proteins, peptides, nucleic acids, vitamins.

Choose C18 for more hydrophilic proteins and C8 or C4 for more hydrophobic molecules.

- **High efficiency for sharp peak shape, high resolution separations**
- **Choice of large pore size for proteins and smaller pore size for peptides**
- **High sensitivity core-shell technology**
- **Choice of Protein ligand to increase or decrease hydrophobic nature**

Speedcore C18 is designed to provide characteristics which will enhance method development. It provides the ability to obtain sharp peak shapes whilst retaining and separating a wide variety of compounds.

INSULIN SEPARATION

SpeedCore BIO Protein C4 columns provide separation of larger molecular weight protein species, or those with a large 'footprint'.

Insulin is a hormone which is central to regulating carbohydrate and fat metabolism in the body. It is critical to have fast, sensitive measurement of proteins such as this which play a major role in fighting common issues in human health. Diabetes being a major contributor to illness and death[1].

Insulin is produced and stored in the body as a hexamer (a unit of six insulin molecules) whilst the active form is the monomer.
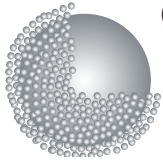
1. Projections of Global Mortality and Burden of Disease from 2002 to 2030. C. Mathers, D.Loncar. PLoS Med, 2006, 3(11)

Insulin Hexamer
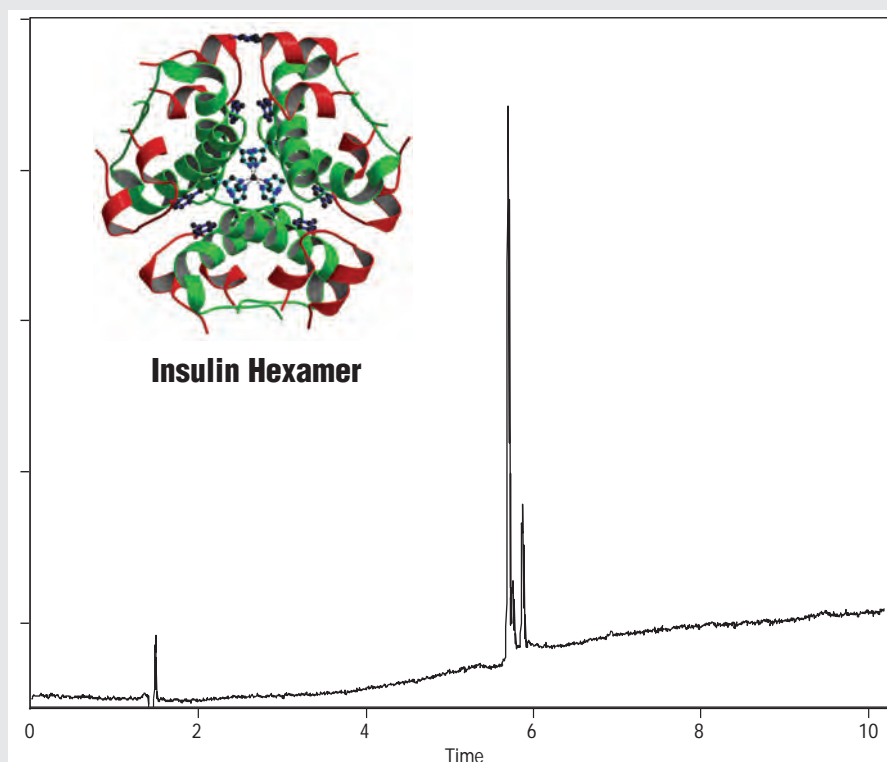
SpeedCore BIO

Peptide

⊙ New Fused Core technology

- **0.3 μm Porous Shell**
- **2.0 μm Solid Core**
- **2.6μm SpeedCore BIO Peptide**

- ⊙ **Provides high efficiency sharp peak shapes**
- ⊙ **Improve Resolution even at high speed**
- ⊙ **160Å pore size optimised for peptides**
- ⊙ **Excellent for peptide mapping**

Speedcore® BIO Peptide is designed to be optimal for the separation of small peptides, with maximum resolution and efficiency. Complex samples such as tryptic digests are easily achieved with the high efficiency provided by the excellent mass-transfer kinetics.

PEPTIDES

SpeedCore BIO Peptide C18 will allow the separation of small peptide analytes.

High resolution will be provided by the high efficiency of the speedcore particle. The optimised shell to core ratio providing excellent mass-transfer mechanism.

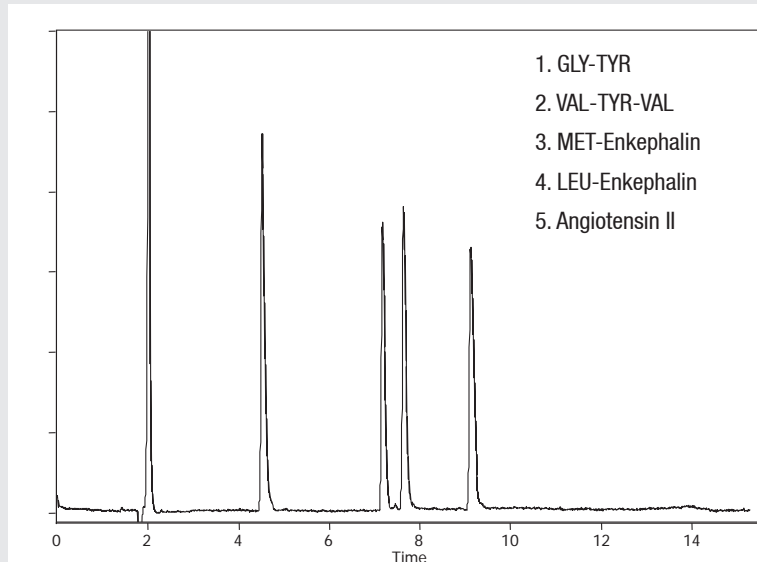2.6μm Fortis SpeedCore BIO Peptide C18 150x4.6mm

Mobile Phase:
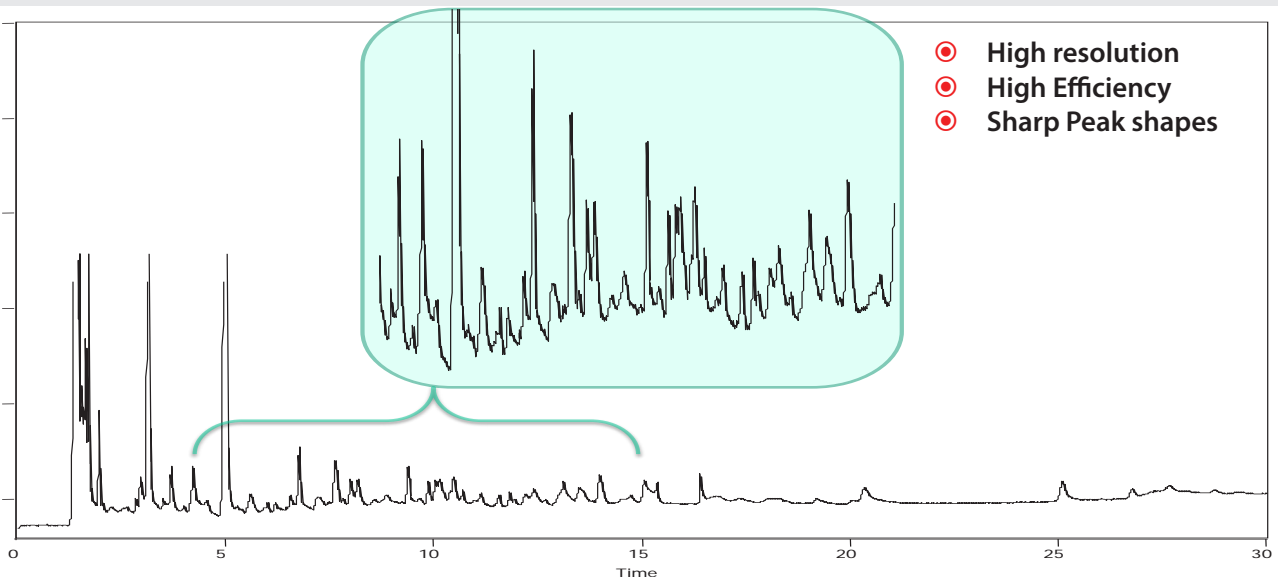
A: 0.1% Formic acid in Water

B: 0.1% formic acid in ACN

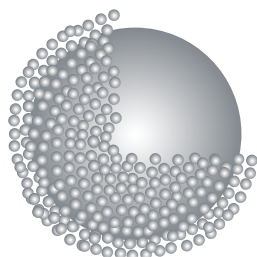Gradient: 10 - 40 %B in 10mins

Flow: 0.2ml/min

Wavelength: 220nm

1. GLY-TYR
2. VAL-TYR-VAL
3. MET-Enkephalin
4. LEU-Enkephalin
5. Angiotensin II

COMPLEX PEPTIDE SAMPLE - TRYPTIC DIGEST

- ⊙ **High resolution**
- ⊙ **High Efficiency**
- ⊙ **Sharp Peak shapes**

SpeedCore BIO

Protein

⊙ New Fused Core technology

- ⊙ Sharp efficient peak shapes
- ⊙ 300Å for optimal separation of Proteins
- ⊙ Ultra High sensitivity
- ⊙ C18, C8 and C4 options

Speedcore® BIO Protein is designed to separate large proteins. The larger pore-size and thinner outer shell allow for a fast efficient mass-transfer process of large molecules which would be excluded from traditional 100Å type stationary phases.

0.2 µm Porous Shell

3.1 µm Solid Core

3.5µm SpeedCore BIO Protein

LIGHT AND HEAVY CHAINS OF IgG1

SpeedCore BIO Protein C18 will separate light (25k Da) and heavy chain(50k Da) deglycosylated and reduced IgG1-antibody molecules.

Extra unknown peaks were also separated on the high resolution SpeedCore particle. This enhanced resolution will be critical to ensure maximum resolution for sample mixtures.

2.6µm Fortis SpeedCore BIO Protein C18 150x4.6mm

Mobile Phase:

A: 0.1% Formic acid in Water

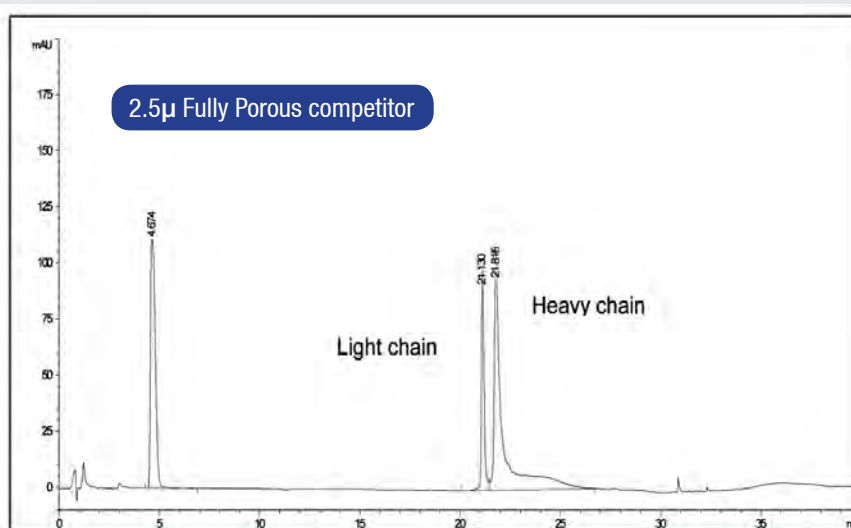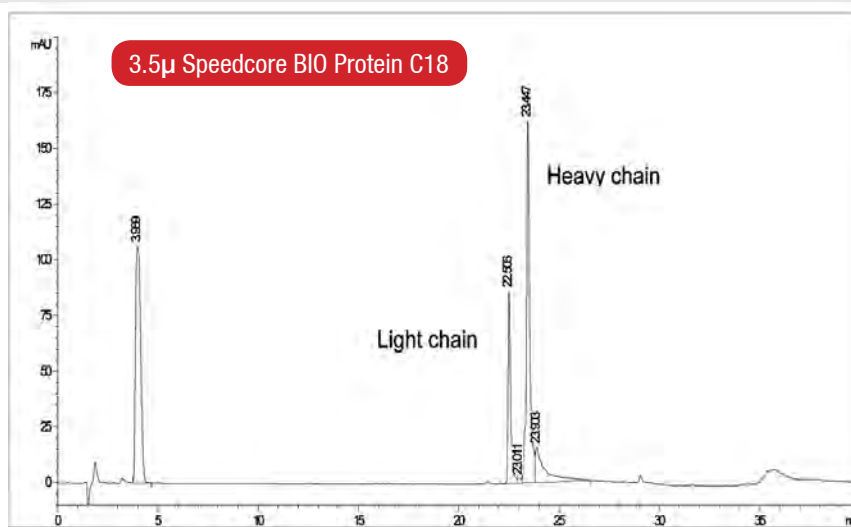B: 0.1% formic acid in IPA:ACN

Gradient:

0 - 40 %B in 25mins

40 - 100 %B in 30mins

Flow: 0.3ml/min

Temp: 65ºC

Wavelength: 220nm

1. Light Chain (25k Da)

2. Impurity (only on the core-shell)

3. Heavy Chain (50k Da)

3. Impurity

3.5µ Speedcore BIO Protein C18

2.5µ Fully Porous competitor

2.6µm SpeedCore® part numbers

2.6µm SpeedCore C18		Column Length			
		30	50	100	150
Column Diameter	2.1	SP18-020226	SP18-020326	SP18-020526	SP18-020726
	3.0	SP18-030226	SP18-030326	SP18-030526	SP18-030726
	4.6	SP18-050226	SP18-050326	SP18-050526	SP18-050726

2.6µm SpeedCore pH+ C18		Column Length			
		30	50	100	150
Column Diameter	2.1	SCPLUS-020226	SCPLUS-020326	SCPLUS-020526	SCPLUS-020726
	3.0	SCPLUS-030226	SCPLUS-030326	SCPLUS-030526	SCPLUS-030726
	4.6	SCPLUS-050226	SCPLUS-050326	SCPLUS-050526	SCPLUS-050726

2.6µm SpeedCore RP18-Amide		Column Length			
		30	50	100	150
Column Diameter	2.1	SPRA-020226	SPRA-020326	SPRA-020526	SPRA-020726
	3.0	SPRA-030226	SPRA-030326	SPRA-030526	SPRA-030726
	4.6	SPRA-050226	SPRA-050326	SPRA-050526	SPRA-050726

2.6µm SpeedCore Diphenyl		Column Length			
		30	50	100	150
Column Diameter	2.1	SPPH-020226	SPPH-020326	SPPH-020526	SPPH-020726
	3.0	SPPH-030226	SPPH-030326	SPPH-030526	SPPH-030726
	4.6	SPPH-050226	SPPH-050326	SPPH-050526	SPPH-050726

2.6µm SpeedCore PFP		Column Length			
		30	50	100	150
Column Diameter	2.1	SPFP-020226	SPFP-020326	SPFP-020526	SPFP-020726
	3.0	SPFP-030226	SPFP-030326	SPFP-030526	SPFP-030726
	4.6	SPFP-050226	SPFP-050326	SPFP-050526	SPFP-050726

2.6µm SpeedCore HILIC		Column Length			
		30	50	100	150
Column Diameter	2.1	SPHI-020226	SPHI-020326	SPHI-020526	SPHI-020726
	3.0	SPHI-030226	SPHI-030326	SPHI-030526	SPHI-030726
	4.6	SPHI-050226	SPHI-050326	SPHI-050526	SPHI-050726

SpeedCore Sample Filters

- – Low volume in-line filter for all core-shell/UHPLC columns
- – Increase lifetime of columns
- – Change over time seconds not minutes
- - Pressure rated to 1000bar

High pressure In-line Filters	
UHPSAV2	UHPLC In-line filter pk 2
UHPSAV4	UHPLC In-line filter pk 4
UHPSAV2-w	UHPLC In-line filter pk 2 Acquity® Compatible
UHPSAV4-w	UHPLC In-line filter pk 4 Acquity® Compatible

Acquity® is a registered trademark of Waters Corporation

5µm SpeedCore® part numbers

5µm SpeedCore C18		Column Length			
		30	50	100	150
	2.1	SP18-020250	SP18-020350	SP18-020550	SP18-020750
Column Diameter	3.0	SP18-030250	SP18-030350	SP18-030550	SP18-030750
	4.6	SP18-050250	SP18-050350	SP18-050550	SP18-050750

5µm SpeedCore pH+ C18		Column Length			
		30	50	100	150
	2.1	SCPLUS-020250	SCPLUS-020350	SCPLUS-020550	SCPLUS-020750
Column Diameter	3.0	SCPLUS-030250	SCPLUS-030350	SCPLUS-030550	SCPLUS-030750
	4.6	SCPLUS-050250	SCPLUS-050350	SCPLUS-050550	SCPLUS-050750

5µm SpeedCore RP18-Amide		Column Length			
		30	50	100	150
	2.1	SPRA-020250	SPRA-020350	SPRA-020550	SPRA-020750
Column Diameter	3.0	SPRA-030250	SPRA-030350	SPRA-030550	SPRA-030750
	4.6	SPRA-050250	SPRA-050350	SPRA-050550	SPRA-050750

5µm SpeedCore Diphenyl		Column Length			
		30	50	100	150
	2.1	SPPH-020250	SPPH-020350	SPPH-020550	SPPH-020750
Column Diameter	3.0	SPPH-030250	SPPH-030350	SPPH-030550	SPPH-030750
	4.6	SPPH-050250	SPPH-050350	SPPH-050550	SPPH-050750

5µm SpeedCore PFP		Column Length			
		30	50	100	150
	2.1	SPFP-020250	SPFP-020350	SPFP-020550	SPFP-020750
Column Diameter	3.0	SPFP-030250	SPFP-030350	SPFP-030550	SPFP-030750
	4.6	SPFP-050250	SPFP-050350	SPFP-050550	SPFP-050750

5µm SpeedCore HILIC		Column Length			
		30	50	100	150
	2.1	SPHI-020250	SPHI-020350	SPHI-020550	SPHI-020750
Column Diameter	3.0	SPHI-030250	SPHI-030350	SPHI-030550	SPHI-030750
	4.6	SPHI-050250	SPHI-050350	SPHI-050550	SPHI-050750

SpeedCore® BIO part numbers

2.6µm SpeedCore BIO Peptide C18		Column Length			
		30	50	100	150
	2.1	SCPEP18-020250	SCPEP18-020350	SCPEP18-020550	SCPEP18-020750
Column Diameter	3.0	SCPEP18-030250	SCPEP18-030350	SCPEP18-030550	SCPEP18-030750
	4.6	SCPEP18-050250	SCPEP18-050350	SCPEP18-050550	SCPEP18-050750

3.5µm SpeedCore BIO Protein C18		Column Length			
		30	50	100	150
	2.1	SCPRO18-020250	SCPRO18-020350	SCPRO18-020550	SCPRO18-020750
Column Diameter	3.0	SCPRO18-030250	SCPRO18-030350	SCPRO18-030550	SCPRO18-030750
	4.6	SCPRO18-050250	SCPRO18-050350	SCPRO18-050550	SCPRO18-050750

3.5µm SpeedCore BIO Protein C8		Column Length			
		30	50	100	150
	2.1	SCPRO08-020250	SCPRO08-020350	SCPRO08-020550	SCPRO08-020750
Column Diameter	3.0	SCPRO08-030250	SCPRO08-030350	SCPRO08-030550	SCPRO08-030750
	4.6	SCPRO08-050250	SCPRO08-050350	SCPRO08-050550	SCPRO08-050750

3.5µm SpeedCore BIO Protein C4		Column Length			
		30	50	100	150
	2.1	SCPRO04-020250	SCPRO04-020350	SCPRO04-020550	SCPRO04-020750
Column Diameter	3.0	SCPRO04-030250	SCPRO04-030350	SCPRO04-030550	SCPRO04-030750
	4.6	SCPRO04-050250	SCPRO04-050350	SCPRO04-050550	SCPRO04-050750

WORLDWIDE AVAILABILITY

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- Romania
- Russia
- Singapore
- South Africa
- Spain
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- Switzerland
- Taiwan
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