Uptisphere® CS Evolution™

Core Shell columns for fast & highly efficient identification & quantification of small molecules

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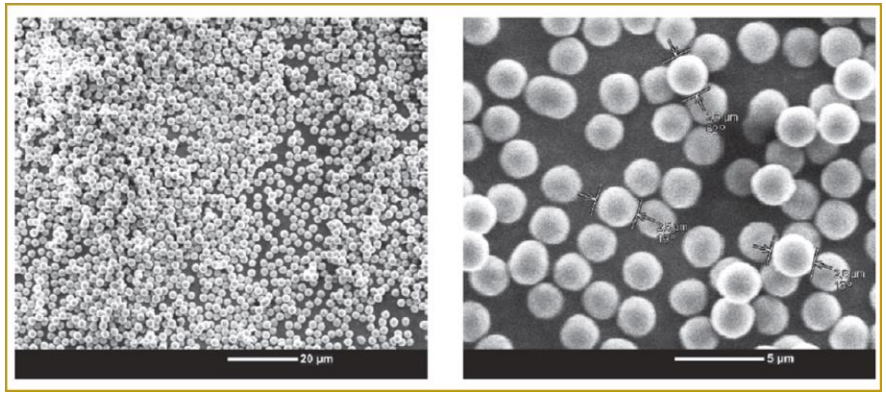
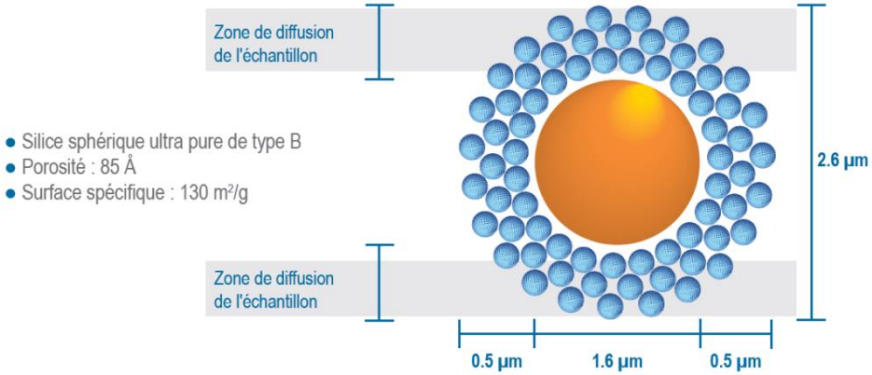
Uptisphere® CS Evolution™

superficially porous & mono-dispersed silica





Uptisphere® CS Evolution ™ consists of superficially porous & mono dispersed 2,6µm particles of high purity silica.

They are formed by a solid core of 1.6 microns diameter and welded to its surface, a totally porous silica layer of 0,50 µm thickness.

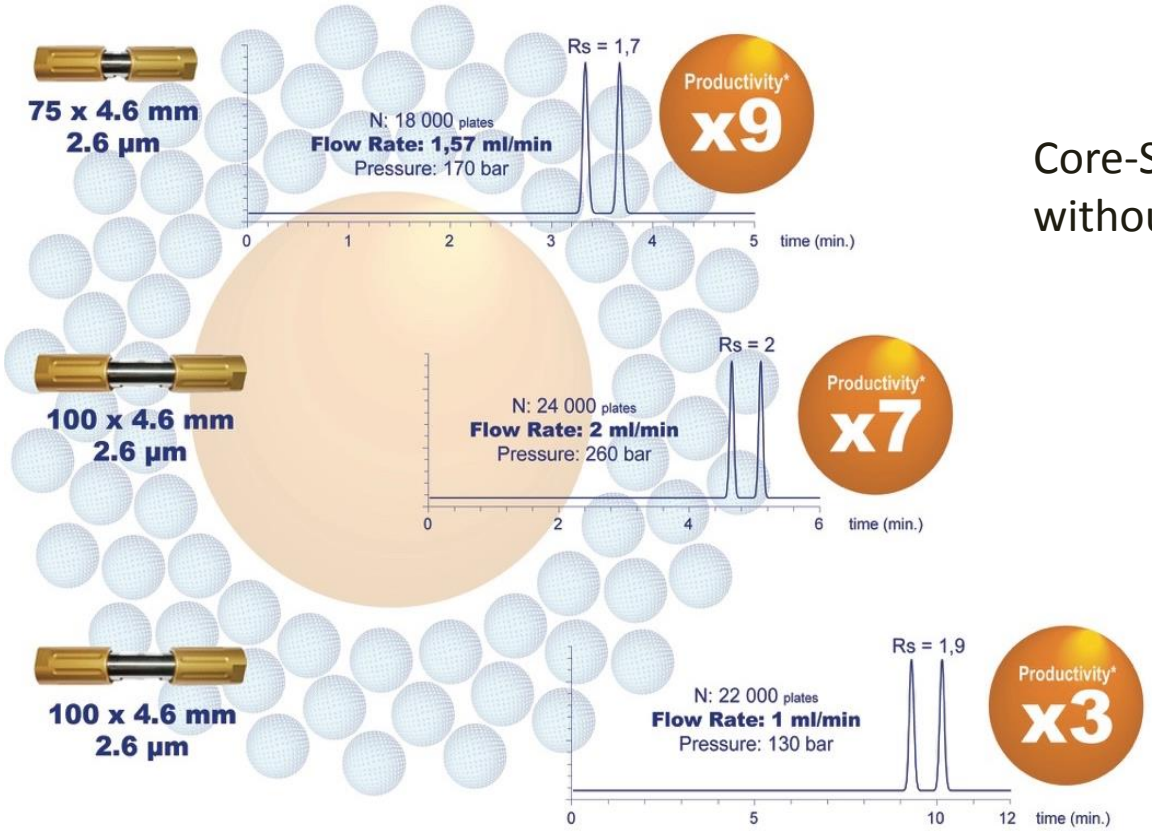
Benefit of its technology:

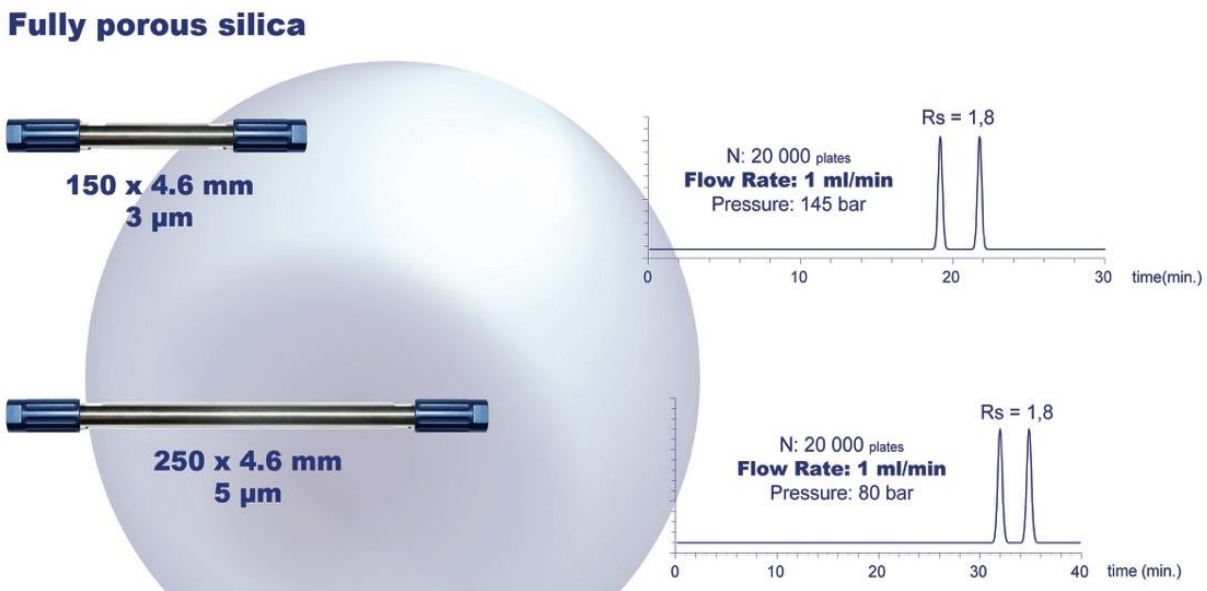
- ✓ Thin diffusion zone which allows rapid mass transfer.
- ✓ Mono-dispersed and "heavy" particles ensure optimum columns packing. Efficiency & reproducibility are superior to equivalent totally porous columns, h <1.8 .
- ✓ Low back pressure

Uptisphere® CS Evolution guarantee high efficiencies and very fast separations with lower back pressures for (U)HPLC applications.

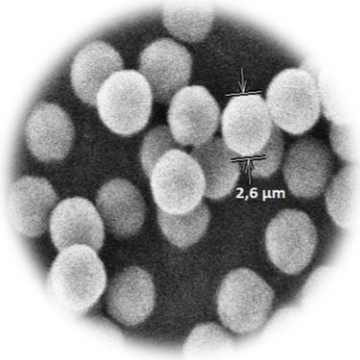
interchim

Core-Shell technology boots productivity without compromising with resolution.





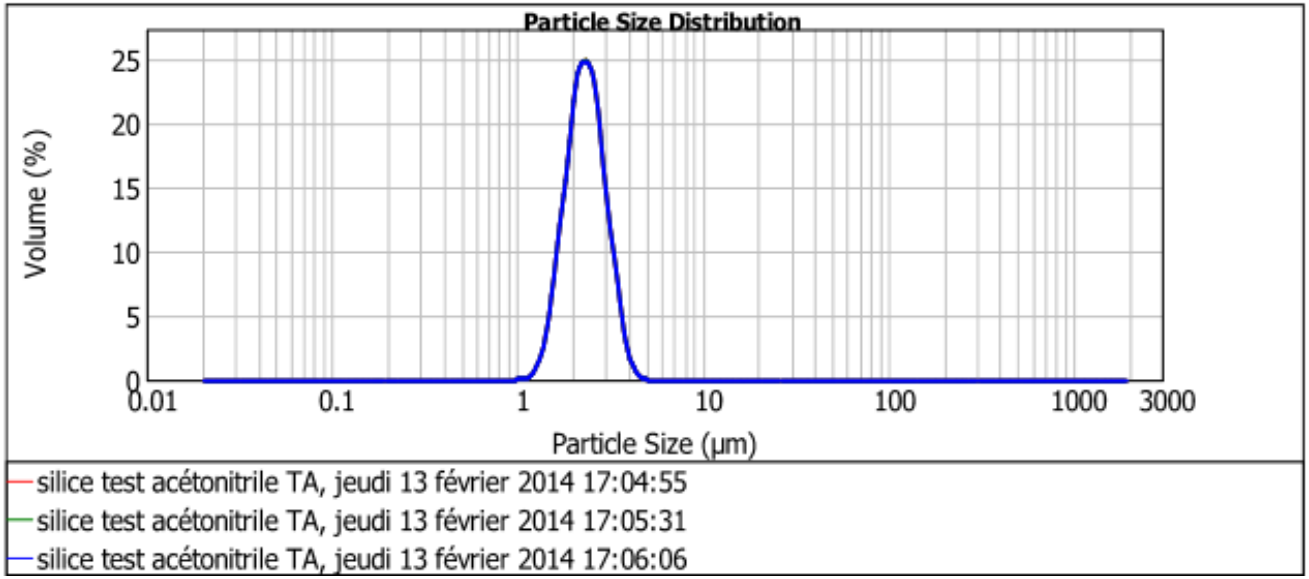
CS Evolution™ silica characterization



Particle size

- Superposition of three consecutive measurements: very good homogeneity
- One Gaussian, narrow, ranging from 1.7 to 3.1 microns

d(0.1): 1.706 um d(0.9): 3.173 um

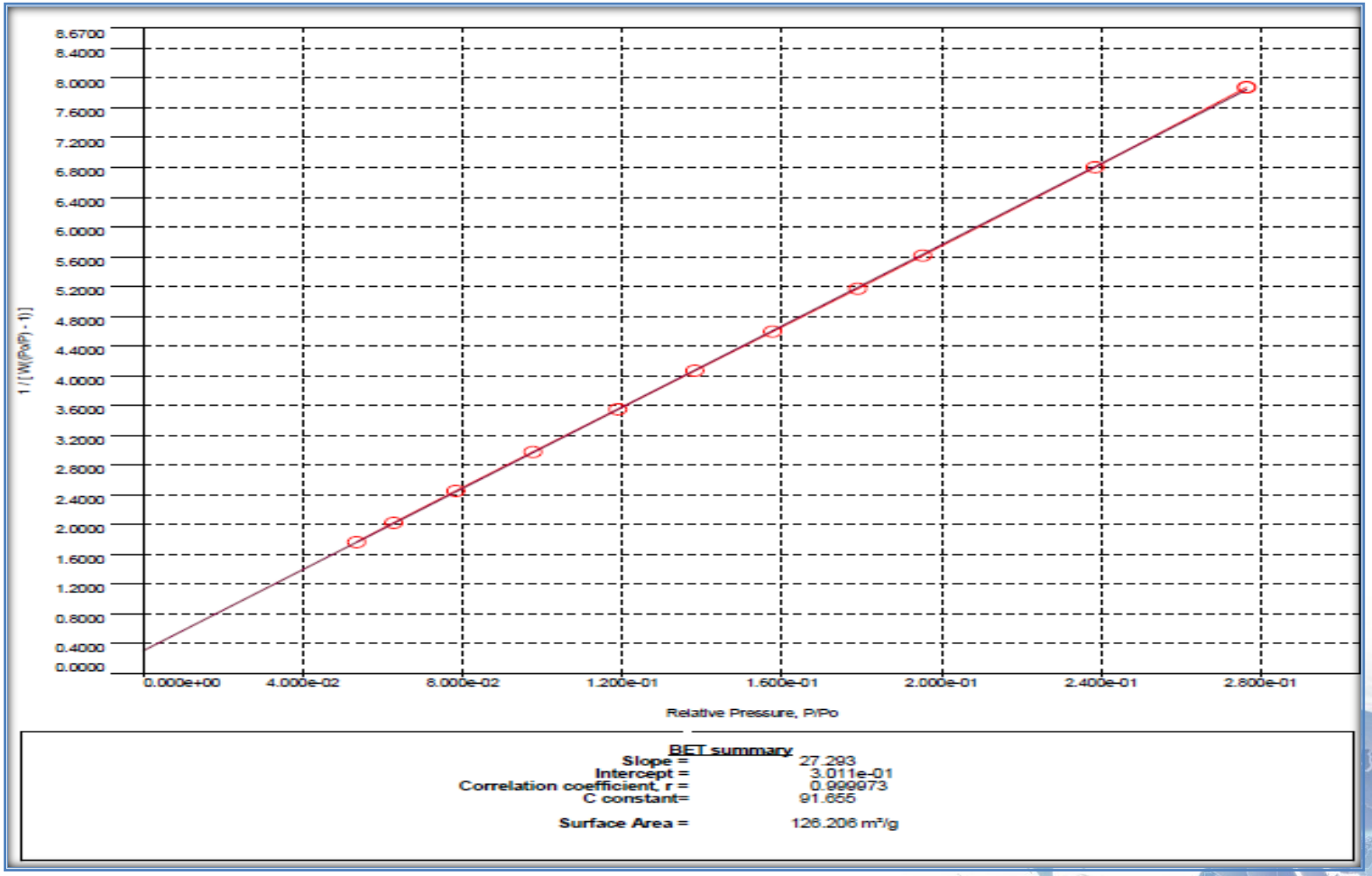


Analyzes done with Mastersizer 2000 wet process (suspended in acetonitrile)

CS Evolution™ silica characterization

Surface Area

- BET = 126 m^2/g



Uptisphere® CS Evolution™

superficially porous & mono-dispersed silica

Maximum Operational Surface Technology (MOST)

Interchim technology advantages & benefits

Before bonding, Uptisphere® CS Evolution ™ particles undergo a proprietary treatment similar to a re-condensation of the porous silica layer, which has the effect of maximizing the operational surface density.

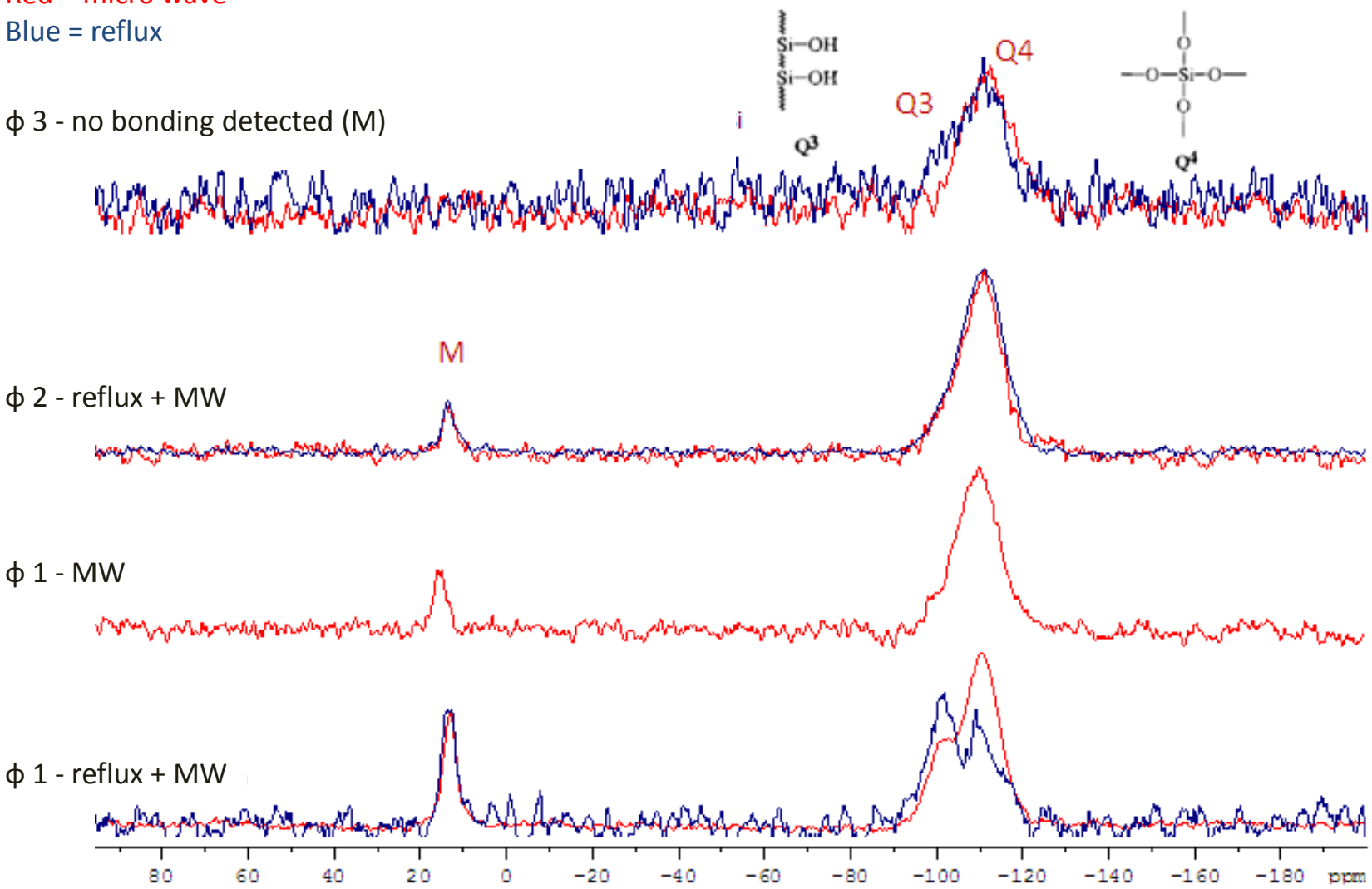
✓ Enhance surface with selected silanol ready for bonding for both hilic & reverse phase mode

✓ High temperature stability

✓ Allows direct transfer from Uptisphere® CS Evolution ™ to Interchim purification stationary phases

^{29}Si RMN after ITM proprietary treatment & C18 bonding

Red = micro wave
Blue = reflux



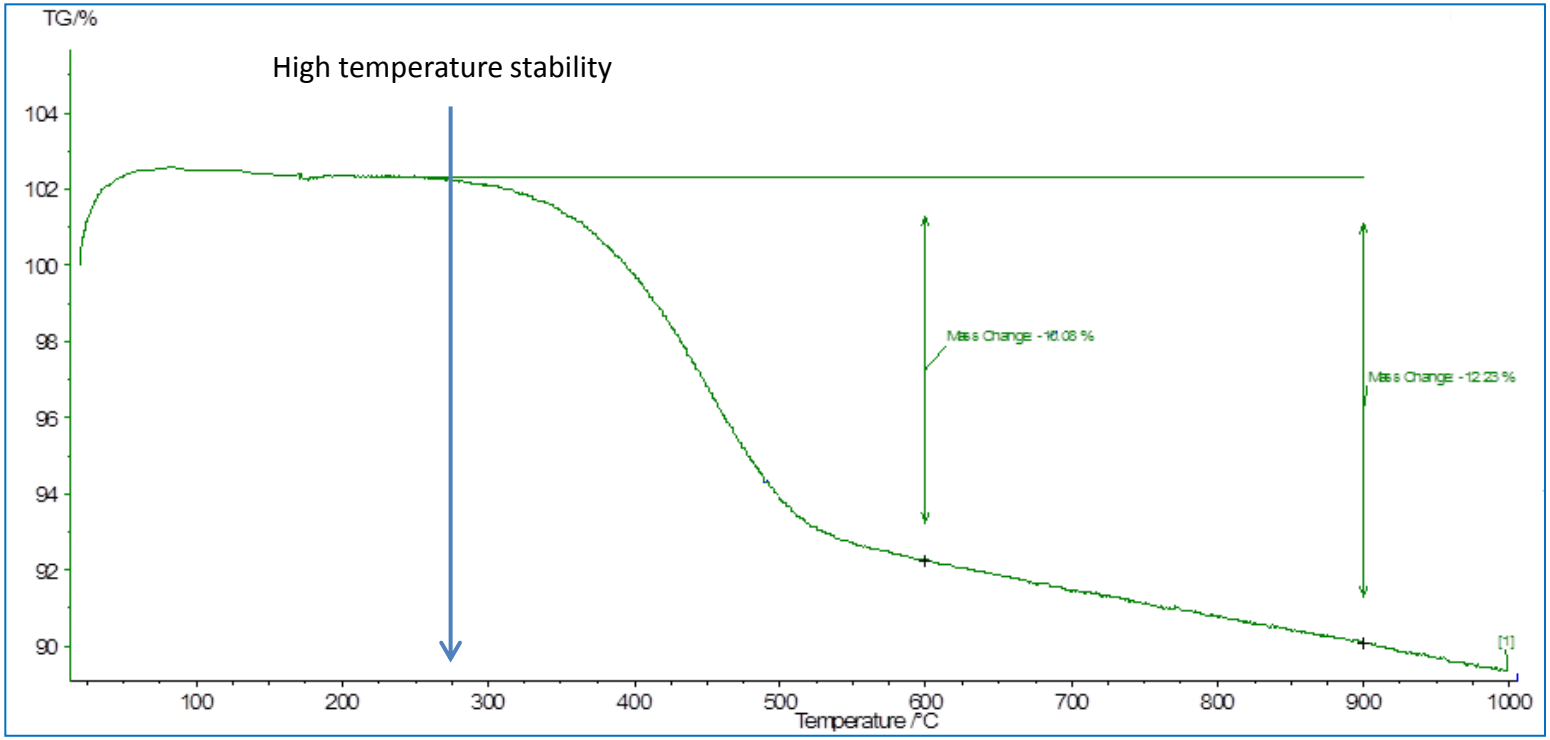
Elementary analysis after ITM proprietary treatment & C18 bonding

Synthesis	Bonding type	n_c	M_w (g. mol^{-1})	Treatment (°C)	%C	Grafting rate* (µmol/m^2)
Microvawe	$-Si(CH_3)_2C_{18}H_{37}$	20	311,65	Regular	9,54	3,60
Microvawe	$-Si(CH_3)_2C_{18}H_{37}$	20	311,65	ϕ 1	9,06	3,39
Microvawe	$-Si(CH_3)_2C_{18}H_{37}$	20	311,65	ϕ 2	7,68	2,82
Microvawe	$-Si(CH_3)_2C_{18}H_{37}$	20	311,65	ϕ 3	0,50	0,17

* Based on a surface area of 126 m²/g

Impact on chromatographic results	Regular	Step 1	Step 2
Qty of alkyl chains	5,24	4,53	5,34
Hydrophobicity	1,51	1,53	1,51
Steric Selectivity	1,50	1,74	1,55
Potential of hydrogen links	0,43	0,37	0,52
Exchange potential @ pH: 2.7	0,06	0,05	0,05
Exchange potential @ pH: 7.6	0,30	0,30	0,68

Thermogravimetric studies



C18 bonded & end-capped material

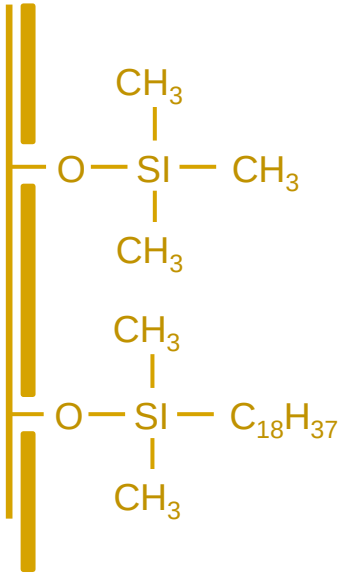
	Empty crucible (%)	Normalized C18 silica (%)
20 to 300°C	0	**- 0,1**
300 to 600°C	- 0,5	- 9,5
600 to 900°C	- 1,75	- 0,5
Total loss 20 to 1000°C	- 3	- 10,5

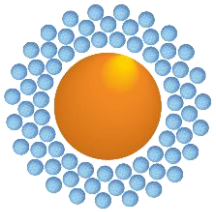
C18-HB

Selectivity

Uptisphere® CS Evolution™

Capacity | Productivity





Maximum Operational Surface Technology

Uptisphere® CS Evolution™ C18-HB
85Å - 130m²/g

2.6 µm

Bonding: C18 monofonctionnal
%C: 8.0
End-capping: one-step

pH stability: 1.5 to 8.0

Suitable for non polar compounds separation. Exhibits a very hydrophobic surface. HB shows excellent mechanical stability under high temperature.

USP code: L1

Application:
non-polar organic compounds

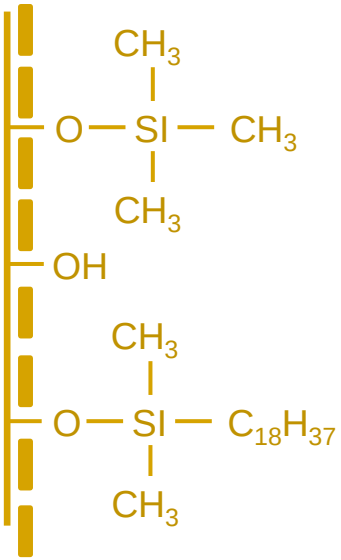
interchim

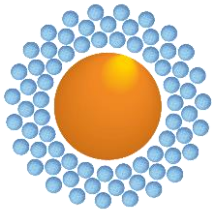
C18

Selectivity

Uptisphere® CS Evolution™

Capacity | Productivity





Maximum Operational Surface Technology

Uptisphere® CS Evolution™ C18
85Å - 130m²/g

2.6 µm

Bonding: C18 monofonctionnal
%C: 9,0
End-capping: one-step

pH stability: 1.5 to 7.5

Serves a broad-ship of analytical & prep LC requirements for separating non polar compounds

USP code: L1

Application:
non-polar organic compounds

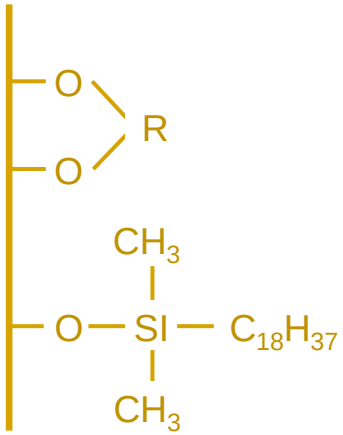
interchim

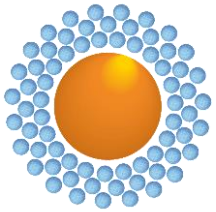
C18-RP

Selectivity

Uptisphere® CS Evolution™

Capacity | Productivity





Uptisphere® CS Evolution™ C18-RP
85Å - 130m²/g

2.6 µm

Bonding: C18 monofonctionnal
%C: 6,0
End-capping: multi step mixte

pH stability: 1.5 to 8.0

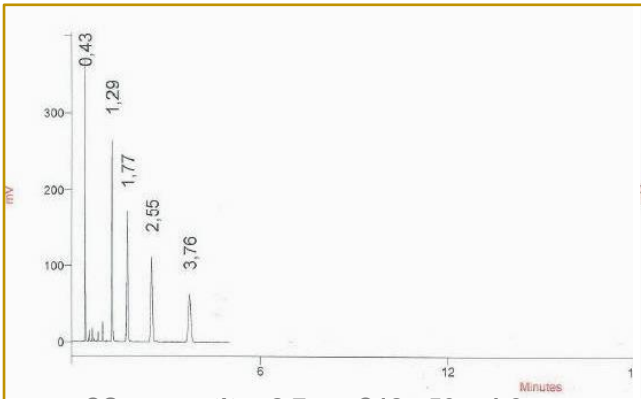
Suitable for mid & non polar compounds separation. RP shows excellent mechanical stability that provides long-life & make it an excellent tool for analysis under acidic or basic conditions.

USP code: L1

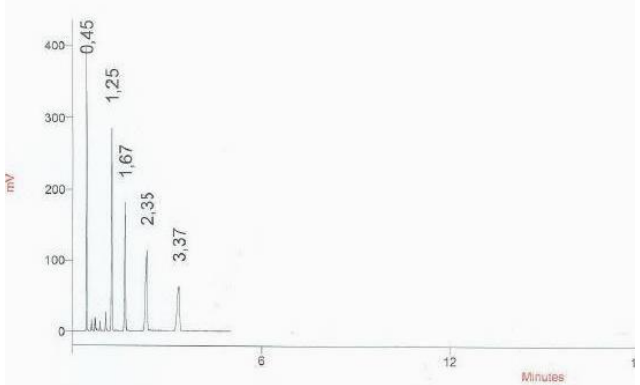
Application:
mid-polar organic compounds

interchim

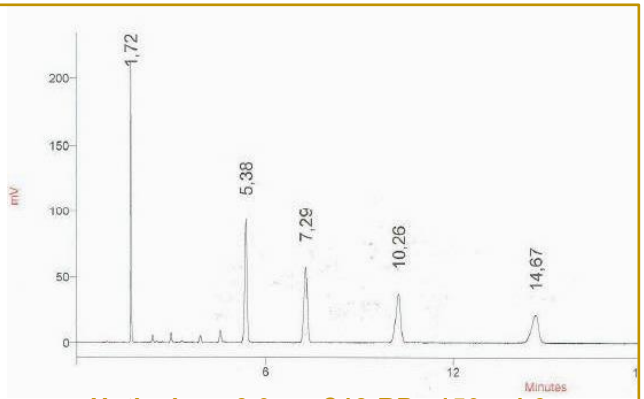
Hydrophobic selectivity – (Tanaka Méthylène)



CS competitor 2.7µm C18 - 50 x 4.6mm



CS Evolution 2.6µm C18-RP - 50 x 4.6mm



Uptisphere 3.0µm C18-RP - 150 x 4.6mm

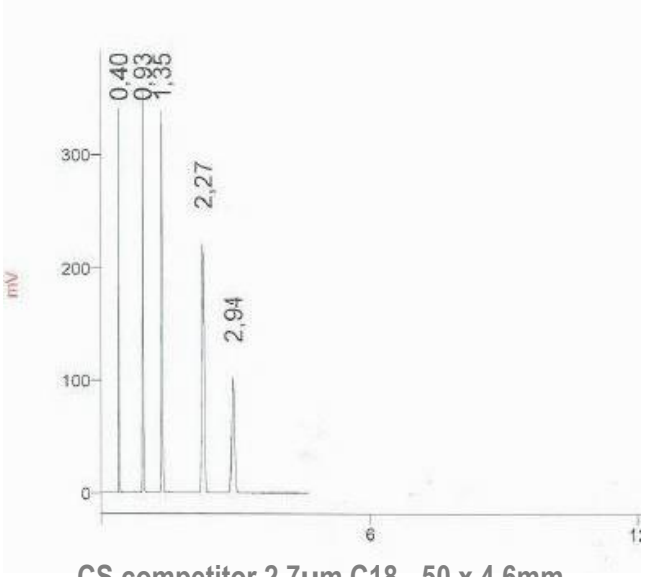
1) Uracil, 2) Ethylbenzene, 3) n-Propylebenzene, 4) n-Butylbenzene, 5) n-pentylbenzene
MeOH-H2O @ 1 ml/min - UV: 254 nm

Similar selectivity for Hydrophobic probes

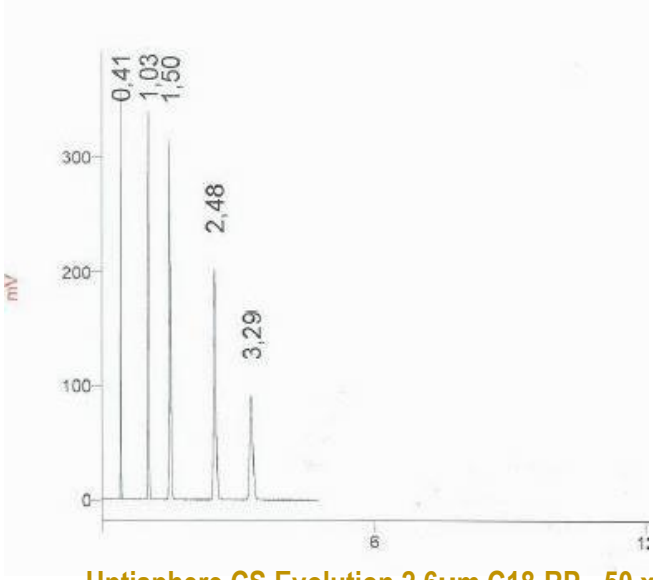
	CS competitor C18 2.7µm 50 x 4.6mm	CS Evolution C18-RP 2.6µm 50 x 4.6mm	Uptisphere C18-RP 3µm 150 x 4.6mm
α butylbenzene/pentylbenzene	**1.56**	**1.54**	**1.50**

interchim

Polar selectivity



CS competitor 2.7µm C18 - 50 x 4.6mm



Uptisphere CS Evolution 2.6µm C18-RP - 50 x 4.6mm

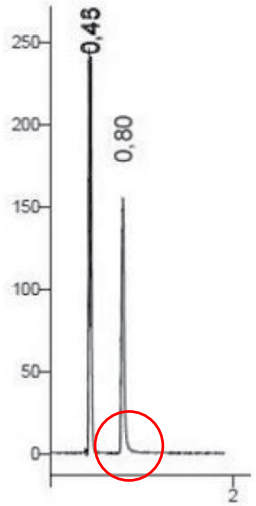
1) Uracil, 2) Benzoic acid, 3) p-Toluic acid, 4) p-Ethylbenzoic acid, 5) Methyl benzoate
ACN-formic acid buffer pH: 2.8 @ 1 ml/min - UV: 254 nm

Better selectivity & resolution for Polar probes

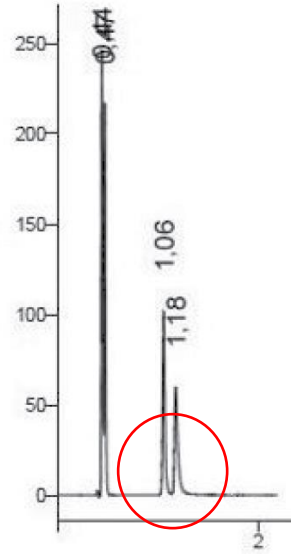
	CS concurrente C18 2.7µm 50 x 4.6mm	CS Evolution C18-RP 2.6µm 50 x 4.6mm
α Ethylbenzoic /methyl benzoate	**1.36**	**1.39**
Rs Ethylbenzoic /methyl benzoate	**6.63**	**7.19**

interchim

Basic compounds



CS competitor 2.7µm C18 - 50 x 4.6mm



Uptisphere CS Evolution 2.6µm C18-RP - 50 x 4.6mm

1) Uracil, 2) p-Hydroxybenzoic acid, 3) Pyridine, 4) Dimethylpyridine
ACN-buffer pH: 5.7 @ 1 ml/min - UV: 254 nm

Good resolution & symmetry with Basic probes

	CS concurrente C18 2.7µm 50 x 4.6mm	CS Evolution C18-RP 2.6µm 50 x 4.6mm
α pyridine/diMepyridine	-	**1.19**
Rs pyridine/diMepyridine	-	**2.39**

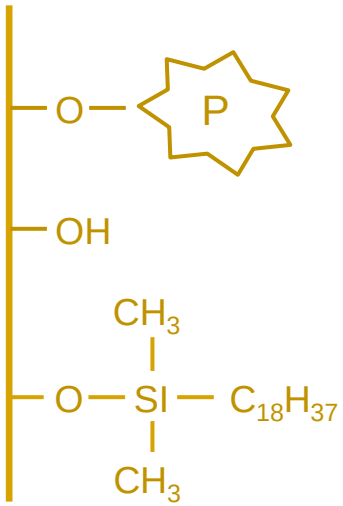
interchim

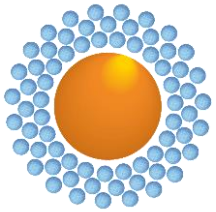
C18-AQ

Selectivity

Uptisphere® CS Evolution™

Capacity | Productivity





Uptisphere® CS Evolution™ C18-AQ
85Å - 130m²/g

2.6 µm

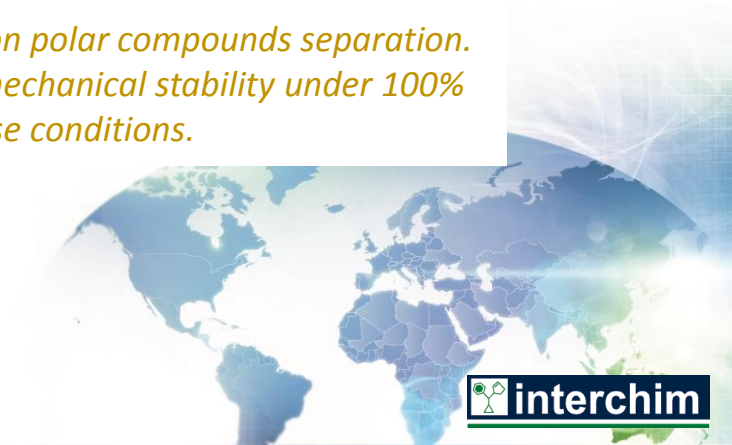
Bonding: C18 monofonctionnal
%C: 6.5%
End-capping: Mixte

pH stability: 1.5 to 7.0

Suitable for mid & non polar compounds separation. RP shows excellent mechanical stability under 100% aqueous mobile phase conditions.

USP code: L1

Application:
mid-polar organic compounds
100% water compatible

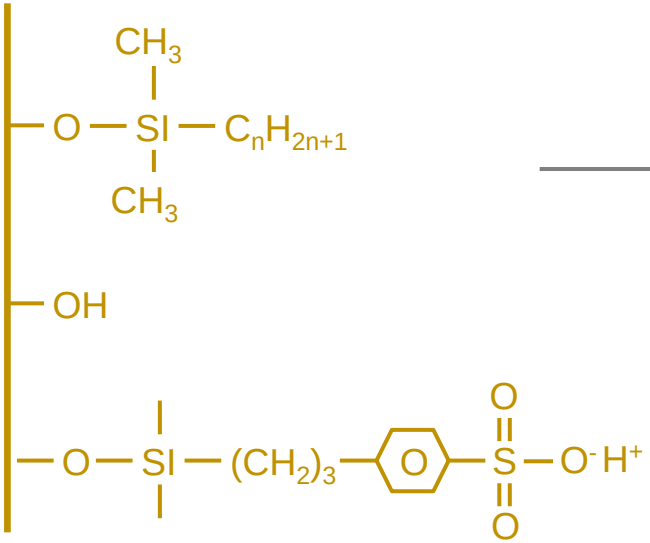


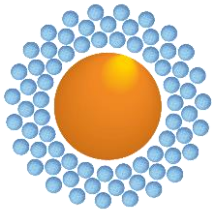
interchim

RP/SCX | Selectivity

Uptisphere® CS Evolution™

Capacity | Productivity





Uptisphere® CS Evolution™ RP/SCX

85Å - 130m²/g

2.6 µm

Bonding: mixed mode – RP/SCX monofonctionnal
%C: 8.5
End-capping: one step

pH stability: 2.0 to 7.0

Ion exchange & hydrophobic chains are bonded onto the surface of silica providing unique selectivity. Compounds that possess basic functionality are retained by ion exchange functionality.

USP code: L44

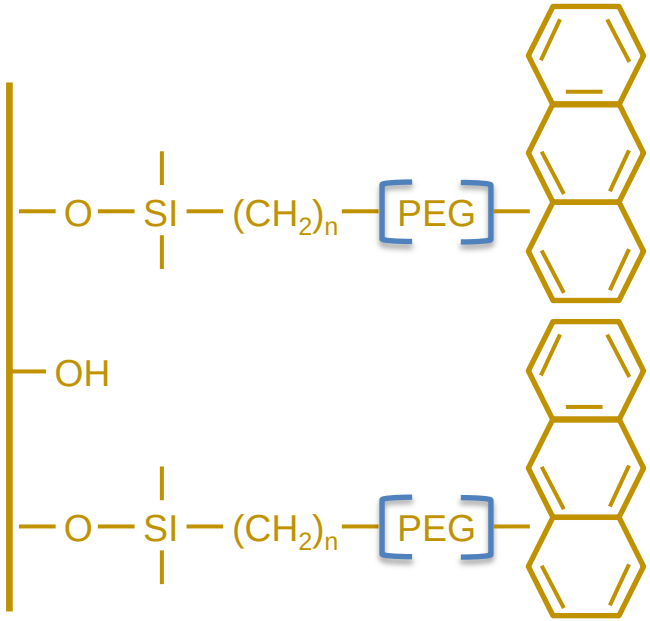
Application:
Mid-polar & non polar organic compounds under cationic form

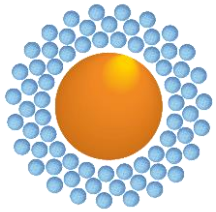
interchim

MVP | Selectivity

Uptisphere® CS Evolution™

Capacity | Productivity





Uptisphere® CS Evolution™ MVP

85Å - 130m²/g

2.6 µm

Bonding: monofonctionnal
%C: 7.0
End-capping: propriétaire

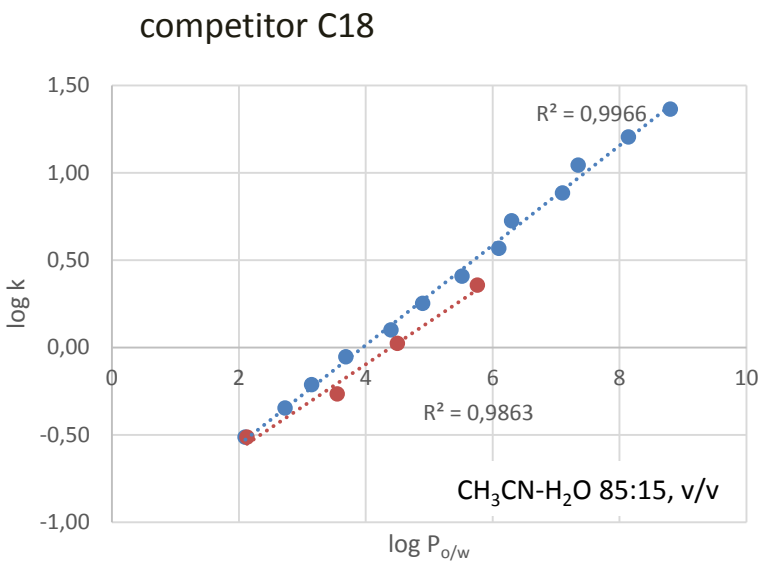
pH stability: 2.0 to 7.5

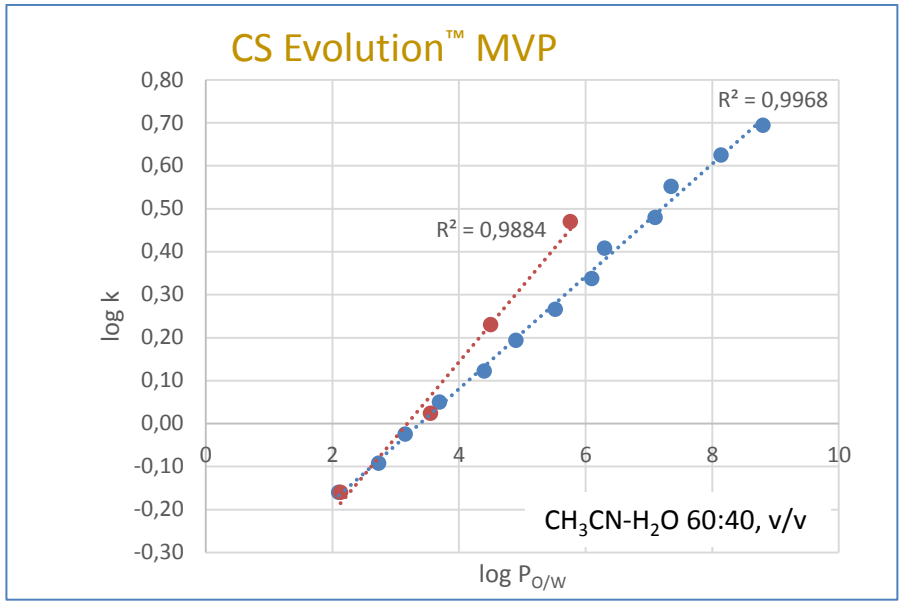
Suitable for Alkylbenznes, PAHs applications

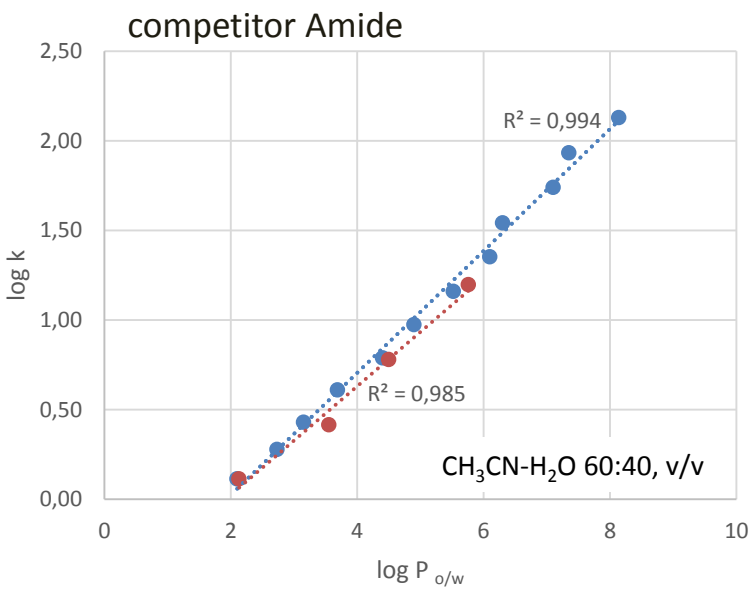
USP code:

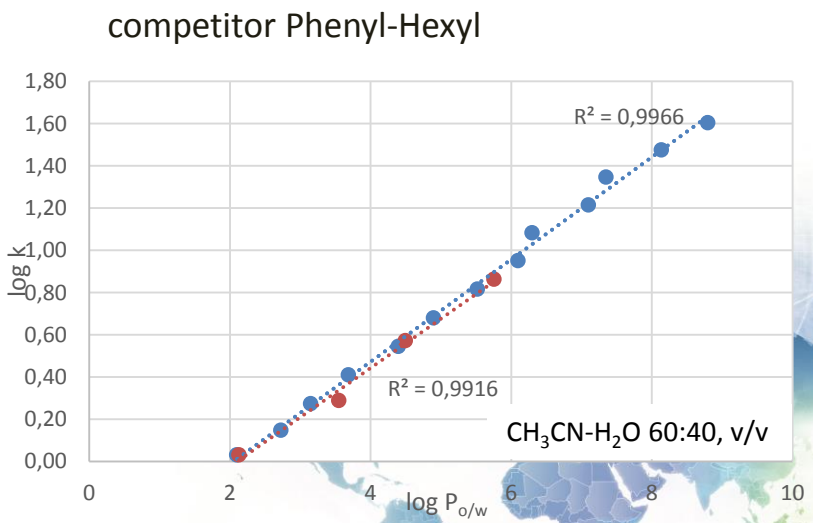
Application:
Planar & PI compounds. Peptides

Linear regressions of log k in function of log $P_{o/w}$ for an homologous serie of (•) Alkylbenzenes & (•) PAHs









interchim

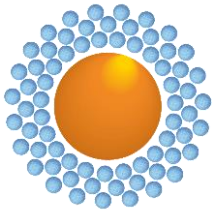
Hilic-HIT

Selectivity

Uptisphere® CS Evolution™

Capacity

Productivity



Maximum Operational Surface Technology

Uptisphere® CS Evolution™ Hilic-HIT

85Å - 130m²/g

2.6 µm

Bonding: proprietary

End-capping: proprietary

pH stability: 1.5 to 7.0

USP code: L3

Application:
water-soluble compounds

Aqueous normal phase separation (ANP) of water-soluble compounds .
Typical mobile phase: water / ACN (> 70%)
ANP is an excellent alternative to RP purification for highly polar compounds

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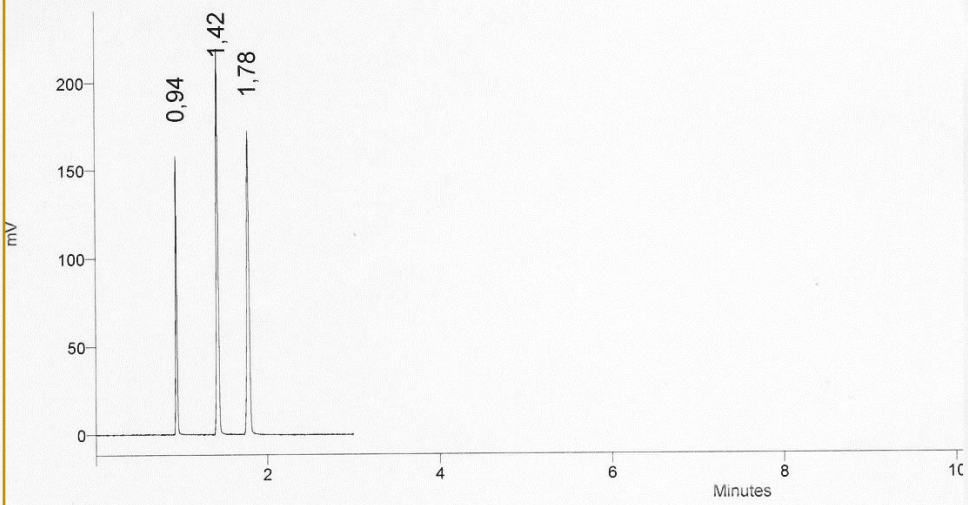
Selectivity, Efficiency & Resolution

#	Peak Name	Rt.	Tailling	Plates (USP)	Resolution (USP)
1	Tri-tert-butylbenzene	0,94	1,19	21285,62	0,00
2	Diethylphthalate	1,43	1,02	21584,83	14,96
3	Dimethylphthalate	1,78	1,02	20426,69	8,01

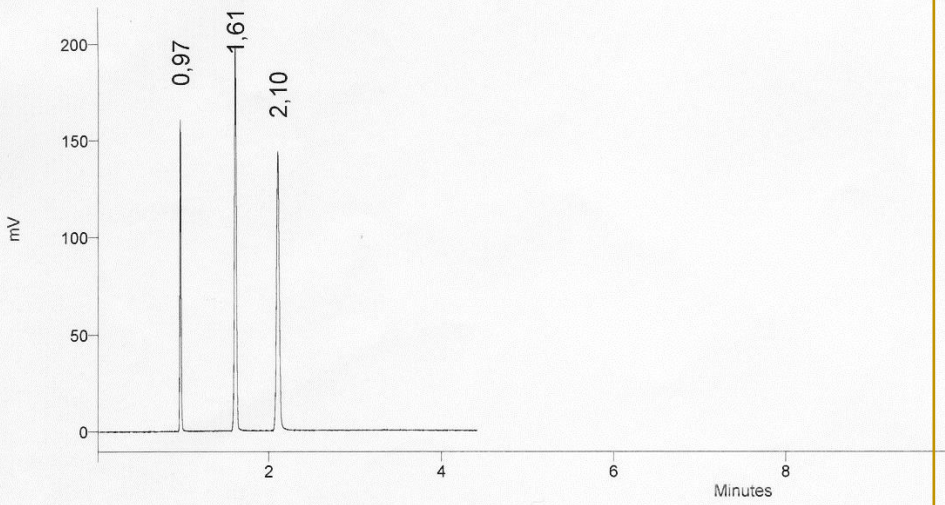
SUM



CS competitor 2.7µm Hilic - 50 x 4.6mm

#	Peak Name	Rt.	Tailling	Plates (USP)	Resolution (USP)
1	Tri-tert-butylbenzene	0,97	1,03	22714,51	0,00
2	Diethylphthalate	1,61	1,05	22918,27	18,75
3	Dimethylphthalate	2,10	1,13	20861,99	9,79

SUM



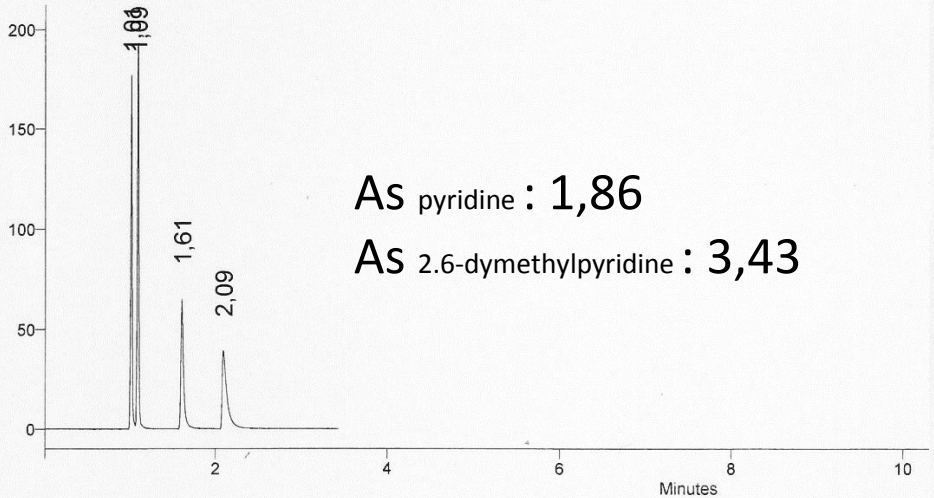
Uptisphere CS Evolution 2.6µm HIT - 50 x 4.6mm

interchim

Symmetry for basic compounds

#	Peak Name	Rt.	Tailling	Plates (USP)	Resolution (USP)
1	p-hydroxybenzoic acid	1,01	1,25	21412,79	0,00
2	Uracil	1,09	1,17	19577,18	2,66
3	pyridine	1,61	1,86	14456,86	12,18
4	2.6-dimethylpyridine	2,09	3,43	8827,32	6,81

SUM



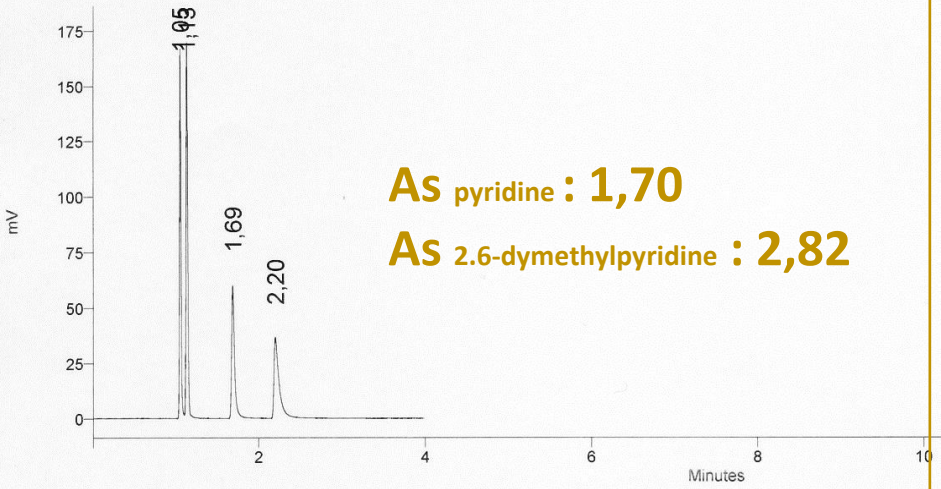
As pyridine : 1,86

As 2.6-dymethylpyridine : 3,43

CS competitor 2.7µm Hilic - 50 x 4.6mm

#	Peak Name	Rt.	Tailling	Plates (USP)	Resolution (USP)
1	p-hydroxybenzoic acid	1,05	1,19	19885,54	0,00
2	uracil	1,13	1,17	15643,32	2,42
3	pyridine	1,69	1,70	13526,09	11,74
4	2.6-dimethylpyridine	2,20	2,82	8415,31	6,65

SUM

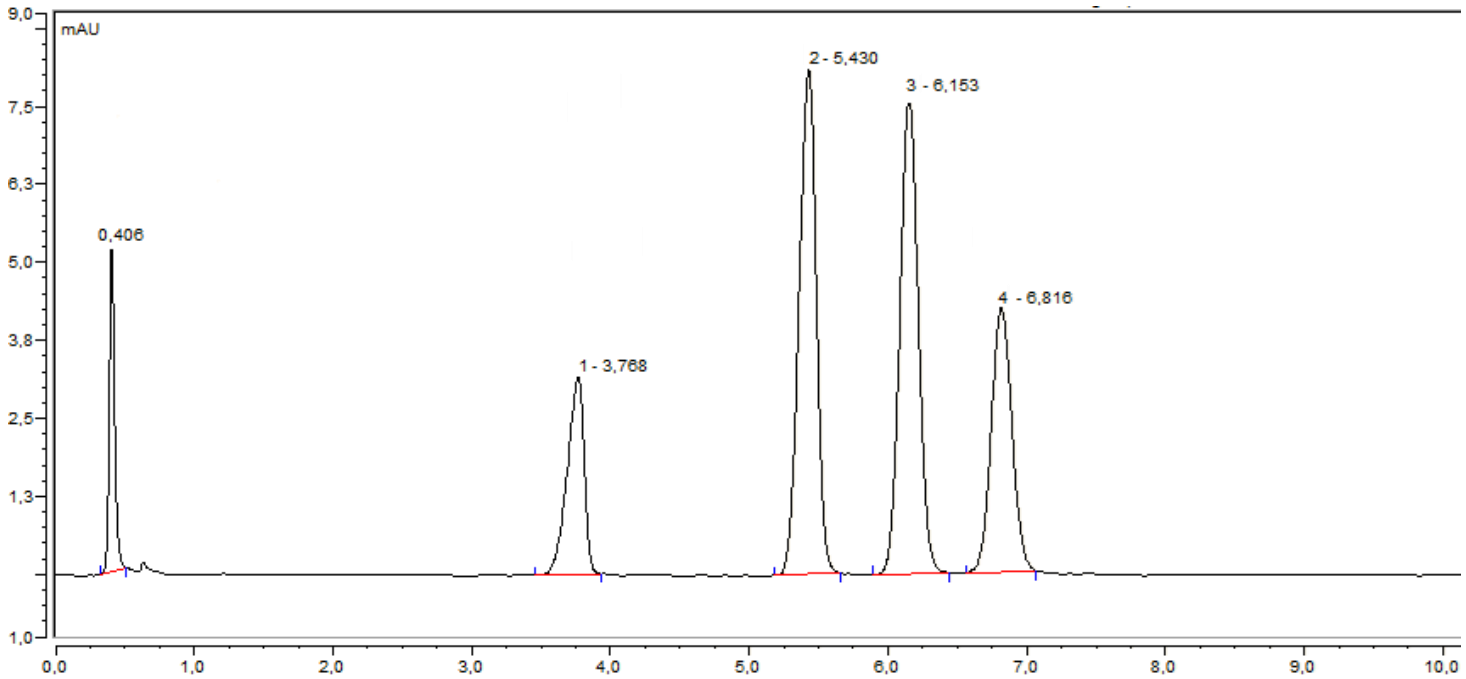


As pyridine : 1,70

As 2.6-dymethylpyridine : 2,82

Uptisphere CS Evolution 2.6µm HIT - 50 x 4.6mm

Stimulant compounds



(90/10) - ACN/Acétate d'ammonium 40 mM

Flow rate = 1,5 mL/min

T = 35°C

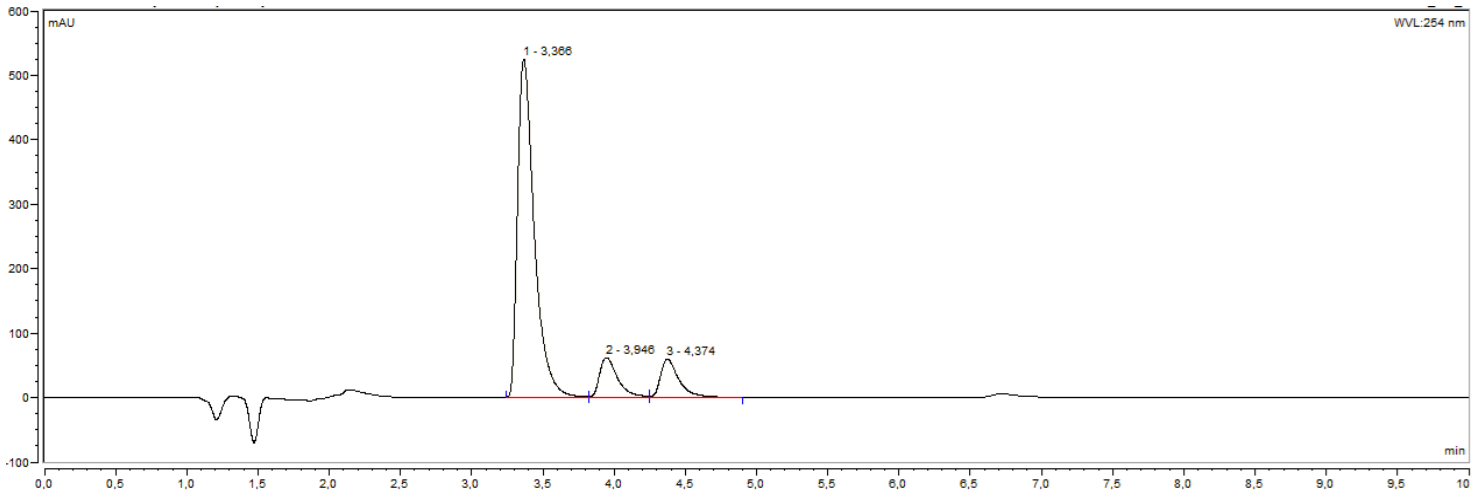
UV : 254 nm

Sample: 1 - norephedrin
2 - ephedrin
3 - hydroxyephedrin
4 - synephrin

Uptisphere CS Evolution 2.6µm HIT

interchim

Aromatic Amino-acids



(85/15) - ACN/Acétate d'ammonium 100 mM pH: 4

Flow rate = 0,5 mL/min

T = 25°C

UV : 254 nm

Samples : 1 - tryptophan

2 - phenylalanin

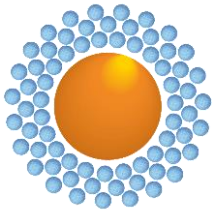
3 - tyrosin

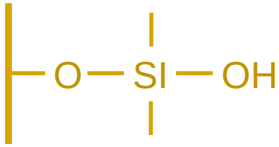
Uptisphere CS Evolution 2.6µm HIT

Silica | Selectivity

Uptisphere® CS Evolution™

Capacity | Productivity





Uptisphere® CS Evolution™ Silica

85Å - 130m²/g

2.6 µm

Bonding: none

End-capping: none

pH stability: 1.5 to 7.0

Specific of non-ionic, polar organic compounds analysis

USP code: L3

Application:
Non-ionic, polar organic compounds

interchim

211 bis avenue JF Kennedy – BP1140 – 03100 Montluçon France
Tel. +33 4 70 03 88 55 – Fax +33 4 70 03 82 60
interchim@interchim.com – www.interchim.com