Dr. Maisch

Any Column, Any Size, Any Media

REPROSPHER®

MADE BY DR. MAISCH

CONTENT

REPROSPHER MADE BY DR. MAISCH

From one of the biggest **H**igh-**P**erformance **L**iquid **C**hromatography (HPLC/UPLC) - Column Manufacturers in Europe.

www.dr-maisch.com

- Ultra high pure, base-deactivated silica.
- Standard fully porous particles with all standard stationary phases.
- Fully scalable from 1.7 µm - 15 µm
- Capillary to preparative dimensions available.
- Unique selectivities (C18-Phenyl, C18-WCX, C18-TNE)
- SFC approved (NH_2, Si, PFP, C18-WCX and PEI)

Technical specifications:

Besides the standard bondings (C18, C12, C8, C6, C4, Phenyl, Amino) some unique proprietary bonding chemistries are available which provide orthogonal selectivities for a comprehensive method development approach.

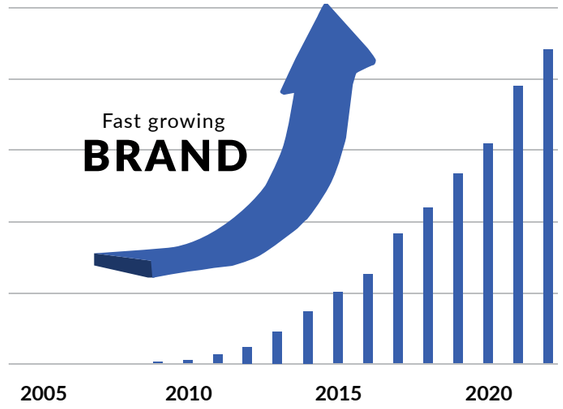
Excellent column performance and reproducibility are guaranteed for acidic, basic and neutral compounds.

	Pore size:	100 Å	200 Å	300 Å
	Surface area:	350 m^2/g	200 m^2/g	100 m^2/g
Particle sizes:	1.7 µm	yes		
	1.8 µm	yes	yes	yes
	2.0 µm	yes	yes	
	2.5 µm	yes		
	3.0 µm	yes	yes	yes
	3.5 µm	yes		
	4.0 µm	yes		
	5.0 µm	yes	yes	yes
	10.0 µm	yes	yes	yes
	Other particle sizes are available on request.			

Reprospher History

The Reprospher range of silica was launched in 2003. The production capacity has been successively enlarged over the last decade from gram to multi-hundred kg scale. Reprospher raised to one of the Top Brands on the market.

The reliable & reproducible **workhorse** which should not be missed in any laboratory!



Number of citations in publications

REPROSPHER SILICA BASED HPLC COLUMNS

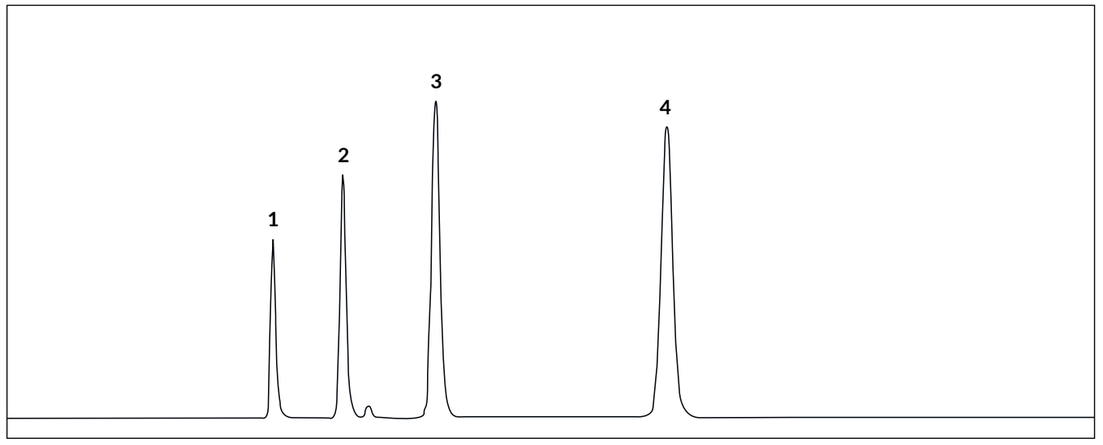
The whole manufacturing process of Reprospher silica is based on ultrapure reagents. This leads to very uniform particle shape, very reproducible pore size distribution and consistent surface characteristics.

Every batch is extensively tested and has to pass the very high Dr. Maisch HPLC standards. Very narrow specifications guarantee a straightforward validation process on the customer side.

Every column has to pass all parameters for selectivity, efficiency and asymmetry.

The advanced bonding technology results in highly base deactivated phases that perfectly combine pH-stability with extraordinary batch-to-batch reproducibility.

QC Chromatogram



Column:	Repropsher 100 C18-DE, 5 µm (150 x 4.6 mm) (PN: rs15.9de.s1546)
Mobile phase:	MeOH/$H_2$0 85/15
Flowrate:	1.0 ml/min
Detector:	UV at 254 nm
Temperature:	Ambient
Pressure:	75 bar
Sensitivity:	12.9 mV

Peak	Compound	RT (min)	Capacity factor	Symmetry	Plates/m
1	Uracil	1.45	0.00	1.2	94 000
2	Phenol	1.82	0.26	1.2	98 000
3	N,N-Diethyl-m-Toluamid	2.33	0.61	1.1	91 000
4	Toluene	3.58	1.0	1.0	105 000

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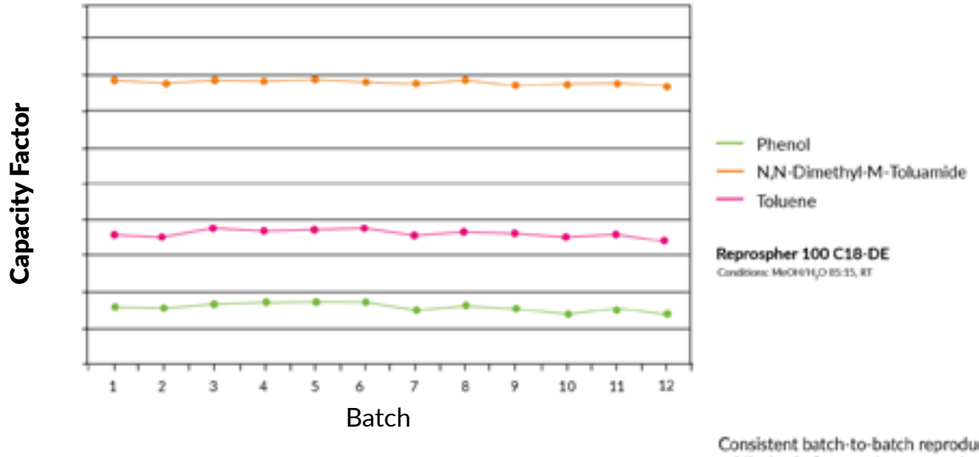
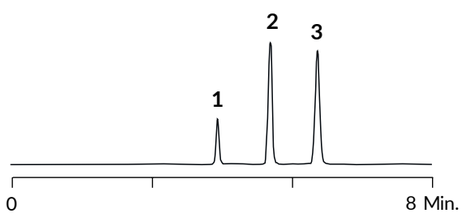
Highly Reproducible Selectivity



Consistent batch-to-batch reproducibility for acidic, basic & neutral compounds

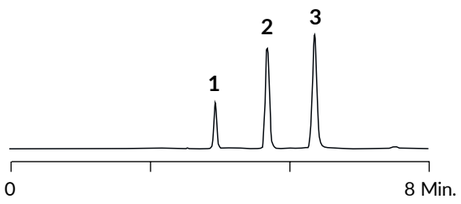
Scalability from Analytical to Prep dimension



Column: Reprospher 100 Si, 5µm (250 x 4.6mm)
(PN: rs15.00.s2546)
Mobile Phase: Heptane/Isopropanol 85:15 (v:v)
Flowrate: 1.0 mL/min
Detector: UV at 254 nm

1. Toluene
2. Diethylphtalate
3. Dimethylphtalate

Same performance
Analytical to Prep
Scale-up



Column: Reprospher 100 Si, 5µm (250 x 30mm)
(PN: rs15.00.s2530)
Mobile Phase: Heptane/Isopropanol 85:15 (v:v)
Flowrate: 42 mL/min
Detector: UV at 254 nm

1. Toluene
2. Diethylphtalate
3. Dimethylphtalate

C30

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
C30-DE	Extreme strong hydrophobic interactions	Double	100 Å	20%	L62
C30-DE	Sterical recognition	Double	200 Å	10%	L62

- Very strong hydrophobic interactions.
- Special planar selectivity (geometric isomers). Best results at room temperature or lower. Organic concentration > 20 %.
- Applications: Carotenoids, tocopherols , PAHs.

C18

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
C18	Standard C18	Yes	100 Å	16%	L1
			200 Å	9%	
			300 Å	7%	

- Endcapped standard fully-porous C18 phase.
- 100 Å for molecules < 10 kDa.
- 200 Å and 300 Å for all molecules larger than 10 kDa.

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
C18-DE	Standard C18	Double	100 Å	16%	L1
			200 Å	10%	
			300 Å	7%	

- Double endcapping results in less silanol interactions.
- Reduced tailing.
- Improved stability at mid pH.

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Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
C18-Aqua	Hydrophobic retention Polar interactions	Polar	100 Å	12%	L1 L96
			200 Å	5%	
			300 Å	4%	

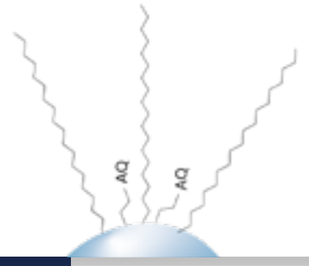
Useful facts:

- Special C18 bonding technique
- Endcapping with polar groups
- Stable under 100 % aqueous conditions
- pH-stable: 1-8

Recommended applications:

- Standard RP
- SFC
- Polar & hydrophilic compounds under highly aqueous conditions

Reprospher C18-Aqua



Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
C18-NE	Mixed mode: Hydrophobic retention Polar interactions	No	100 Å	15%	L1

- Not endcapped version of the standard C18.
- Polar molecules can be retained (like organic acids).

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
C18-TDE	Hydrophobic retention Polar interactions stable under 100 % aqueous conditions	Double	100 Å	20%	L1
			200 Å	12%	

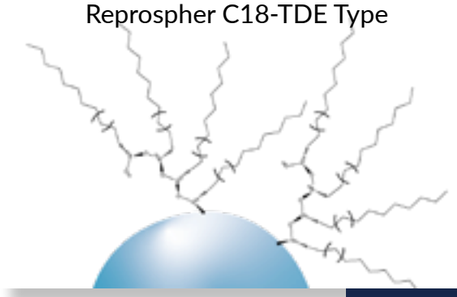
Useful facts:

- Polymeric C18 modification
- High carbon load
- Available with or without endcapping
- Steric recognition

Recommended applications:

- Standard RP
- High loading capacity

Reprospher C18-TDE Type



Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
C18-TN	Hydrophobic retention Polar interactions trifunctional bonding	Double	100 Å	18%	L1
			200 Å	11%	
			300 Å	10%	

- Not endcapped version of the C18-TDE.
- Offers mixed – mode interactions (hydrophobic & polar).

C8

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
C8	Standard C8 Medium hydrophobic interactions	Yes	100 Å	10%	L7
			200 Å	5%	
			300 Å	4%	

- Endcapped standard fully-porous C8 phase.
- 100 Å for molecules < 10 kDa.
- Popular phase for the analysis and purification of synthesized peptides.
- 200 Å and 300 Å for all molecules larger than 10 kDa.

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
C8-DE	Standard C8 Medium hydrophobic interactions	Double	100 Å	10%	L7

- Double endcapped version of standard C8-phase.
- Less silanol interactions.
- Reduced tailing.
- 100 Å for molecules < 10 kDa.
- Popular phase for the analysis and purification of synthesized peptides.

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
C8-NE	Mixed-mode Medium hydrophobic & polar interactions	No	100 Å	9%	L7

- Not endcapped version of the standard C8 phase.
- Retention of polar molecules.
- 100 Å for molecules < 10 kDa.

REPROSPHER SILICA MODIFICATIONS ALKYL-PHASES

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
C8-Aqua	Medium hydrophobic interactions Polar endcapping 100% aqueous stable	Yes	100 Å	8%	L7

- Retention of polar molecules.
- 100 Å for molecules < 10 kDa.

C6

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
C6-TDE	Low hydrophobic interactions Trifunctional	Double	100 Å	8%	L15

- Double endcapped C6 phase.
- Less silanol interactions - reduced tailing and retention than C18 and C8.

C4

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
C4	Standard C4 Low hydrophobic interactions	Yes	100 Å	6%	L26
			300 Å	2.5%	

- Endcapped standard C4 phase.
- 100 Å for molecules < 10 kDa; 300 Å for all molecules larger than 10 kDa (mAbs, proteins).

REPROSPHER SILICA MODIFICATIONS ALKYL-PHASES

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
C4-DE	Standard C4 Low hydrophobic interactions	Double	100 Å	7%	L26
			300 Å	3%	

- Double endcapped version of standard C4 phase.
- Less silanol interactions - reduced tailing.
- 100 Å for molecules < 10 kDa; 300 Å for all molecules larger than 10 kDa (mAbs, proteins).
- Standard phase for the analysis of intact proteins.

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
C4-Aqua	Low hydrophobic interactions Polar endcapping 100% aqueous stable	Polar	100 Å	6%	L26
			300 Å	3%	

- Retention of polar molecules.
- 100 Å for molecules < 10 kDa; 300 Å for all molecules larger than 10 kDa (mAbs, proteins).

Phenyl

Alternative selectivity compared to Alkyl-phases. Phenyl-phases separate positional isomers of aromatic compounds and aromatic analytes with different substituents.

Methanol is the preferred organic modifier with Phenyl-columns to achieve selectivity based upon π- π- interactions.

Phenyl phases retain hydrophobic non-aromatic compounds based on pure reversed-phase interactions.

REPROSPHER SILICA MODIFICATIONS PHENYL-PHASES

Phenyl-C4

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
Phenyl	Medium hydrophobic interactions Standard Phenyl-phase C4-linker π-π-interactions	Yes	100 Å	9%	L11
			200 Å	5%	
			300 Å	4%	

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
Phenyl-NE	Medium hydrophobic interactions Polar interactions Standard Phenyl-phase C4-linker π-π-interactions	No	100 Å	12%	L11

- Not endcapped version of the standard Phenyl-C4-phase.
- Retention of polar molecules.
- 100 Å for molecules < 10 kDa.

Phenyl-C6

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
Phenyl-Hexyl-e	Medium hydrophobic interactions Standard Phenyl-phase C6-linker π-π-interactions	Yes	100 Å	13%	L11

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
Phenyl-Hexyl	Medium hydrophobic interactions Polar interactions Standard Phenyl-phase C6-linker π-π-interactions	No	100 Å	13%	L11

- Not endcapped version of the standard Phenyl-C6-phase.
- Retention of polar molecules.
- 100 Å for molecules < 10 kDa.

Diphenyl

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
Diphenyl	Enhanced π-π interactions Shape selectivity Mixed-mode selectivity	Yes	100 Å	13%	L11

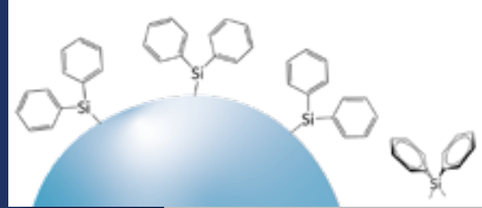
Useful facts:

- Hydrophobic, aromatic and polar interactions result in unique selectivity
- Strong retention of aromatic compounds
- Separates sterically challenging compounds (tub shape)
- pH-stable: 1-8

Recommended applications:

- Standard RP
- For peptides & aromatic compounds

Reprospher Diphenyl



REPROSPHER SILICA MODIFICATIONS PHENYL-PHASES

Biphenyl

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
Biphenyl	Enhanced π-π interactions Shape selectivity Mixed-mode selectivity	Yes	100 Å	N/A	L11

Reprospher Biphenyl

Useful facts:

- Hydrophobic, aromatic and polar interactions result in unique selectivity
- Strong retention for aromatic compounds
- Separates sterically challenging compounds (linear rotation)
- pH-stable: 1-8

Recommended applications:

- Standard RP
- For peptides & aromatic compounds

PFP

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
PFP	Enhanced π-π interactions dipol-dipol interaction Shape selectivity Mixed-mode selectivity	Yes	100 Å	N/A	L43

- Suitable for separation of structural isomers of aromatic compounds.
- Interact differently with analytes with electron-donating & electron-withdrawing groups.

SILICA-NP

Normal Phase columns are used to separate compounds on the basis of their polarity. The least polar compound elutes first.

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
Si	Standard NP-phase	No	100 Å	16%	L3
			200 Å	9%	
			300 Å	7%	

AMINO – NP, RP, WAX

Phase for separating non-polar and moderately polar isomeric compounds.

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
NH2	Standard NP-phase Amino-Propyl-phase	No	100 Å	4%	L8
NH2-DE		Yes	100 Å	4%	L8

- Separation of low molecular weight sugars such as glucose, fructose, xylose, and lactose.
- Normal phase analysis, weak anion exchange, and reversed-phase analysis of water containing polar compounds.

REPROSPHER SILICA MODIFICATIONS NP-PHASES

CYANO – NP, RP

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
CN	Standard NP-phase Cyano-Propyl	No	100 Å	7%	L10

- NP- and RP-mode.
- CN phases offer a complementary selectivity to Silica-, Amino- and Diol-phases.
- Fast equilibration - best choice for gradient elution in NP mode.

DIOL - NP, RP, HILIC

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
DIOL	Standard NP-phase	No	100 Å	7%	L20

- Improved peak shape compared to bare silica.
- Applications: sugars analysis (carbohydrates, glycosides and oligosaccharides), vitamins analysis.

Ethylpyridine - NP, SFC

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
2-EP	SFC standard phase	Yes	100 Å	N/A	N/A
4-EP			100 Å	N/A	

- Gold standard for achiral SFC analysis of basic compounds.
- 4-EP offers different selectivity compared to 2-EP.

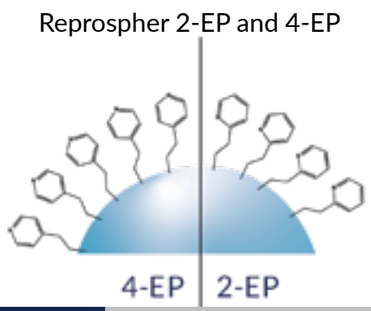
Useful facts:

- Ideal for very basic analytes
- Hydrophilic selector
- No amines needed as additives
- Designed for achiral SFC separations

Recommended applications:

- NP
- SFC

Reprospher 2-EP and 4-EP

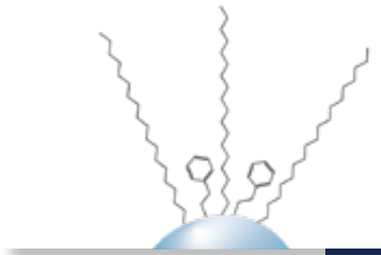


C18-Phenyl

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
C18-Phenyl	hydrophobic & π-π interactions	Yes	100 Å	N/A	N/A

REPROSPHER SILICA MODIFICATIONS SPECIALITY PHASES

Reprospher C18-Phenyl



Useful facts:

- Bimodal separation mechanism
- Alternative C18-Selectivity
- Compatible with highly aqueous conditions
- pH-stable: 1-8

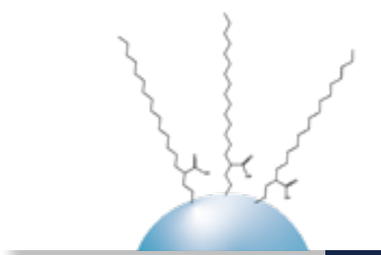
Recommended applications:

- Standard RP
- Analysis of aromatic compounds

C18-WCX

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
C18-WCX	Hydrophobic & cationexchange	No	100 Å	N/A	N/A

Reprospher C18-WCX



Useful facts:

- Acidic shield technology
- Carboxylic side chains directly connected to the alkyl spacer
- Without endcapping
- Mixed mode (RP & weak cation exchanger)
- pH-stable: 2.5 - 7.5

Recommended applications:

- RP
- SFC (for acidic and basic compounds)

Arginine - NP, HILIC, SFC

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
HILIC-ARG	SFC special phase	No	100 Å	N/A	N/A

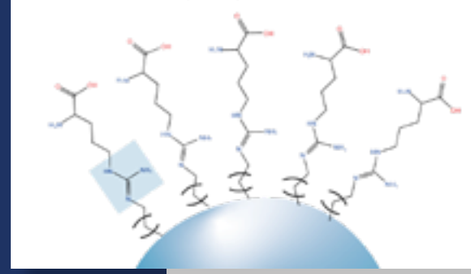
Useful facts:

- Arginine covalently bonded
- High hydrophilic
- Suitable for separation of polar compounds
- Shield technology
- Zwitter-ionic

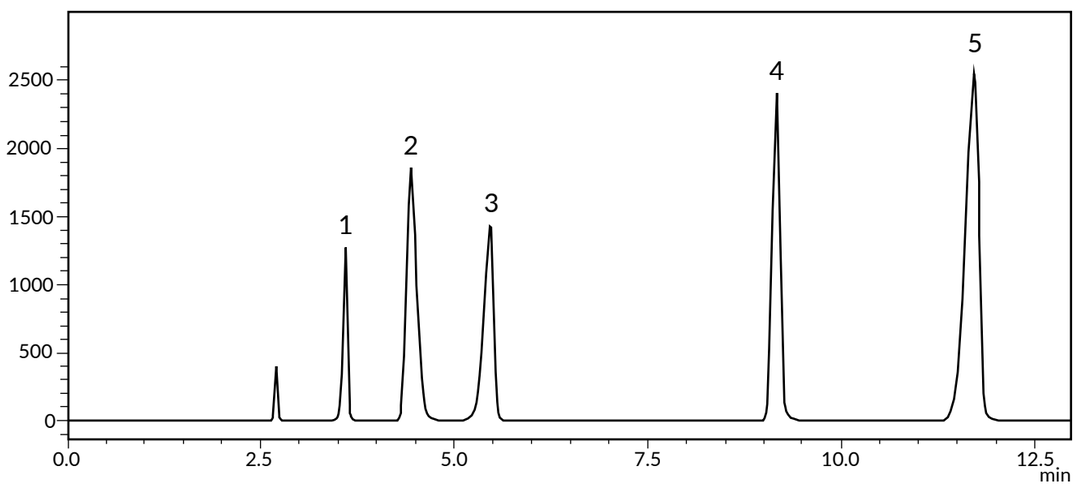
Recommended applications:

- NP
- HILIC
- SFC

Reprospher ARG

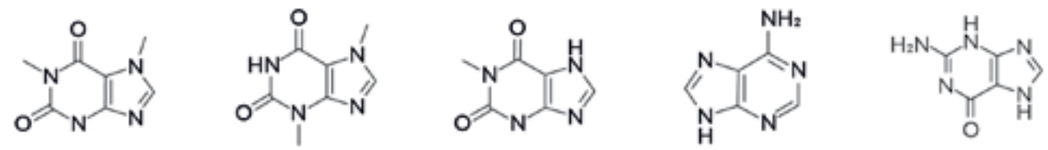


- Applications for purine bases, nucleobases, peptides, vitamins



REPROSPHER SILICA MODIFICATIONS SPECIALITY PHASES

Analyte:



1. Caffeine
2. Theobromine
3. Theophylline
4. Adenine
5. Guanine

LC comunn: Reprospher-Arginine, 5 µm, 250 x 4,6 mm (PN)
PN: rs15.ARG.s2546
Elution Type: Isocratic
Mobile phase: MeCN/ H_2O (8:2) (v/v)
Flowrate: 1 ml/min
Detection: UV at 254 nm

Polyethyleneimine – NP, SFC, HILIC, WAX

Available phases:	Special feature	Endcapping	Pore size	Carbon load	USP
PEI	SFC standard phase	No	100 Å	N/A	N/A
			300 Å	N/A	

Useful facts:

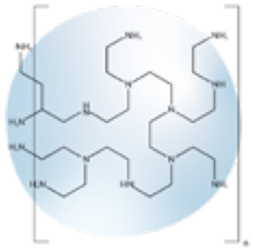
- Fully coated silica with cross-linked Polyethyleneimine
- For highly basic analytes
- Universal SFC phase

Recommended applications:

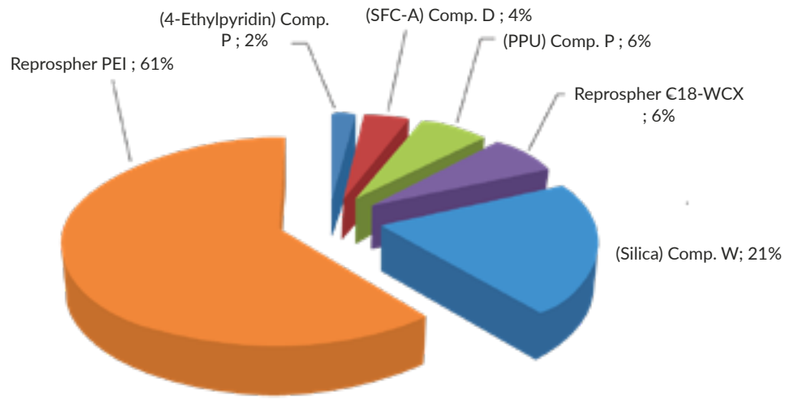
- NP
- HILIC
- SFC
- Wax for peptides & olingonucleotides

Most suitable for SFC application.

Reprospher PEI

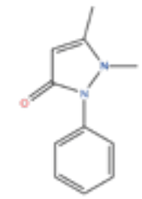


- Superior performance of PEI as SFC-phase.

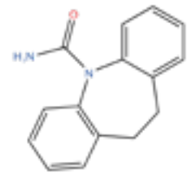


Published by: Thomas Wolf, Alexander Marziale, Eric Francotte and Trixie Wagner
Achiral SFC-MS Lab: Support of Global Discovery Chemistry Basel 2016

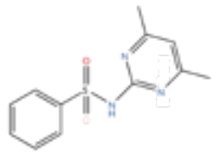
REPROSPHER SILICA MODIFICATIONS SPECIALITY PHASES



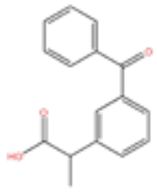
1. Antipyrine



2. Carbamazepine

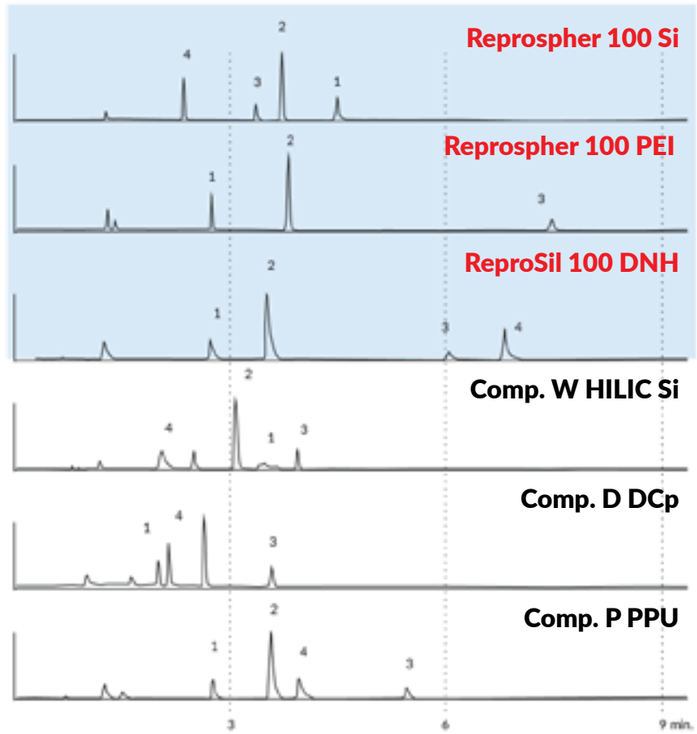


3. Sulamethazine



4. Ketoprofen

Mobile Phase: CO_2 + MeOH (5-50% in 6 min)
Flowrate: 1.0 ml/min
Detector: UV at 254 nm
Dimension: 250 x 4.6 mm



Published by: Eric Francotte (Novartis)
8th International Conference on packed column SFC, Oct 2014, Basel.

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