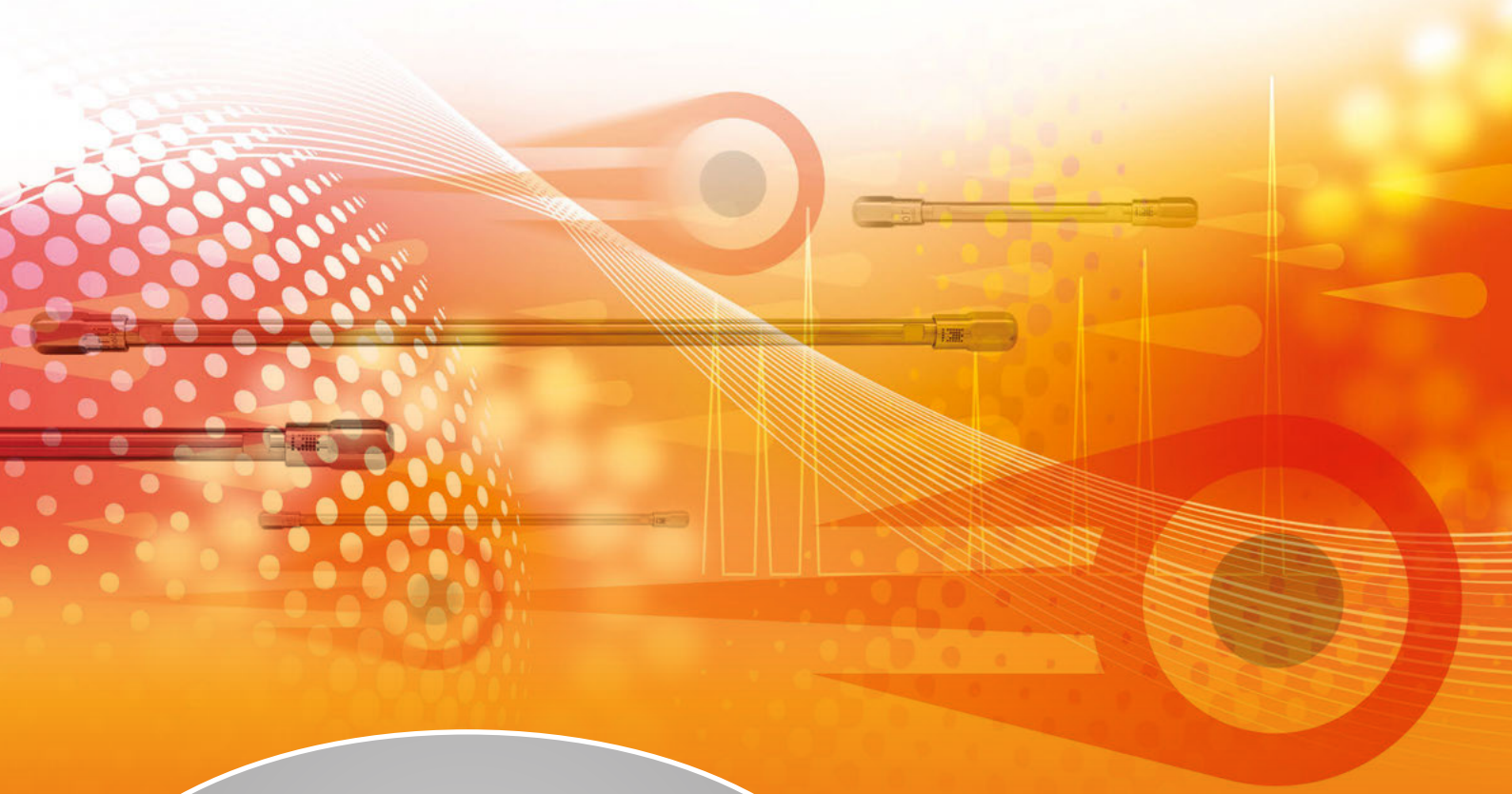
Fortis®
SpeedCore®



Now Includes
SpeedCore BIO
Peptide and Protein columns

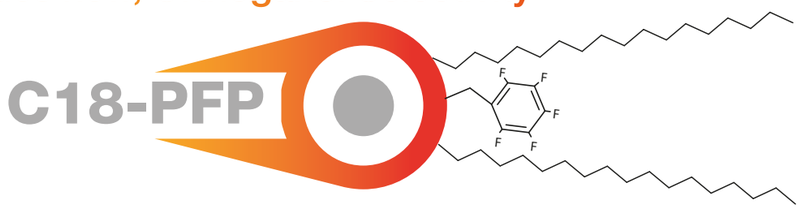
Fortis®
Technologies Ltd.

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, Orthoganol Selectivity



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 C18-PFP	2.6µm and 5µm	140m²/g	80Å	8	2-9	L1
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 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.

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

SpeedCore pH+ 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.

- **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.

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

SpeedCore Diphenyl is designed to provide pi-pi, steic 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.

- **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.

- **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 Core Shell technology

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

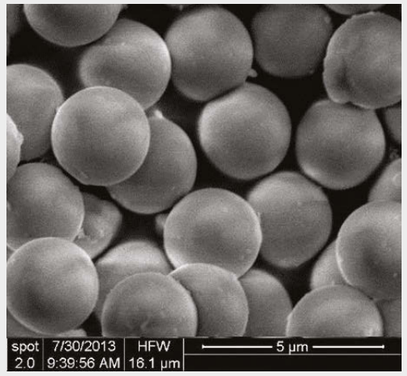
Speedcore® increases efficiency over traditional porous particles, leading to high efficiency, resolution and sensitivity.

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.

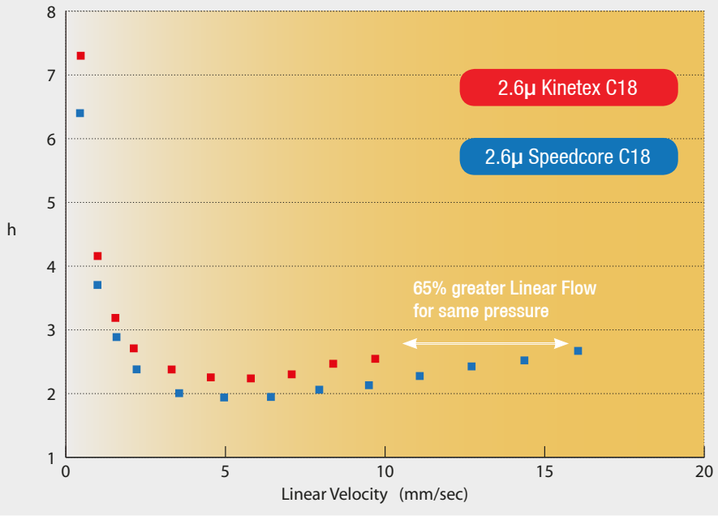


VAN DEEMTER CURVE

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



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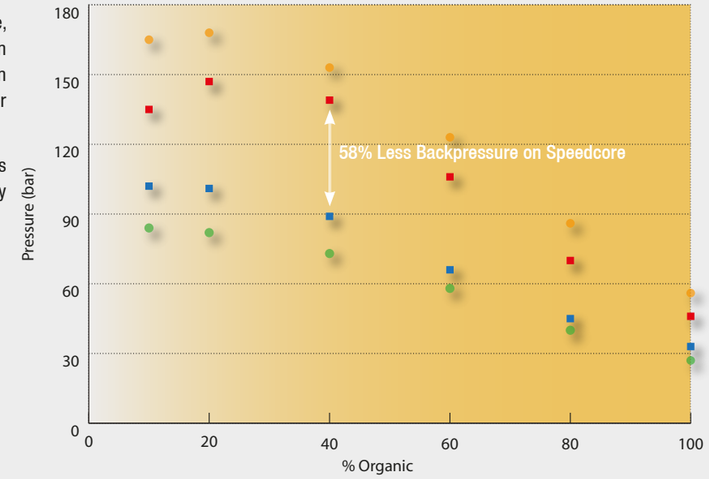
BACKPRESSURE

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.

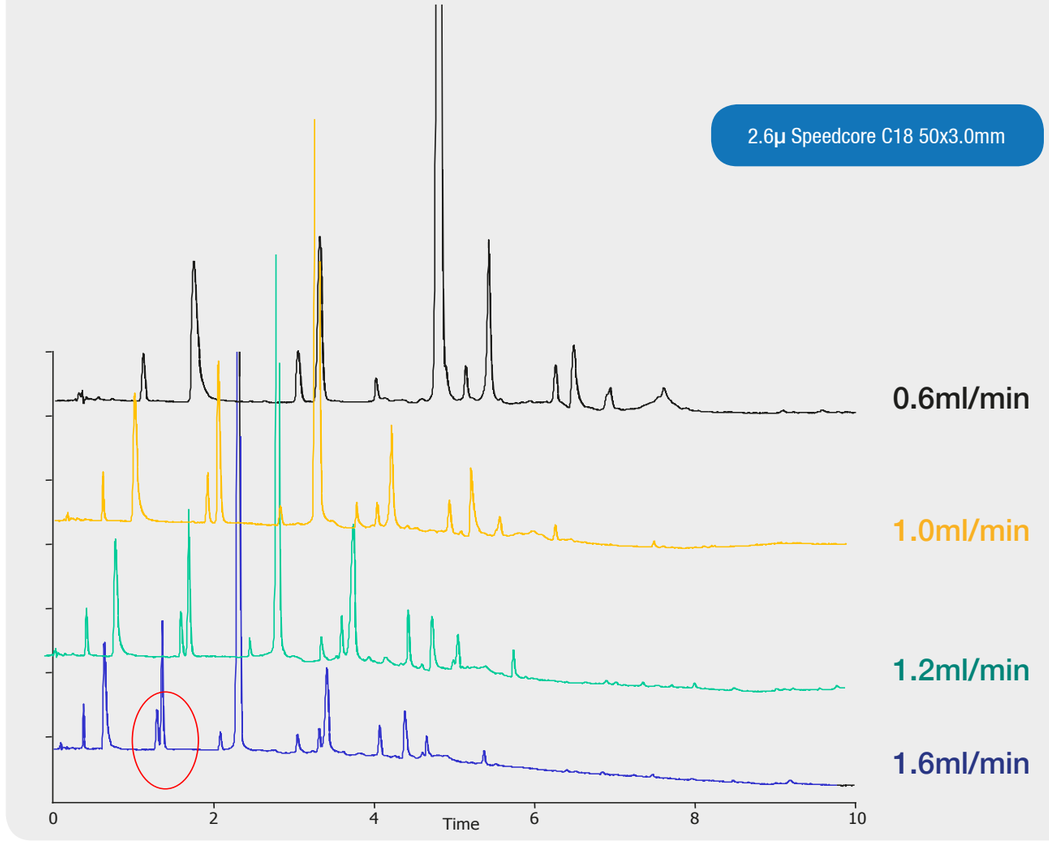
This aids in method development, if high flow rates can be used without significant loss in efficiency and resolution.

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



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



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HPLC & UHPLC Compatibility

Fortis® SpeedCore®

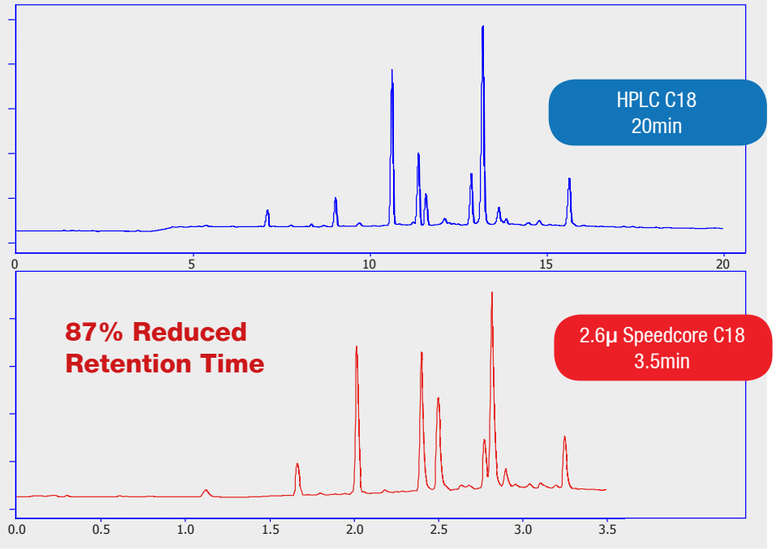
SIMPLE METHOD TRANSFER - IMPROVE THROUGHPUT

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



DOWNLOAD AT:
www.fortis-technologies.com/core_shell_throughput

INCREASE RESOLUTION

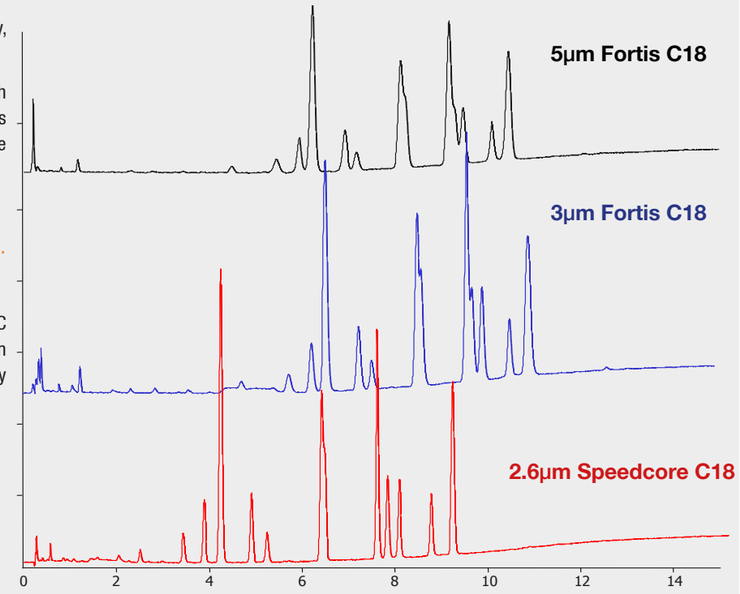
Resolution is a factor affected by efficiency, retention and selectivity.

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

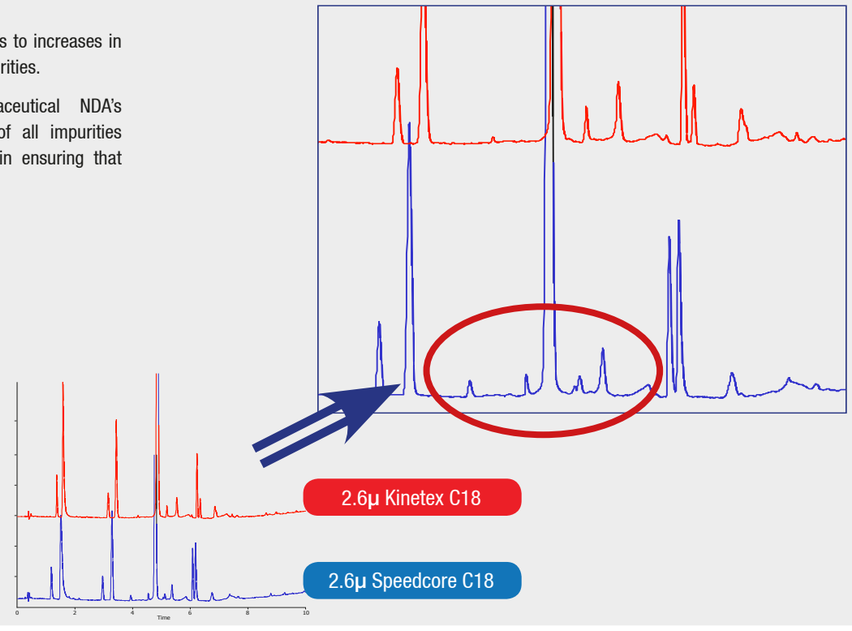


INCREASE SENSITIVITY

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



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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

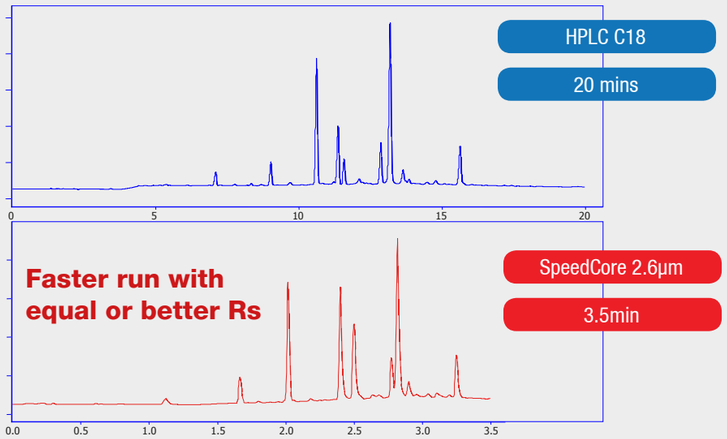
METHOD TRANSFER - SIGNIFICANTLY IMPROVE THROUGHPUT

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



METHOD TRANSFER CALCULATOR

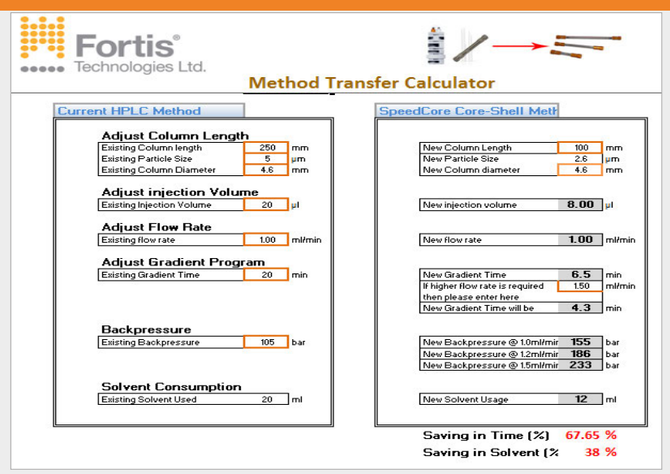
The method transfer calculator is available at www.fortis-technologies.com/core_shell_throughput

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:

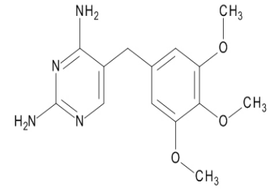
www. fortis-technologies.com/core_shell_throughput



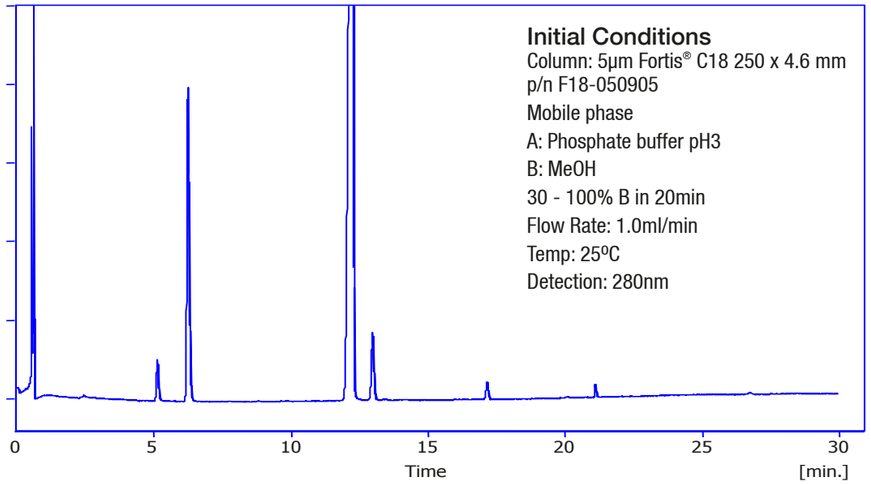
Method Transfer Example

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.



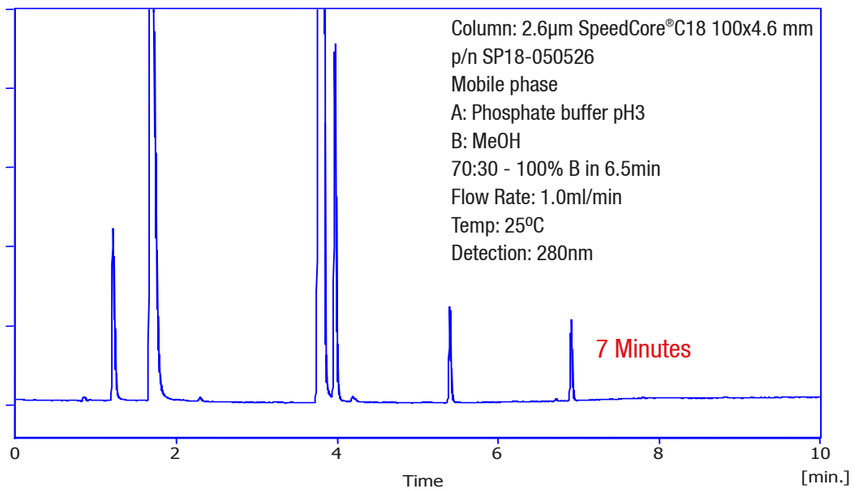
Stage 1 - Initial Method



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



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.

DOWNLOAD AT:
www.fortis-technologies.com/core_shell_throughput

Method Transfer - Selectivity

- New Method Development on Core shell
- If speed is required - Resolution is critical
- Selectivity (α) has the greatest impact on Resolution
- Using stationary phases with orthogonal selectivity is key
- Multiple L1 columns can provide selectivity if diverse bonding

– SpeedCore C18 : General purpose C18 for many acid, base and neutral compounds.

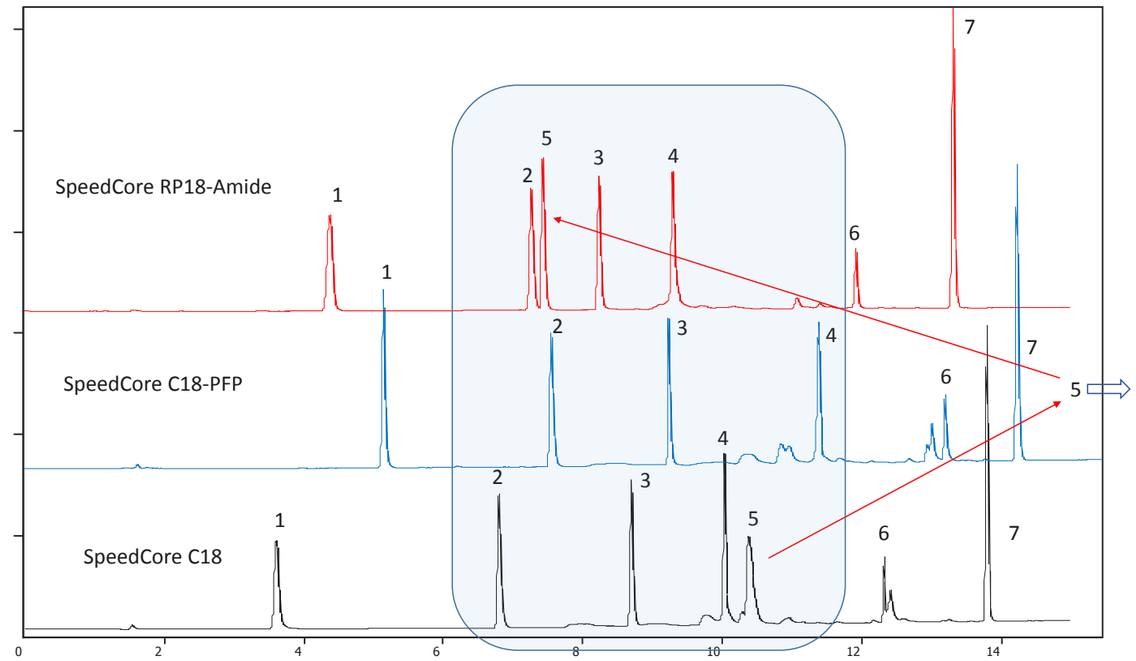
– SpeedCore C18-PFP: Alkyl chain C18 ligand with addition of a PFP ligand, more retention and selectivity provided by the added mechanism of interaction.

- SpeedCore RP18-Amide : Polar embedded C18 ligand. Addition of a positive charge can provide extra retention of acid and basic compounds.

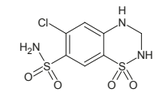
SpeedCore C18, SpeedCore C18-PFP and SpeedCore RP18-Amide are all based around a C18 alkyl chain bonding. If the analyst is developing a new method then the 3 phases will offer orthogonal selectivity for a wide range of compounds and metabolites. SpeedCore C18 being the most generic is where most method development analysts have started in the past. However the use of alternative C18 ligand mechanisms can aid in the selectivity of critical pairs. Use for daily sample screening and new method development as an initial starting point.

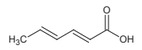
	Particle Size	Surface Area	%C	Pore Size	pH range
SpeedCore C18	2.6µ	140	10	80	2-9
SpeedCore C18-PFP	2.6µ	140	8	80	2-9
SpeedCore RP18-Amide	2.6µ	140	9	80	2-9

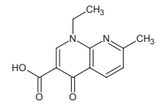
All three phases give different retention and selectivity profiles for the mixture of acids, bases and neutrals in the test mixture below under identical mobile phase conditions. This allows for the resolution to be changed for critical pairs that struggle on one type of C18 without having to alter mobile phase conditions excessively, making a great screening tool kit. Once the best C18 phase is found then the mobile phase conditions can be fully optimised.

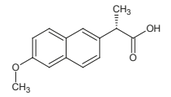


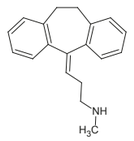
1. Hydrochlorothiazide 2. Phenol 3. Sorbic acid 4. Nalidixic acid 5. Nortripyline 6. Naproxine 7. Napthalene


Hydrochlorothiazide


Sorbic acid


Nalidixic acid


Naproxen


Nortriptyline

SpeedCore

C18

New Core Shell technology

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

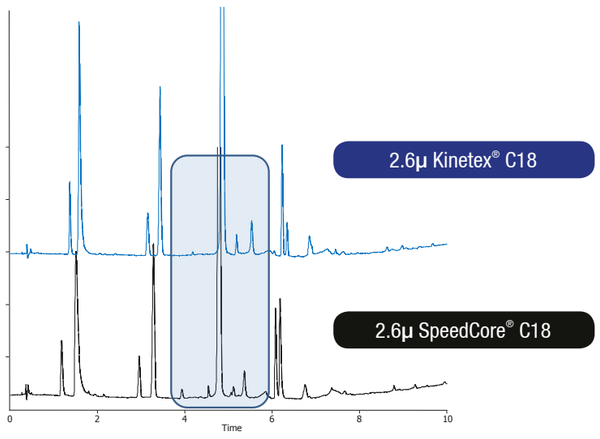
Speedcore® C18 increases efficiency over traditional porous particles. Leading to high efficiency, resolution and sensitivity.

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.

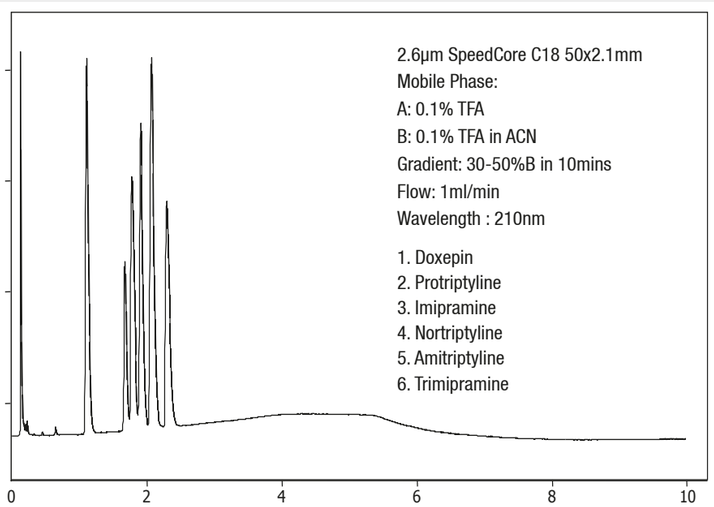


IMPROVE PEAK SHAPE

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.

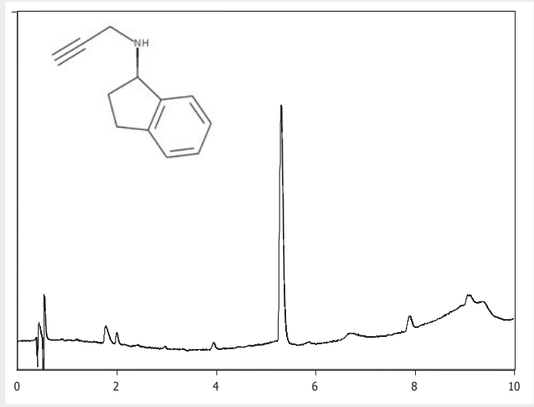
High efficiency high speed separations are achievable by combining core-shell technology with the correct choice of stationary phase bonding.



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

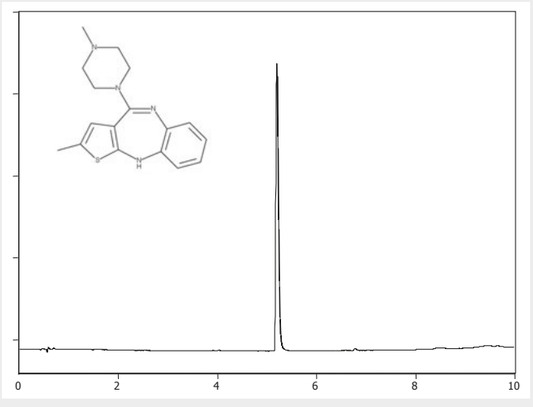
1. Doxepin
2. Protriptyline
3. Imipramine
4. Nortriptyline
5. Amitriptyline
6. Trimipramine

AZILECT - Rasagiline



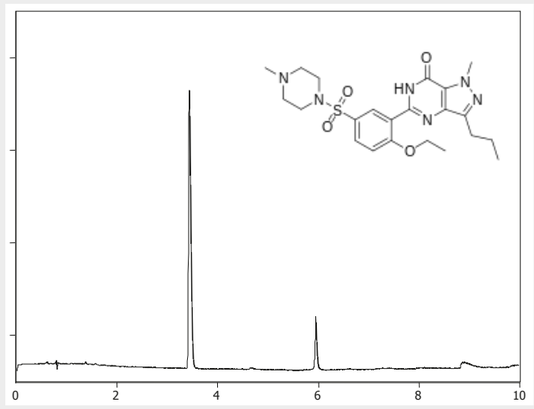
Column: 2.6µm SpeedCore C18 100x2.1mm
Mobile Phase:
A: 0.1% Formic acid
B: ACN
Gradient: 10-90%B in 10mins
Flow: 0.4ml/min
Wavelength : 254nm

OLANZAPINE



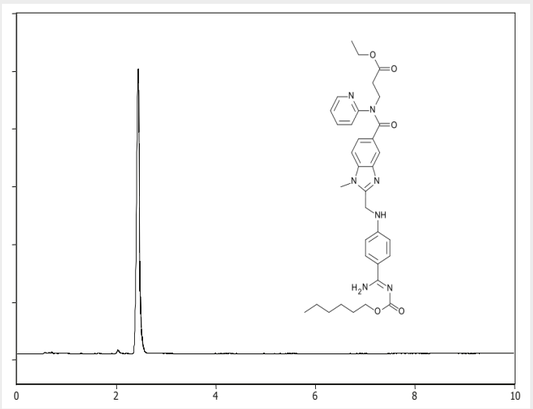
Column: 2.6µm SpeedCore C18 100x2.1mm
Mobile Phase:
A: 25mM NH_4OAc
B: ACN
Gradient: 10-90%B in 10mins
Flow: 0.4ml/min
Wavelength : 254nm

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 NH_4OAc : ACN

Flow: 1.2ml/min
Wavelength : 254nm

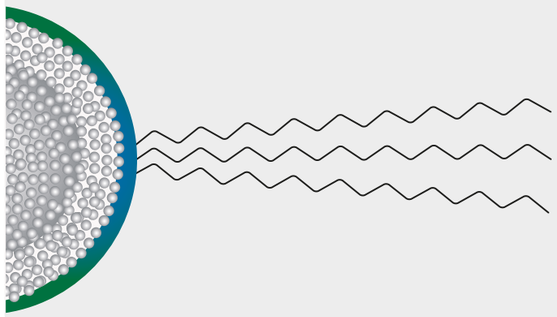
Fortis® SpeedCore® pH+ C18

New Core Shell 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+ 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

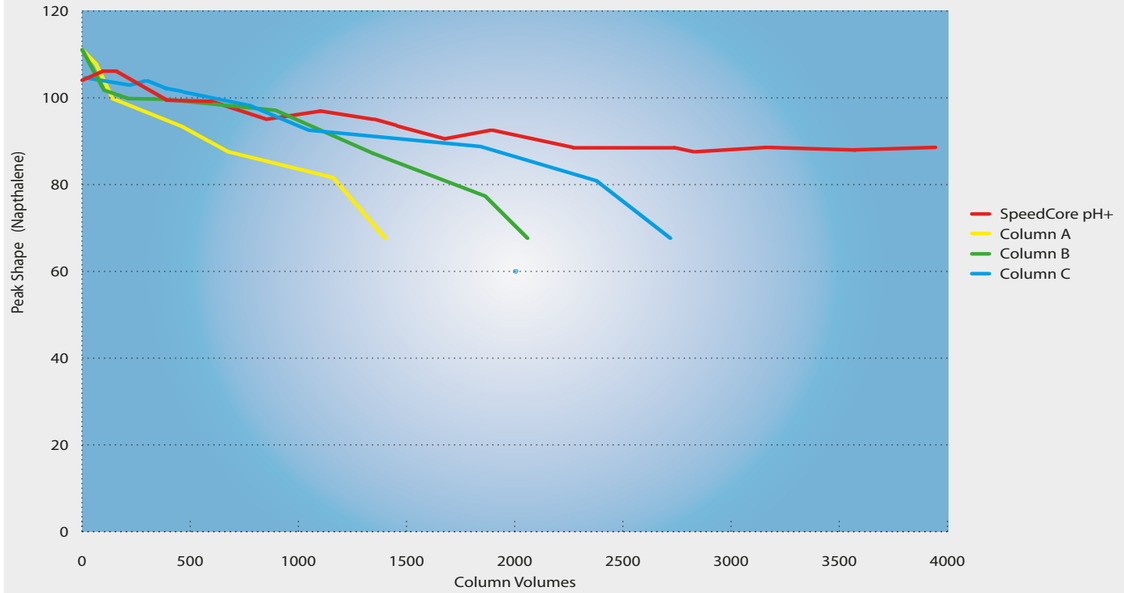
Surface grafting technology (SGT) extends the capability of core-shell technology to now allow for high pH use as well as low and mid pH stability. High efficiency core-shell technology combined with this improved ability to run at extremes of pH allow for excellent method development options. Peak capacity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

pH 2 pH 11

No buffer limitations

Fortis® SpeedCore® pH+ C18

ACCELERATED COLUMN AGEING STUDY



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+ 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+ 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

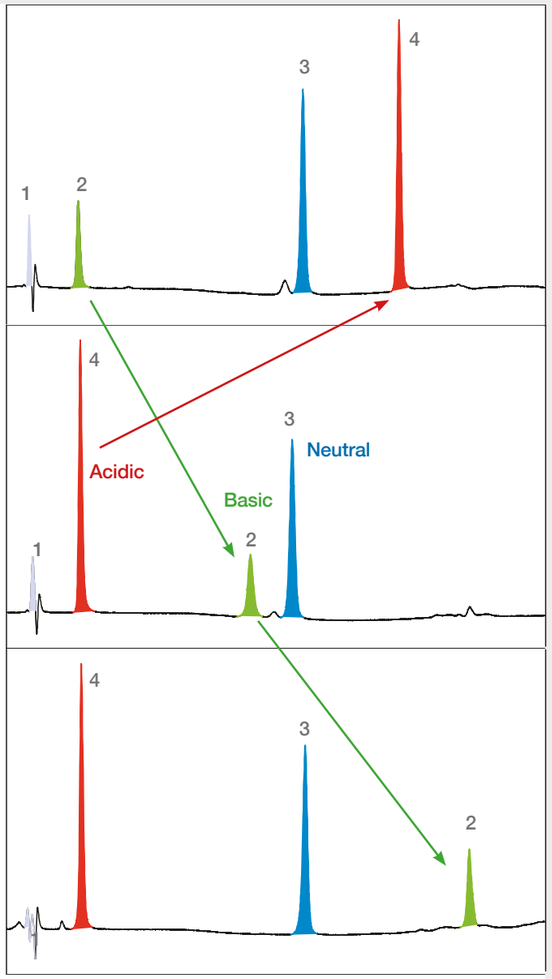
No buffer limitations

Fortis SpeedCore pH+ C18

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

2.6µm Fortis SpeedCore pH+ 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 pH+ 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

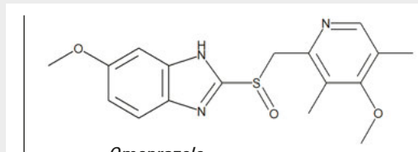
pH 11.0

pH 2 **pH 11**

No buffer limitations

Fortis SpeedCore pH+ C18

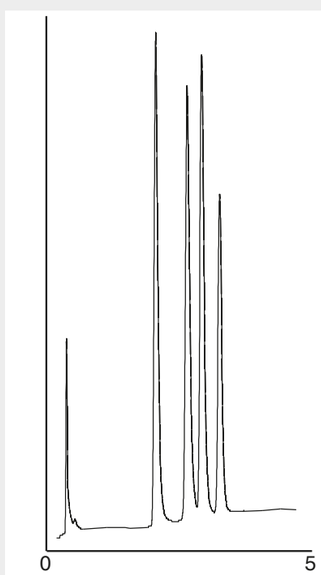
OMEPRAZOLE

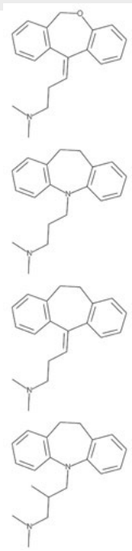


Omeprazole

2.6µm SpeedCore pH+ 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+ 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

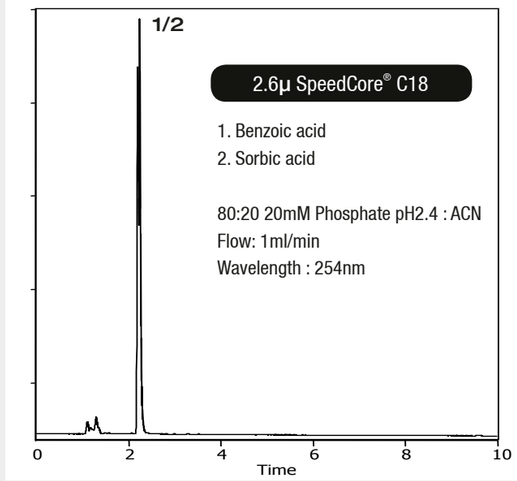
RP18-Amide

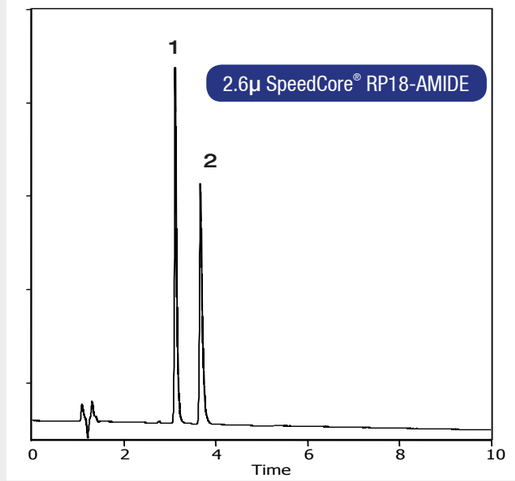
New Core Shell technology

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

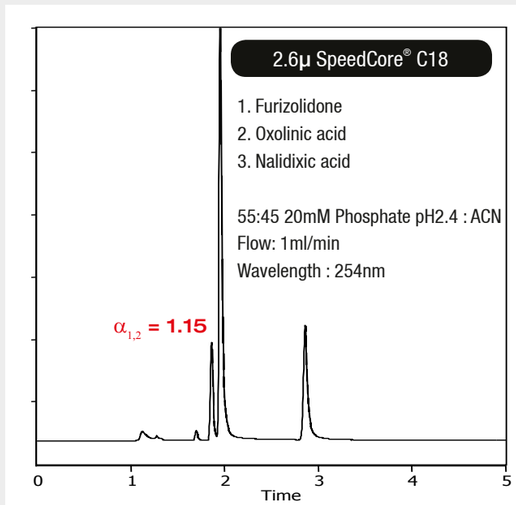
Speedcore® RP18-Amide increases resolution and efficiency over traditional porous particles. Orthogonal selectivity is provided by the polar-embedded group in the stationary phase.

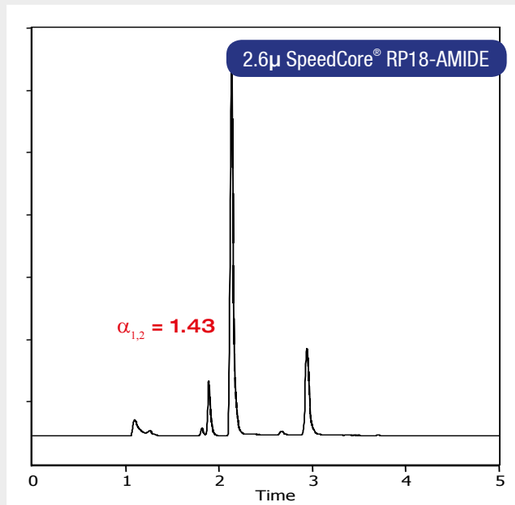
ORTHOGONAL SELECTIVITY - ACIDS





ORTHOGONAL SELECTIVITY - ANTIBACTERIALS

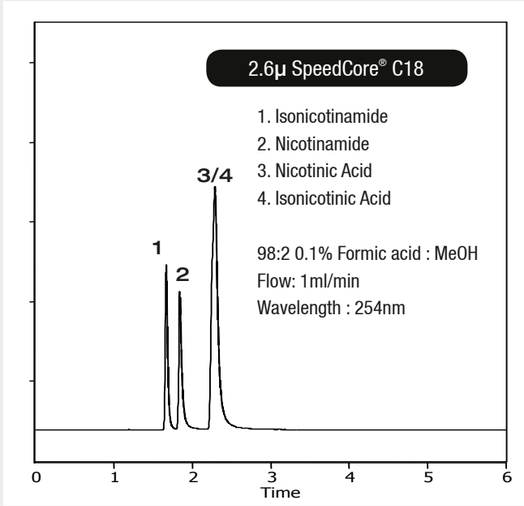


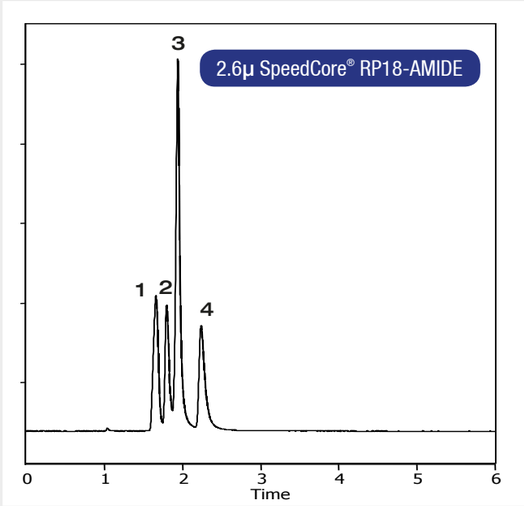


SpeedCore RP18-Amide features a single polar embedded stationary phase ligand, unlike some other commercial polar embedded phases produced by a multi-stage synthesis. As this is a single ligand bonding there are no uncontrolled secondary phase interactions. Therefore SpeedCore RP18-Amide provides highly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

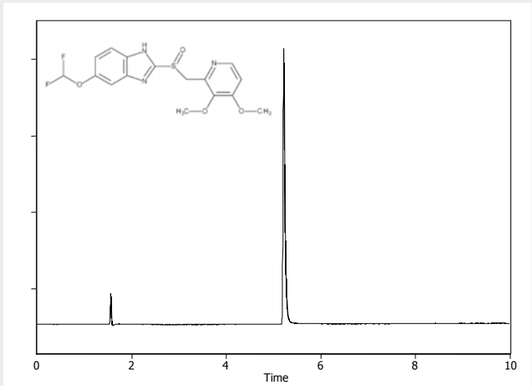
Selectivity of the RP18-Amide is different to that of a traditional C18 ligand and allows for separations of complex pairs not easily achieved on standard C18 stationary phases.

ORTHOGONAL SELECTIVITY - NICOTINIC ACIDS



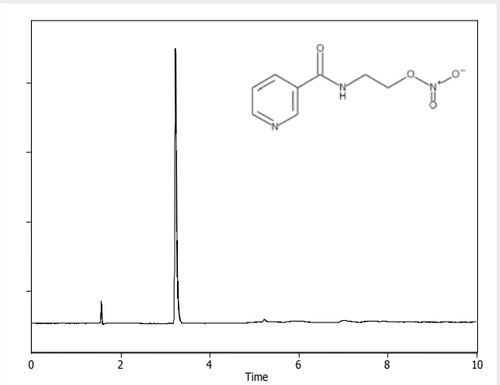


PANTOPRAZOLE



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

C18-PFP

New Core Shell technology

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

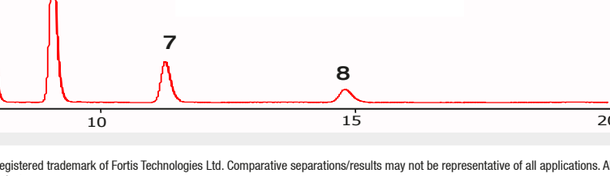
Speedcore® C18-PFP increases selectivity over alkyl chain stationary phase particles. Leading to a combination of high efficiency, resolution and sensitivity.

SPEEDCORE C18-PFP STRUCTURE

SpeedCore C18-PFP features a mixture of C18 alkyl chain ligands and PentaFluoroPhenyl (PFP) ligands. This provides multiple mechanisms of interaction between stationary phase and analytes, allowing for unique selectivity of closely related species and metabolites. No complex mobile phase additives are necessary, therefore simplifying LC method development.

- π-π (High selectivity)
- Steric selectivity
- Hydrophobicity (Highly stable)

SpeedCore® C18-PFP

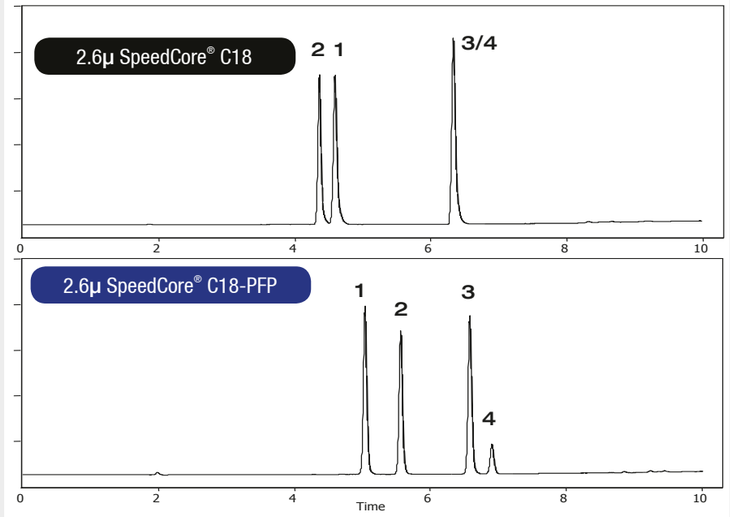


ORTHOGONAL SELECTIVITY - SUBSTITUTED BENZENES

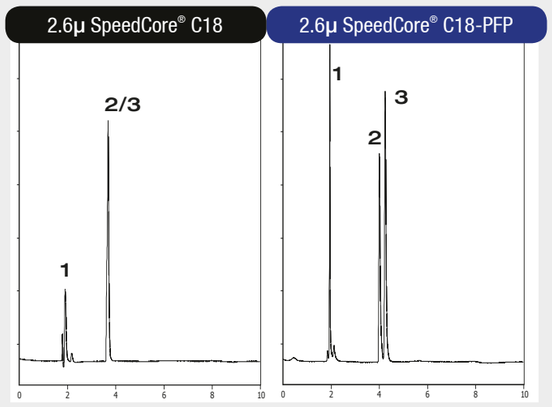
ORTHOGONAL SELECTIVITY

Selectivity of compounds is enhanced on the SpeedCore C18-PFP over traditional C18 stationary phases due to the added steric selectivity and pi-pi interactions available. The result is a robust stationary phase with the high efficiency of core shell particles coupled with the orthogonal selectivity of C18-PFP stationary phase.

2.6µm Fortis SpeedCore 150x4.6mm
Mobile Phase:
A: 0.1% Formic acid in Water
B: 0.1% Formic acid in ACN
5 - 100 %B in 10mins
1.0ml/min
254nm
1. Paracetamol
2. Hydrochlorothiazide
3. Methylphenylsulfoxide
4. Methylphenylsulfone



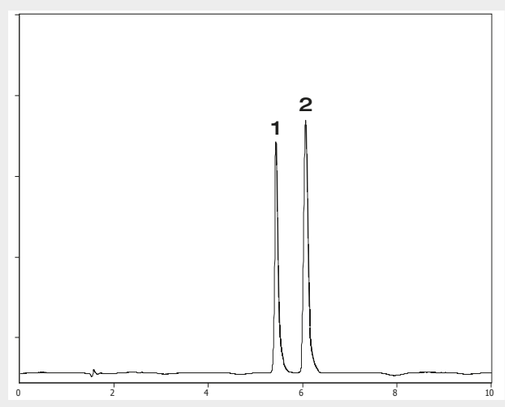
PHENOL SELECTIVITY



Column: 2.6µm SpeedCore C18 150x4.6mm
2.6µm SpeedCore C18-PFP 150x4.6mm
Mobile Phase: 50:50 A:B
A: 0.1% Formic acid
B: MeOH
Flow: 0.8ml/min
Wavelength : 254nm

1. Benzene Sulphonic acid
2. Benzyl Alcohol
3. Phenol

PROGESTERONES



Column: 2.6µm SpeedCore C18-PFP 150x4.6mm
Mobile Phase: 30:70 A:B
A: 0.1% Formic acid
B: MeOH
Flow: 1.0ml/min
Wavelength : 254nm

1. 21-Hydroxyprogesterone
2. 17α-Hydroxyprogesterone

SpeedCore

Diphenyl

New Core Shell technology

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

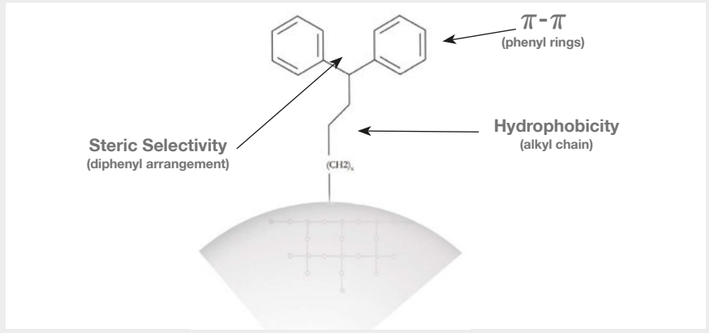
Speedcore® Diphenyl extends selectivity and can discriminate between closely related species, such as metabolites or excipients. The interactions specific to this stationary phase allow for separation of positional isomers as well as small atom or functional group changes to be resolved.

UNIQUE FUNCTIONALITY

SpeedCore Diphenyl is based upon a unique di-phenyl 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

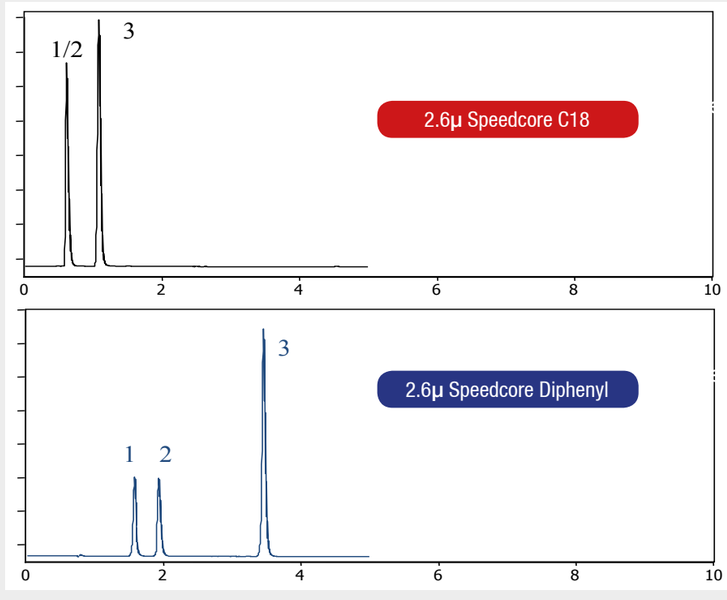
B: 0.1% Formic acid in ACN

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:

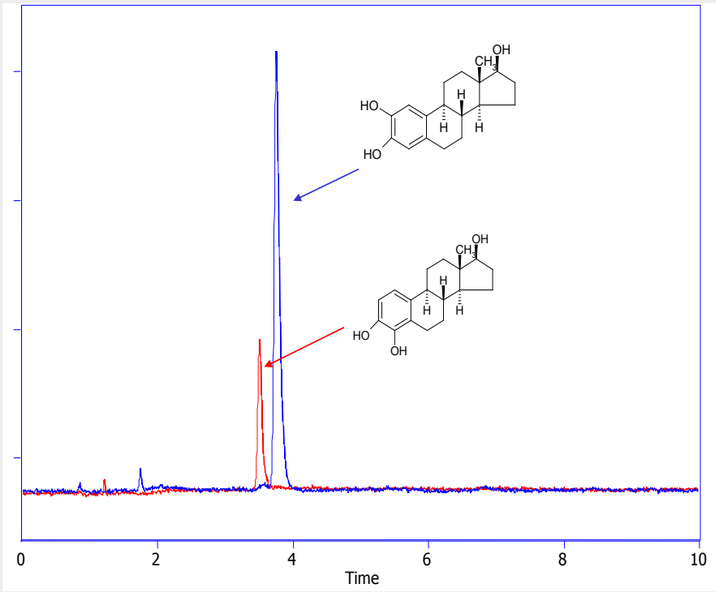
40:60 Water : MeOH

1.2ml/min

210nm

Temp: 40°C

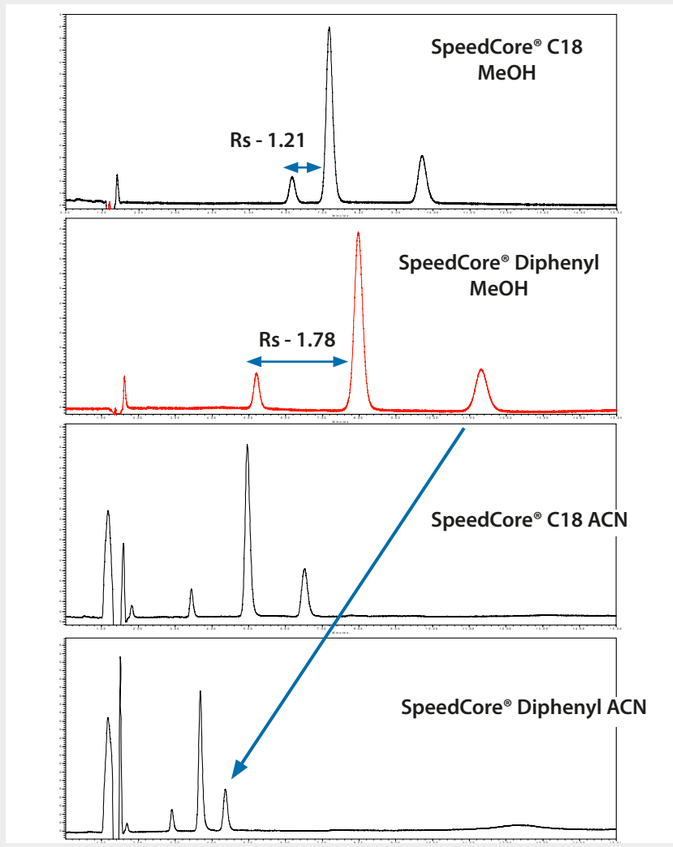
1. 4-Hydroxyestradiol (mw=288.38)
2. 2-Hydroxyestradiol (mw=288.38)



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 Core Shell 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.

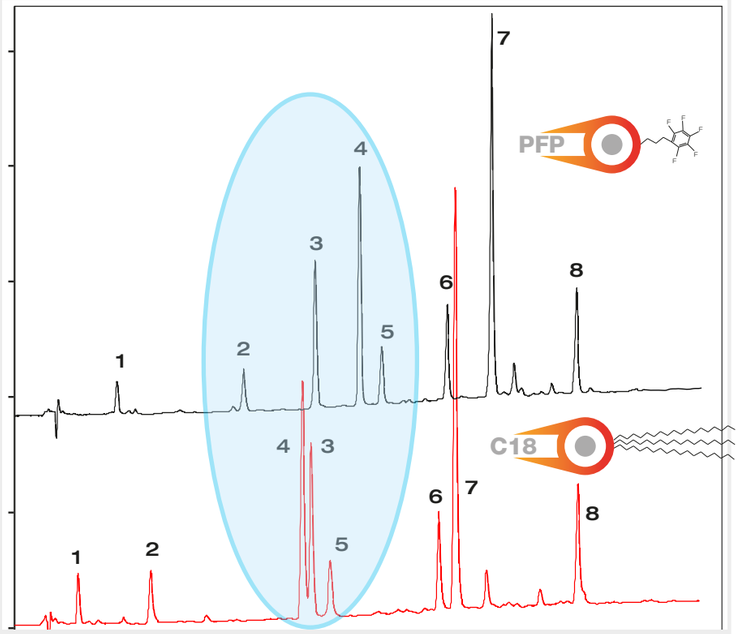
ORTHOGONAL SELECTIVITY - PFP vs C18

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: 25ºC
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.

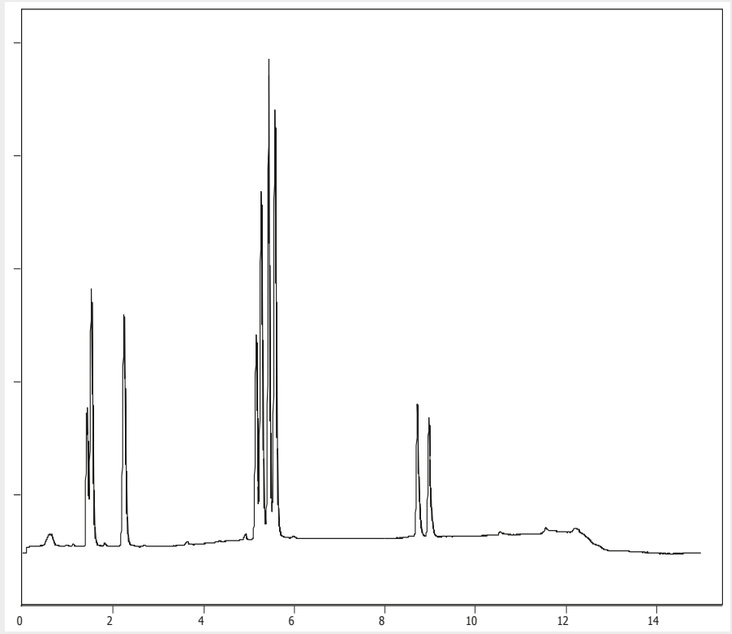
SELECTIVITY - PHTHALATES

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

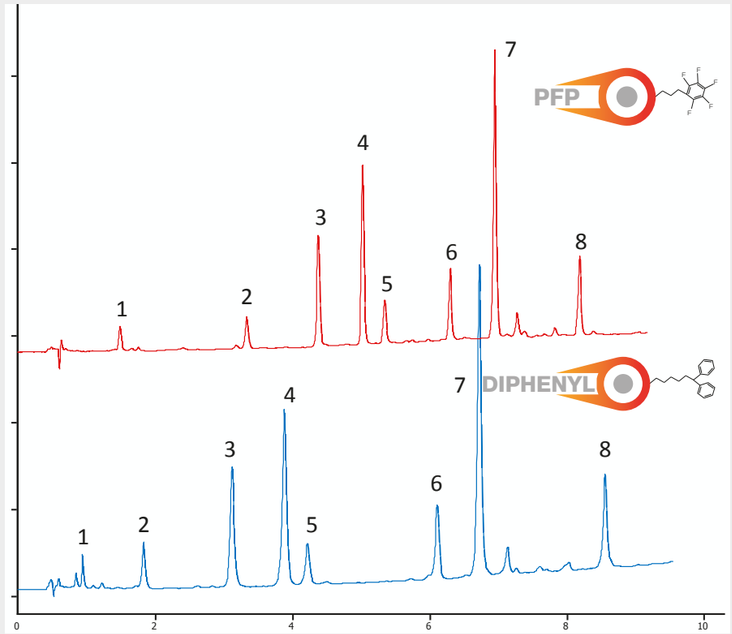


SELECTIVITY - PFP VS DIPHENYL

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 Core Shell 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.

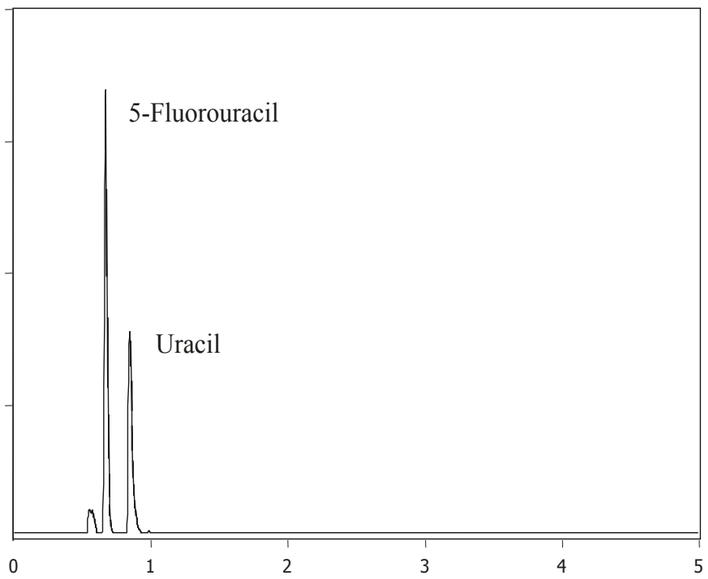
HYDROPHILIC INTERACTION CHROMATOGRAPHY

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

SpeedCore BIO

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.

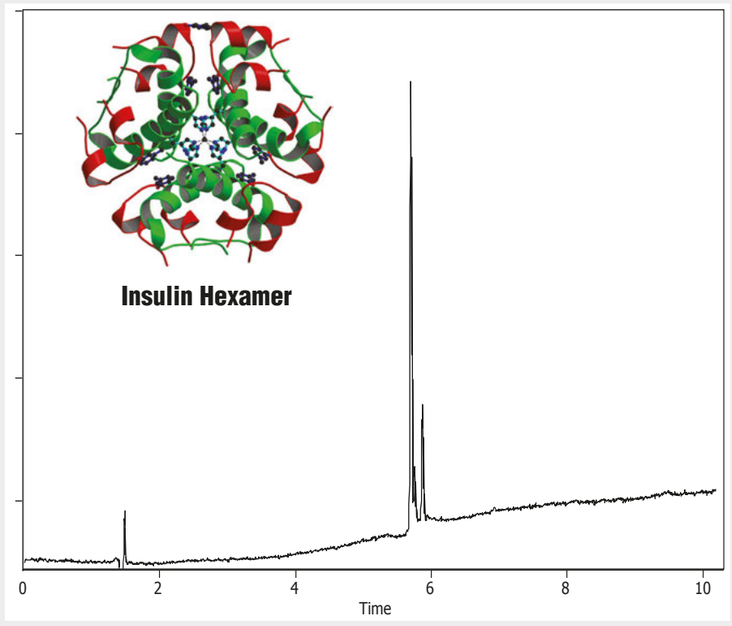
INSULIN SEPARATION

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)



SpeedCore BIO

Peptide

New Core Shell technology

- 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.

0.3 µm Porous Shell

2.0 µm Solid Core

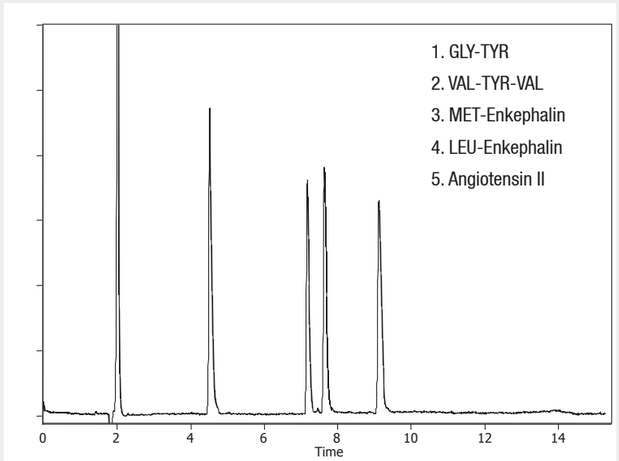
2.6µm SpeedCore BIO Peptide

PEPTIDES

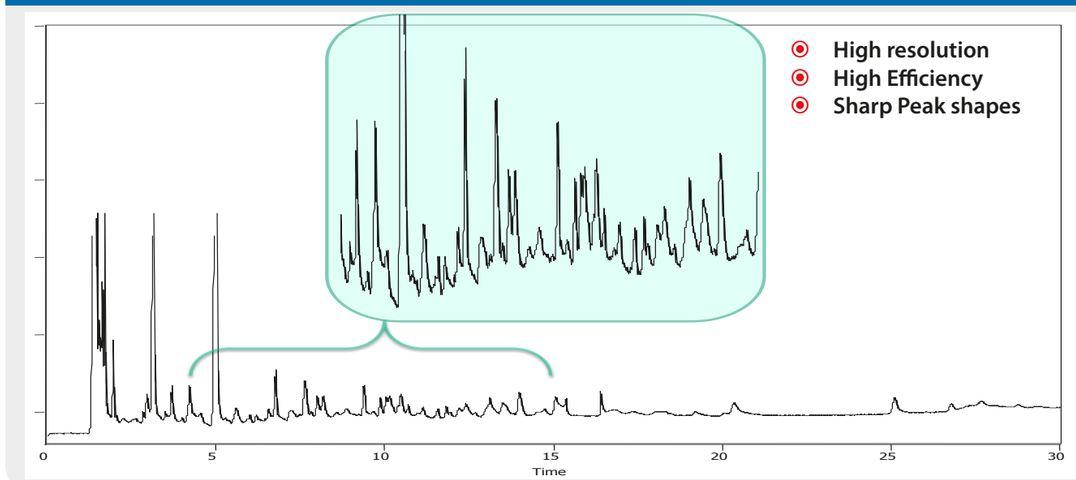
SpeedCore BIO Peptide C18 will allow the separation of small peptide analytes.

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



COMPLEX PEPTIDE SAMPLE - TRYPTIC DIGEST



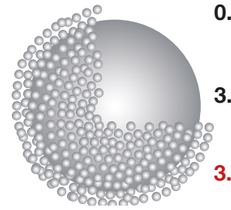
SpeedCore BIO

Protein

New Core Shell 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

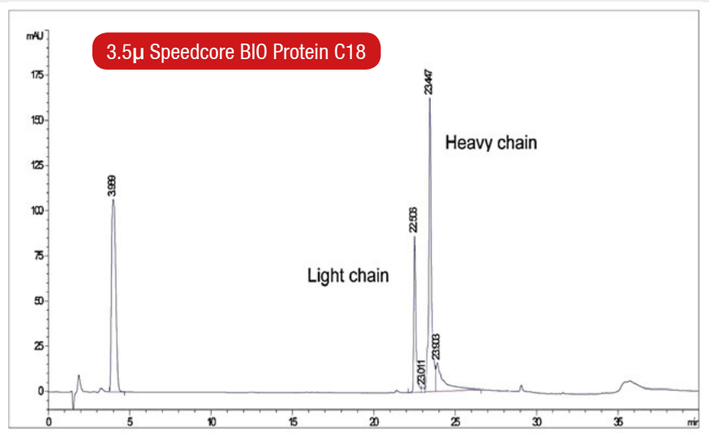
LIGHT AND HEAVY CHAINS OF IgG1

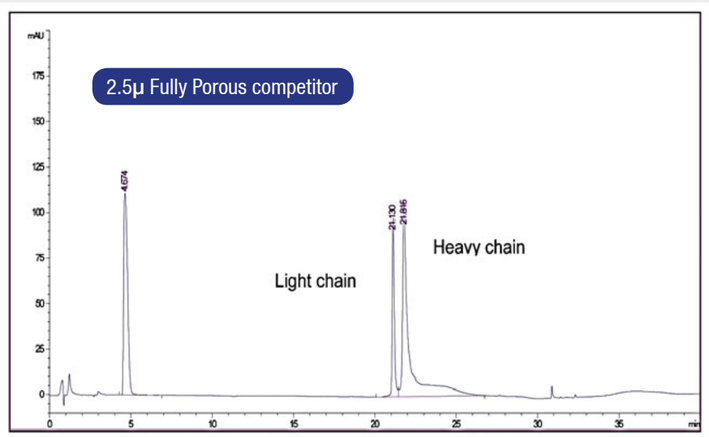
SpeedCore BIO Protein C18 will separate light (25k Da) and heavy chain(50k Da) deglycosylated and reduced IgG1-antibody molecules.

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: 65°C
Wavelength: 220nm

1. Light Chain (25k Da)
2. Impurity (only on the core-shell)
3. Heavy Chain (50k Da)
3. Impurity





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	SCPLUS18-020226	SCPLUS18-020326	SCPLUS18-020526	SCPLUS18-020726
	3.0	SCPLUS18-030226	SCPLUS18-030326	SCPLUS18-030526	SCPLUS18-030726
	4.6	SCPLUS18-050226	SCPLUS18-050326	SCPLUS18-050526	SCPLUS18-050726

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 C18-PFP		Column Length			
		30	50	100	150
Column Diameter	2.1	SP18FP-020226	SP18FP-020326	SP18FP-020526	SP18FP-020726
	3.0	SP18FP-030226	SP18FP-030326	SP18FP-030526	SP18FP-030726
	4.6	SP18FP-050226	SP18FP-050326	SP18FP-050526	SP18FP-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
Column Diameter	2.1	SP18-020250	SP18-020350	SP18-020550	SP18-020750
	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
Column Diameter	2.1	SCPLUS18-020250	SCPLUS18-020350	SCPLUS18-020550	SCPLUS18-020750
	3.0	SCPLUS18-030250	SCPLUS18-030350	SCPLUS18-030550	SCPLUS18-030750
	4.6	SCPLUS18-050250	SCPLUS18-050350	SCPLUS18-050550	SCPLUS18-050750

5µm SpeedCore RP18-Amide		Column Length			
		30	50	100	150
Column Diameter	2.1	SPRA-020250	SPRA-020350	SPRA-020550	SPRA-020750
	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
Column Diameter	2.1	SPPH-020250	SPPH-020350	SPPH-020550	SPPH-020750
	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
Column Diameter	2.1	SPFP-020250	SPFP-020350	SPFP-020550	SPFP-020750
	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
Column Diameter	2.1	SPHI-020250	SPHI-020350	SPHI-020550	SPHI-020750
	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
Column Diameter	2.1	SCPEP18-020226	SCPEP18-020326	SCPEP18-020526	SCPEP18-020726
	3.0	SCPEP18-030226	SCPEP18-030326	SCPEP18-030526	SCPEP18-030726
	4.6	SCPEP18-050226	SCPEP18-050326	SCPEP18-050526	SCPEP18-050726

3.5µm SpeedCore BIO Protein C18		Column Length			
		30	50	100	150
Column Diameter	2.1	SCPR018-020235	SCPR018-020335	SCPR018-020535	SCPR018-020735
	3.0	SCPR018-030235	SCPR018-030335	SCPR018-030535	SCPR018-030735
	4.6	SCPR018-050235	SCPR018-050335	SCPR018-050535	SCPR018-050735

3.5µm SpeedCore BIO Protein C8		Column Length			
		30	50	100	150
Column Diameter	2.1	SCPR008-020235	SCPR008-020335	SCPR008-020535	SCPR008-020735
	3.0	SCPR008-030235	SCPR008-030335	SCPR008-030535	SCPR008-030735
	4.6	SCPR008-050235	SCPR008-050335	SCPR008-050535	SCPR008-050735

3.5µm SpeedCore BIO Protein C4		Column Length			
		30	50	100	150
Column Diameter	2.1	SCPR004-020235	SCPR004-020335	SCPR004-020535	SCPR004-020735
	3.0	SCPR004-030235	SCPR004-030335	SCPR004-030535	SCPR004-030735
	4.6	SCPR004-050235	SCPR004-050335	SCPR004-050535	SCPR004-050735

WORLDWIDE AVAILABILITY

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