

Over 30 Years of Experience



- Plus in Performance
- Plus in Efficiency
- Plus in Selecitivities



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## Silica Bulk for HPLC

The best for the best

- Ultra High Efficient
- Perfect Reproducibility
- Exceptional Performance
- Extraordinary Selecitivities

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# Difficult Separations? Choose Exsil Plus!

## For Challenging Separations

- Unique selectivity
- Better peak shapes with polar analytes
- More separation choices with dual-selectivity
- Excellent stability and reproducibility
- 1.5µm high throughput media for speed and resolution, especially when combined with Rocket™ and Expedite™ hardware by Dr Maisch HPLC GmbH

## The Exsil Plus Column Advantage

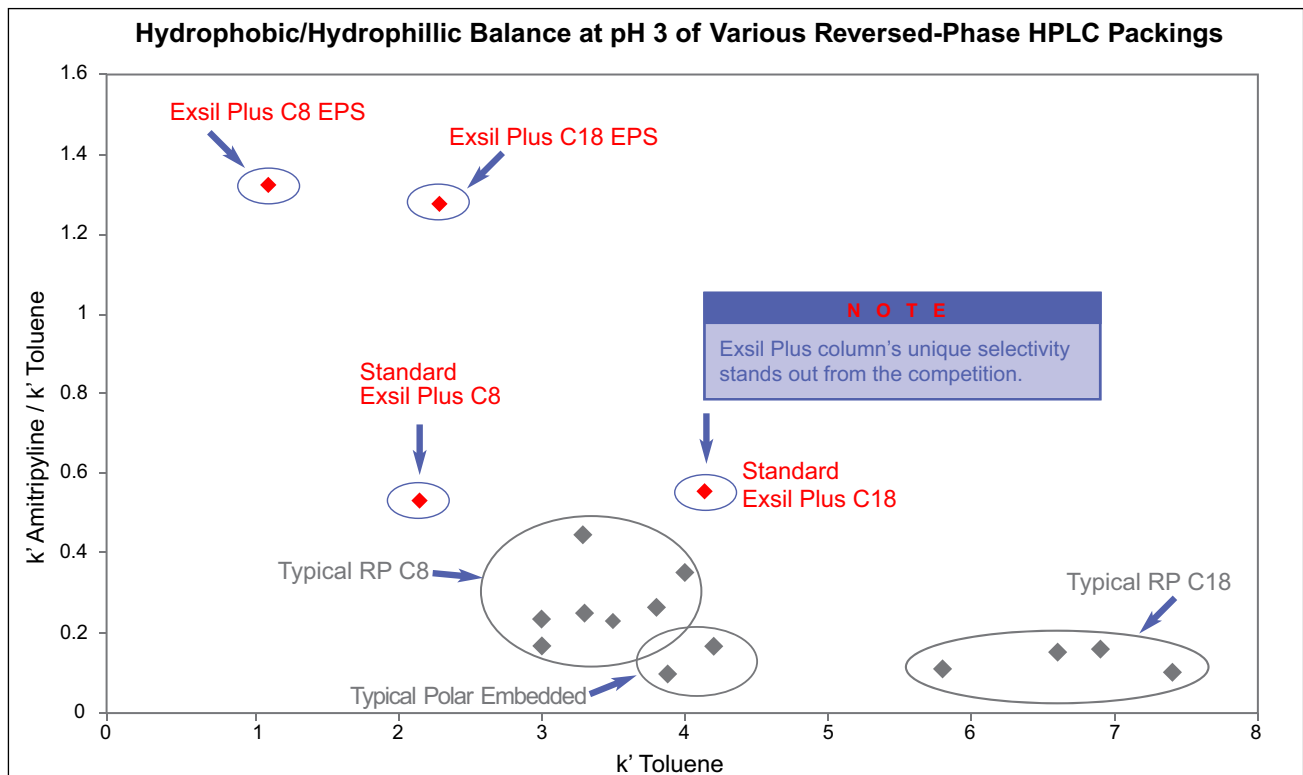
Controlled silica exposure is the difference that makes Exsil Plus columns unique. Instead of thoroughly covering the silica with bonded phase to hide the silica, the exposure of the silica in Exsil Plus columns is controlled to provide a dual mode separation with both polar and non-polar sites exposed to your samples. This extends polar selectivity well beyond what other RP columns offer and gives separations other columns can not.

## Standard Exsil Plus Columns vs Exsil Plus EPS Columns

Exsil Plus columns come in two varieties offering different levels of silica exposure. Standard Exsil Plus has a moderate silica exposure and is best used with neutral and moderately polar compounds. Exsil Plus EPS (Extended Polar Selectivity) has a high level of silica exposure and is best used with compounds containing more than two polar functional groups.

Exsil Plus Phase Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18	Silica	Spherical	1.5, 3, 5µm	100Å	210m <sup>2</sup> /g	6.3%	Monomeric	Yes	L1
C18 EPS	Silica	Spherical	1.5, 3, 5µm	100Å	210m <sup>2</sup> /g	5.5%	Monomeric	No	L1
C8	Silica	Spherical	1.5, 3, 5µm	100Å	210m <sup>2</sup> /g	4.3%	Monomeric	Yes	L7
C8 EPS	Silica	Spherical	3, 5µm	100Å	210m <sup>2</sup> /g	2.90%	Monomeric	No	L7
Phenyl	Silica	Spherical	3, 5µm	100Å	210m <sup>2</sup> /g	—	Monomeric	Yes	L11
Cyano	Silica	Spherical	3, 5µm	100Å	210m <sup>2</sup> /g	—	Monomeric	No	L10
Amino (NH <sub>2</sub> )	Silica	Spherical	3, 5µm	100Å	210m <sup>2</sup> /g	—	Monomeric	No	L8
Silica	Silica	Spherical	3, 5µm	100Å	210m <sup>2</sup> /g	—	—	—	L3
SAX	Silica	Spherical	3, 5µm	100Å	210m <sup>2</sup> /g	—	Monomeric	No	—

Trying to solve difficult separation problems using typical reversed-phase columns often leads to the same result. Choose Exsil Plus columns for completely different selectivity. See chart below.

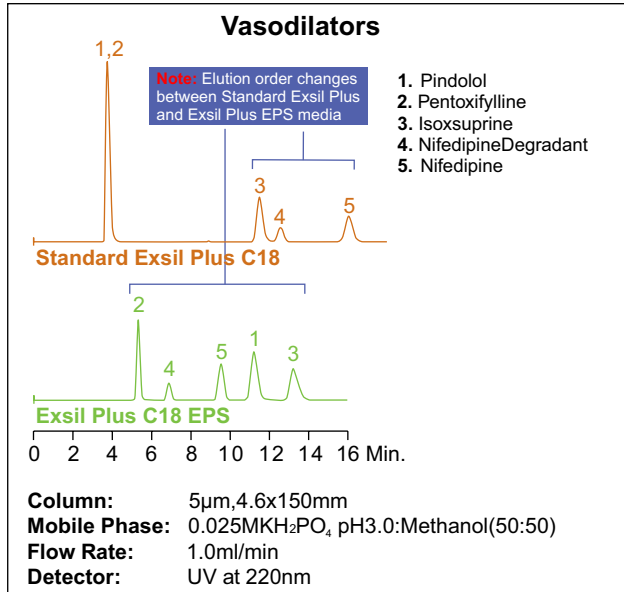


Plotting  $k'$  values of different compounds (polar vs. nonpolar) demonstrate the unique selectivity of Exsil Plus and Exsil Plus EPS columns, compared to conventional reversed-phase columns.

# Exsil Plus and Exsil Plus EPS will solve your Problems!

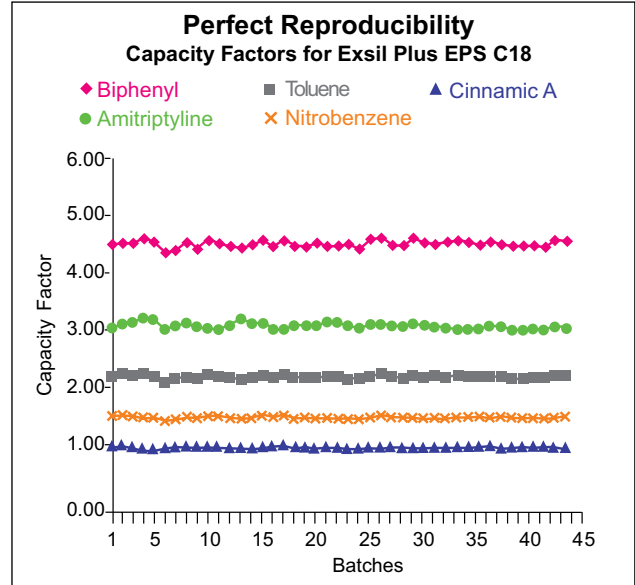
## Reverse Elution Order with Standard Exsil Plus and Exsil Plus EPS Columns

Often it's preferable when minor components elute before, rather than after, closely retained major components.



## Exsil Plus EPS Columns Have High Polar Compound Capacity

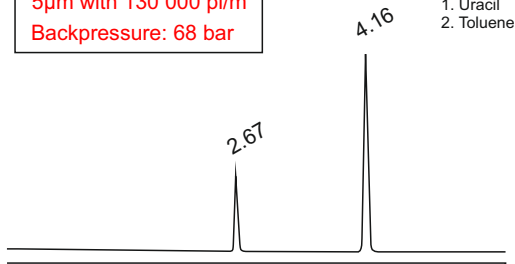
This is important for early eluting polar compounds which are often unresolved on conventional reversed-phase columns.



# Not only a Plus in Selectivity but also in Performance!

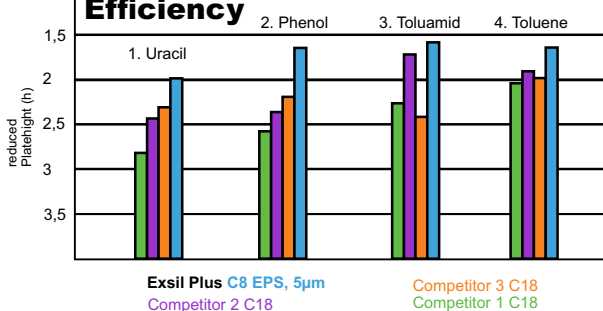
## PLUS in Performance on C8 EPS

5µm with 130 000 pl/m  
Backpressure: 68 bar



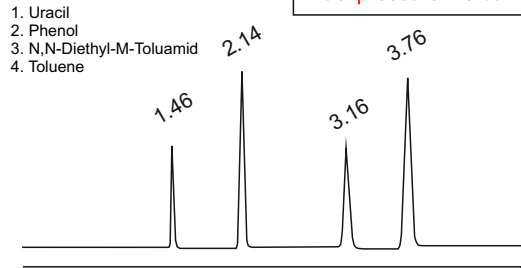
**Column:** Exsil Plus C8 EPS, 4.6x250mm, 5µm  
**Mobile Phase:** ACN/Water 58:42  
**Flow Rate:** 1.0ml/min  
**Detector:** UV at 254nm

### Efficiency



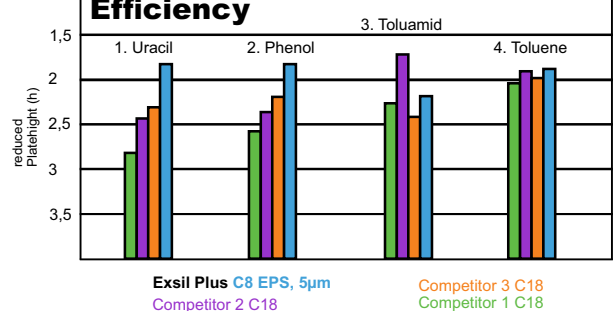
## PLUS in Performance on C18 EPS

5µm with 110 000 pl/m  
Backpressure: 45 bar



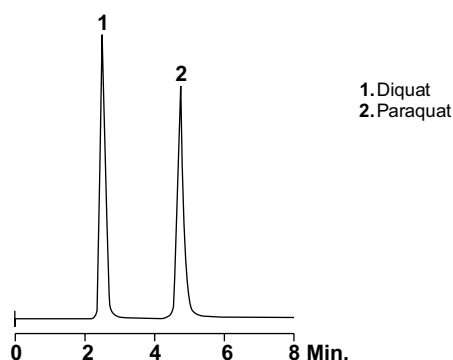
**Column:** Exsil Plus C18 EPS, 4.6x150mm, 5µm  
**Mobile Phase:** ACN/Water 58:42  
**Flow Rate:** 1.0ml/min  
**Detector:** UV at 254nm

### Efficiency



## Applications at low pH

### Bipyridylium Herbicides



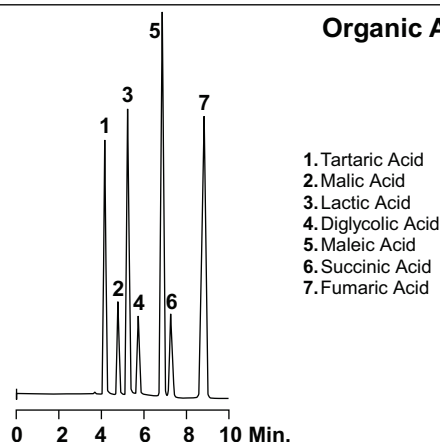
1. Diquat
2. Paraquat

**Column:** Exsil Plus Si 100Å, 3µm, 30mmx4.6mm  
**Mobile Phase:** 0.01M Tetramethylammonium Hydroxide and 0.15M Ammonium Sulfate in Water, pH3.0 with 5M Sulfuric Acid  
**Flow Rate:** 0.5mL/min  
**Detector:** UV at 310nm until 3minutes  
 UV at 260nm after 3minutes

### Low pH? No Problem!

- perfect for Acids

### Organic Acid Mix

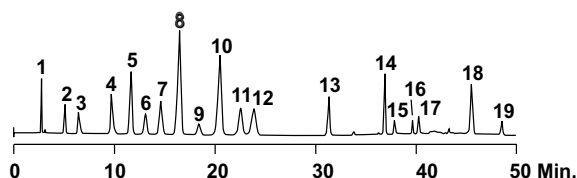


1. Tartaric Acid
2. Malic Acid
3. Lactic Acid
4. Diglycolic Acid
5. Maleic Acid
6. Succinic Acid
7. Fumaric Acid

**Column:** Exsil Plus C8 EPS, 5µm, 150x4.6mm  
**Mobile Phase:** 0.025M KH<sub>2</sub>PO<sub>4</sub>, pH 2.5: Methanol(97:3)  
**Flow Rate:** 0.7ml/min  
**Detector:** UV at 220nm

## Choose Exsil Plus for Water Pollutants

### Semipolar & Highly Hydrophilic Waste Water Contaminants



1. 4-Amino-5-hydroxy-2,7-naphthalene-disulfonic Acid
2. Hydroquinone
3. Benzylamine
4. 3'-Aminoacetophenone
5. Phenol
6. 4-Hydroxyphenylacetic Acid
7. 1-Naphthalene Sulfonic Acid
8. 2,4-Dihydroxybenzoic Acid
9. 1-Naphthalene Sulfonic Acid Degradant
10. 4-Hydroxy-3-methoxybenzoic Acid
11. Phenylacetic Acid
12. m-Cresol
13. 4-Hydroxycinnamic Acid
14. trans -Cinnamaldehyde
15. trans -Cinnamaldehyde Degradant
16. trans -Cinnamaldehyde Degradant
17. 2-Naphthalenethiol Degradant
18. 2-Naphthalenethiol
19. 2-Naphthalenethiol Degradant

**Column:** Exsil Plus C18 EPS, 5µm, 250x4.6mm  
**Mobile Phase:** A: 0.03M Monosodium Phosphate, pH2.5  
 B: Acetonitrile:Methanol:Water(40:50:10)  
**Gradient**

Time:	0	3	13	20	25	30	40	45	55
%B:	5	5	10	10	20	40	75	80	80

**Flow Rate:** 1.0mL/min  
**Detector:** UV at 210nm

### Carbamate Pesticides from Water

#### Procedure using GracePure™ C18-Fast, 500mg:

Sample Treatment – Spike 500mL tap water with 125µL carbamate solut on for final concentration of 25ppb.

Conditioning – Rinse with 3mL acetonitrile:water (80:20) followed by 3mL water. Dry with vacuum.

Sample Application – Apply 500µL sample.

Wash – 2 x 3mL water.

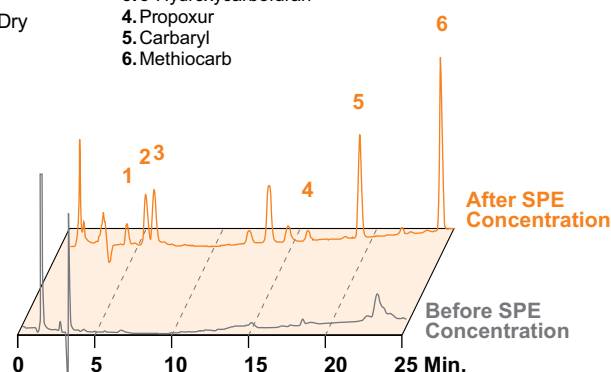
Elution – Elute with 4 x 1mL acetonitrile:water (80:20)

**Column:** Exsil Plus C18 EPS, 5µm, 250x4.6mm (Part No. )  
**Mobile Phase:** A: DI water B: Acetonitrile  
**Gradient**

Time:	0	5	20	25	30
%B:	25	25	50	50	25

**Flow Rate:** 1mL/min  
**Detector:** UV at 210nm

1. Aldicarb sulfoxide
2. Methomyl
3. 3-Hydroxycarbofuran
4. Propoxur
5. Carbaryl
6. Methiocarb

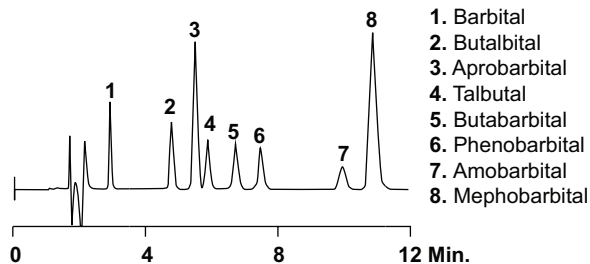


# Special Applications on Exsil Plus EPS

## For Challenging Separations

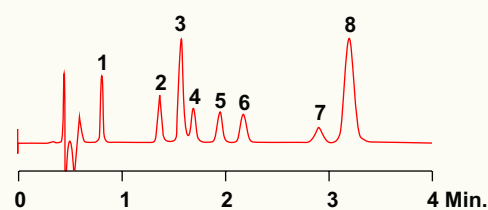
- 100% Water suitable
- Better peak shapes with polar analytes
- Higher Retention on polar compounds
- Excellent stability and reproducibility
- Suitable for ELSD
- Suitable for MS
- Very high mechanical strength
- pH Stable from 1-10

### Sleeping Drugs (Barbiturates)



**Column:** Exsil Plus C18 EPS, 5µm, 150 x 4.6mm  
**Mobile Phase:** 0.010M Sodium Acetate, pH4.0 Acetonitrile (75:25)  
**Flowrate:** 1.0ml/min  
**Detector:** UV at 230nm

**Run Time  
Reduced  
by 70%**

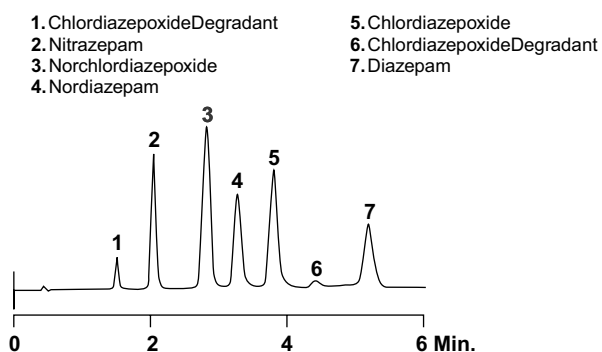


**Rocket™ Column**

**Column:** Exsil Plus C18 EPS, 3µm, 53 x 7mm  
**Mobile Phase:** 0.010M Sodium Acetate, pH4.0 Acetonitrile (75:25)  
**Flowrate:** 3.0ml/min  
**Detector:** UV at 230nm

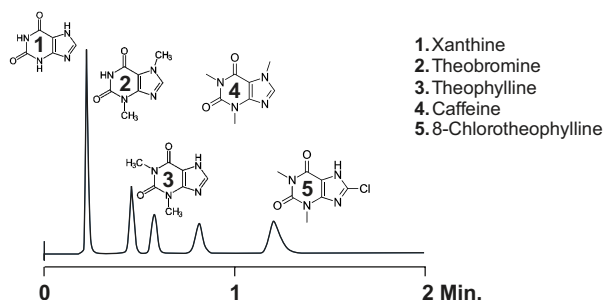
## From UHPLC to conventional LC

### Benzodiazepines and Metabolites



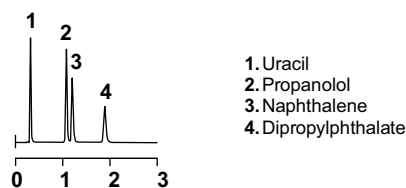
**Column:** Exsil Plus C18 EPS, 3µm, 53x7mm Rocket™ (PartNo. 50573)  
**Mobile Phase:** 0.05M Ammonium Acetate, pH5.5:Acetonitrile(65:35)  
**Flow Rate:** 3.0ml/min  
**Detector:** UV at 254nm

### Stimulans



**Column:** Exsil Plus C18 EPS, 3µm, 7x33mm Rocket™  
**Mobile Phase:** 0.010M Sodium Acetate, pH4.0:Methanol(70:30)  
**Flow Rate:** 5.0 ml/min  
**Detector:** UV at 254nm

### Propranolol

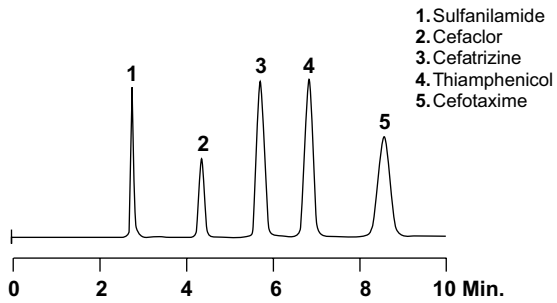


**Column:** Exsil Plus C18 EPS, 1.5µm, 50x2.0mm  
**Mobile Phase:** 20mM Potassium Phosphate, pH2.5:Methanol(40:60)  
**Flow Rate:** 0.5ml/min  
**Detector:** UV at 280nm  
**Temperature:** Ambient

**Silica Phases for High Throughput  
with Conventional LC**

## Special Applications for Exsil Plus EPS

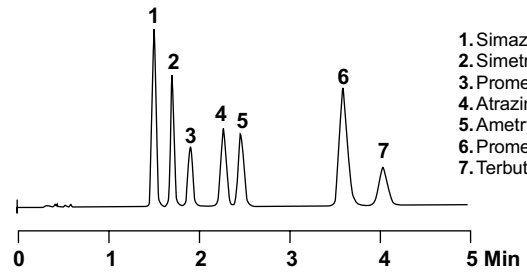
### Antibiotics Antibacterials



1. Sulfanilamide
2. Cefaclor
3. Cefatrizine
4. Thiamphenicol
5. Cefotaxime

**Column:** Exsil Plus C18 EPS, 5µm, 150x4.6mm  
**Mobile Phase:** 0.025M KH<sub>2</sub>PO<sub>4</sub>, pH3.0:Acetonitrile(90:10)  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV at 230nm

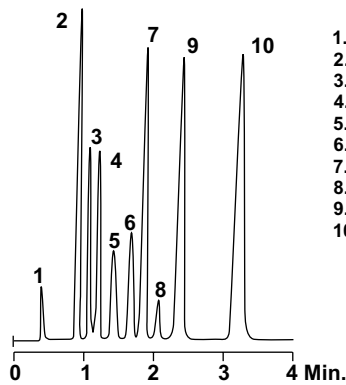
### Triazine Herbicides



1. Simazine
2. Simetryn
3. Prometon
4. Atrazine
5. Ametryn
6. Prometryn
7. Terbutryn

**Column:** Exsil Plus C18 EPS,  
1.5µm, 33x7mm  
**Mobile Phase:** 0.025M KH<sub>2</sub>PO<sub>4</sub>, pH3.0:Acetonitrile(65:35)  
**Flow Rate:** 2.0ml/min  
**Detector:** UV at 254nm

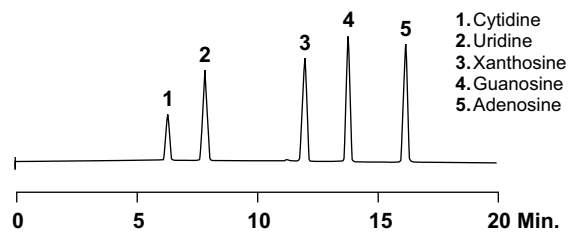
### Monoaromatics



1. Uracil
2. Benzamide
3. Benzyl Alcohol
4. Phenol
5. Methylbenzoate
6. Acetophenone
7. N,N-Diethyl-m-toluamide
8. Toluene
9. Benzophenone
10. Biphenyl

**Column:** Exsil Plus C18 EPS, 3µm, 53x7mm Rocket™  
**Mobile Phase:** 0.05M KH<sub>2</sub>PO<sub>4</sub>, pH3.0:Methanol(50:50)  
**Flow Rate:** 2.3ml/min  
**Detector:** UV at 254nm

### Nucleosides



1. Cytidine
2. Uridine
3. Xanthosine
4. Guanosine
5. Adenosine

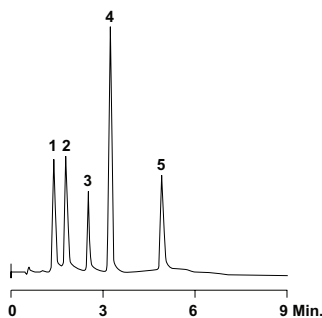
**Column:** Exsil Plus C18 EPS, 5µm, 250x4.6mm  
**Mobile Phase:** A:0.03M KH<sub>2</sub>PO<sub>4</sub>, pH3.2 B: Acetonitrile  
**Gradient:**

Time:	0	2	20
%B:	5	5	30

  
**Flow Rate:** 0.7ml/min  
**Detector:** UV at 260nm

## Special Applications for Exsil Plus EPS with ELSD

### Peptides



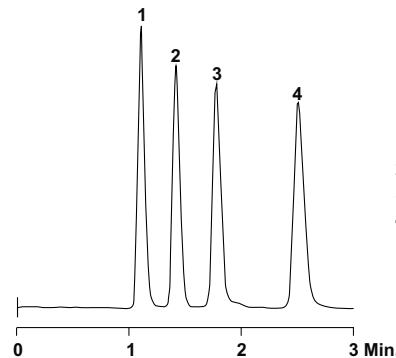
1. (Arg-8)-Vasotocin
2. (Lys-8)-Vasopressin
3. Oxytocin
4. Leucine Enkephalin
5. Angiotensin 1

**Column:** Exsil Plus C18 EPS, 3µm, 53x7mm Rocket  
**Mobile Phase:** A: 0.15%TFA in Water  
B: 0.13%TFA in 95%Acetonitrile:5%Water  
**Gradient:**

Time:	0	10
%B	20	50

  
**Flowrate:** 3.0ml/min  
**Detector:** Alltech ELSD

### Anticonvulsants

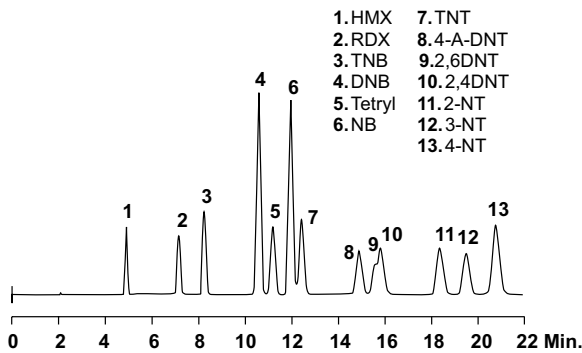


1. Ethotoin
2. Mephenytoin
3. 5,5-Diphenylhydantoin
4. Carbamazepine

**Column:** Exsil Plus C18 EPS, 3µm  
53 x 7mm Rocket™ Column  
**Mobile Phase:** 0.025M Ammonium Acetate, pH 5.5: Acetonitrile (70:30)  
**Flowrate:** 3.0ml/min  
**Detector:** Alltech ELSD

# Choose Exsil Plus for difficult Applications

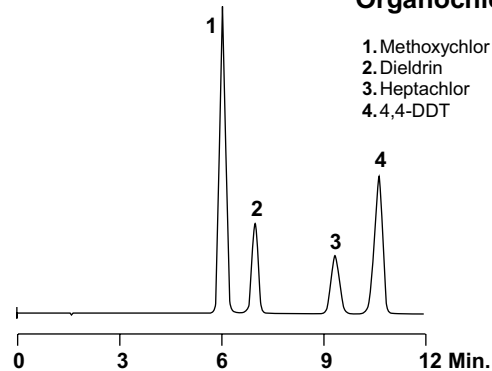
## Nitroaromatic and Nitroamine Explosives



**Column:** Exsil Plus C18, 5µm, 250x4.6mm  
**Mobile Phase:** Water:Methanol(50:50)  
**Flow Rate:** 0.7ml/min  
**Detector:** UV at 254nm

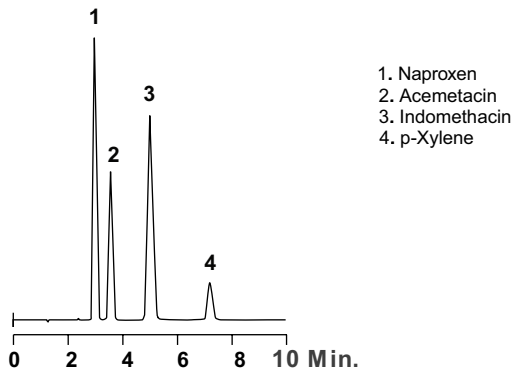
## Pesticides

### Organochlorines



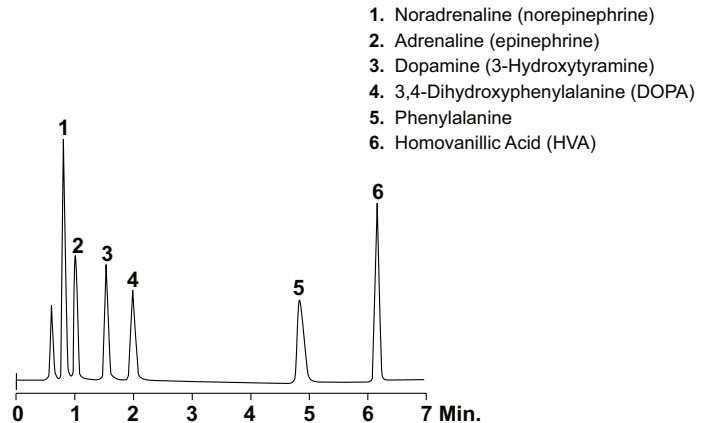
**Column:** Exsil Plus C18, 5µm, 150x4.6mm  
**Mobile Phase:** 0.025M KH<sub>2</sub>PO<sub>4</sub>, pH7.0:Methanol(25:75)  
**Flow Rate:** 1.0ml/min  
**Detector:** UV at 220nm

## Anti-Inflammatories



**Column:** Exsil Plus C18, 5µm, 150x4.6mm  
**Mobile Phase:** 0.02M KH<sub>2</sub>PO<sub>4</sub>: Methanol: Acetonitrile:  
 pH4.5(40:50:10)  
**Flow Rate:** 1.0ml/min  
**Detector:** UV at 254nm

## Catecholamines



**Column:** Exsil Plus C18, 3µm  
 53 x 7mm Rocket™ Column  
**Mobile Phase:** A: 0.15% TFA  
 B: Acetonitrile  
**Gradient:**

<b>Time:</b>	0	3	12	15
<b>%B:</b>	3	3	65	65

**Flowrate:** 2.5ml/min  
**Detector:** ELSD  
**Drift Tube Temp:** 40°C  
**Nitrogen Flowrate:** 1.75SLPM

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# Exmere Ltd.

## Silica Engineering

Unit 8, Boundary Way,  
 Business Park  
 Carnforth, LA5 9XP  
 United Kingdom  
 Fon: 0044(0)1524 727934  
 Fax: 0044(0)1524 733599  
 E-mail: info@exmere.eu  
 web: www.exmere.eu

Dealer:

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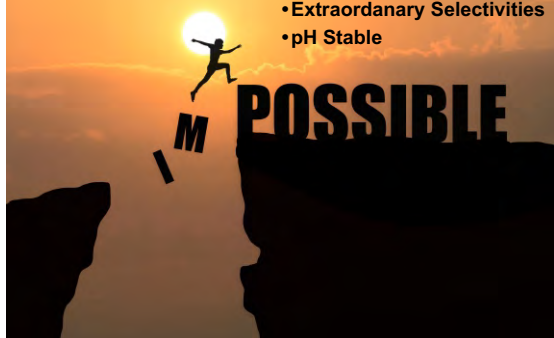
Silica Engineering

Over 30 Years of Experience

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## Exsil Pure™

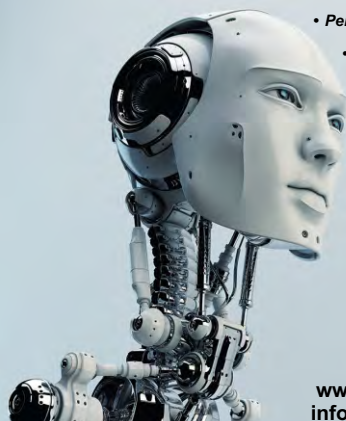
- Perfect Reproducibility
- Exceptional Performance
- Extraordinary Selectivities
- pH Stable



## Exsil Mono™

The Next Generation of Silica

- Monosized Silica Particles
- Perfect Reproducibility
- Exceptional Performance
- Highly Efficient



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## Exsil Plus

• Plus in Performance



• Plus in Selectivities



• Plus in Efficiency

• Perfect Reproducibility

Discover new Possibilities

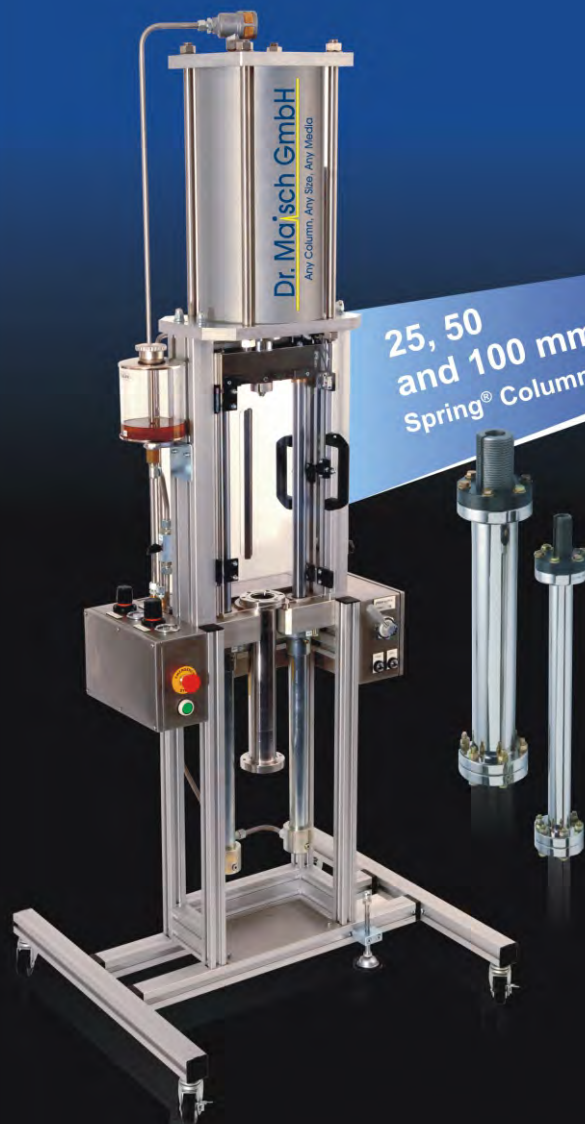
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Unit 8, Boundary Way,  
Business Park  
Carnforth, LA5 9XP  
United Kingdom  
Fon: +44(0)1524 727934  
Fax: +44(0)1524 733599  
E-mail: info@exmere.eu  
web: www.exmere.eu

