



CHROMATOGRAPHY

Product Guide

Everything
for your
applications



WHAT IS NEW

ASTRA® BDS and ASTRA® Sugar HPLC columns

New ASTRA® HPLC columns are complementary to our ARION® brand. These columns offer not only a high-endurance C18, C18-BDS, DB-BDS and PhenylHemp-HF phases, but also a unique 200 Å phase with dual modification. Another novel phase C18-AQ offers dual-chemistry bonding for analysis in aqueous mobile phases.

We extended ASTRA® HPLC columns with polymer-based columns for sugar analysis. See page 4.



ARION® HPLC columns and Guard system

We have extended range of ARION® HPLC columns with the PEP phase. New ARION® Vety cartridges extend the AGS system. See page 10.



LION™ GC columns

The family of GC columns LION™ has grown by two stages. LION 624, 50 MS brings with it a higher temperature limit of 300/320 °C, lower background and longer lifetime. New LION FAME HT is a highly polar bonded phase with an increased temperature limit up to 280 °C, with the application being focused on the analysis of FAME and their esters and isomers. See details on page 76.



SpeExtra™ MSPE columns

MSPE filters enable the quick and effective pre-treatment of a sample using different types of membranes with 0.22 micrometer porosity and a suitable sorbent. They are a suitable replacement for 1-3 mL SPE columns. Its filled with sorbent and L type extraction. With MSPE filters you will save time, use a minimum amount of solvents and perform more sample analyses than with conventional SPE columns. See details on page 88.



MetAmino® sample preparation kit

The bioactive® kit offers an easy sample preparation method for pure LC/MS or GC/MS analysis. It has been developed in the Czech Republic in cooperation with Biology Centre CAS. See page 94.

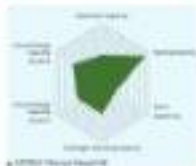
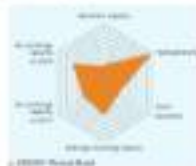
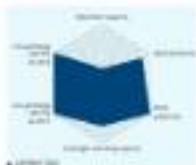
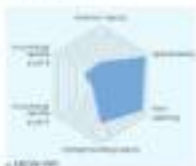
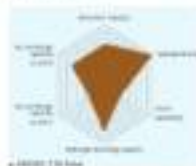


HPLC COLUMN SELECTION

HPLC column selectivity

The selectivity is defined as the capability of stationary phases to separate analytes under certain conditions. The selectivity mainly depends on the structure, metal content and modification of base silica gel, type of chemical bonding or ligand and coating. The HPLC column selectivity has been measured according to the Tanaka plots (Tanaka, H. et al., *Journal of Chromatographic Science*, 27 (1989), 221-226) shown below. This allows users a quick comparison of different phases in order to choose the best possible HPLC column for their application.

Property	Synonym	Measured parameter
Reversed-phase	Hydrophobicity	hydrophobicity
Hydrophilicity	Hydrophilic selectivity	hydrophilic selectivity
Ion selectivity	-	anion selectivity, cation selectivity
Hydrogen bonding capacity	Capacity enhancer	hydrogen bonding capacity
Ion exchange capacity (anion)	-	anion exchange capacity
Ion exchange capacity (cation)	-	cation exchange capacity





ASTRA® HPLC columns extend our AKOPL® and CRBODMILL® product lines. The ASTRA® has been developed in the Czech Republic to offer an alternate to a broad range of general HPLC columns. ASTRA® brings completely new and unique stationary phase with the polar embedded group to offer a complementary selectivity.

- Unique and high endcapped C18 phases
- 100 m²/g surface area (170 m²/g for BDS phases)
- 100 Å pore phase

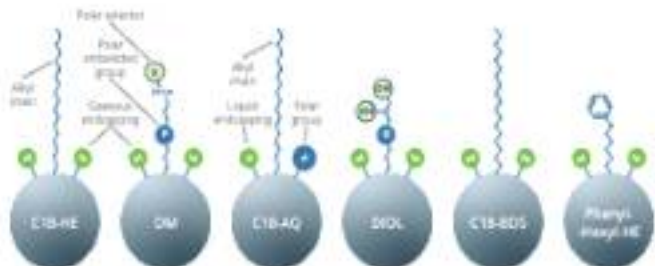


ASTRA® Silicagel

Particle size	5 µm	5 µm	5 µm
Flow control	170 µm	170 µm	170 µm
Flow path diameter	4.6 x 125 µm	4.6 x 125 µm	4.6 x 125 µm
Flow path diameter	4.6 x 125 µm	4.6 x 125 µm	4.6 x 125 µm

ASTRA® phase	Particle size (µm)	Porosity (%)	Surface area (m ² /g)	Carbon load (%)	pH stability	Endcapping	100% aqueous mobile phase	100% water
C18-RE	5, 5.5, 10	100	100	17%	2 to 9	High	+	1.1
C18-AQ	5, 5.5, 10	100	100	17%	2 to 9	High	+	1.1
C18-BDS	5, 5	100	100	17%	2 to 9	Highly	+	1.1
DM-8	5	100	100	17%	2 to 9	High	+	1.1
CRBOD	5, 5	100	100	17%	2 to 9	Highly	+	1.1
Phenyl Hexagel 100	5, 5	100	100	17%	2 to 9	High	+	1.1
DM	5, 5	100	100	17%	2 to 9	High	+	1.1
DM	5, 5	100	100	17%	2 to 9	High	+	1.1

ASTRA® phase	Particle size (µm)	Conditioning	Max. Flow rate (mL/min)	Max. Pressure (bar)	Max. Temperature (°C)	100% water
Super C18	5, 10	Highly	1.5 mL/min	50	50	1.1
Super HPL	5, 10	Highly	1.5 mL/min	50	50	1.1
Super BDS	5	Highly	1.5 mL/min	50	50	1.1
Super HPL	5	Highly	1.5 mL/min	50	50	1.1



Up close

In with all phases developed by Chromatography, ASTRA® HPLC column particles are continuously analysed by SEM. The electron-microscope shows the very high quality of ASTRA® 5 and 5µm particles.



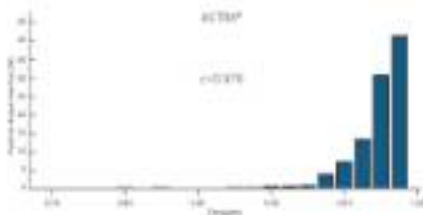
ASTRA® particle 5 µm



ASTRA® particle 5 µm



ASTRA® particle 2 µm



Main particle characteristics

- Close proximity to a sphere
- Highly effective endcapping
- No broken particles
- Robustness to high pressures
- Lot-to-lot reproducibility
- Unique modern embedded phases



High endcapping



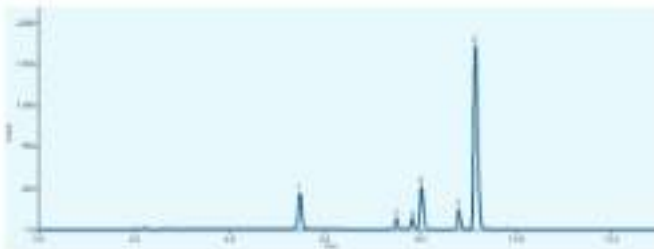
Low endcapping



Non-endcapped

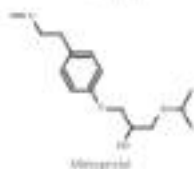
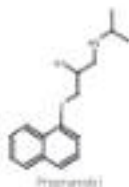
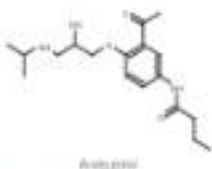
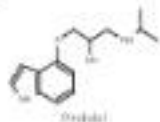
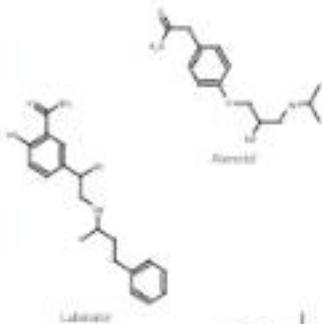
Beta Blockers

Beta Blockers are also known as beta-adrenergic blocking agents. They are used as a medication that reduces blood pressure.



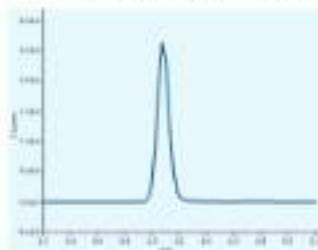
Standard Mixture on ASTRA C18-H2 column

Column	ASTRA C18-H2, 5µm			
Detection	220 nm ± 4 nm			
Port number	AST 1112 (400)			
Mobile phase	A: Acetonitrile/0.01M pH 3.3 B: H ₂ O			
Gradient elution	Time	A (%)	B (%)	Flow rate (mL/min)
	1	80	0	0.75
	2	80	20	1.00
	8	50	50	1.00
	12	30	70	1.00
	18	30	70	0.75
Flow rate	1.00 (ASTRA 3000-25, L)			
Temperature	25 °C			
Injection	10 µL (200 nm)			
Analysis	1. Atenolol, CAS No. 29122-86-7 2. Propranolol, CAS No. 13223-86-9 3. Naloxone, CAS No. 27057-93-0 4. Metoprolol, CAS No. 27055-58-4 5. Labetalol, CAS No. 30884-09-4 6. Propranolol, CAS No. 325-05-4			

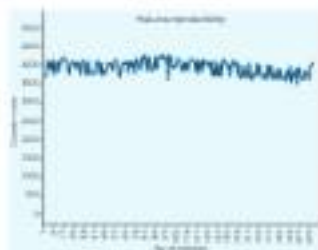


API glucuronide by LC/MS

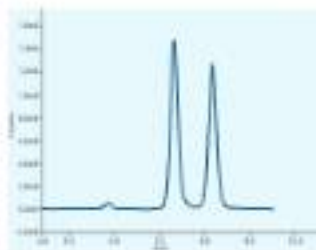
This application shows high ASTRA® HPLC column stability in the pharmaceuticals assay. API is used in hypotonic therapy adjusting cholesterol levels in the human body.



Scan 1 - API glucuronide



Pharma sample on ASTRA® C18-HL column



Scan 2 - API isomers

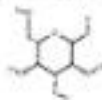
Column	ASTRA® C18-HL 3 µm
Dimensions	150 mm x 4.6 mm
Part number	AST-ET01.0046
Mobile phase	90/10 v/v MeCN / water - 0.1% H ₃ PO ₄ 25000000 g/mol formic acid formic acid
Flow rate	0.40 mL/min
Temperature	Ambient
Injection volume	10 µL
Detection	MS/MS
Mode	ESI, negative 2700 V
MS Temperature	300 °C (collision), 300 °C (exhaust)
Collision gas	Argon
Exhaustant	100 g/L acid in 20 mmol/L Sodium
Analysis	1. API (pharmaceutical)

Compound name	Q1 (m/z)	Q2 (m/z)	Collision cell pressure	Collision energy
API glucuronide (A)	368	271	2 mTorr	20 eV
API (B)	412	271	2 mTorr	20 eV

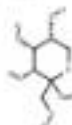
Sugars in infusion solutions

Sugar solutions in the form of infusions can be used to treat low blood sugar and water loss and as part of parenteral nutrition to optimize fluid, energy and nitrogen balance. As active ingredients of finished dosage forms, sugars should be controlled according to the strict requirements of pharmaceutical guidelines. In this application there are the results of the control of several solutions containing glucose, fructose and mannitol using Astra® Sugar Ca(OH) columns.

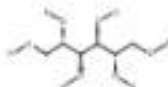
Column	Astra® Sugar Ca(OH), 10 µm
Dimensions	252 mm x 4.6 mm
Part number	437-5440-0040
Mobile phase	100% H ₂ O
Flow rate	1.0 mL/min
Temperature	80 °C
Injection volume	20 µL
Detection	420 nm / 15 °C
Analysis	1. Glucose 2. Fructose 3. Mannitol



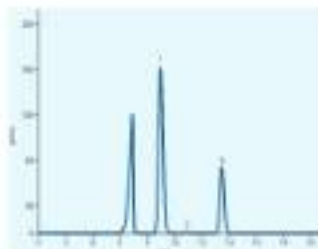
Glucose



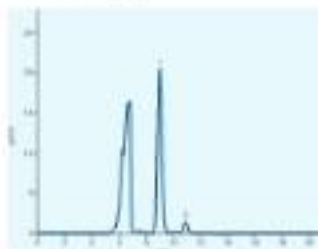
Fructose



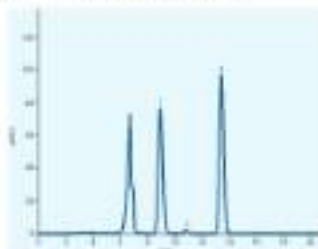
Mannitol



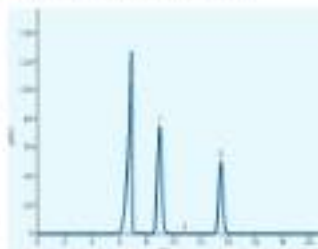
Test solution 1 on Astra® Sugar Ca(OH) column



Test solution 2 on Astra® Sugar Ca(OH) column



Test solution 3 on Astra® Sugar Ca(OH) column

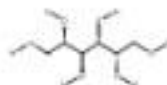


Test solution 4 on Astra® Sugar Ca(OH) column

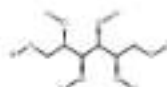
Sorbitol analysis according to Ph. Eur.

Sorbitol is a sugar alcohol commonly used as a sweetener and stabilizer in a wide range of pharmaceutical formulations. This application shows a method of control of sorbitol according to **Ph. Eur. Monograph 01/2019:0430**. Astra® Super C40 column provides a perfect resolution factor and peak asymmetry under the conditions of the pharmaceutical method.

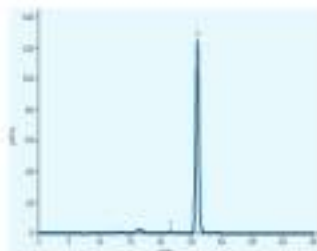
Column	Astra® Super C40 3 µm
Dimensions	250 mm x 4.6 mm
Part number	437-5440-9940
Mobile phase	100% H ₂ O
Flow rate	0.5 mL/min and 0.75 mL/min
Temperature	30 °C
Injection volume	20 µL
Detection	4.0 AU @ 21 °C
Analyte	1. Mannitol 2. Sorbitol



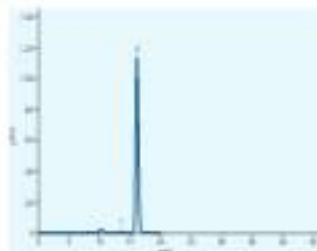
Mannitol



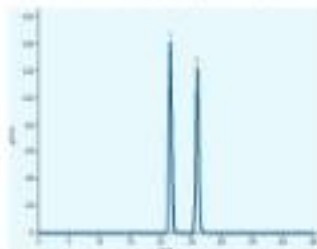
Sorbitol



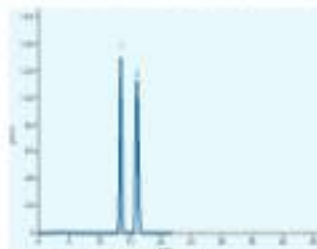
Test solution on Astra® Super C40 column (0.5 mL/min)



Test solution on Astra® Super C40 column (0.75 mL/min)



Reference solution (R) on Astra® Super C40 column (0.5 mL/min)



Reference solution (R) on Astra® Super C40 column (0.75 mL/min)



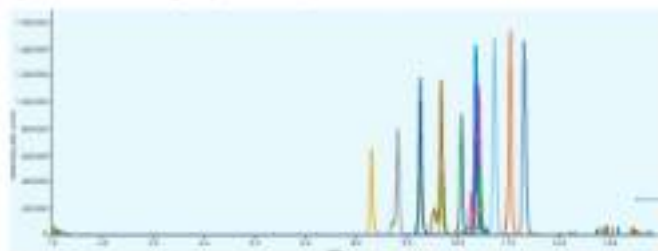
Analysis of long-chain PFASs in biological sample matrix

PFASs are a group of synthetic organofluorine chemical compounds used in the production of fluoropolymer coatings and products such as furniture, adhesives, personal care products, food packaging, mobile phone screens, etc. Many PFASs pose health and environmental concerns because they are classified as persistent organic pollutants. The long-chain PFASs are due to higher bioaccumulative potential frequently detected in living organisms. This application shows a robust method of extraction and detection of the PFAS compounds in fish tissue samples, which can be a relevant exposure pathway for humans.

MS/MS with 15 mg of 1:18 stationary phase and nylon frits was used for analysis 14 PFAS compounds in fish tissue samples. The MS/MS sample preparation approach was compared with the reference extraction method without SPE based on Grubisova et al. 2018 [1]. Both sets of samples were fortified to 1 ng/g of PFAS. The MS/MS method enhanced the response of most of the analytes between 80-180 % (Fig. 1). Although sample preparation is more demanding than the reference method, the MS/MS offers relevant signal improvement.



Fig. 1. MS/MS method relative signal improvement in comparison to the reference extraction method without SPE



Mixture of PFASs on-4070W column

References

- [1] Grubisova, Vojtech; Kolarik, Katarina; Kolarik, Radoslav; Grubisova, Zuzana. Development of a new extraction procedure for the HPLC-ESI-MS/MS determination of multi-residue pharmaceuticals in fish samples. Anal. Biochem. 2018 Aug 11; 552:55-63. doi: 10.1016/j.ab.2018.04.011. Epub 2018 4 Apr 18. PMID: 29729758.

This application was developed in cooperation with the Faculty of Fisheries and Protection of Waters, Research Institute of Fish Culture and Hydrobiology, Laboratory of Environmental Chemistry and Biochemistry.



Analysis of long-chain PFASs in biological sample matrix

MSPE Method

MSPE Column Metro Spin Separation® MSPE C18 column with 0.22 µm Superficial Porous Layer (SPL) technology (5 µg/g of PFAS/GBN/NaCl)

Investigation	Perfluorinated compounds, fatty acids, PCBs, PAHs, etc.
Extraction	100% > 0.1% (1)
Configuration	100 µm i.d. x 100 mm, 100 µm i.d. x 100 mm
Retention	100% > 0.1% (1)
Elution	100% > 0.1% (1)
MSPE Activation	100% > 0.1% (1)
MSPE Spill/Recovery	100% > 0.1% (1)
MSPE Extraction of analytes	100% > 0.1% (1)
MSPE Purification of analytes	100% > 0.1% (1)

100% recovery of 10 µg of PFASs in 100 µl of sample matrix (10 µg of PFASs in 100 µl of sample matrix)



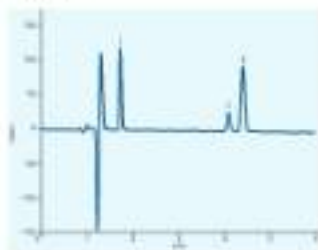
MSPE column

LC-HPLC Method

Column	ASTRA C18 150 Å 2 µm			
Dimensions	150 mm x 2.1 mm			
Part number	AST C18 150 Å			
Mobile phase	A: 100% H ₂ O + 10 mM ammonium acetate B: 100% MeCN + 10 mM ammonium acetate			
Gradient elution	Time	A (%)	B (%)	Flow rate (µL/min)
	0	90	10	300
	2.5	90	10	300
	5	40	60	300
	15	0	100	400
	18	0	100	400
	18.01	90	10	300
	30	90	10	300
Temperature	25 °C			
Injection volume	1 µL			
Detection	ESI-MS/MS (positive ion mode)			
Analytes	1. L-PFHx (perfluorooctanesulfonic acid) 2. PFHx (perfluorooctanesulfonic acid) 3. PFDA (perfluorodecane sulfonic acid) 4. PFHxS (perfluorooctanesulfonic acid) 5. PFNA (perfluorononanoic acid) 6. PFDA (perfluorodecane sulfonic acid) 7. PFDA (perfluorodecane sulfonic acid) 8. PFDA (perfluorodecane sulfonic acid) 9. PFDA (perfluorodecane sulfonic acid) 10. N-MePFDA (N-methylperfluorodecane sulfonic acid) 11. N-EtPFDA (N-ethylperfluorodecane sulfonic acid) 12. PFDA (perfluorodecane sulfonic acid) 13. PFDA (perfluorodecane sulfonic acid) 14. PFDA (perfluorodecane sulfonic acid)			

Stevia glycosides

Stevia rebaudiana extract is a plant used for its sweet taste. It contains glycosides, which are used as sweeteners in the food industry.

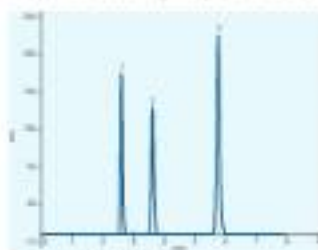


Standard on ASTRA® C18-HPLC

Column	ASTRA C18-HPLC, 5 µm
Dimensions	150 mm x 4.6 mm
Part number	AG15012-9000
Mobile phase	Acetonitrile + 0.1% formic acid / water [12: 88 v/v] Isocratic elution
Flow rate	1.0 mL/min
Temperature	30 °C
Detection	UV 210 nm
Analytes	1. Steviolonic acid 2. Rebendiolonic acid 3. Rebioside A

Amines

This application shows the symmetry of various amines on ASTRA® C18-BE3.



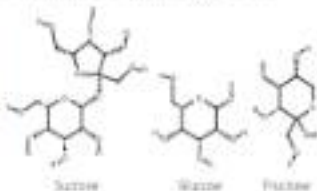
Standard on ASTRA® C18-BE3

Column	ASTRA C18-BE3, 5 µm
Dimensions	150 mm x 4.6 mm
Part number	AG15015-9000
Mobile phase	Water / 0.1% TFA
Flow rate	1.0 mL/min
Temperature	30 °C
Injection volume	1 µL
Detection	UV 220 nm
Analytes	1. Aniline 2. 4-Dichloroaniline 3. N,N-Dimethylaniline

Sugars control in tomatoes and ketchups

A taste of tomato products depends on content of the main food sugars, such as sucrose, glucose and fructose. Sugars are analysed continuously during the products manufacturing at the different steps of a process. The content of sugars in tomatoes is highly dependent on the geographical origin, ripeness and transportation conditions. This application highlights the analysis of food sugars in several kinds of tomatoes and ketchups using ASTRA® Sugar Cartridges.

Column	ASTRA® Sugar C18, 15 µm
Dimensions	252 mm x 4 mm
Part number	437-5440-0000
Mobile phase	100% H ₂ O
Flow rate	1.0 mL/min
Temperature	30 °C
Injection volume	2 µL
Detection	RI (21 °C)
Analysis	1. Sucrose 2. Glucose 3. Fructose



Sugars profile in small red tomatoes



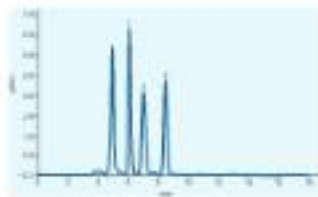
Sugars profile in big red tomatoes



Sugars profile in small orange tomatoes



Sugars profile in ketchup (Purpo®)



Sugars profile in ketchup (Horm®)



Sugars profile in ketchup (Hälsam®)

Ordering information

Analytical columns

3 µm ASTRA [®] all dimensions in mm						AGG Guard System
Phase	30 × 2.1	30 × 2.1	75 × 2.1	100 × 2.1	150 × 2.1	2.1 mm Cartridges
C18-BE	On request	AST 3751-7521	On request	AST 3751-101	AST 3751-1501	AGG 3711-BE2*
C18-B2	On request	On request	On request	AST 3851-101	AST 3851-1501	AGG 3711-BE2*

3 µm ASTRA [®] all dimensions in mm						AGG Guard System
Phase	50 × 2.1	75 × 2.1	100 × 2.1	150 × 2.1	200 × 2.1	2.1 mm Cartridges
C18-BE	On request	AST 3751-401	AST 3751-101	AST 3751-1501	AST 3751-2001	AGG 3711-AC2*
C18-B2	On request	AST 3851-401	AST 3851-101	AST 3851-1501	AST 3851-2001	AGG 3711-AC2*
C18-B2S	On request	On request	On request	AST 3851-1501	AST 3851-2001	AGG 3711-AC2*
Thermal Guard BE	On request	On request	AST 3851-101	AST 3851-1501	AGG 3711-AC2*	
DA	On request	On request	AST 3851-101	AST 3851-1501	AGG 3711-AC2*	
DB	On request	On request	AST 3851-101	AST 3851-1501	On request	
S	On request	On request	On request	AST 3851-1501	On request	

3 µm ASTRA [®] all dimensions in mm						AGG Guard System
Phase	50 × 3.0	100 × 3.0	150 × 3.0	200 × 3.0	250 × 3.0	2.1 mm Cartridges
C18-BE	AST 3751-400	AST 3751-100	AST 3751-150	AST 3751-200	AST 3751-250	
C18-B2	AST 3851-400	AST 3851-100	AST 3851-150	AST 3851-200	AST 3851-250	AGG 3711-AC2*
C18-B2S	On request	On request	On request	AST 3851-200	AST 3851-250	AGG 3711-AC2*
Thermal Guard BE	On request	AST 3851-100	On request	AST 3851-200	AST 3851-250	
DA	On request	AST 3851-100	AST 3851-150	AST 3851-200	AST 3851-250	
DB	On request	On request	AST 3851-150	On request	On request	

3 µm ASTRA [®] all dimensions in mm						AGG Guard System
Phase	50 × 4.6	100 × 4.6	150 × 4.6	200 × 4.6	250 × 4.6	2.1 mm Cartridges
C18-BE	AST 3751-400	AST 3751-100	AST 3751-150	AST 3751-200	AST 3751-250	AGG 3711-AC2*
C18-B2	On request	AST 3851-100	AST 3851-150	AST 3851-200	AST 3851-250	AGG 3711-AC2*
C18-B2S	On request	AST 3851-100	AST 3851-150	On request	AST 3851-250	AGG 3711-AC2*
DB-B	On request	On request	AST 3851-150	On request	AST 3851-250	
Thermal Guard BE	On request	On request	AST 3851-100	On request	AST 3851-250	
DA	On request	AST 3851-100	AST 3851-150	On request	AST 3851-250	
DB	On request	On request	AST 3851-150	AST 3851-200	On request	

3 µm ASTRA [®] all dimensions in mm						AGG Guard System
Phase	30 × 2.1	30 × 2.1	50 × 3.0	100 × 3.0	150 × 3.0	2.1 mm Cartridges
C18-BE	AST 3751-7521	AST 3751-1021	AST 3751-1030	AST 3751-1530	AST 3751-1530	AGG 3711-BE2*
C18-B2	On request	AST 3851-1021	On request	AST 3851-1530	AST 3851-1530	AGG 3711-BE2*
C18-B2S	On request	On request	On request	AST 3851-1530	AST 3851-1530	AGG 3711-BE2*
DB-B	On request	On request	On request	AST 3851-1530	On request	AGG 3711-BE2*
Thermal Guard BE	On request	On request	On request	On request	On request	AGG 3711-BE2*
DA	On request	AST 3751-1021	On request	AST 3751-1530	AST 3751-1530	AGG 3711-BE2*
DB	On request	On request	On request	AST 3851-1530	On request	On request

* AGG Guard System cartridges require the column guard cartridge to be used. The column is equipped with a stainless steel frit and a stainless steel frit support.
 † 100 × 3.0 mm cartridge specifications are not applicable for the 3 µm ASTRA column.

Ordering information

Analytical columns

5 µm ASTRA® all dimensions in mm		AGC Guard Screen
Phase	200 × 4.6	4.6 mm Cartridges
C18-B	On request	AGC-5780-B2A*
C18-H	On request	AGC-5780-H2A*
C18-B2	AGC-5875-B2B	AGC-5780-B2A*
C8-B	AGC-5885-B2B	AGC-5780-B2A*
C8-B2	AGC-5895-B2B	AGC-5780-B2A*
Phenyl-Hept-EC	On request	AGC-5780-E2A*
HA	On request	AGC-5780-H2A*
DA	On request	On request
U	AGC-5875-B2B	AGC-5780-B2A*

5 µm ASTRA® all dimensions in mm		AGC Guard Screen				
Phase	30 × 4.6	50 × 4.6	100 × 4.6	150 × 4.6	250 × 4.6	4.6 mm Cartridges
C18-B	AGC-5772-B2B	On request	AGC-5772-B2B	AGC-5772-B2B	AGC-5772-B2B	AGC-5780-B2A*
C18-H	On request	On request	AGC-5882-B2B	AGC-5882-B2B	AGC-5882-B2B	AGC-5780-B2A*
C18-B2	On request	On request	AGC-5875-B2B	AGC-5875-B2B	AGC-5875-B2B	AGC-5780-B2A*
C8-B	On request	On request	On request	AGC-5884-B2B	AGC-5884-B2B	AGC-5780-B2A*
C8-B2	On request	On request	On request	AGC-5895-B2B	AGC-5895-B2B	AGC-5780-B2A*
Phenyl-Hept-EC	On request	On request	AGC-5887-B2B	AGC-5887-B2B	AGC-5887-B2B	AGC-5780-B2A*
HA	On request	On request	AGC-5872-B2B	AGC-5872-B2B	AGC-5872-B2B	AGC-5780-B2A*
DA	On request	On request	AGC-5882-B2B	AGC-5882-B2B	AGC-5882-B2B	On request
U	On request	On request	On request	AGC-5882-B2B	AGC-5882-B2B	AGC-5780-B2A*

* AGC Guard-screening columns require AGC order form AGC-5772-B2B. The order is supplied with a number of seal discs (see AGC-5772-B2B) for all AGC columns. For applications, go to www.agilent.com or contact your local Agilent representative.

5 µm ASTRA® all dimensions in mm		Guard columns
Phase	200 × 3.2	30 × 3.2
Super C18-B	AGC-5885-B2B	AGC-5885-B2C
Super H-C	On request	AGC-5885-B2C

5 µm ASTRA® all dimensions in mm		Guard columns
Phase	200 × 3.2	30 × 3.2
Super C18-B	AGC-5885-B2B	AGC-5885-B2C
Super H-C	AGC-5887-B2B	AGC-5885-B2C
Super E-C	On request	On request
Super Na-C	On request	On request

5 µm ASTRA® all dimensions in mm		
Phase	200 × 2.1	250 × 4.6
C18-B	AGC-5882-B2C	AGC-5780-B2B
C18-H	On request	



ASTRA® Super guard column



As ARION® is one of the most sought after stationary phases, so it is also the best workhorse for your applications. Explore our portfolio of ARION® HPLC columns. What advantages does this column bring to you?

- Strict quality control of alkaline and metal content during the silica gel production
- Narrow particle size and pore size distribution
- Unique production process ensuring high lot-to-lot reproducibility
- Good stability at higher temperatures



ARION® Silicagel

Parameter	3 µm	5 µm
Material composition	<1% organics	<1% organics
Temperature stability	100 °C	100 °C
Mean particle diameter	3.3 ± 0.05 µm	5.3 ± 0.05 µm
Particle size distribution	0.95 ± 0.04	0.97 ± 0.02

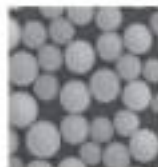
* Based on particle size and pore size analysis

ARION® phase	Particle size (µm)	Pore size (Å)	Surface area (m ² /g)	Carbon content	Reproducibility	Shrinkage	100% equivalent mobile phase	120% code
Fluor 118	1.2, 2.2, 3.5, 5, 10, 15	100	500	10%	1.0 to 1.5	Shrinkage	n	11
Fluor 118T	1.2, 3.5, 5, 10, 15	120	520	10%	1.0 to 1.7	Shrinkage	✓	11
118	3.5	120	520	11%	1.0 to 1.7	Single dose	n	11
Agarose	3.5	100	520	12%	2.0 to 1.5	Preparatory	✓	11
Phenyl 100	1.2, 3.5	100	500	12%	1.5 to 1.5	Single dose	n	11
100	5	100	480	14%	1.0 to 1.5	Single dose	✓	10
101	1.2, 3.5	120	520	9%	2.0 to 0.5	Preparatory	n	10
111	3.5, 10	120	520	8%	2.0 to 1.7	Single dose	n	11
111C Rep	1.2, 3.5	100	480	—	1.0 to 1.7	Preparatory	✓	10
11	1.2, 3.5, 10	100	420	—	1.0 to 1.7	—	n	11
103	5	120	520	—	1.0 to 1.5	—	n	11
103	5	120	520	—	1.0 to 1.5	—	n	10

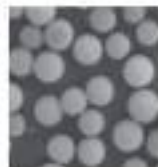
* Unrepresentative for some real practical situations.

What does ARION® quality look like?

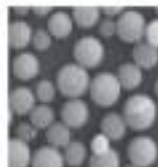
ARION® particles have a very tight distribution and the closest proximity to the shape of a spherical particle ($\phi = 0.9618 \pm 0.025$). This ensures high separation power and consistent reproducibility.



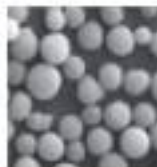
ARION®



Competitor A



Competitor B



Competitor C

SEM-TO analysis 20.0 kV, resolution 30 µm (by independent laboratory)

The ARION® medium does not include broken or 'isolate shaped' particles. The silica spherical shape is unique, both surface uniformity and surface smoothness, enable better packing into HPLC columns and therefore paramount chromatography resolution and reproducibility.

Up close

The 5-micron electron microscope field clearly shows the highest quality of ARION® 5µm particles.



ARION® particle 5 µm



Competitor 5 particle 5 µm



Competitor X particle 5 µm



Competitor 2 particle 5 µm

Main particle characteristics:

- The closest geometry to a sphere
- Unique surface smoothness shown in the pictures above
- Tight particle size distribution
- No doublets/quadruplets
- No presence of fractured particles
- No 'fish tail' defects or 'mushrooms'

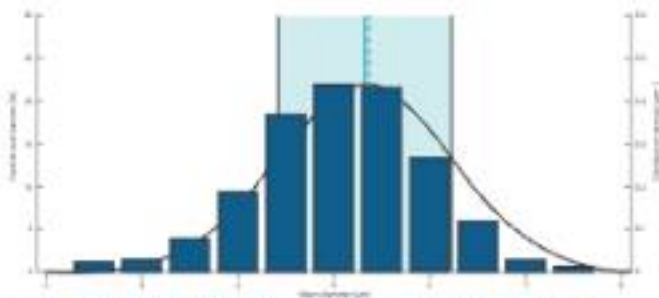
Particle size distribution



ARION® particle 1.3 µm



ARION® particle 2.2 µm

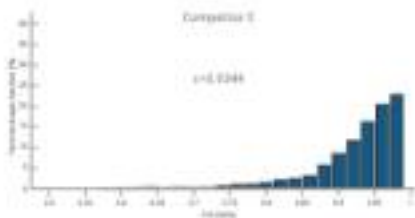
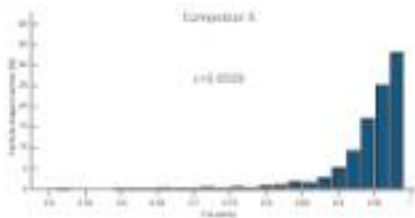
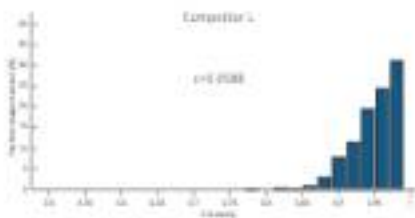
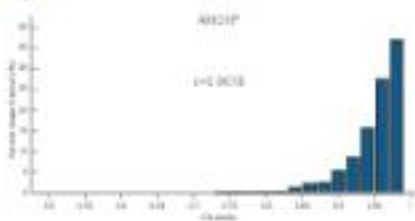


Particle size distribution of ARION® 5 µm particles (shown as a light profile extracted from cluster figures by SEM)

ARION® column hardware

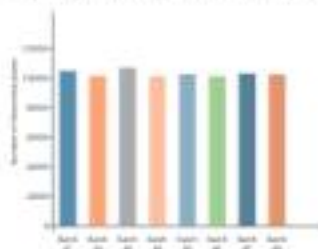
- Modern column hardware for easy handling in a narrow space
- UHPLC grade Stainless Steel with an amazingly smooth internal surface
- Colour coded fittings

Circularity



Batch to batch reproducibility

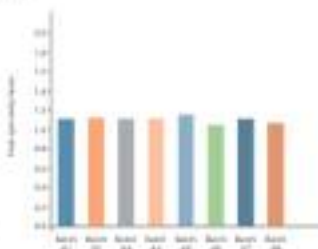
Batch to batch reproducibility is shown in the bar charts below. The oil as batches are strictly controlled and checked for symmetry and efficiency (number of theoretical plates/meter).



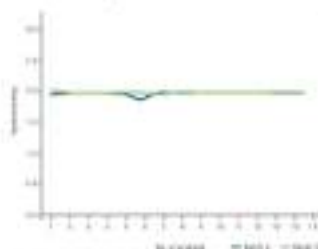
Theoretical plates reproducibility

Both the column activity and hydrophobicity tests are well testing by the Engelman test. The hydrophobicity test is based on calculation of the ratio of retention factors $k_{\text{ret, non-polar}}/k_{\text{ret, polar}}$. The top picture of the Engelman test shows a comparison of 2 batches to 10 HPLC columns for 10 replicates.

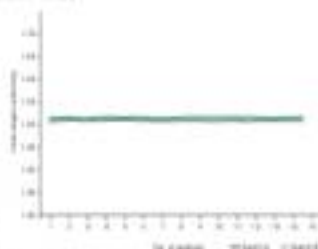
Peak shape sensitivity is based on a calculation of ratio of $k_{\text{ret, non-polar}}/k_{\text{ret, polar}}$.



Symmetry reproducibility

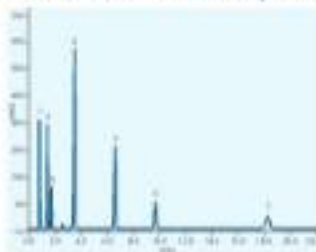


Hydrophobicity test



Peak shape sensitivity

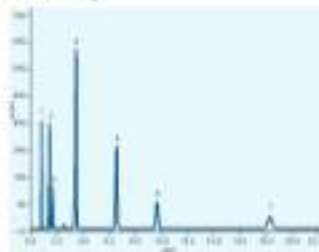
Batch to batch reproducibility



Batch A

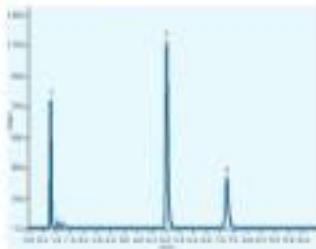
Analysis of two batches based on the SinglePoint test.

Column	ARION Plus C18 1 Tyto
Dimensions	100 mm x 2.1 mm
Mobile phase	99.999% water / 0.001% acetic acid
Flow rate	0.3 mL/min
Temperature	40 °C



Batch B

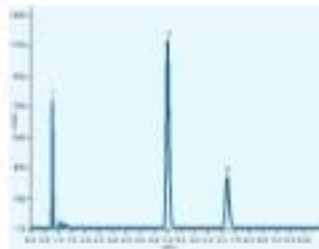
Analyses	1. 1,3-bis(4-chlorophenyl)propane 2. Aniline 3. Phenol 4. N,N-dimethylacetamide 5. p-toluenesulfonic acid 6. Toluene 7. Ethylbenzene
----------	--



Batch A

Analysis of two batches based on the SinglePoint test.

Column	ARION Plus C18 1 Tyto
Dimensions	100 mm x 2.1 mm
Mobile phase	99.999% water / 0.001% acetic acid
Flow rate	0.3 mL/min



Batch B

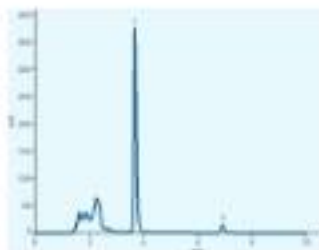
Temperature	40 °C
Analyses	1. 1,3-bis(4-chlorophenyl)propane 2. p-toluenesulfonic acid 3. m-Toluenesulfonic acid

Alcaloids – xanthine derivatives

Xanthine alkaloids occur naturally in various plants, such as cocoa, tea and coffee beans. They are commonly used for their effects as mild stimulants. Xanthine alkaloids are representative food and drinks, e.g. in chocolate, cocoa powder, and energy drinks.



Theophylline and caffeine standard



Cocoa sample

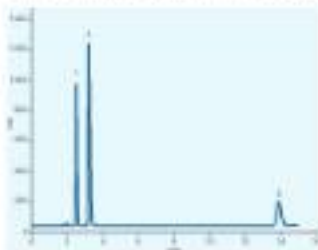


Energy drink

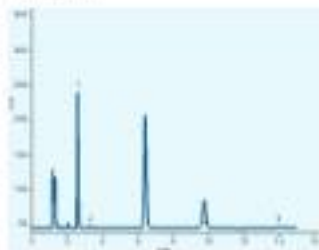
Column	ARION® RP-C18 150 µm
Dimensions	250 mm x 4.6 mm
Part number	AR1001 2500
Mobile phase	Isocratic acid solution
Flow rate	1.0 mL/min
Temperature	20 °C
Detection	UV 220 nm
Analytes	1. Theophylline 2. Caffeine

Non-nutritive sweeteners

Low-calorie sweeteners are commonly used worldwide in the food and drink industry. The list of approved sweeteners varies from country to country. The most common method used to monitor these highly consumed products involves high performance liquid chromatography (HPLC or UHPLC).



Standard mixture



Sample drink

Column	ARION HPLC 150/5 µm
Dimensions	250 mm x 4.6 mm
Part number	AR-5701049
Mobile phase	20 mM NH ₄ F ₂ / ACN 90/10 v/v
Flow rate	1.5 mL/min
Temperature	30 °C
Detection	UV 210 nm
Analyte	1. Acesulfame-K (ACS-K) 2. Saccharin (SAO) 3. Aspartame (ASP)

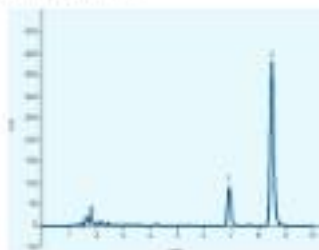
Preservatives in syrup

Sorbic and potassium salts of sorbic acid and benzoic acid are well known food preservatives. The permitted amount in food is strictly regulated with the level depending on the food group. As an example, European regulation (EC) 1831/2003 sets the rules on food additive definitions, conditions of use, labelling and procedures.



Standard mixture

Column	ARION® HPLC 150 µm
Dimensions	250 mm x 4.6 mm
Part number	AR-CT011046
Mobile phase	70% water / 30% ACN (acidic) 7000/3000 µg

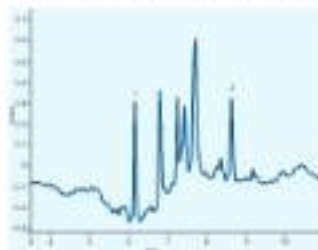


Fruit syrup sample

Flow rate	1.0 mL/min
Temperature	30°C
Detection	UV 254 nm
Analytes	1. Sorbic benzoate 2. Potassium sorbate

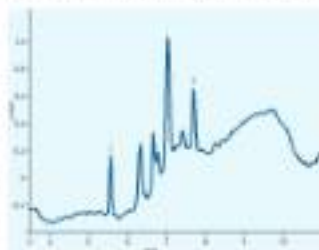
Preservatives in fats and oils

BHA is used as an antioxidant and preservative in food, animal feed, cosmetics and in rubber and petroleum products. BHT is also used as a preservative and, additionally, as a dietary supplement. BHA is generally recognised as being safe for use in food if the total amount does not exceed 0.02 % by wt or 0.024 % is suspected of being a human carcinogen.



BHA standard on ARION® column

Column	ARION® HPLC 150 µm
Dimensions	250 mm x 4.6 mm
Part number	AR-CT011046
Mobile phase	70% water / 30% ACN (acidic) 7000/3000 µg

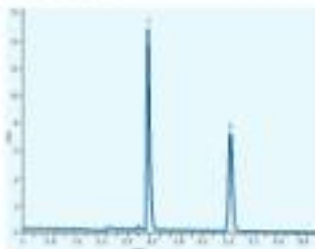


BHA standard on competition column (Competitor L)

Flow rate	Flowrate
Temperature	Temperature
Detection	UV 254 nm (approx.)
Analytes	1. BHA 2. BHT

Organic acids

The identification and quantitative analysis of major organic acids in fruits and vegetables is considered very important for the food and beverage industry. Organic acids play a significant role thanks to their influence on flavor, stability and keeping quality. Organic acids are generated during the aerobic oxidation of carbohydrates, proteins and fats in most biological systems.

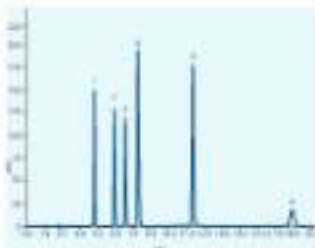


Standard Mixture

Column	ARION® Plus C18 3.0 µm
Dimensions	250 mm x 4.6 mm
Part number	AR15 31 0006
Mobile phase	0.05M H ₂ PO ₄
Flow rate	1.0 mL/min
Temperature	30 °C
Detection	UV 210 nm
Analytes	1. Lactic acid 2. Acetic acid

Drink additives

This application shows the separation of three groups of compounds in parallel: sun-routine preservatives, preservatives (organic acids) and synthetic derivatives.



Standard Mixture

Column	ARION® Plus C18 3.0 µm
Dimensions	250 mm x 4.6 mm
Part number	AR1533 0006
Mobile phase	Acetic acid: methanol: 12:88 (v/v) pH 4.0, 0.1 mol/L NaCl + pH 4.0 gradient across 10 minutes
Temperature	30 °C
Detection	UV 210 & 220 nm
Analytes	1. Acesulfame-K 2. Benzoic acid 3. Saccharin 4. Sorbic acid 5. Caffeine 6. Aspartame

* Gradient program

Time (min)	Flow rate (µL/min)	Wavelength (nm)	A (%) Water	B (%) 17.5 mmol KH ₂ PO ₄	C (%) Acetic acid	D (%) Methanol
0	1.0	220	0	98	2	0
7	1.0	210	0	98	0	12
18	1.0	210	0	98	0	12
19	1.0	210	0	98	2	0
37	1.0	210	0	98	2	0

Vitamins A and E

Fat soluble vitamins are monitored not only in patient's samples, but are also the subject of quality control in various food and dietary supplements.

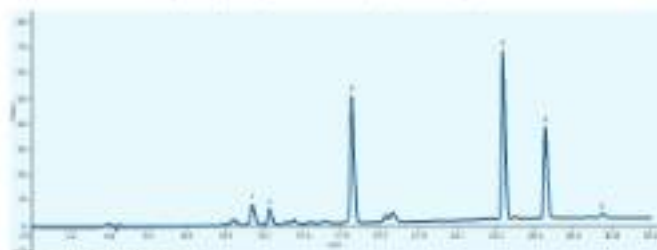


Standard on ARION® column

Column	ARION® Plus C18, 3µm		
Dimensions	100 mm x 4.6 mm		
Part number	J.B. CTC0188		
Mobile phase	A: Water B: Methanol		
Gradient elution	Time	A (%)	B (%)
	0	15	85
	10	0	100
	15	0	100
Flow rate	1.0 mL/min		
Temperature	40 °C		
Injection volume	0.2 µL		
Detection	UV 325 nm		
Analyte	1. Retinol (Vitamin A) 2. Delta-tocopherol (α-Vitamin E) 3. Gamma-tocopherol (Vitamin E γ) 4. Alpha-tocopherol (Vitamin E α) 5. Alpha-Triphosphatide (Vitamin E acetate)		

Wheat pigments

This application has been developed by ALGOTEC, the Institute of Metrology of the Academy of Sciences, Czech Republic. Chlorophylls and carotenoids are essential cofactors for oxygenic photosynthesis. As the content and distribution of individual pigments are very significantly in plant leaves a function of different environmental conditions, the quantification of pigments is important for understanding plant physiology, but also for food-quality monitoring.

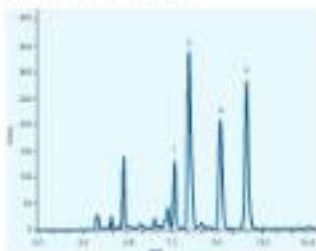


Wheat extract on ARION column

Column	ARION 150, 5 µm
Dimensions	250 mm x 4.6 mm
Part number	AR 5730-1-000
Mobile phase	A: Methanol, Acetonitrile, DMSO gradient 50/50/0 to 0/0/100 B: Methanol, Acetonitrile, Acetone 20/60/20 to 0/0/100
Gradient	linear gradient of solvent B 90-100% in 20 min, subsequently 100% solvent B
Flow rate	0.8 mL/min
Temperature	40 °C
Detection	DAD 260 nm
Analysis	1. Neoxanthin 2. Xanthoxanthin 3. Lutein 4. Chlorophyll b 5. Chlorophyll a 6. β-Carotene

Bitter acids in hop

Alpha-bitter acids are precursors of iso-alpha-bitter acids that are formed during the brewing process. They are present in hops (Humulus lupulus L.) and their content depends on plant variety and growing conditions. Iso-alpha-bitter acids give an appreciable bitter taste to the beer.

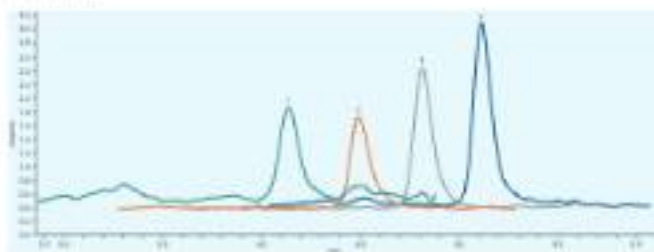


Alpha- & beta-acids in hop sample

Column	ARION® HPLC column
Dimensions	250 mm x 4.6 mm
Part number	AR1021-0000
Mobile phase	water / water + propionic acid 80/20 (v/v/v)
pH	4.00 ± 0.02
Flow rate	1.0 mL/min
Temperature	40 °C
Detection	UV 214 nm
Analyses	1. α-Acids 2. β-Acids 3. α-Acids 4. β-Acids

Aflatoxins by LC/MS

Aflatoxins are Group 1 carcinogens and are a natural product of fungi. Mycotoxins are monitored worldwide and allowed concentration limits depend not only on the territory, but also on the food/feed matrix and are given by local administrations.

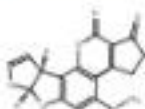


Green diet – test method on ARION® column

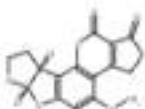
Column	ARION® HPLC 150 x 2.1 µm	
Dimensions	100 mm x 2.1 mm	
Part number	AR-0101-001	
Mobile phase	A: 5 mM ammoniumacetate 10:90 B: formic acid C: dichloromethane 10:90 formic acid	
Gradient elution	Time	φ (%)
	0.0	30
	0.5	30
	8.0	0
	10.0	0
	10.0	30
Flow rate	1.0 mL/min	
Temperature	30 °C	
Analyses	1. Aflatoxin B1 2. Aflatoxin B2 3. Aflatoxin G1 4. Aflatoxin G2	

MS method:

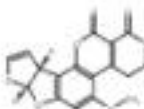
Compound Name	Precurser Ion	Product Ion	Collision energy
Aflatoxin B1	313.07	283.9	22
Aflatoxin B1	313.07	241.9	45
Aflatoxin B2	313.05	283.9	22
Aflatoxin B2	313.05	250	22
Aflatoxin G1	329.07	292.9	22
Aflatoxin G1	329.07	183.9	52
Aflatoxin G2	329.08	292.9	22
Aflatoxin G2	329.08	183.9	42



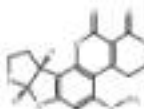
Aflatoxin B1



Aflatoxin B2



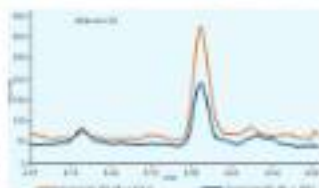
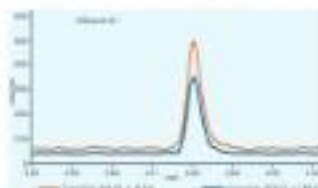
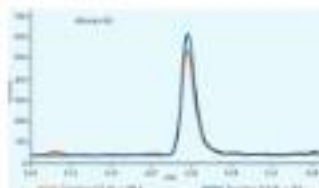
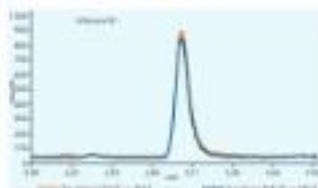
Aflatoxin G1



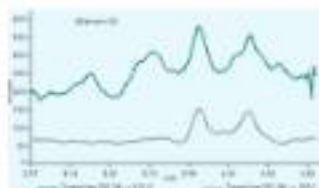
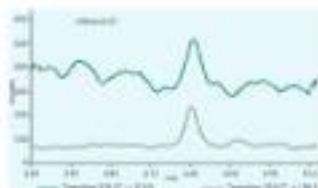
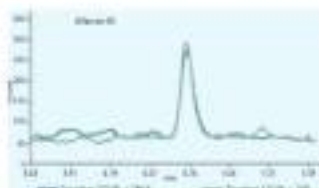
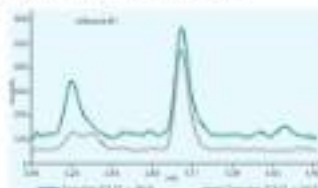
Aflatoxin G2

Aflatoxins by LC/MS

This page shows analyses of peanuts and flaxseeds



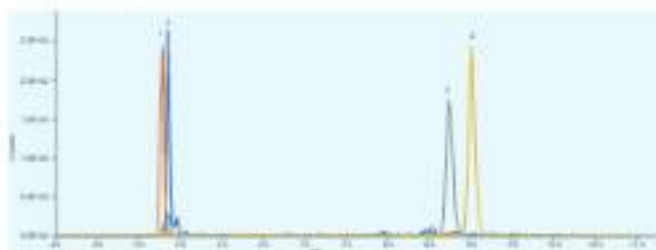
LC/MS analyses of aflatoxins in flax seeds



LC/MS analyses of aflatoxins in peanuts

Vitamin D in dry blood spot

Vitamin D is a group of steroids that have various effects on the human body and support the immune system. This application shows LC/MS/MS separation of the hydroxylated and non-hydroxylated forms of vitamin D2 and vitamin D3. The amount of their hydroxylated forms determines the total vitamin D in a blood sample. Non-hydroxylated forms of vitamin D2 and vitamin D3 are important for food analysis. The LC/MS/MS chromatogram shows the separation of all the above-mentioned analytes.



Standard mixture on ARION® column

Chromatography method:

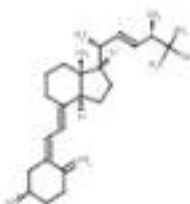
Column	4.8 µm PFP 150 x 2.2 mm		
Dimensions	100 mm x 2.2 mm		
Part number	4.8-1120-001		
Mobile phase	A: 10 mM formic acid B: 100% MeCN		
Gradient elution	Time	A (%)	B (%)
	4.5	95	5
	2.5	5	95
	7.5	5	95
	1.1	95	5
	12.0	90	10
Flow rate	0.4 mL/min		
Temperature	30 °C		
Injection volume	10 µL		
Detection	MS/MS/MS		
Analytes	1. 25-OH-Vitamin D3		
	2. 25-OH-Vitamin D2		
	3. Vitamin D2		
	4. Vitamin D3		

Vitamin D in dry blood spot

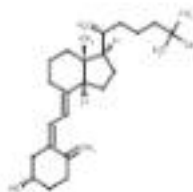
MS method:

Ionisation	Electron spray		
Carrier gas	Nitrogen		
MS detection	Analysis	Q1 (Da)	Q3 (Da)
	25-OH Vitamin D2	411.32	593.46
	25-OH Vitamin D3	431.32	613.46
	Vitamin D2	385.32	573.46
	Vitamin D3	385.32	593.46
Scan time	100 ms		

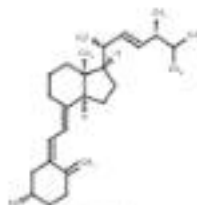
The acquisition was done using the ScanAss



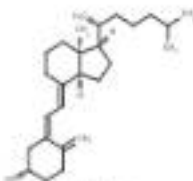
25-OH Vitamin D2



25-OH Vitamin D3



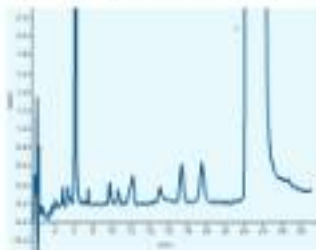
Vitamin D2



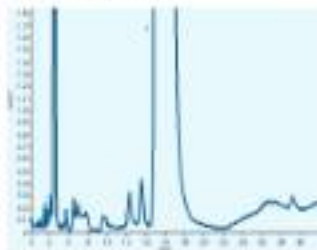
Vitamin D3

Pharmaceutical drugs

Penicillin is a well known antibiotic discovered by Alexander Fleming, which was isolated from the mold *Penicillium notatum*. This application shows better separation of impurities in pharmaceutical production.



Separation on ARION P column

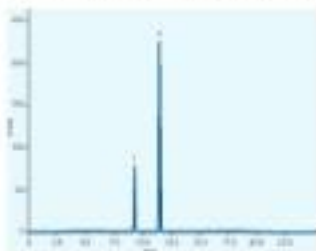


Separation on competitive column (Competitor LD)

Column	ARION P 150 x 4.6 mm
Dimensions	250 mm x 4.6 mm
Part number	28-CTO-LAB
Mobile phase	Isocratic elution (gradient)
Flow rate	1.2 mL/min
Detection	UV 220 nm
Analyte	Penicillin

Ipidacrine

Ipidacrine is a long-acting anticholinergic produced for the treatment of motor disorders caused by various diseases. It was first synthesized by the National Research Centre for Biotechnology (Bioscience Division).

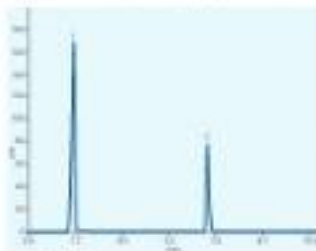


Standard mixture

Column	ARION Plus C18, 150mm
Dimensions	250x4.6x4.0mm
Part number	AR1121-0100
Mobile phase	Propylene
Flow rate	0.5ml/min
Temperature	40°C
Detection	UV
Analysis	1. Ipidacrine 2. Ipidacrine

Ibuprofen

Ibuprofen is a substance from a group of non-steroidal anti-inflammatory drugs. In order for the drug release to be targeted on the basis of pH change (pH-dependent release for up to 30 days), binding to a polymer carrier is used.

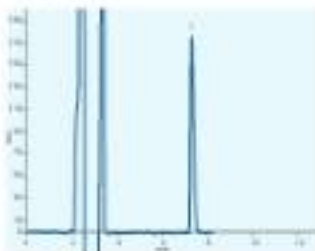


Standard mixture

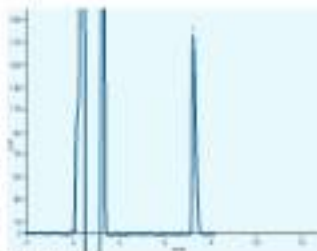
Column	ARION Plus C18, 150mm
Dimensions	250x4.6x4.0mm
Part number	AR1121-0100
Mobile phase	A: 0.1M HCl, 0.1M NaCl B: 0.1M HCl, 0.1M NaCl C: 0.1M HCl, 0.1M NaCl
Flow rate	1.2ml/min
Temperature	40°C
Detection	UV
Analysis	1. Ibuprofen in polymer carrier 2. Ibuprofen

Pharmaceutical drugs

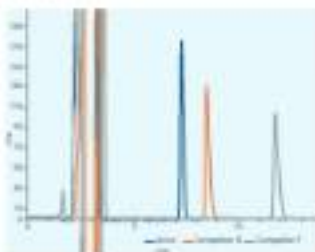
Tamoxifen hydrochloride is used to treat the symptoms of an enlarged prostate. Tamoxifen hydrochloride is an alpha blocker which is used to treat the symptoms of an enlarged prostate by relaxing the muscles of the prostate and bladder. Tamoxifen is sold under various trade names, e.g. Flomax, Irtava, Cystoflo, etc. Prostatid BR, Tamisil and Fokusan. Shown below is a chromatogram of the determination of the tamoxifen hydrochloride content according to the proprietary method.



Standard solution



Drug sample

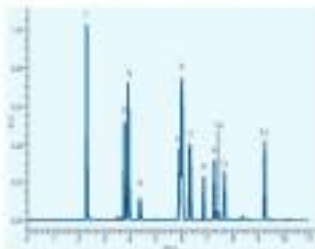


Comparison of fatty acid samples

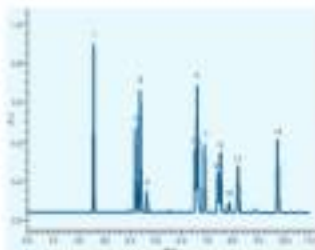
Column	ARION Plus C18 150µm
Dimensions	250mm x 4.6mm
Part number	AR1121-0000
Mobile phase	Acetonitrile / water 50:50
Flow rate	1.2 mL/min
Temperature	30°C
Detection	UV 254 nm
Analyses	1. Tamoxifen hydrochloride

Fluorinated compounds

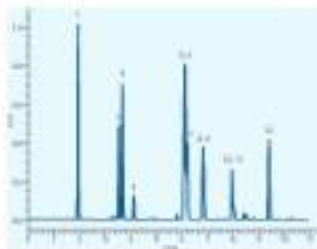
This application shows the ARION® column overcomes a co-elution of two critical pairs of 3-fluoro- and 4-fluoro compounds. Separation of these compounds is problematic in general.



Sample on ARION column



Sample on Competitive hybrid column F1

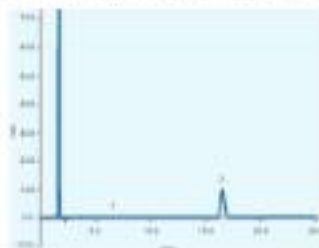


Sample on Competitive hybrid column F2

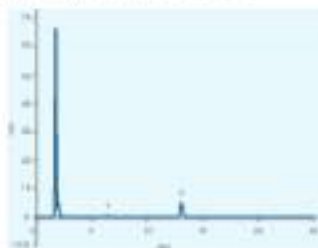
Column:	ARION® Plus C18 200 µm		
Dimensions:	150 mm x 4.6 mm		
Part number:	AR1721 200		
Mobile phase:	A: 0.1% formic acid phosphate buffer of formic acid in 1000 mg of 50-50 water B: ACN		
Gradient elution:	Time	A (%)	B (%)
	0	95	5
	2	25	75
	10	5	95
	14	5	95
	14.7	95	5
	15.5	95	5
Flow rate:	1.0 ml/min		
Temperature:	30 °C		
Detection:	UV 254 nm		
Analytes:	1: 3-fluoro compound 2: 3-fluoro compound 3: 4-fluoro compound 4: 4-fluoro compound 5: 3-fluoro compound 6: 3-fluoro compound 7: 4-fluoro compound 8: 4-fluoro compound 9: 3-fluoro compound 10: 4-fluoro compound All other compounds are confidential.		

Veterinary drugs

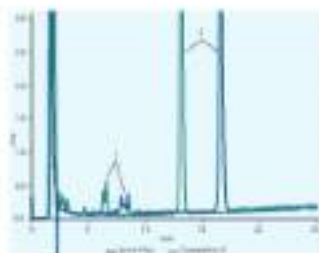
Trimethoprim hydrogen fumarate is a synergistic drug with an antibacterial effect. It is used to treat animal diseases, such as canine distemper (caused by *Dist. Canine Hydropericulis*), canine pneumonitis or *Myxoplasma* arthritis. Trimethoprim is also used for the prevention and treatment of chronic respiratory diseases in domestic chickens and turkeys.



Sample – 20 ppm on ARION® column



Sample – 20 ppm on competitive column -
(Comparison 1)

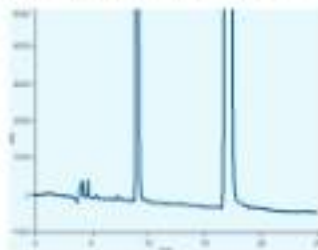


Detailed view on competitive

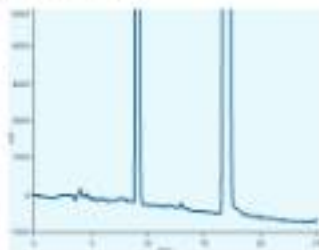
Column	ARION Blue C18 150µm
Dimensions	250mm x 4.6 mm
Part number	AR1015-0000
Mobile phase	Confidential laboratory method MSD Lab. Pharmaceutical [0011-0011-00]
Analysis	1. Impurities 2. Trimethoprim hydrogen fumarate

Veterinary drugs

Trimethoprim and Sulfamethoxazole are veterinary drugs used to treat animals of various species with gastrointestinal and respiratory tract infections. This drug is used to diagnose of various species of animals.



Standard on ARION® column



Drug sample

Column	ARION Plus C18, 5 µm
Dimensions	250 mm x 4.6 mm
Port number	46 (TIC/LAB)
Mobile phase	1.16 TFA - 98.84 H ₂ O 80/20 (v/v)
	isocratic and 100
Flow rate	1.0 mL/min
Temperature	40 °C
Detection	254 nm UV
Analysis	1. Trimethoprim 2. Sulfamethoxazole sodium

Opioids and Tramadol and their metabolites by LC/MS

This application shows the LC/MS method for the most common opioids and their metabolites analyzed by toxicological labs.

Substances

Codaine

CA Number: 26229

Worphine

CA Number: 21273

4-O-Acetylmorphine

CA Number: 2784734

Morphine-4-glucuronide

CA Number: 22293262

Expiromorphine

CA Number: 24897957

Dihydrocodeine

CA Number: 284294

Pecaxyl

CA Number: 433387

Acetylheroin

CA Number: 323344

Naloxone

CA Number: 400886

Nalmefene

CA Number: 10090403

Hydroxycodone

CA Number: 464494

Codeinophene

CA Number: 84113

Hydrocodone

CA Number: 233391

Acetylmorphine

CA Number: 3070234

Narceatide

CA Number: 407792

Herfentanyl

CA Number: 344441

Capacitine

CA Number: 35426

Desmethine Naloxone

CA Number: 37441

Tramadol

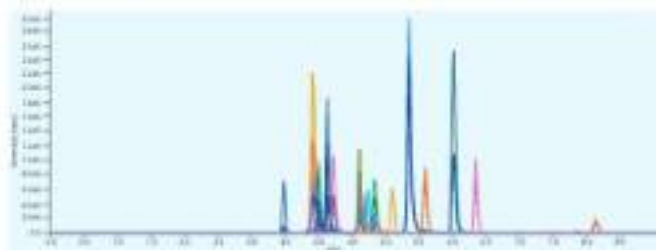
CA Number: 2724442

Methadone

CA Number: 35403

DDT

CA Number: 3024734



Standard mixture on ARION® column (50 mg/L)

Opioids and Tramadol and their metabolites by LC/MS

Column	4820P Plus C18, 5 µm
Dimensions	150 mm × 3.0 mm
Part number	48-0700-0100
Mobile phase	A: 1% ammonium formate in water B: 50% MeOH / 1% ammonium formate in water → ACM1000 (pH)

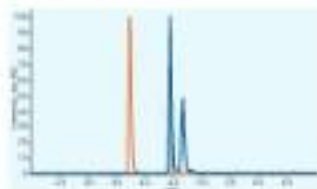
Gradient elution	Time	A (%)	B (%)
	0	100	0
	1	100	0
	4	70	30
	9	50	50
	14.1	100	0

Flow rate	0.3 mL/min
-----------	------------

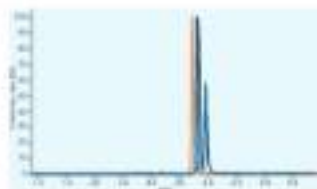
Temperature	30 °C
-------------	-------

Detection	MS/MS
-----------	-------

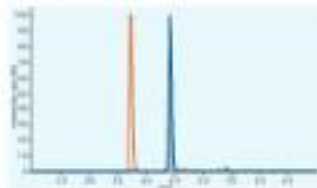
Analysis	See MS/MS method
----------	------------------



Cocaine (280.1 → 152.0)



Morphine (285.1 → 151.0)

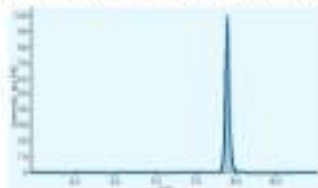


6-O-Acetylmorphine (285.1 → 151.0)

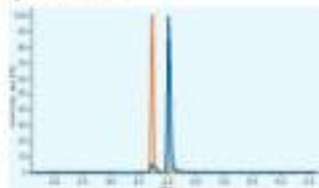


Morphine 6-glucuronide (462.1 → 290.2)

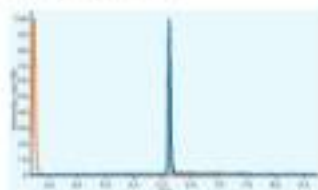
Opioids and Tramadol and their metabolites by LC/MS



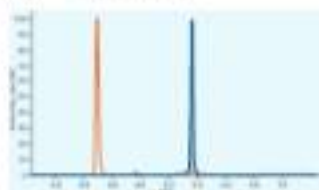
Buprenorphine (188.2 → 188.2)



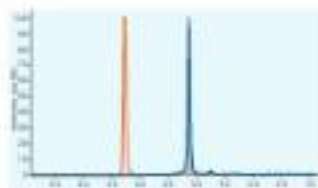
Dihydrocodeine (102.2 → 109.2)



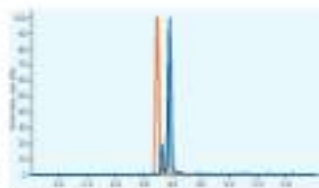
Fentanyl (117.2 → 115.1)



Naloxone (128.1 → 112.1)



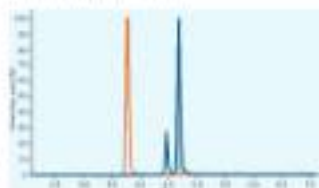
Naltrexone (142.5 → 167.2)



Hydrobuprenorphine (206.1 → 145.0)



Oxycodone (303.2 → 227.1)

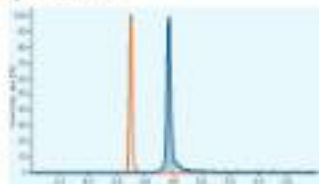


Hydrocodone (303.1 → 199.0)

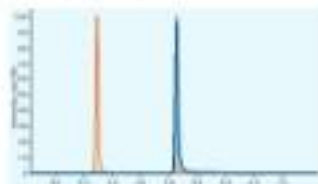
Opioids and Tramadol and their metabolites by LC/MS



Naloxone (386.1 → 112.0)



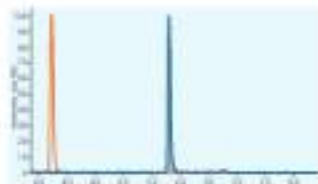
Oxycodone (318.1 → 241.1)



Naloxidine (Naloxone) (346.1 → 221.1)



Tramadol (264.1 → 98.1)



Metabolite (316.1 → 235.0)

Opioids and Tramadol and their metabolites by LC/MS

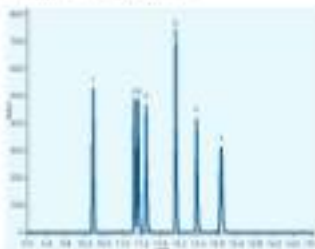
MS/MS method

Compound name	Precursor mass	Fragment mass	Type	Collision energy
Codeine	300.1	152.0	Quadrupole	35 eV
	300.1	167.1	Quadrupole	35 eV
Morphine	285.1	152.0	Quadrupole	35 eV
	285.1	167.1	Quadrupole	35 eV
3-O-Acetylmorphine	325.1	152.0	Quadrupole	35 eV
	325.1	167.1	Quadrupole	35 eV
Morphine-6-glucuronide	463.2	284.2	Quadrupole	35 eV
	463.2	300.1	Quadrupole	35 eV
Sufentanil	403.2	403.2	Quadrupole	35 eV
	403.2	419.0	Quadrupole	35 eV
Etorphine	312.2	199.2	Quadrupole	35 eV
	312.2	173.2	Quadrupole	35 eV
Fentanyl	317.2	199.2	Quadrupole	35 eV
	317.2	184.2	Quadrupole	35 eV
Alfentanil [†]	323.1	184.1	Quadrupole	35 eV
	323.1	199.1	Quadrupole	35 eV
Naloxone	331.1	212.1	Quadrupole	35 eV
	331.1	267.1	Quadrupole	35 eV
Nalmefene	402.1	387.0	Quadrupole	35 eV
	402.1	284.1	Quadrupole	35 eV
Naltrexone	285.1	152.0	Quadrupole	35 eV
	285.1	167.0	Quadrupole	35 eV
Oxycodone	313.0	227.1	Quadrupole	35 eV
	313.0	184.1	Quadrupole	35 eV
Hydrocodone	309.1	184.0	Quadrupole	35 eV
	309.1	152.0	Quadrupole	35 eV
Nalbuphine [†]	416.0	30.0	Quadrupole	35 eV
	416.0	84.0	Quadrupole	35 eV
Butorphanol	245.1	152.0	Quadrupole	35 eV
	245.1	167.0	Quadrupole	35 eV
Buprenorphine [†]	319.1	84.0	Quadrupole	35 eV
	319.1	167.1	Quadrupole	35 eV
Ergonovine	273.1	241.1	Quadrupole	35 eV
	273.1	256.1	Quadrupole	35 eV
Meperidine [†]	245.1	220.1	Quadrupole	35 eV
	245.1	173.0	Quadrupole	35 eV
Tramadol	255.1	167.1	Quadrupole	35 eV
	255.1	182.1	Quadrupole	35 eV
Metaxalone	273.1	258.0	Quadrupole	35 eV
	273.1	182.0	Quadrupole	35 eV
ECPP [†]	270.1	224.1	Quadrupole	35 eV
	270.1	167.1	Quadrupole	35 eV

[†] Not shown in this application.
For more details, see page 42.

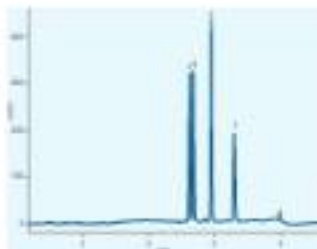
Cannabinoids

Cannabinoids have become more and more popular thanks to their health effects and the recreational use of their use. Analytical columns that can offer available results play an important role. The challenge is to achieve the separation of the critical pair – CB1 and CB2.



Standard on ARION® Flex C18 1.7 µm

Column	ARION® Flex C18 1.7 µm		
Dimensions	100 mm x 3.1 mm		
Part number	AR1101-001		
Mobile phase	A: MeOH B: Acetonitrile		
Gradient elution	Time	A (%)	B (%)
	0	95	5
	1	30	70
	5	30	70
	10	30	70
	12	30	70
	14	30	70
	16	30	70
Flow rate	1.2 mL/min		
Temperature	30°C		
Detection	DAD 192/210 nm		
Analysis	1. CB6 2. CB8 3. CB9 4. THCF 5. CB4 6. THC 7. CB2		



Fast method - standard on ARION® Flex C18 3.0 µm

Column	ARION® Flex C18 3.0 µm		
Dimensions	100 mm x 4.6 mm		
Part number	AR1101-004		
Mobile phase	A: Acetonitrile B: Water with formic acid 0.1%		
Gradient elution	Time	A (%)	B (%)
	0	95	5
	2.5	30	70
	2.8	100	0
	7.5	100	0
	8.5	30	70
	11.5	30	70
Flow rate	1.2 mL/min		
Temperature	30°C		
Injection volume	10 µL		
Detection	DAD 192/210 nm		
Analysis	2. CB6 3. CB9 5. CB8 6. CB4 7. CB2		

UHPLC and LC/MS columns

Phase	10 + 4.0	75 + 4.0	100 + 4.0	100 + 4.0	100 + 4.0
Time / h	100.17	100.17	100.17	100.17	100.17

Group	Age	Sex	Height (cm)	Weight (kg)	Body Mass Index (kg/m ²)	Waist Circumference (cm)	Hip Circumference (cm)	Waist-Hip Ratio
Female	44	F	158	68	27.2	90	105	0.86
Male	44	M	175	85	27.9	95	110	0.86

Entity	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
France	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Italy	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Spain	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
UK	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

*The use of a separate unit for the second unit is the same as the first unit.

Ordering information

Analytical columns

SpecARION® all dimensions in mm		ARION® Guard Cartridge*					
Phase		30 x 2.1	75 x 2.1	150 x 2.1	250 x 2.1	500 x 2.1	5 x 2.1
Plus C18	■	AR 5121-021	AR 5122-021	AR 5123-021	AR 5124-021	AR 5125-021	AR 5126-021
Plus C18	■	AR 5131-021	AR 5132-021	AR 5133-021	AR 5134-021	—	AR 5135-021
CB	■	AR 5126-021	AR 5127-021	AR 5128-021	AR 5129-021	—	AR 5130-021
Optima	■	AR 5141-021	AR 5142-021	AR 5143-021	AR 5144-021	—	AR 5145-021
Thermal Shield	■	AR 5128-021	AR 5129-021	AR 5130-021	AR 5131-021	—	AR 5132-021
TSI	■	AR 5126-021	AR 5127-021	AR 5128-021	AR 5129-021	—	AR 5130-021
TSI	■	AR 5132-021	AR 5133-021	AR 5134-021	AR 5135-021	—	—
Hi-C Plus	■	AR 5126-021	AR 5127-021	AR 5128-021	AR 5129-021	—	AR 5130-021
TS	■	AR 5126-021	AR 5127-021	AR 5128-021	AR 5129-021	—	AR 5130-021

SpecARION® all dimensions in mm		ARION® Guard Cartridge*					
Phase		30 x 3.0	75 x 3.0	150 x 3.0	250 x 3.0	500 x 3.0	5 x 3.0
Plus C18	■	AR 5121-030	AR 5122-030	AR 5123-030	AR 5124-030	AR 5125-030	AR 5126-030
Plus C18	■	AR 5131-030	AR 5132-030	AR 5133-030	AR 5134-030	AR 5135-030	AR 5136-030
CB	■	AR 5126-030	AR 5127-030	AR 5128-030	AR 5129-030	—	AR 5130-030
Optima	■	AR 5141-030	AR 5142-030	AR 5143-030	AR 5144-030	AR 5145-030	AR 5146-030
Thermal Shield	■	AR 5128-030	AR 5129-030	AR 5130-030	AR 5131-030	AR 5132-030	AR 5133-030
TSI	■	—	—	AR 5128-030	AR 5129-030	—	AR 5130-030
TSI	■	—	—	AR 5132-030	AR 5133-030	—	—
Hi-C Plus	■	AR 5126-030	AR 5127-030	AR 5128-030	AR 5129-030	—	AR 5130-030
TS	■	AR 5126-030	AR 5127-030	AR 5128-030	AR 5129-030	—	AR 5130-030

SpecARION® all dimensions in mm		ARION® Guard Cartridge*					
Phase		30 x 4.0	75 x 4.0	150 x 4.0	250 x 4.0	500 x 4.0	5 x 4.0
Plus C18	■	AR 5121-040	AR 5122-040	AR 5123-040	AR 5124-040	AR 5125-040	AR 5126-040
Plus C18	■	AR 5131-040	AR 5132-040	AR 5133-040	—	AR 5134-040	AR 5135-040
CB	■	AR 5126-040	AR 5127-040	AR 5128-040	—	AR 5129-040	AR 5130-040
Optima	■	AR 5141-040	AR 5142-040	AR 5143-040	—	AR 5144-040	AR 5145-040
Thermal Shield	■	AR 5128-040	AR 5129-040	AR 5130-040	—	AR 5131-040	AR 5132-040
TSI	■	AR 5126-040	AR 5127-040	AR 5128-040	—	AR 5129-040	AR 5130-040
TSI	■	AR 5132-040	—	AR 5133-040	—	AR 5134-040	—
Hi-C Plus	■	AR 5126-040	AR 5127-040	AR 5128-040	—	AR 5129-040	AR 5130-040
TS	■	AR 5126-040	AR 5127-040	AR 5128-040	—	AR 5129-040	AR 5130-040

* ARION® Guard Cartridge 500 x 2.1 mm and 500 x 3.0 mm are supplied without cartridge.
 † The use of guard column guard cartridge depends on the application. Please contact us.

Being a financial services provider

[illegible][illegible]

Spice-MS/MS ^a	MS/MS Score			
Peptide	125 + 0.0	126 + 0.0	127 + 0.0	128 + 0.0
Protein A	999.175 (1.0)	999.175 (1.0)	—	999.175 (1.0)
Protein B	—	999.175 (1.0)	—	999.175 (1.0)
C	—	999.175 (1.0)	999.175 (1.0)	999.175 (1.0)
D	999.175 (1.0)	999.175 (1.0)	999.175 (1.0)	999.175 (1.0)
E	999.175 (1.0)	999.175 (1.0)	999.175 (1.0)	999.175 (1.0)
F	999.175 (1.0)	999.175 (1.0)	999.175 (1.0)	999.175 (1.0)
G	—	999.175 (1.0)	—	999.175 (1.0)
H	—	999.175 (1.0)	—	999.175 (1.0)
I	—	999.175 (1.0)	—	999.175 (1.0)
J	—	999.175 (1.0)	—	999.175 (1.0)
K	—	999.175 (1.0)	—	999.175 (1.0)
L	—	999.175 (1.0)	—	999.175 (1.0)
M	—	999.175 (1.0)	—	999.175 (1.0)
N	—	999.175 (1.0)	—	999.175 (1.0)
O	—	999.175 (1.0)	—	999.175 (1.0)
P	—	999.175 (1.0)	—	999.175 (1.0)
Q	—	999.175 (1.0)	—	999.175 (1.0)
R	—	999.175 (1.0)	—	999.175 (1.0)
S	—	999.175 (1.0)	—	999.175 (1.0)
T	—	999.175 (1.0)	—	999.175 (1.0)
U	—	999.175 (1.0)	—	999.175 (1.0)
V	—	999.175 (1.0)	—	999.175 (1.0)
W	—	999.175 (1.0)	—	999.175 (1.0)
X	—	999.175 (1.0)	—	999.175 (1.0)
Y	—	999.175 (1.0)	—	999.175 (1.0)
Z	—	999.175 (1.0)	—	999.175 (1.0)

[†] Since the authors have not published the results of the 1994 survey, we cannot compare the results of the 1994 survey with the results of the 1992 survey.

^aThe use of all types of contraceptives depends on the individual. Please refer to:



Ordering information

Analytical columns

SymARION® all ARION columns		ARION Guard® Cartridge ¹				
Phase	120 × 4.0	150 × 4.0	150 × 4.0	250 × 4.0	5 × 4.0	
PLA C18	40-1720-140	40-1720-140	40-1720-140	40-1720-140	40-1720-140	
PLA C18	40-1720-140	40-1720-140	40-1720-140	40-1720-140	40-1720-140	
CR	40-1720-140	—	—	—	40-1720-140	
Symant	40-1720-140	40-1720-140	40-1720-140	40-1720-140	40-1720-140	
Phenyl Silyl	—	—	—	—	40-1720-140	
HT	40-1720-140	40-1720-140	40-1720-140	40-1720-140	40-1720-140	
HA	—	—	—	—	40-1720-140	
CR	—	—	—	—	40-1720-140	
MS/MS	—	40-1720-140	40-1720-140	40-1720-140	40-1720-140	
CR	—	40-1720-140	40-1720-140	40-1720-140	40-1720-140	
CR	—	—	40-1720-140	—	40-1720-140	

SymARION® all ARION columns		ARION® Guard Cartridge ¹				
Phase	100 × 4.0	125 × 4.0	150 × 4.0	250 × 4.0	5 × 4.0	
PLA C18	40-1720-140	40-1720-140	40-1720-140	40-1720-140	40-1720-140	
PLA C18	40-1720-140	—	40-1720-140	40-1720-140	40-1720-140	
CR	40-1720-140	40-1720-140	40-1720-140	40-1720-140	40-1720-140	
Symant	40-1720-140	40-1720-140	40-1720-140	40-1720-140	40-1720-140	
Phenyl Silyl	40-1720-140	—	40-1720-140	40-1720-140	40-1720-140	
HT	40-1720-140	40-1720-140	40-1720-140	40-1720-140	40-1720-140	
HA	40-1720-140	—	40-1720-140	40-1720-140	40-1720-140	
CR	40-1720-140	—	40-1720-140	40-1720-140	40-1720-140	
MS/MS	40-1720-140	—	40-1720-140	40-1720-140	40-1720-140	
CR	40-1720-140	—	40-1720-140	40-1720-140	40-1720-140	
CR	40-1720-140	—	40-1720-140	40-1720-140	40-1720-140	
CR	40-1720-140	—	40-1720-140	40-1720-140	40-1720-140	
CR	40-1720-140	—	40-1720-140	40-1720-140	40-1720-140	
CR	40-1720-140	—	40-1720-140	40-1720-140	40-1720-140	

Note: Other products are required.

1. ARION® Guard cartridge, ARION ARION® Guard cartridge, ARION ARION® Guard cartridge, ARION ARION® Guard cartridge.

2. The cartridge is a guard cartridge, not a cartridge, please contact us.

ARION® column test mixture 1 for RP columns

p/n AR-MIX-1

4 components in Acetonitrile/Water (70/30) 1 mL ampoule

Ureid	CAC-12-1	100 ng/mL
Acetophenone	CAC-12-1	100 ng/mL
Thiophene	CAC-12-1	1000 ng/mL
Acetophenone	CAC-12-1	1000 ng/mL

ARION® column test mixture 2 for DIOL/HLIC phases

p/n AR-MIX-2

3 components in Acetonitrile/Water

Acetophenone	CAC-12-1	100 ng/mL
Ureid	CAC-12-1	100 ng/mL
Thiophene	CAC-12-1	100 ng/mL

ARION® column test mixture 2

p/n AR-MIX-2

1 component in Acetonitrile/Water, 1 mL ampoule

Ureid	CAC-12-1	100 ng/mL
Acetophenone	CAC-12-1	1000 ng/mL
Thiophene	CAC-12-1	1000 ng/mL
Acetophenone	CAC-12-1	1000 ng/mL
Ureid	CAC-12-1	1000 ng/mL
Acetophenone	CAC-12-1	1000 ng/mL
Thiophene	CAC-12-1	1000 ng/mL

Ordering information

Semi-preparative and preparative columns

Spec. ARION® all dimensions in mm	ARION® Quant Cartridges					
Phase	250 × 10	250 × 21.2	250 × 21.2	250 × 21.2	250 × 21.2	
PLA C18	AR 5121-1011	AR 5121-1017	AR 5121-1017	AR 5121-1017	AR 5121-1017	PLA 1800-250**
PLA C18	AR 5121-1011	AR 5121-1017	AR 5121-1017	AR 5121-1017	AR 5121-1017	request*
Phenyl-Si	-	-	-	-	AR 5121-1017	request*
Si	AR 5121-1011	AR 5121-1017	AR 5121-1017	AR 5121-1017	AR 5121-1017	PLA 1800-250**

Preparative columns

Spec. ARION® all dimensions in mm	ARION® Quant Cartridges				
Phase	100 × 50	150 × 50	250 × 50	250 × 50	
PLA C18	AR 5121-1011	AR 5121-1017	AR 5121-1017	AR 5121-1017	request*
PLA C18	AR 5121-1011	AR 5121-1017	AR 5121-1017	AR 5121-1017	request*
Phenyl-Si	-	-	AR 5121-1017	AR 5121-1017	request*
Si	AR 5121-1011	AR 5121-1017	AR 5121-1017	AR 5121-1017	request*

* The cost of specialised gases and reagents is not included in this price list.

** The price of the cartridge includes a stainless steel cartridge holder (AR 5121-1011).



Semi-preparative column, 250 × 10 mm



Preparative column, 250 × 21.2 mm



Preparative column, 250 × 21.2 mm



Preparative column, 250 × 50 mm

Ordering information

Preparative columns

10 µm ARION® all dimensions in mm	ARION® Guard Cartridges				
Phase	100 × 4.0	200 × 4.0	100 × 10	200 × 10	
PLA C18	44-1710-PLA	44-1720-PLA	44-1730-PLA	44-1720-PLA	request*
PLA C18	44-1711-PLA	44-1721-PLA	44-1731-PLA	44-1721-PLA	request*
Si	-	-	-	44-1730-PLA	request*

10 µm ARION® all dimensions in mm	ARION® Guard Cartridges				
Phase	10 × 21.2	100 × 21.2	100 × 21.2	200 × 21.2	
PLA C18	44-1740-PLA	44-1750-PLA	44-1760-PLA	44-1750-PLA	request*
PLA C18	44-1741-PLA	44-1751-PLA	44-1761-PLA	44-1751-PLA	request*
Si	44-1740-PLA	44-1750-PLA	44-1760-PLA	44-1750-PLA	request*

10 µm ARION® all dimensions in mm	ARION® Guard Cartridges				
Phase	100 × 20	100 × 30	200 × 30	200 × 51	
PLA C18	44-1720-PLA	44-1730-PLA	44-1740-PLA	44-1730-PLA	request*
PLA C18	44-1721-PLA	44-1731-PLA	44-1741-PLA	44-1731-PLA	request*
Si	44-1720-PLA	44-1730-PLA	44-1740-PLA	44-1730-PLA	request*

* The cost of guard cartridges is dependent on the selected phase and the lot. It is not available on request for ARION® cartridges. In particular: PLG 100g, 1g.

Ordering information

Preparative columns

10 µm ARION® all dimensions in mm	ARION® Guard Cartridges				
Phase	100 × 4.0	200 × 4.0	100 × 10	200 × 10	
PLA C18	AR 1010-C18H	AR 1010-C18H	AR 1010-C18	AR 1010-C18H	Required
PLA C18	AR 1010-C18H	AR 1010-C18H	AR 1010-C18	AR 1010-C18H	Required

10 µm ARION® all dimensions in mm	ARION® Guard Cartridges			
Phase	100 × 21.2	100 × 21.2	100 × 21.2	200 × 21.2
PLA C18	AR 1010-C18H	AR 1010-C18H	AR 1010-C18H	AR 1010-C18H
PLA C18	AR 1010-C18H	AR 1010-C18H	AR 1010-C18H	AR 1010-C18H
PLA C18	AR 1010-C18H	AR 1010-C18H	AR 1010-C18H	AR 1010-C18H

10 µm ARION® all dimensions in mm	ARION® Guard Cartridges				
Phase	100 × 30	100 × 30	100 × 30	200 × 30	
PLA C18	AR 1010-C18H	AR 1010-C18H	AR 1010-C18H	AR 1010-C18H	Required
PLA C18	AR 1010-C18H	AR 1010-C18H	AR 1010-C18H	AR 1010-C18H	Required

ARION® Guard cartridges are required for all ARION® columns, 10 µm, 100 µm, 5 µm.

* The use of appropriate guard cartridges depends on the application phase system.

Product support

Not found the information you require? The ARION® website www.electromagnetic.com serves as your support source.



Application database

The ARION® website has a specially engineered application database of different systems, e.g. compound name, trial name, formula etc.



Product selection guide

The system catalogue offers you fast access as well as sorting the required HPLC systems based on various parameters (column dimensions, particle size, surface chemistry, ...).



Distributor finder

The ARION® website includes a world map with an active filter of your distributor, who will support you with technical and price information.



Certificate download

If you cannot find your volume certificate, please contact your local distributor or download the certificate from the [Download section](#).





ARION® BIO columns have been developed for the protein, polypeptide and peptide characterization and purification. They are offered with C18 and C4 stationary phases. ARION® C18-BIO phase is oriented to separate weakly hydrophobic oligopeptides and peptides up to 50 kDa. ARION® C4-BIO HPLC columns are designed for highly hydrophobic proteins and polypeptides from 50 to 750 kDa.

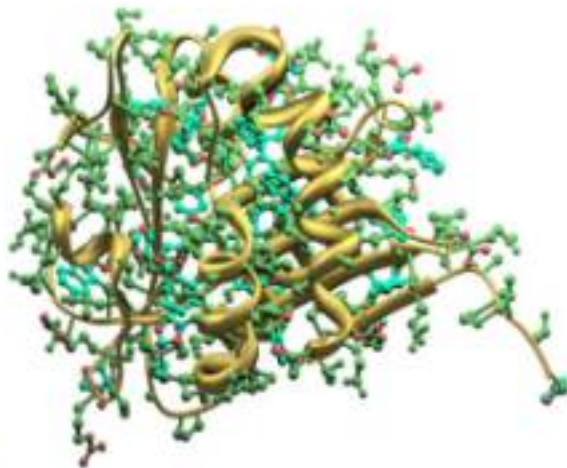
- No makes in preparation up to 150 ÅOD.
- Pre-columns with corresponding media.
- Load up to 15 µm

ARION® BIO Silicagel

Particle size	10 µm	5 µm	3 µm
Media content	100 µm	100 µm	100 µm
Temperature stability	60 °C*	60 °C*	60 °C*
Small particle diameter	10.2 x 10 µm	5.2 x 5.2 µm	3.2 x 3.2 µm

* Dependence on media content and column length

ARION® BIO phases	Particle size (µm)	Porosity Å	Surface area (m²/g)	Carbon content	Carbon load (µg)	pH stability	Wetting	100% aqueous mobile phase	100% code
C18-BIO	2.5, 5, 10	300	750	11 %	1.2 to 1.5	High-end	+	11	
C4-BIO	2.5, 5, 10	300	750	4.5 %	1.2 to 1.5	High-end	+	12	
C8-BIO	2	300	750	8.5 %	1.2 to 1.5	High-end	+	13	

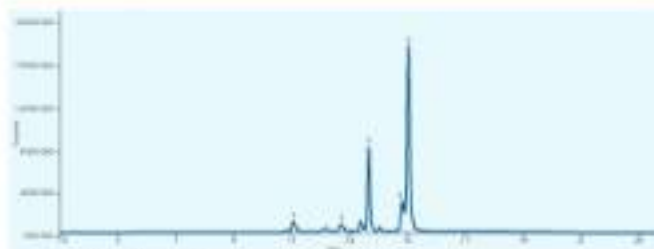


Lactoferrin in bovine milk

Lactoferrin (LT) is a glycoprotein, which is one of the group of transferrins. It is an iron-binding protein with a mass of 80 kDa. Lactoferrin has molecular properties against many microorganisms (bacteria, viruses and fungi, including parasites). It is one of the non-specific components of the immune system and has anticancer and anti-inflammatory properties.

Lactoferrin is widely represented in various animal fluids, mainly milk, saliva and tears. It is separated from bovine milk to produce this key ingredients of infant formulas. Lactoferrin is also used as a food supplement to support the natural immune system, gut microbiota and healthy skin.

Substance	Lactoferrin (LT)
System	Lactoferrin (LT)



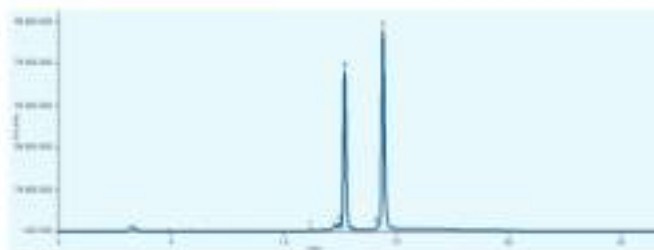
Lactoferrin analysis in bovine milk

Column	ACQUITY+BEH, 5 µm				
Dimensions	250 mm × 4.6 mm				
Part number	18-1090-1000				
Mobility phase	A: 100% acetonitrile (ACN) B: 95% ACN + 5% (pH = 9) H ₂ O C: 5% ACN + 95% (pH = 9) H ₂ O				
Gradient elution	Retention (min)	Flow (µL/min)	NA	NA	WC
	6.0	0.5	0.0	33.0	66.0
	6.5	0.5	0.0	33.0	66.0
	7.0	0.5	0.0	33.0	66.0
	900	0.5	5.0	46.0	54.0
	950	0.5	6.0	51.0	49.0
	960	0.5	6.0	50.0	50.0
	990	0.5	6.0	51.0	49.0
Temperature	30 °C				
Detection	UV-214 (214 nm) nm				
Injection volume	10 µL				
Analysis	1. Isopropanol 2. Lactoferrin 3. α-Lactoferrin 4. β-Lactoferrin (B) 5. β-Lactoferrin (A)				

1. The procedure is based on the product data.

Lactoferrin in goat's milk

Substance lactoferrin (L)
Sample goat's milk (S)



Lactoferrin analysis in goat's milk

Column	AcuPac 800, 5 µm				
Dimensions	250 mm × 4.6 mm				
Part number	AR-1040-100				
Mobile phase	A: 100% acetonitrile (ACN) B: 0.05 M ACN + 0.05 M NaCl C: 0.05 M ACN + 0.05 M NaCl				
Gradient elution	Extension (min)	Flow (mL/min)	NA	Na	AC
	0.0	0.5	0.0	20.0	80.0
	0.5	0.5	0.0	30.0	70.0
	0.5	0.5	0.0	30.0	60.0
	10.0	0.5	0.0	40.0	60.0
	50.0	0.5	0.0	50.0	50.0
	100.0	0.5	0.0	30.0	70.0
	120.0	0.5	0.0	30.0	80.0
Temperature	30 °C				
Detection	FLUORESCENCE (RF)				
Injection volume	20 µL				
Analysis	1. Lactoferrin 2. Lactoferrin 3. α-Lactoferrin 4. β-Lactoferrin 5. β-Lactoferrin				

* The overall length is 120 minutes.

Ordering information

Peptides and oligopeptides columns

ARION® 80 C18		ARION® Guard		
all dimensions in mm		Cartridges*		
Phase	100 × 4.0	100 × 4.0	200 × 4.0	
1 µm	AR10001-000	AR10001-000	AR10001-000	AR10001-000
3 µm	AR10001-000	AR10001-000	AR10001-000	AR10001-000
12 µm	—	—	AR10001-000	—

ARION® 80 C18		ARION® Guard		
all dimensions in mm		Cartridges*		
Phase	100 × 2.1	100 × 2.1	200 × 2.1	100 × 2.1
1 µm	—	—	AR10001-000	AR10001-000
3 µm	AR10001-000	AR10001-000	—	AR10001-000

ARION® 80 C18		ARION® Guard
all dimensions in mm		Cartridge*
Phase	100 × 4.0	
1 µm	AR10001-000	—

Proteins and polypeptides

ARION® 80 C18		ARION® Guard		
all dimensions in mm		Cartridges*		
Phase	50 × 4.0	100 × 4.0	150 × 4.0	200 × 4.0
1 µm	—	—	AR10001-000	—
3 µm	AR10001-000	AR10001-000	AR10001-000	AR10001-000

ARION® 80 C18		ARION® Guard		
all dimensions in mm		Cartridges*		
Phase	50 × 2.1	100 × 2.1	200 × 2.1	
1 µm	AR10001-000	AR10001-000	AR10001-000	AR10001-000

* ARION® Guard cartridges require ARION® Guard holder for ARION® 80 columns without cartridges.

Sample preparative columns

ARION® 80 C18		ARION® Guard
all dimensions in mm		Cartridge*
Phase	100 × 10	100 × 10
1 µm	AR10001-000	AR10001-000

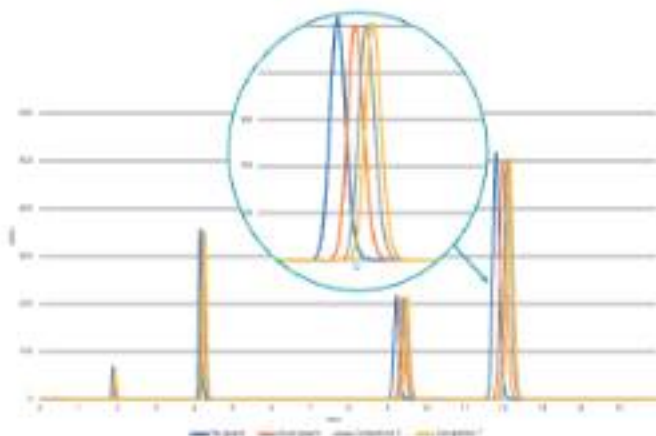
Guard column system

The ARION® Guard system (AGS) is a universal guard system, which can be connected to almost any column hardware on the market. It is easy to use and it offers the shortest retention time shift of analysis in comparison with other major manufacturers. The AGS consists of a guard holder and guard cartridge, which is offered with various silica materials according to the stationary phase in the HPLC column used.

- Universal – fits virtually any column on the market
- The **lowest influence on retention times** compared with other guard systems
- Small gaps for better immission in the column pores
- **Any orientation** of the cartridge
- Pressure rating up to **300 bar**
- Higher cartridge capacity

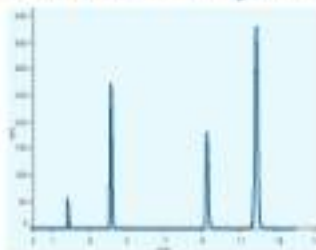


AGS system holder

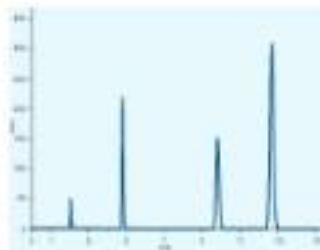


Comparison of guard systems from various manufacturers

Guard column system



ARION® Plus with ARION® Guard System



ARION® Polar with ARION® Guard System



Both chromatograms above show the separation of Unacid Acetophenone, Toluene and Isophenol with the ARION® Guard system in 40 minutes of Water (0.1% TFA) at 254 nm. The ARION® Guard system does not affect column performance; it does not show any influence on peak symmetry or column resolution.

A longer column bed (5 × 4 mm ID) offers a **raised capacity** without needing to couple two cartridges together. All this ensures lower running costs.



ARION® Guard exploded view

Guard System Selection Guide

Material	Form size	pH Stability	Column ID 2.1-5.0 5.0 x 3.1 mm	Column ID 3.0-4.6 4.6 x 4.2 mm	100% aqueous mobile phase
					
			Package of 3 pcs	Package of 3 pcs	
HF 1.7 µm	150.8	1 to 10	AGL-5731-06A	—	+
HF 2.2 µm	150.8	1 to 10	AGL-5731-06B	—	✓
HF 3 µm	150.8	1 to 10	AGL-5731-06C	AGL-5731-07B	✓
HF 5 µm	150.8	1 to 10	AGL-5731-08C	AGL-5731-09C	✓
HSC 2.2 µm	150.8	1 to 10	AGL-5731-06D	—	DN/SP*
HSC 3.2 µm	150.8	1 to 10	AGL-5731-06E	AGL-5731-07A	DN/SP*
HSC 5.0 µm	150.8	1 to 10	AGL-5731-08D	AGL-5731-09A	DN/SP*
HF 2.2 µm	150.8	—	AGL-5731-06D	—	—
HF 3.2 µm	150.8	—	AGL-5731-06E	AGL-5731-07A	—
HF 5.0 µm	150.8	—	AGL-5731-08D	AGL-5731-09A	—
HF 2.2 µm	150.8	2 to 10	AGL-5731-03D	—	✓
HF 3.2 µm	150.8	2 to 10	AGL-5731-03E	AGL-5731-03A	✓
HF 5.0 µm	150.8	2 to 10	AGL-5731-03D	AGL-5731-03A	✓
HF 2.2 µm	150.8	1 to 10	AGL-5731-08C	AGL-5731-09C	+
HF 3.2 µm	150.8	1 to 10	AGL-5731-08C	AGL-5731-09C	+

* DN/SP: 100% aqueous mobile phase is not recommended.

Ferrules for ARION® Guard System

Material	Pressure	ID µm
SS316	1400 bar*	AGL-5731-03D
Super Inert, Type 316	1400 bar	AGL-5731-03D

* Maximum pressure of the ferrule sets depends on the type of the column. For the ARION Guard System, the maximum recommended pressure is 1400 bar.



AGL-5731-03D ferrule set with SS316 ferrule



AGL-5731-03D ferrule set with Super Inert ferrule

Guard system for preparative columns

Preparative guard column system (PGS) is intended to use with 10 mm, 21.2 mm and 50 mm ID preparative HPLC columns.

Preparative Guard System Holders

ID	Description	Part number
10 mm	ARION® Preparative 10 mm Guard System Holder only for 10 mm	PGS-10GV-001
21.2 mm	ARION® Preparative 21.2 mm Guard System Holder only for 21.2 mm	PGS-20GV-001
50 mm	ARION® Preparative 50 mm Guard System Holder only for 50 mm	PGS-50GV-001

Preparative Guard System cartridges

3 µm ARS			
all dimensions in mm			
Phase	10 × 10	10 × 25.2	10 × 50
C18	PGS-10S18-008	PGS-10S18-008	PGS-10S18-008
C18 Polar	On request	PGS-10S18-AR1	PGS-10S18-AR1
CS	On request	PGS-10S18-T01	On request
Phenyl	On request	On request	On request
Hydrophil	On request	PGS-10S18-008	On request
DI	On request	PGS-10S18-008	PGS-10S18-008

Preparative Guard System cartridges

10 µm ARS			
all dimensions in mm			
Phase	10 × 10	10 × 25.2	10 × 50
C18	PGS-10S10-008	PGS-10S10-008	PGS-10S10-008
C18 Polar	PGS-10S10-AR1	PGS-10S10-AR1	PGS-10S10-AR1
CS	On request	On request	On request
Phenyl	PGS-10S10-T01	PGS-10S10-T01	On request
Hydrophil	On request	On request	On request
DI	On request	On request	PGS-10S10-008

Preparative Guard System cartridges

10 µm ARS			
all dimensions in mm			
Phase	10 × 10	10 × 25.2	10 × 50
C18	PGS-10S10-008	PGS-10S10-008	On request
C18 Polar	PGS-10S10-AR1	PGS-10S10-AR1	On request
CS	On request	On request	On request
Phenyl	PGS-10S10-T01	PGS-10S10-T01	On request
Hydrophil	On request	On request	On request
DI	On request	On request	On request



PGS Holder
part PGS-10GV-001



Preparative guard system cartridge

CHROMSHELL®



CHROMSHELL® particles are 500 nm particles of core-shell technology (CSP), specifically the C18 Plus family. These particles are an ultra-high purity silica of 2.0 µm particles.

- Ultra-pure silica with low metal content.
- Maximum pressure 600 bar.
- Temperature stability up to 100 °C.

Global content	100 µm
Temperature stability	100 °C
Mean Particle Diameter	2.04 ± 0.10 µm
Deviation to the shape of a sphere	0.05 ± 0.10

CHROMSHELL® phase	Particle size (µm)	Particle size (Å)	Surface area (m ² /g)	Carbon load	pH stability	100% aqueous mobile phase	Endcapping	USP code
C18 Plus	2.0	85	100	9.6%	1.5 to 11.5	+	Large size	1.1
C18-XB	2.0	85	100	9.5%	1.5 to 10.0	+	Large size	1.1
C18 Polar	2.0	85	100	9.5-9.8%	1.5 to 11.0	+	Medium	1.1



A C18 phase with a balanced intermediate profile with the highest hydrophobicity.

pH Range	1.5 to 11.5
USP Code	1.1



A hydrophobic C18 phase with a specific surface treatment for high temperature applications.

pH Range	1.5 to 10.0
USP Code	1.1



A polar end-capped developed for mid-polar and polar retention together with stability in the 100% aqueous mobile phase.

pH Range	1.5 to 11.0
USP Code	1.1

Up close

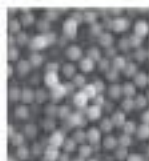
The 2.6 micron electron microscope built clearly shows the exceptional quality of CHROMSHELL® particles



CHROMSHELL®
(100 × 100 µm)



Compositel R
(100 × 100 µm)



CHROMSHELL®
(30 × 30 µm)

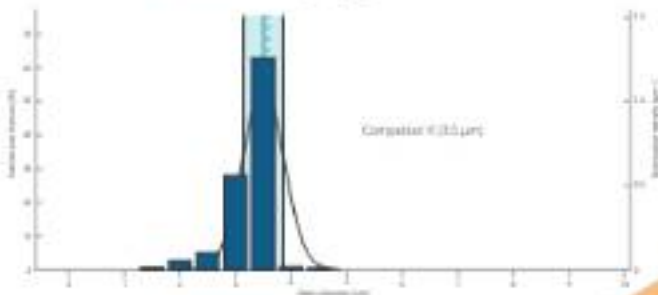
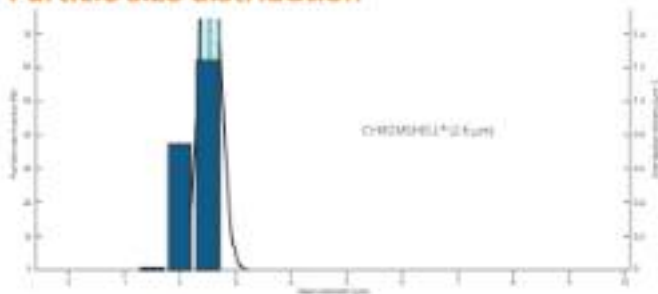


Compositel R
(30 × 30 µm)

The main particle characteristics

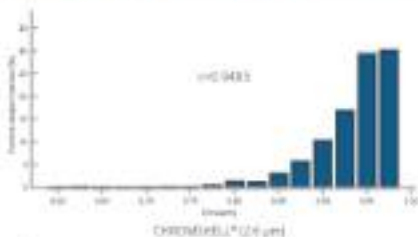
- High proximity to a sphere
- Tight particle size distribution
- No floc or agglomerates
- No presence of clustered particles
- Particle uniformity homogeneity

Particle size distribution

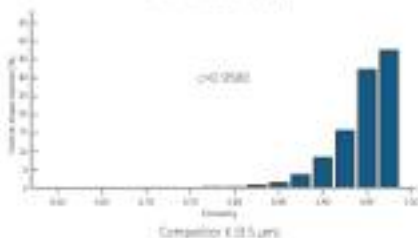


Circularity & surface smoothness

The chromshell particles were subjected to SEM analysis to determine circularity and surface smoothness.



Detail view on particle



Detail view on particle surface

Ordering information

34µm CHROMSHELL®

all dimensions in mm

Phase	30 × 3.1	30 × 3.2	75 × 3.1	100 × 3.1	100 × 3.2
CTE Plus	CSH-3712-0001	CSH-3722-0001	CSH-3712-0001	CSH-3722-0001	CSH-3722-0001
CTE HR	CSH-3719-0001	CSH-3749-0001	CSH-3749-0001	CSH-3749-0001	CSH-3749-0001
CTE Pure	CSH-3711-0001	CSH-3731-0001	CSH-3711-0001	CSH-3731-0001	CSH-3731-0001

34µm CHROMSHELL®

all dimensions in mm

Phase	30 × 5.0	30 × 8.8	75 × 5.0	100 × 5.0	100 × 8.8	100 × 8.8
CTE Plus	CSH-3712-0001	CSH-3731-0001	CSH-3712-0001	CSH-3731-0001	CSH-3731-0001	-
CTE HR	CSH-3719-0001	CSH-3749-0001	CSH-3749-0001	CSH-3749-0001	CSH-3749-0001	-
CTE Pure	CSH-3711-0001	CSH-3731-0001	CSH-3711-0001	CSH-3731-0001	CSH-3731-0001	-

34µm CHROMSHELL®

all dimensions in mm

Phase	50 × 4.6	75 × 4.6	100 × 4.6	100 × 4.6	200 × 4.6
CTE Plus	CSH-3712-0001	CSH-3731-0001	CSH-3731-0001	CSH-3731-0001	-
CTE HR	CSH-3719-0001	CSH-3749-0001	CSH-3749-0001	CSH-3749-0001	-
CTE Pure	CSH-3711-0001	CSH-3731-0001	CSH-3731-0001	CSH-3731-0001	-

Chemicals of emerging concern (CECs) in river water

Validated parameters	100 µg/L	100 µg/L
acetaminophen	4.5	11.5
benzotriazole	3.3	8.7
benzophenone	3.3	11.0
carbamate	4.5	7.1
carbazepine	9.0	12.5
carbutamol	3.3	11.1
carfenbrine	3.7	11.3
carvedilol	4.5	10.2
cetirizine	3	9.8
clonazepam	3.8	12.0
clozapine	4	13.4
cisatracurium	3.8	9.4
desmethylcarbamazepine	5.5	31
diazepam	4	13.0
diclofenac	4.2	13.0
disopyramide	3	15.8
drofenolone	3.5	11.4
epinephrine	3.1	8.8
gabapentin	3.8	11.0
gabrisone	4.5	14.1
gabrisone	3	11
gabrisone	3.5	13.1
gabrisone	2.7	8.8
gabrisone	4.7	11.0
gabrisone	3.7	10.0
gabrisone	3.3	7.9
gabrisone	4.0	21.1
gabrisone	3	11.1
gabrisone	3.3	7.1
gabrisone	3.3	7.1
gabrisone	3.8	14.3
gabrisone	3	9.8
gabrisone	4.5	11.1
gabrisone	4.4	14.0
gabrisone	3.5	11.1
gabrisone	3.3	9.1
gabrisone	3.3	9.1
gabrisone	3.5	11.0
gabrisone	3.4	11.4
gabrisone	3.7	14.8
gabrisone	3	20.1
gabrisone	3.8	12.7
gabrisone	3	20.1
gabrisone	3	20
gabrisone	3	8.8
gabrisone	3.4	11.2
gabrisone	4.5	12.4
gabrisone	3.4	10.1

* The table contains only the validated parameters. The table does not contain the parameters that are not validated.

Chemicals of emerging concern (CECs) in river water

Internal standard are used:

Benzoate D5 RT: 4.32

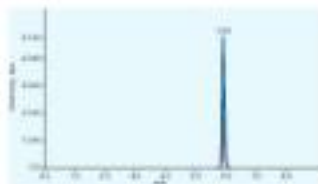
Isopropyl D5 RT: 5.35

Stearic D15 RT: 5.48

1-Quinoline 244.9 > 192.3 [-98.7%], Quinoline 244.9 > 191.3 [-98.7%]

2-Quinoline 215.3 > 163.2 [-21.0%], Quinoline 215.3 > 162.2 [-51.2%]

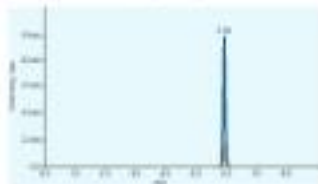
3-Quinoline 212.1 > 187.1 [-25.0%], Quinoline 212.1 > 194.2 [-29.0%]



Mecoprop RT: 5.35

1-Quinoline 215.0 > 141.3 [-16.0%]

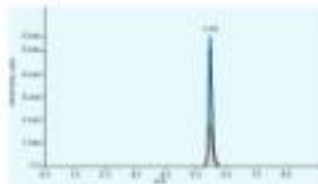
Quinoline 215.0 > 140.3 [-16.0%]



Stearic acid RT: 5.48

1-Quinoline 233.0 > 191.3 [-16.0%]

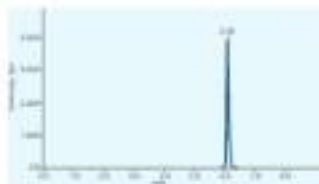
Quinoline 233.0 > 191.3 [-16.0%]



3- Chloro 2-methylphenoxycarb acid RT: 5.48

1-Quinoline 199.0 > 141.3 [-16.0%]

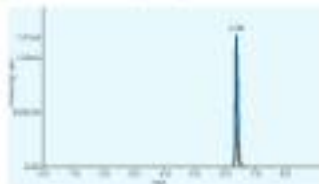
Quinoline 201.0 > 140.3 [-20.0%]



1,4,5-trimethoxybenzoic acid RT: 5.37

1-Quinoline 252.7 > 194.3 [-15.0%]

Quinoline 254.7 > 195.3 [-15.0%]



4-(4-Chloro-2-methylphenoxy)butanoic acid RT: 6.1

1-Quinoline 233.3 > 141.3 [-15.0%]

Quinoline 235.3 > 140.3 [-15.0%]

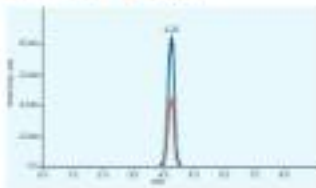


Perfluorooctanoic acid RT: 7.0

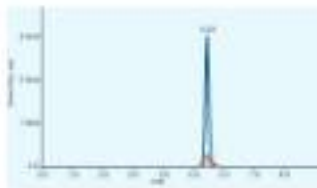
1-Quinoline 406.3 > 191.3 [-15.0%]

Quinoline 408.3 > 191.3 [-15.0%]

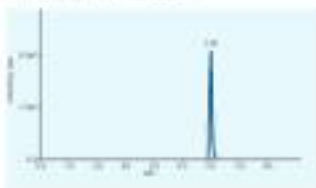
Chemicals of emerging concern (CECs) in river water



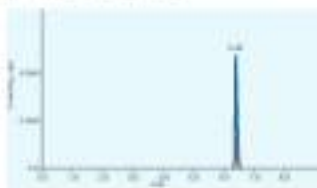
Beratesin RT: 4.22
 (-) Qualifier 139.0 > 132.0 [36.0 V]
 Qualifier 249.0 > 191.0 [30.0 V]



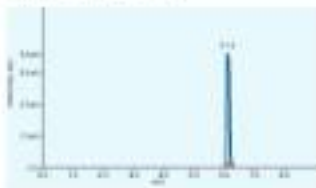
2,4-Dichlorophenoxyacetic acid RT: 5.44
 (-) Qualifier 219.0 > 151.0 [18.0 V]
 Qualifier 274.0 > 125.0 [35.0 V]



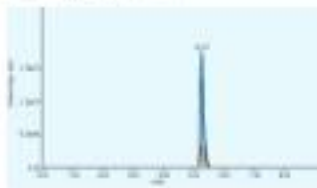
Beratesin RT: 9.0
 (-) Qualifier 202.1 > 152.1 [15.0 V]
 Qualifier 202.1 > 104.0 [15.0 V]



Beratesin RT: 9.08
 (-) Qualifier 207.2 > 12.1 [20.0 V]
 Qualifier 207.2 > 45.1 [31.0 V]

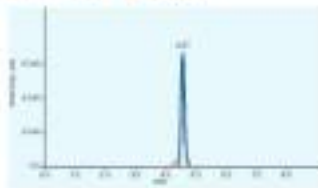


Desethylmorphine RT: 9.7
 (-) Qualifier 202.1 > 146.0 [15.0 V]
 Qualifier 202.1 > 79.0 [30.0 V]

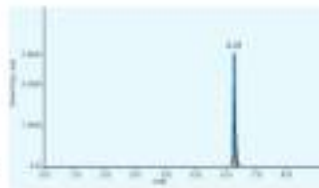


Cisheptazin RT: 9.74
 (-) Qualifier 192.2 > 163.2 [27.0 V]
 Qualifier 192.2 > 132.1 [30.0 V]

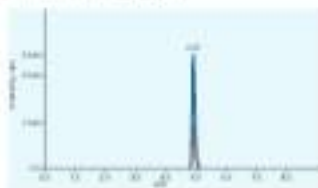
Chemicals of emerging concern (CECs) in river water



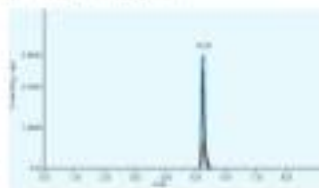
Despropylatrazine RT: 4.38
 (-) Qualifier 174.1 > 164.1 (31.0 V)
 Quantifier 144.1 > 95.1 (27.0 V)



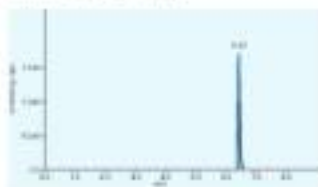
Chlormetazone RT: 8.21
 (-) Qualifier 213.1 > 72.1 (31.0 V)
 Quantifier 213.1 > 46.2 (21.0 V)



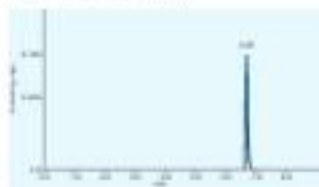
Metoprolol RT: 8.8
 (-) Qualifier 203.2 > 175.1 (31.0 V)
 Quantifier 203.2 > 104.1 (31.0 V)



Desethylatrazine RT: 9.1
 (-) Qualifier 188.1 > 146.2 (21.0 V)
 Quantifier 188.1 > 104.1 (31.0 V)

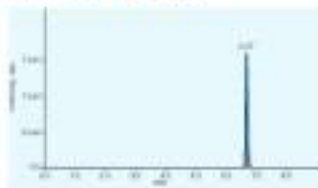


Clozapine RT: 9.35
 (-) Qualifier 239.1 > 72.0 (31.0 V)
 Quantifier 239.1 > 72.1 (31.0 V)

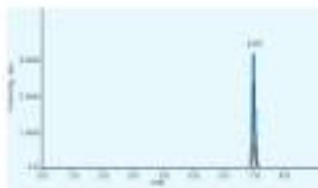


Propafenone RT: 9.55
 (-) Qualifier 235.1 > 106.0 (25.0 V)
 Quantifier 235.1 > 146.0 (31.0 V)

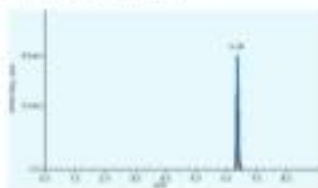
Chemicals of emerging concern (CECs) in river water



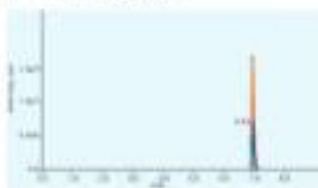
Arsenic (RT: 6.61)
 (+) Quanter 126.2 + 190.2 (15.0 V)
 Quanter 226.2 + 95.1 (25.0 V)



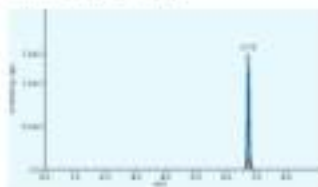
Resazurin (RT: 6.28)
 (+) Quanter 226.1 + 146.1 (27.0 V)
 Quanter 279.9 + 104.0 (27.0 V)



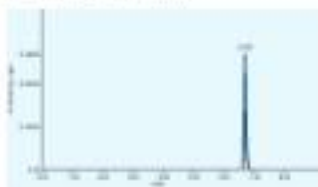
Azoxystrobin (RT: 6.31)
 (+) Quanter 210.1 + 176.8 (15.0 V)
 Quanter 210.1 + 104.1 (15.0 V)



Prometryn (RT: 6.8)
 (+) Quanter 242.2 + 200.1 (19.0 V)
 Quanter 262.2 + 150.1 (25.0 V)

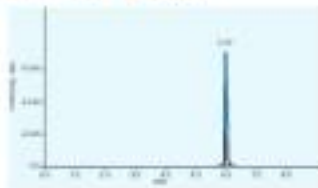


Imidacloprid (RT: 6.3)
 (+) Quanter 190.1 + 174.1 (15.0 V)
 Quanter 190.1 + 104.1 (15.0 V)

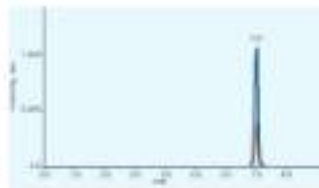


Metolachlor (RT: 6.63)
 (+) Quanter 226.7 + 169.2 (19.0 V)
 Quanter 226.7 + 121.1 (25.0 V)

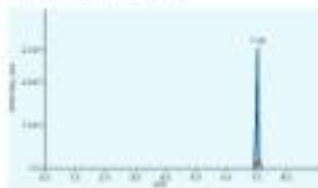
Chemicals of emerging concern (CECs) in river water



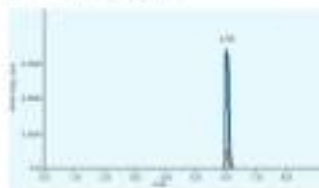
Chlorfenvinylol RT: 4.00
 (+) Qualifier 220.0 > 180.1 (15.0 V)
 Quantifier 220.0 > 121.2 (21.0 V)



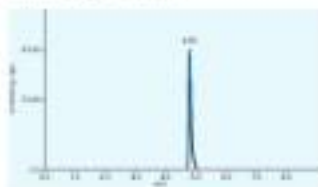
Alachlor RT: 7.70
 (+) Qualifier 270.1 > 238.2 (17.0 V)
 Quantifier 270.1 > 162.2 (28.0 V)



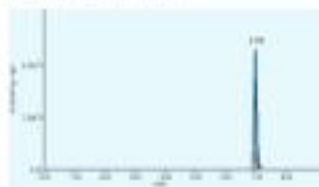
Glufosinate RT: 5.40
 (+) Qualifier 254.2 > 186.2 (13.0 V)
 Quantifier 254.2 > 85.2 (39.0 V)



Hexachlor RT: 5.40
 (+) Qualifier 253.2 > 171.2 (27.0 V)
 Quantifier 253.2 > 85.1 (34.0 V)

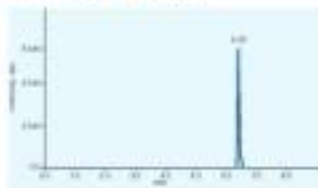


Chlorfenvinylol RT: 4.00
 (+) Qualifier 220.0 > 180.1 (17.0 V)
 Quantifier 220.0 > 121.2 (21.0 V)

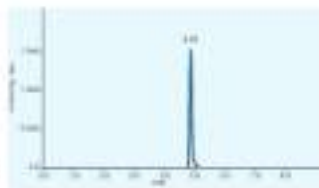


Chlorfenvinylol RT: 4.00
 (+) Qualifier 242.2 > 186.1 (29.0 V)
 Quantifier 242.2 > 98.7 (57.0 V)

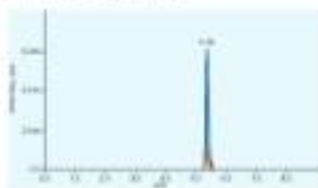
Chemicals of emerging concern (CECs) in river water



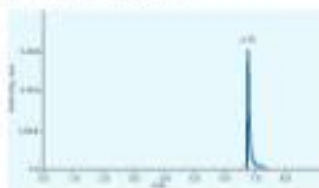
Miconazole BT 5.35
 (+) Quanter 178.2 + 194.2 (17.0 V)
 Quanter 218.2 + 216.2 (17.0 V)



Imidacloprid BT 4.52
 (+) Quanter 256.2 + 278.0 (24.0 V)
 Quanter 256.2 + 175.2 (24.0 V)



Thiacloprid BT 5.22
 (+) Quanter 253.1 + 126.1 (18.0 V)
 Quanter 253.1 + 98.1 (17.0 V)



Imazacloprid BT 6.6
 (+) Quanter 248.7 + 163.0 (24.0 V)
 Quanter 248.7 + 182.1 (17.0 V)

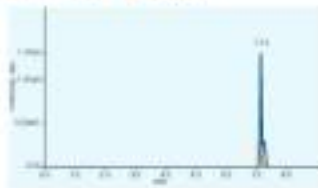


Spiromesifen BT 7.1
 (+) Quanter 298.4 + 144.2 (17.0 V)
 Quanter 298.4 + 105.2 (14.0 V)



Fenprophethrin BT 7.97
 (+) Quanter 304.0 + 147.0 (19.0 V)
 Quanter 304.0 + 117.0 (17.0 V)

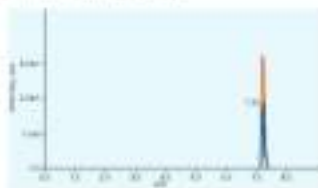
Chemicals of emerging concern (CECs) in river water



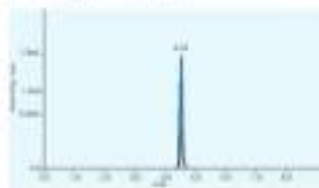
Toluenesulfonate RT: 7.1
 (+) Quatifier 208.0 > 70.0 (37.0 V)
 Quatifier 308.0 > 125.0 (47.0 V)



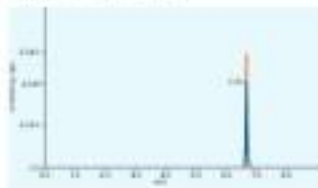
Propiconazole RT: 7.15
 (+) Quatifier 342.1 > 150.0 (49.0 V)
 Quatifier 542.1 > 88.1 (33.0 V)



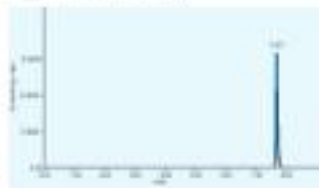
Disinfectant RT: 7.18
 (+) Quatifier 358.0 > 90.0 (34.0 V)
 Quatifier 358.0 > 150.0 (77.0 V)



Tricloromethane RT: 4.34
 (+) Quatifier 290.0 > 211.0 (73.0 V)
 Quatifier 285.0 > 181.0 (37.0 V)

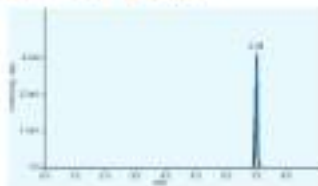


Chloroform RT: 4.63
 (+) Quatifier 304.0 > 121.0 (37.0 V)
 Quatifier 304.0 > 161.0 (31.0 V)

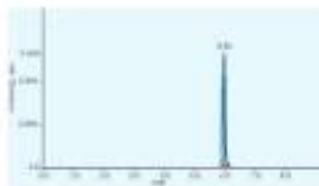


Quinazolin RT: 7.61
 (+) Quatifier 308.0 > 157.0 (49.0 V)
 Quatifier 308.0 > 142.0 (57.0 V)

Chemicals of emerging concern (CECs) in river water



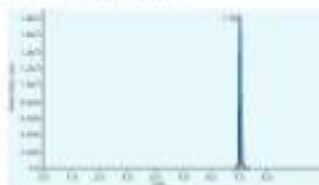
Isoproturon (RT: 2.9)
 (+) Quanter 330.0 + 121.0 (27.0 V)
 Quanter 330.0 + 101.8 (5.0 V)



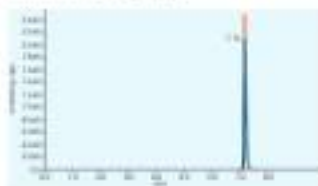
Trifluralin-methyl (RT: 5.84)
 (+) Quanter 340.0 + 151.0 (25.0 V)
 Quanter 340.0 + 130.2 (21.0 V)



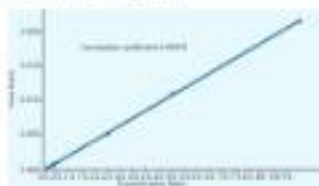
Prochloraz (RT: 3.05)
 (+) Quanter 280.2 + 21.2 (11.0 V)
 Quanter 282.2 + 194.2 (21.0 V)



Metolachlor (RT: 3.0)
 (+) Quanter 280.2 + 25.2 (21.0 V)
 Quanter 284.2 + 170.2 (19.0 V)



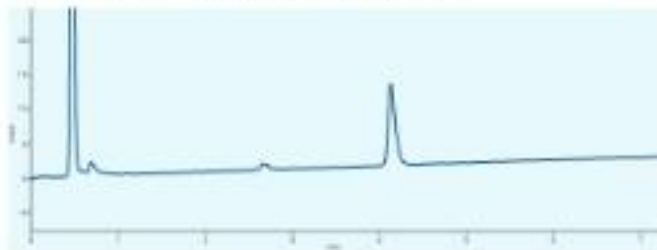
Fenitrothion (RT: 7.1)
 (+) Quanter 178.0 + 149.0 (15.0 V)
 Quanter 178.0 + 146.0 (14.0 V)



Example of calibration curve for
 4-alkoxy-2-methylphenoxymethanes (4-AMC-MS)

Tween 80

Tween 80 is used to stabilize aqueous solutions with drugs and also as an emulsifier in the pharmaceutical industry. It is also used as an additive in vaccine production. Currently it is added to CovID19 vaccines.



Analysis of hydrolyzed PS-80 in: $\text{CH}_3\text{COOH}/\text{H}_2\text{SO}_4$ 7:3 v/v

Column	CHROMSHELL® C18-BB, 3 µm
Detection	UV 210 nm
Port number	75-11041-01-01
Mobile phase	Acetonitrile
Temperature	Acetonitrile
Injection volume	2.5 µl
Execution	UV 210 nm
Analysis	1. Tween 80

Column protection

CHROMSHELL® UPLC® columns series is protected by means of a guard system or by using an appropriate guard column (see below).

The APOG® Guard System (AGS) is ideal for the protection of CHROMSHELL® UPLC® columns. We recommend it as an easy and less expensive solution in comparison with high pressure guard systems. The AGS can be used with pressures up to **800 bar**. More details about this guard system are on page 50.

Protection can be perfectly ensured by installing an in-line filter holder with a 0.2 µm or 0.5 µm filter. This in-line filter can withstand pressures of up to 1325 bar and is easy to use. The filter holder consists of a two-part body and replaceable filter – a metal frit.

Main features and benefits:

- Minimized dead volume
- Easy installation and flush
- Pressure rating up to **1325 bar**
- Works with 20/25 mm column connections from all manufacturers
- Spare frits with various porosities



F22 in-line filter

In-line filter selection guide

The F22 in-line filter made from 316 stainless steel is designed to reduce the number of contaminants compared with standard pre-column filters.

The in-line filter guarantees a very small dead volume thanks to the small bore size (0.13 mm) in the body and frit. The total length is 46.5 mm.



Replacement frits

F22 in-line filter holder

Description	Amount	Internal volume	Part number
F22 in-line filter holder for 20 mm ID connecting standard type fit	1 pc	0.59 µL	AGS 1360-043
F22 in-line filter holder for 25 mm ID connecting standard type fit	1 pc	0.63 µL	AGS 1360-054

Replacement frits

Description	Amount	Frit volume	Frit ID	Part number
F22 stainless steel frit for in-line filter 0.2 µm, 0.1 µm, 0.5 µm	1 pc	0.11 µL	1.80 mm	AGS 1360-048
F22 stainless steel frit for in-line filter 0.2 µm, 0.1 µm, 0.5 µm	1 pc	0.11 µL	1.80 mm	AGS 1360-049

Note: The maximum pressure exceeds 1325 bar (e.g. 1500 bar) and 1600 bar. No flow should occur in any column. Please refer also to our user manual for details.



Exploded view



- Strict quality control, each column individually tested
- Column box includes column seal rheure and strong water
- High flexibility in column dimensions and flow velocities
- Columns supplied in pairs or 4-tuples
- 0° and 90° valve available

Phase name	Stationary phase composition	Max. temp. +
1A1	100% Dimethylsiloxane	100 °C
1A2	98.9% Dimethylsiloxane	140 °C
1A3	97.9% Dimethylsiloxane	180 °C
1A4	95.9% Dimethylsiloxane	180 °C
1A5	93.9% Dimethylsiloxane	180 °C
1A6	91.9% Dimethylsiloxane	220 °C
1A7	89.9% Dimethylsiloxane	220 °C
1A8	87.9% Dimethylsiloxane	260 °C
1A9	85.9% Dimethylsiloxane	260 °C
1A10	83.9% Dimethylsiloxane	260 °C
1A11	81.9% Dimethylsiloxane	260 °C
1A12	79.9% Dimethylsiloxane	260 °C
1A13	77.9% Dimethylsiloxane	260 °C
1A14	75.9% Dimethylsiloxane	260 °C
1A15	73.9% Dimethylsiloxane	260 °C
1A16	71.9% Dimethylsiloxane	260 °C
1A17	69.9% Dimethylsiloxane	260 °C
1A18	67.9% Dimethylsiloxane	260 °C
1A19	65.9% Dimethylsiloxane	260 °C
1A20	63.9% Dimethylsiloxane	260 °C
1A21	61.9% Dimethylsiloxane	260 °C
1A22	59.9% Dimethylsiloxane	260 °C
1A23	57.9% Dimethylsiloxane	260 °C
1A24	55.9% Dimethylsiloxane	260 °C
1A25	53.9% Dimethylsiloxane	260 °C
1A26	51.9% Dimethylsiloxane	260 °C
1A27	49.9% Dimethylsiloxane	260 °C
1A28	47.9% Dimethylsiloxane	260 °C
1A29	45.9% Dimethylsiloxane	260 °C
1A30	43.9% Dimethylsiloxane	260 °C
1A31	41.9% Dimethylsiloxane	260 °C
1A32	39.9% Dimethylsiloxane	260 °C
1A33	37.9% Dimethylsiloxane	260 °C
1A34	35.9% Dimethylsiloxane	260 °C
1A35	33.9% Dimethylsiloxane	260 °C
1A36	31.9% Dimethylsiloxane	260 °C
1A37	29.9% Dimethylsiloxane	260 °C
1A38	27.9% Dimethylsiloxane	260 °C
1A39	25.9% Dimethylsiloxane	260 °C
1A40	23.9% Dimethylsiloxane	260 °C
1A41	21.9% Dimethylsiloxane	260 °C
1A42	19.9% Dimethylsiloxane	260 °C
1A43	17.9% Dimethylsiloxane	260 °C
1A44	15.9% Dimethylsiloxane	260 °C
1A45	13.9% Dimethylsiloxane	260 °C
1A46	11.9% Dimethylsiloxane	260 °C
1A47	9.9% Dimethylsiloxane	260 °C
1A48	7.9% Dimethylsiloxane	260 °C
1A49	5.9% Dimethylsiloxane	260 °C
1A50	3.9% Dimethylsiloxane	260 °C
1A51	1.9% Dimethylsiloxane	260 °C
1A52	0.9% Dimethylsiloxane	260 °C
1A53	0.9% Dimethylsiloxane	260 °C
1A54	0.9% Dimethylsiloxane	260 °C
1A55	0.9% Dimethylsiloxane	260 °C
1A56	0.9% Dimethylsiloxane	260 °C
1A57	0.9% Dimethylsiloxane	260 °C
1A58	0.9% Dimethylsiloxane	260 °C
1A59	0.9% Dimethylsiloxane	260 °C
1A60	0.9% Dimethylsiloxane	260 °C
1A61	0.9% Dimethylsiloxane	260 °C
1A62	0.9% Dimethylsiloxane	260 °C
1A63	0.9% Dimethylsiloxane	260 °C
1A64	0.9% Dimethylsiloxane	260 °C
1A65	0.9% Dimethylsiloxane	260 °C
1A66	0.9% Dimethylsiloxane	260 °C
1A67	0.9% Dimethylsiloxane	260 °C
1A68	0.9% Dimethylsiloxane	260 °C
1A69	0.9% Dimethylsiloxane	260 °C
1A70	0.9% Dimethylsiloxane	260 °C
1A71	0.9% Dimethylsiloxane	260 °C
1A72	0.9% Dimethylsiloxane	260 °C
1A73	0.9% Dimethylsiloxane	260 °C
1A74	0.9% Dimethylsiloxane	260 °C
1A75	0.9% Dimethylsiloxane	260 °C
1A76	0.9% Dimethylsiloxane	260 °C
1A77	0.9% Dimethylsiloxane	260 °C
1A78	0.9% Dimethylsiloxane	260 °C
1A79	0.9% Dimethylsiloxane	260 °C
1A80	0.9% Dimethylsiloxane	260 °C
1A81	0.9% Dimethylsiloxane	260 °C
1A82	0.9% Dimethylsiloxane	260 °C
1A83	0.9% Dimethylsiloxane	260 °C
1A84	0.9% Dimethylsiloxane	260 °C
1A85	0.9% Dimethylsiloxane	260 °C
1A86	0.9% Dimethylsiloxane	260 °C
1A87	0.9% Dimethylsiloxane	260 °C
1A88	0.9% Dimethylsiloxane	260 °C
1A89	0.9% Dimethylsiloxane	260 °C
1A90	0.9% Dimethylsiloxane	260 °C
1A91	0.9% Dimethylsiloxane	260 °C
1A92	0.9% Dimethylsiloxane	260 °C
1A93	0.9% Dimethylsiloxane	260 °C
1A94	0.9% Dimethylsiloxane	260 °C
1A95	0.9% Dimethylsiloxane	260 °C
1A96	0.9% Dimethylsiloxane	260 °C
1A97	0.9% Dimethylsiloxane	260 °C
1A98	0.9% Dimethylsiloxane	260 °C
1A99	0.9% Dimethylsiloxane	260 °C
1A100	0.9% Dimethylsiloxane	260 °C

² See, e.g., *United States v. Smith*, 199 F.3d 1033, 1037 (9th Cir. 2000).

18758 *Chamaecrista* s. str. *Chamaecrista* s. str.

¹⁰⁰ *Idem*, *La cultura del libro*, pp. 101–102.

Cross reference guide

Standard DC phases

UDM™	Agilent / Karlson	Maxim- Nigel	Phoenix	Switch	S&S	Superon	UPS Method Classification
LM1	DA-1 HP-1, CP100-03	CP100A-1	20-1	Rev 1	SP-1	SPW1, Supply 1	01, 02, 0A, 0B
LM5	DA-1 HP-1, CP100-03	CP100A-1	20-1	Rev 1	SP-1	SPW1, Supply 1	027, 030, 041
LM1-1	CP100-03	-	-	-	-	-	-
LM20	-	-	-	Rev 20	-	SPW20	018, 030
LM30	DA-10 HP-10	-	20-20	Rev 30	-	SPW30, SPW- 030	018, 030, 041
LM1-1	DA-10 HP-10 CP100-03	CP100A-10	20-20	Rev 10	SPW-030	SPW-030	01, 017
LM30B	DA-200 HP-200, CP200-04	CP200A-020	-	Rev 200	-	-	03
LM30A	DA-200 HP-200, CP200-04	CP200A-020	20-200	Rev 1000, Rev 600	SPW20	SPW20A, Rev 6	043
LM1-100	DA-200 HP-200, CP200-04	CP200A-100	20-200	Rev 1000, Rev 600	SPW20	SPW20A, Rev 6	040
LM1-100	DA-200 HP-200, CP200-04	CP200A-100	20-1000	Rev 1000	SPW-04	SPW1-100, Supply 1-100	040
LM200	DA-200 HP-200, CP200-04	CP200A-200	-	Rev 200	SPW20	SPW200	02, 019, 040
LM400	DA-400 HP-400, CP400-08	CP400A-040	20-400	Rev 400	SPW40	-	014, 015, 016, 024, 030, 038
LM400A	CP400-08	-	20-400A	Switches	-	-	014, 015, 016
LM200	DA-400	-	20-400	Switches 04	SPW20	04, 04	014, 015, 016, 024, 030, 038
LM400A	DA-400	-	Switches 08	-	-	-	-
LM20	DA-20 HP-20 CP100-03	-	-	Rev 2000	SPW-01	SPW200, SPW100, SPW001	02
LM300	DA-30 HP-30	-	20-300	Rev 2000	SPW-01	SPW200	02, 03, 04

DC/DC low level phases

UDM™	Agilent / Karlson	Maxim- Nigel	Phoenix	Switch	S&S	Superon	UPS Method Classification
LM1-M1	DA-1 HP-1, CP100-03, SP-100	CP100A-1-03, A0001	20-1-03	Rev 1-03	SP-1	Supply 1	01, 02, 0A, 0B
LM5-M5	DA-5 HP-5	CP100A-0-05	20-0-05	Rev 0-05	SPW-0	Supply 0	027, 030, 041
LM5-MT-05	DA-5 HP-5 CP-5-00	CP100A-0-05 A0001	20-0-05plus 20-Supply 05	Rev 0-05plus	-	0-0-0-0	027, 030, 041
LM5-M5-M5	DA-5 HP-5 CP-5-00	CP100A-0-05 A0001	20-0-05	Rev 0-0-0-05	-	0-0-0-0	027, 030, 041
LM30-B	DA-30 HP-30	CP100A-0-30	20-0-0-030	Rev 0-0-0	-	-	-
LM30-M5	DA-30 HP-30, CP-30-00	CP100A-0-0-30	20-0-0-0-030 20-0-0-0-0	Rev 0-0-0-0-030	SPW-0-0	SPW-0-0	018, 030, 041
LM1-1-M5	DA-10 HP-10, CP-10-00	CP100A-10-00	-	Rev 10-0-0-00	SPW-0-0	-	01, 017
LM200-M5	DA-200 HP-200	CP200A-0-20	-	-	-	-	02, 019
LM20A-M5	DA-200 HP-200	CP200A-0-20	-	Rev 0-20-0-0	-	-	040
LM400-M5	DA-400 HP-400	CP400A-0-40	-	Rev 0-40-0-0	-	-	014, 015, 016
LM400A-M5	DA-400 HP-400	CP400A-0-40	-	Switches 05	-	-	014, 015, 016

* All phases comply with IEC 60364-4-41:2017

High temperature GC phases

GC#	Station / Vendor	Station/ Vendor	Phenomenex	Restek	SGE	Supina	ISO Method Classification
LN-1 HT	LN-1 HT	—	25.1 HT column	LN-1 HT	—	—	01, 02, 03, 04
LN-2 HT	LN-2 HT	OPTMA-2 HT	28.5 HT column	LN-2 HT	—	—	021, 026, 041
LN-6 HT	—	—	—	—	LN-6	—	—
LN-8 HT	—	—	28.5 HT column	—	—	—	026, 030, 042
LN-11 HT	LN-11 HT	—	—	—	—	—	04, 017
LN-130 HT	—	—	—	—	—	—	048
LN-184 HT	LN-184 HT	—	—	—	—	—	014, 015, 016
LN-201 HT	LN-201 HT	—	—	LN-201	—	—	—
LN-202 HT	—	—	—	—	—	—	02, 03, 04

Recent developments

LION™ MAX HT

- Up to 200 °C for volume 0.025 to 0.32 mm
- Up to 300 °C for volume 0.019 mm (Fast GC)

LION™ MAX Plus

- Up to 275 °C
- High inertness
- Compatible with water injections

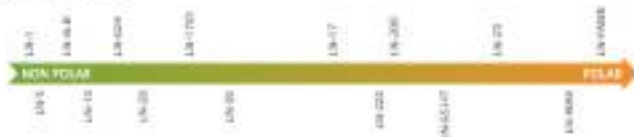
LION™ FAME HT

- Up to 280 °C
- Qualified 100% Capillary (Polyimide Phase)

LION™ 624 SE MS

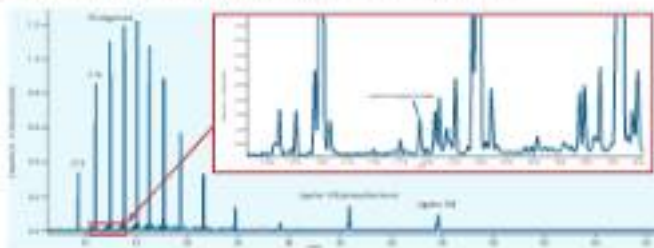
- Up to 300/320 °C
- Longer lifetime
- Better stability

Phase Polarity chart



Non-intentionally added substances (NIAS) in food simulants

2,4-dichlorobiphenyl is the degraded isomeric product from the antioxidant BHA (18)



NIAS sample which has been regulated in 2016 after 12 days under 40 °C.

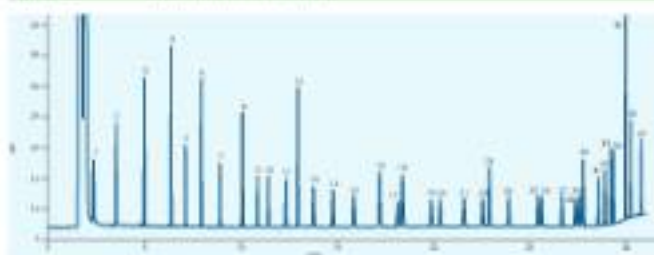
Column	LC18PM, 5 x 1 m
Dimensions	500 x 4.6 (21 mm) x 0.21 µm with integrated guard
Part number	066 5757 000 000
Injection volume	2 µl
Injector temperature	RT/120 °C, 120 °C max. 3.00 °C, 3.00 s at 120 °C
Carrier flowrate	1.00 mL/min (0.99 mL/min)
Total flow	75.7 mL/min, pump 1, no/min
Oven program	30 °C, hold 5 min 20 °C/min, 200 °C, hold 5 min 10 °C/min, 310 °C, hold 10 min
Detection	MS, Bruker (QTOF) MS
Injection energy	70 eV
Injection temperature	240 °C
Agitation	600 x 100 rpm

FAME

Fatty acids are carboxylic acids with a long alkyl carbon chain typically found in lipids. These acids differ by the number of carbon atoms in the chain and the number of double bonds in the chain. According to the number of double bonds we distinguish saturated fatty acids (SFA), monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA). Trans fatty acids are unsaturated fatty acids in which at least one double bond is in the trans position.

Capillary column LION™ LMFAME was designed to provide the required polarity by the high-hydroxypropyl phase (544) in this application where you can see a fast, robust and reproducible baseline separation of the 37 most common FAMES.

Substance Fatty Acid Methyl Esters (FAMES)



FAME standard on LION™ LMFAME capillary column

Column	100% LMFAME
Dimensions	30 m x 0.25 mm x 0.25 µm
Part number	30-0777-01-00
Injection volume	1 µl or less (1 µl is recommended)
Injection temperature	240 °C
Injection mode	split, splitless, split
Carrier flow rate	1.0 ml/min (split splitless constant flow) 1.0 ml/min
Oven program	80 °C, 5 min 20 °C/min, 180 °C, hold 5 min 2 °C/min, 180 °C, hold 5 min 3 °C/min, 180 °C, hold 5 min 25 °C/min, 180 °C, hold 1 min
Detection	180-240 °C 40-100 mV/min hydrogen 35 mbar Make-up gas nitrogen 35 mbar
Sample	Supelco 37 FAME mix 4-1000 (50:50 v/v)
Analyte	See table below

FAME

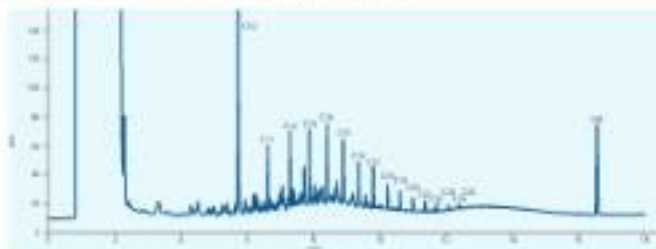
Peak No.	Compound name	Compound ID	Retention time (min)
1	Hexanoic Acid Methyl Ester	1594	2.587
2	Heptanoic Acid Methyl Ester	1603	3.133
3	Octanoic Acid Methyl Ester	1613	4.583
4	Nonanoic Acid Methyl Ester	1705	5.185
5	Undecanoic Acid Methyl Ester	2010	7.773
6	Dodecanoic Acid Methyl Ester	4520	7.887
7	Tridecanoic Acid Methyl Ester	1710	8.503
8	Myristic Acid Methyl Ester	1749	11.075
9	Myristic Acid Methyl Ester	1747 vs 8	11.948
10	Pentadecanoic Acid Methyl Ester	1708	11.470
11	16-Hydroxyhexadecanoic Acid Methyl Ester	1701 vs 10	12.816
12	Hexadecanoic Acid Methyl Ester	1700	12.459
13	Heptadecanoic Acid Methyl Ester	1701 vs 8	13.762
14	Octadecanoic Acid Methyl Ester	1778	14.773
15	19-Octadecanoic Acid Methyl Ester	1771 vs 10	15.851
16	Stearic Acid Methyl Ester	1768	17.325
17	Stearic Acid Methyl Ester	1787 vs 8 +	18.517
18	Stearic Acid Methyl Ester	1781 vs 8	18.888
19	1-Hydroxy-2-ethyl-3-methyl-3-oxopentanoic Acid Methyl Ester	1742 vs 8, 12	18.888
20	1-Hydroxy-2-ethyl-3-methyl-3-oxopentanoic Acid Methyl Ester	1782 vs 10	18.345
21	1-Hydroxy-2-ethyl-3-methyl-3-oxopentanoic Acid Methyl Ester	1783 vs 8, 12	21.578
22	1-Hydroxy-2-ethyl-3-methyl-3-oxopentanoic Acid Methyl Ester	1783 vs 8, 12, 13	22.883
23	Arachidic Acid Methyl Ester	1205	22.973
24	18-Hydroxyoctadecanoic Acid Methyl Ester	1201 vs 11	23.887
25	18-Hydroxyoctadecanoic Acid Methyl Ester	1202 vs 11, 13	25.433
26	1-Hydroxy-2-ethyl-3-methyl-3-oxopentanoic Acid Methyl Ester	1210	25.638
27	18-Hydroxyoctadecanoic Acid Methyl Ester	1203 vs 8, 11, 13	26.882
28	Arachidic Acid Methyl Ester	1204 vs 1, 8, 11, 13	27.478
29	18-Hydroxyoctadecanoic Acid Methyl Ester	1203 vs 11, 14, 15	27.585
30	Behenic Acid Methyl Ester	1215	27.852
31	Stearic Acid Methyl Ester	1201 vs 13	28.546
32	18-Hydroxyoctadecanoic Acid Methyl Ester	1205 vs 1, 11, 14, 17	28.883
33	18-Hydroxyoctadecanoic Acid Methyl Ester	1202 vs 10, 13	28.878
34	Tricosanoic Acid Methyl Ester	1233	29.557
35	Tricosanoic Acid Methyl Ester	1245	29.975
36	Heptacosanoic Acid Methyl Ester	1247 vs 15	30.235
37	18-Hydroxyoctadecanoic Acid Methyl Ester	1205 vs 4, 7, 12, 13, 14	31.797

Total Petroleum Hydrocarbons (C10-C40 index)

Total petroleum hydrocarbons index (TPHI) is a typical environmental analysis. It has replaced the infrared spectroscopy method using problematic solvents, i.e. toluene. This gas chromatography analysis (GC) monitors hydrocarbons between n-decane and n-tetracontane. These two hydrocarbons are used as the range marker and injection efficiency control. Additionally, the GC method has an important advantage - this can show a type of hydrocarbon contamination (e.g. gasoline, naphtha, motor oil) and weathering status (e.g. n-alkanes disappear during their stay in the environment).

Substrate

Time-resolved fluorescence in the range of C10 to C40



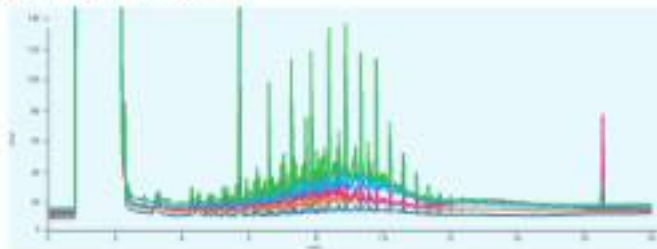
Calibration standard on LION™ LN-S40 using large volume

Column	GC/MS LN-S40
Dimensions	30 m x 0.25 mm x 0.13 µm
Part number	200-0100-00-01
Injection volume	1 µl
Injector temp.	300 °C
Injection mode	splitless, hold 1 min, split purge 30 minutes; splitless purge 10 minutes
Column flow rate	1 mL/min, constant flow (range)
Oven program	40 °C, hold 4 min 25 °C/min, 230 °C, hold 2 min Temperature 10 min
Detection	40 g/100 % Air 200 mL/min hydrogen 40 mL/min Make up gas nitrogen 30 mL/min
Software	Visualizer, ZynProchem (Labs)

Note: The calibration was also checked with 10 µg/g.

As of April 2020.

Total Petroleum Hydrocarbons (C10-C40 index)



Calibration standards for 3 level calibration



Calibration curve



Analysis of sample water with presence of TPH

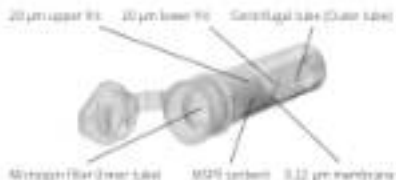


MSPE columns enable the quick and effective preparation of a sample using different types of membranes with 0.22 micron rated porosity and a suitable solvent. They are a suitable replacement for 1-3 mL SPE columns, typically filled with solvent and LL type extraction. With MSPE columns you will save time, use a minimum amount of solvent and perform more sample analyses than with conventional SPE columns. Another advantage is high accuracy and repeatability due to the precise weighing of the solvent. It is also no longer necessary to use an SPE manifold, a mini centrifuge is sufficient.

Speed up your sample preparation

- Simple and fast sample preparation
- 1 in 5 – micro-solid phase extraction and filtration in one step
- SPE manifold replaced by use of centrifuge

MSPE – unique technology



General sample preparation workflow



Note: The workflow may vary depending on your application.

Ordering information

210 MSPE Spectra™

all values in µm

Membrane	15 mg	30 mg	60 mg
Hydro	MSF1875A4017	MSF1875A4017	MSF1875A4017
PTFE hydrophilic	MSF1875C4017	MSF1875C4017	MSF1875C4017
PTFE hydrophobic	On request	MSF1875B4017	MSF1875B4017
PUF	MSF1875B4017	MSF1875B4017	MSF1875B4017
MS	MSF1875C4017	MSF1875C4017	MSF1875C4017

210 MSPE Spectra™

all values in µm

Membrane	15 mg	30 mg	60 mg
Hydro	MSF1875A4017	MSF1875A4017	On request
PTFE hydrophilic	On request	MSF1875C4017	MSF1875C4017
PTFE hydrophobic	On request	MSF1875B4017	MSF1875B4017
PUF	On request	MSF1875B4017	MSF1875B4017
MS	MSF1875C4017	MSF1875C4017	MSF1875C4017

300 MSPE Spectra™

all values in µm

Membrane	3 mg	15 mg	30 mg	60 mg
Hydro	MSF1871A1017	MSF1871A1017	MSF1871A4017	MSF1871A4017
PTFE hydrophilic	MSF1871C1017	MSF1871C4017	MSF1871C4017	On request
PTFE hydrophobic	MSF1871B1017	MSF1871B1017	On request	On request
PUF	MSF1871B1017	MSF1871B4017	On request	MSF1871B4017
MS	MSF1871C1017	MSF1871C4017	MSF1871C4017	MSF1871C4017

300 MSPE Spectra™

all values in µm

Membrane	15 mg	30 mg
Hydro	MSF1871A4017	MSF1871A4017
PTFE hydrophilic	MSF1871C4017	MSF1871C4017
PTFE hydrophobic	MSF1871B4017	MSF1871B4017
PUF	MSF1871B4017	MSF1871B4017
MS	MSF1871C4017	MSF1871C4017

500 MSPE Spectra™

all values in µm

Membrane	15 mg	30 mg
Hydro	On request	On request
PTFE hydrophilic	MSF1871C4017	On request
PTFE hydrophobic	On request	On request
PUF	On request	On request
MS	On request	On request

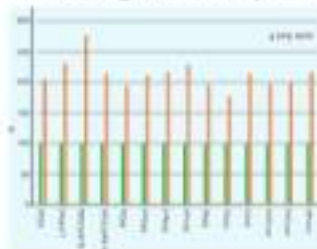
Accessories

Description	Amount	Part number
Micro Spin Spectra™, 200 µm, solid only, 0.1 µm	50 pieces	MSF18000-0110
Hydroxide 0.01M Sodium Acetate, 100 µm, 0.1 µm	1 µm	MSF18010
Hydroxide 0.01M, MicroVAMP™, 100 µm, 0.1 µm	1 µm	MSF18010
Hydroxide 0.01M, MicroVAMP™, 100 µm, 0.1 µm	1 µm	MSF18010
Hydroxide 0.01M, MicroVAMP™, 100 µm, 0.1 µm	1 µm	MSF18010
Hydroxide 0.01M, MicroVAMP™, 100 µm, 0.1 µm	1 µm	MSF18010



MSPE columns

Analysis of long-chain PFASs in biological sample matrix

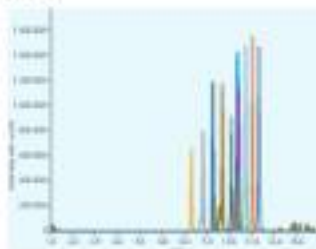


MSPE method relative signal improvement in comparison to the reference extraction method without SPE

MSPE Method

MSPE Column	Shimadzu Inertsil HPLC MSPE 150 column with 5 µm particles hexagone H (polypropylene 100 Å)
Instrumentation	Shimadzu LC-10ADVP, Shimadzu SIL-10A, Shimadzu SPD-10A
Extraction	MSPE 100 µm
Centrifugation	Shimadzu LC-10ADVP, Shimadzu SIL-10A, Shimadzu SPD-10A
Reconstitution	MSPE 100 µm
Dilution	100 µm
MSPE Activation	MSPE 100 µm
MSPE Deactivation	MSPE 100 µm
MSPE Detection of analysis	MSPE 100 µm
MSPE Storage of analysis	MSPE 100 µm

MSPE method relative signal improvement in comparison to the reference extraction method without SPE



Retention of PFASs on C18BAP column

LC-HPLC Method

Column	Shimadzu Inertsil HPLC MSPE
Dimensions	150 mm x 4.6 mm
Particle size	5 µm
Mobile phase	A: 10% v/v Acetonitrile in water B: 100% v/v Acetonitrile
Gradient elution	Time A (%) B (%) Flow rate (µl/min)
	0 10 90 1.0 200
	10 10 90 1.0 200
	15 10 90 1.0 200
	20 10 90 1.0 200
	25 10 90 1.0 200
	30 10 90 1.0 200
Temperature	25 °C
Injection volume	10 µl
Detection	Full scan, scanning range 1.0-200 MS/MS, negative mode

Substances

1. PFOS (perfluorooctanesulfonic acid), CAS number 335-01-8
2. PFHxS (perfluorohexanesulfonic acid), CAS number 335-01-8
3. PFDA (perfluorodecane sulfonic acid), CAS number 335-01-8
4. PFUnA (perfluoroundecanesulfonic acid), CAS number 335-01-8
5. PFDoA (perfluorododecane sulfonic acid), CAS number 335-01-8
6. PFTrDA (perfluorotridecane sulfonic acid), CAS number 335-01-8
7. PFQDA (perfluorotetradecane sulfonic acid), CAS number 335-01-8
8. PFHxDA (perfluorohexadecane sulfonic acid), CAS number 335-01-8

9. PFDA (perfluorodecane sulfonic acid), CAS number 335-01-8
10. PFUnA (perfluoroundecane sulfonic acid), CAS number 335-01-8
11. PFDoA (perfluorododecane sulfonic acid), CAS number 335-01-8
12. PFTrDA (perfluorotridecane sulfonic acid), CAS number 335-01-8
13. PFQDA (perfluorotetradecane sulfonic acid), CAS number 335-01-8
14. PFHxDA (perfluorohexadecane sulfonic acid), CAS number 335-01-8

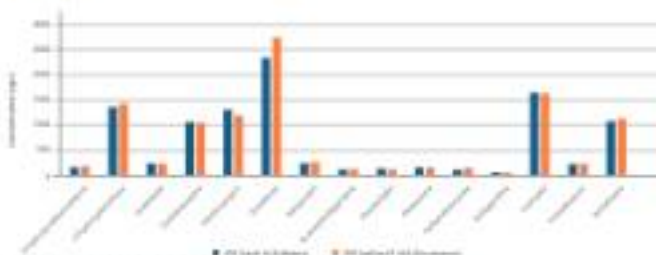


SPE columns



SPEextra™ is a new range of SPE columns for prior sample preparation.

Classic® and HLB columns are suitable for use in the environmental microbiology area. The Sandel® HLB SPE column is based on a modified polymer of 100% pure SPE, it offers a high surface area of 4025 m²/g. The working pH range is from pH 1 to pH 15. The loading capacity is 20 %. It has been developed to clean a broad range of hydrophobic/hydrophilic compounds across various matrices (plasma, urine, etc. maternal).



Comparison of SPEextra™ with Waters Classic® HLB cartridges

SPEextra™ C18	Sorbent mass mg	Particle size µm	Volume mL	Part Number	Box
50	50	5	1	SPS-18-0-100-01	50 pcs
100	100	5	1	SPS-18-0-100-02	50 pcs
100	100	5	2	SPS-18-0-100-03	50 pcs
200	100	5	3	SPS-18-0-100-04	50 pcs
200	100	5	4	SPS-18-0-100-05	50 pcs
500	100	5	5	SPS-18-0-100-06	50 pcs
500	100	5	6	SPS-18-0-100-07	50 pcs

SPEextra™ C8	Sorbent mass mg	Particle size µm	Volume mL	Part Number	Box
50	50	5	1	SPS-08-0-100-01	50 pcs
100	100	5	1	SPS-08-0-100-02	50 pcs
100	100	5	2	SPS-08-0-100-03	50 pcs
200	100	5	3	SPS-08-0-100-04	50 pcs
200	100	5	4	SPS-08-0-100-05	50 pcs
500	100	5	5	SPS-08-0-100-06	50 pcs

SPEextra™ Hbond	Sorbent mass mg	Particle size µm	Volume mL	Part Number	Box
50	50	5	1	SPS-02-0-100-01	50 pcs
100	100	5	2	SPS-02-0-100-02	50 pcs
200	100	5	3	SPS-02-0-100-03	50 pcs
500	100	5	4	SPS-02-0-100-04	50 pcs
500	100	5	5	SPS-02-0-100-05	50 pcs

SPEextra™ HLB Clinical	Sorbent mass mg	Particle size µm	Volume mL	Part Number	Box
50	50	5	1	SPS-02-0-100-01	50 pcs



SPEextra™

Specimen** N.E. Index	Soil Moist. (%)	Particle size (µm)	Volume (µl)	Part Number	Box
50	50	1	0.05	0009-A001	10-pk
50	50	1	0.05	0009-A001	10-pk
50	50	2	0.05	0009-A002	10-pk
50	50	3	0.05	0009-A003	10-pk
750	50	0	0.05	0009-A004	10-pk
750	50	0	0.05	0009-A005	10-pk
2000	50	0	0.05	0009-A006	10-pk
2000	50	0	0.05	0009-A007	10-pk
2000	50	0	0.05	0009-A008	10-pk
2000	50	0	0.05	0009-A009	10-pk
2000	50	0	0.05	0009-A010	10-pk
2000	50	0	0.05	0009-A011	10-pk
2000	50	0	0.05	0009-A012	10-pk
2000	50	0	0.05	0009-A013	10-pk
2000	50	0	0.05	0009-A014	10-pk
2000	50	0	0.05	0009-A015	10-pk
2000	50	0	0.05	0009-A016	10-pk
2000	50	0	0.05	0009-A017	10-pk
2000	50	0	0.05	0009-A018	10-pk
2000	50	0	0.05	0009-A019	10-pk
2000	50	0	0.05	0009-A020	10-pk

[illegible]

Spektra™ HX	Barium Mass mg	Barium chloride gms	Volume ml	Part Number	Box
100	100	1	999-500-5-100-01	10 per	
1000	100	1	999-500-5-1000-01	10 per	
1000	100	3	999-500-5-1000-03	10 per	
2000	100	3	999-500-5-2000-03	10 per	
5000	100	3	999-500-5-5000-03	10 per	

[illegible]

Spektrum™ Turntop (translucent grade)	Bottom Layer (mg)	Spektrum™ poly	Volume (ml)	Part Number	Box
	1000	1.500000	6	SP-5, 5000-10000	50 each
	1000	1.500000	15	SP-5, 5000-15000	25 each
	500	1.500000	3	SP-5, 5000-50000	10 each

Isotope* Densité	Solvent (g)	Particule (g)	Vitesse (ml)	Temps (min)	Notes
Isotope 1	100	100	10	100	100

SPE columns

Spektra™ II	Sample Mass mg	Extraction vol µl	Volume µl	Part Number	Box
901	10	5	5	SPS-9012-00000	10 pks
902	10	5	5	SPS-9022-00000	10 pks
1000	10	5	5	SPS-1002-00000	10 pks



12 position vacuum SPE manifold (p/n: SPS-1000-00000)

Flash columns

Discover our fast and easy flash chromatography columns for high performance purification. EasyFlash™ columns offer high efficiency for a fast separation and isolation of reactants, reaction products and intermediates.

We offer wide range from 6 µm to 100 µm EasyFlash™ columns with various shapes types - spherical and irregular.

Size (L)	EasyFlash™ Silica II		EasyFlash™ Silica III		EasyFlash™ Silica III	
	10 µm	20 µm	20 µm	15 µm	10 µm	15 µm
4	FL-1001-A01	FL-1001-A02	FL-1001-A03	FL-1001-A04	FL-1001-A05	FL-1001-A06
10	FL-1001-A07	FL-1001-A08	FL-1001-A09	FL-1001-A10	FL-1001-A11	FL-1001-A12
25	FL-1001-A13	FL-1001-A14	FL-1001-A15	FL-1001-A16	FL-1001-A17	FL-1001-A18
40	FL-1001-A19	FL-1001-A20	FL-1001-A21	FL-1001-A22	FL-1001-A23	FL-1001-A24
60	FL-1001-A25	FL-1001-A26	FL-1001-A27	FL-1001-A28	FL-1001-A29	FL-1001-A30
100	FL-1001-A31	FL-1001-A32	FL-1001-A33	FL-1001-A34	FL-1001-A35	FL-1001-A36
200	FL-1001-A37	FL-1001-A38	FL-1001-A39	FL-1001-A40	FL-1001-A41	FL-1001-A42
300	FL-1001-A43	FL-1001-A44	FL-1001-A45	FL-1001-A46	FL-1001-A47	FL-1001-A48
400	FL-1001-A49	FL-1001-A50	FL-1001-A51	FL-1001-A52	FL-1001-A53	FL-1001-A54
500	FL-1001-A55	FL-1001-A56	FL-1001-A57	FL-1001-A58	FL-1001-A59	FL-1001-A60
1000	FL-1001-A61	FL-1001-A62	FL-1001-A63	FL-1001-A64	FL-1001-A65	FL-1001-A66

Size (L)	EasyFlash™ Silica III		EasyFlash™ Silica III		EasyFlash™ Silica III	
	10 µm	20 µm	20 µm	15 µm	10 µm	15 µm
4	FL-1001-A67	FL-1001-A68	FL-1001-A69	FL-1001-A70	FL-1001-A71	FL-1001-A72
10	FL-1001-A73	FL-1001-A74	FL-1001-A75	FL-1001-A76	FL-1001-A77	FL-1001-A78
25	FL-1001-A79	FL-1001-A80	FL-1001-A81	FL-1001-A82	FL-1001-A83	FL-1001-A84
40	FL-1001-A85	FL-1001-A86	FL-1001-A87	FL-1001-A88	FL-1001-A89	FL-1001-A90
60	FL-1001-A91	FL-1001-A92	FL-1001-A93	FL-1001-A94	FL-1001-A95	FL-1001-A96
100	FL-1001-A97	FL-1001-A98	FL-1001-A99	FL-1001-A100	FL-1001-A101	FL-1001-A102
200	FL-1001-A103	FL-1001-A104	FL-1001-A105	FL-1001-A106	FL-1001-A107	FL-1001-A108
300	FL-1001-A109	FL-1001-A110	FL-1001-A111	FL-1001-A112	FL-1001-A113	FL-1001-A114
400	FL-1001-A115	FL-1001-A116	FL-1001-A117	FL-1001-A118	FL-1001-A119	FL-1001-A120
500	FL-1001-A121	FL-1001-A122	FL-1001-A123	FL-1001-A124	FL-1001-A125	FL-1001-A126
1000	FL-1001-A127	FL-1001-A128	FL-1001-A129	FL-1001-A130	FL-1001-A131	FL-1001-A132

Size (L)	EasyFlash™ C18 High Performance		EasyFlash™ C18 AQ		EasyFlash™ Silica		EasyFlash™ Silica	
	10 µm	20 µm	15 µm	10 µm	15 µm	10 µm	15 µm	15 µm
4	FL-1001-A133	FL-1001-A134	FL-1001-A135	FL-1001-A136	FL-1001-A137	FL-1001-A138	FL-1001-A139	FL-1001-A140
10	FL-1001-A141	FL-1001-A142	FL-1001-A143	FL-1001-A144	FL-1001-A145	FL-1001-A146	FL-1001-A147	FL-1001-A148
25	FL-1001-A149	FL-1001-A150	FL-1001-A151	FL-1001-A152	FL-1001-A153	FL-1001-A154	FL-1001-A155	FL-1001-A156
40	FL-1001-A157	FL-1001-A158	FL-1001-A159	FL-1001-A160	FL-1001-A161	FL-1001-A162	FL-1001-A163	FL-1001-A164
60	FL-1001-A165	FL-1001-A166	FL-1001-A167	FL-1001-A168	FL-1001-A169	FL-1001-A170	FL-1001-A171	FL-1001-A172
100	FL-1001-A173	FL-1001-A174	FL-1001-A175	FL-1001-A176	FL-1001-A177	FL-1001-A178	FL-1001-A179	FL-1001-A180
200	FL-1001-A181	FL-1001-A182	FL-1001-A183	FL-1001-A184	FL-1001-A185	FL-1001-A186	FL-1001-A187	FL-1001-A188
300	FL-1001-A189	FL-1001-A190	FL-1001-A191	FL-1001-A192	FL-1001-A193	FL-1001-A194	FL-1001-A195	FL-1001-A196
400	FL-1001-A197	FL-1001-A198	FL-1001-A199	FL-1001-A200	FL-1001-A201	FL-1001-A202	FL-1001-A203	FL-1001-A204
500	FL-1001-A205	FL-1001-A206	FL-1001-A207	FL-1001-A208	FL-1001-A209	FL-1001-A210	FL-1001-A211	FL-1001-A212
1000	FL-1001-A213	FL-1001-A214	FL-1001-A215	FL-1001-A216	FL-1001-A217	FL-1001-A218	FL-1001-A219	FL-1001-A220

Size (L)	EasyFlash™ Silica		
	10 µm	20 µm	15 µm
4	FL-1001-A221	FL-1001-A222	FL-1001-A223
10	FL-1001-A224	FL-1001-A225	FL-1001-A226
25	FL-1001-A227	FL-1001-A228	FL-1001-A229
40	FL-1001-A230	FL-1001-A231	FL-1001-A232
60	FL-1001-A233	FL-1001-A234	FL-1001-A235
100	FL-1001-A236	FL-1001-A237	FL-1001-A238
200	FL-1001-A239	FL-1001-A240	FL-1001-A241
300	FL-1001-A242	FL-1001-A243	FL-1001-A244
400	FL-1001-A245	FL-1001-A246	FL-1001-A247
500	FL-1001-A248	FL-1001-A249	FL-1001-A250
1000	FL-1001-A251	FL-1001-A252	FL-1001-A253



EasyFlash™ column

Sample preparation kit



Metamino® is a fast and easy sample preparation method for your GC/MS analysis. Metamino® kits include demonstration reagents and all clean-up accessories to prepare your sample for injection. They eliminate time-consuming sample preparation procedures.

The new clean-up procedure uses a special material as the end-step. The other advantage is that the derivatization procedure enables the extension of the analysis list. Contact us for further details.

- 18 ketone acids, polyamines, biogenic amines and coenzymes in 25 minutes (sample preparation and analysis time)
- Easy sample preparation
- Unique clean-up step
- GC/MS and GC/MS/MS
- NIST library for GC/MS available
- Possible extension to other analyses on request



LC/MS kit

No.	Name	System	Identification	MS/MS	Retention	Quantity	17	Quantity	22
1	Metamino	Metamino							
2	Metamino	Metamino							
3	Metamino	Metamino							
4	Metamino	Metamino							
5	Metamino	Metamino							
6	Metamino	Metamino							
7	Metamino	Metamino							
8	Metamino	Metamino							
9	Metamino	Metamino							
10	Metamino	Metamino							
11	Metamino	Metamino							
12	Metamino	Metamino							
13	Metamino	Metamino							
14	Metamino	Metamino							
15	Metamino	Metamino							
16	Metamino	Metamino							
17	Metamino	Metamino							
18	Metamino	Metamino							
19	Metamino	Metamino							
20	Metamino	Metamino							
21	Metamino	Metamino							
22	Metamino	Metamino							
23	Metamino	Metamino							
24	Metamino	Metamino							
25	Metamino	Metamino							
26	Metamino	Metamino							
27	Metamino	Metamino							
28	Metamino	Metamino							
29	Metamino	Metamino							
30	Metamino	Metamino							
31	Metamino	Metamino							
32	Metamino	Metamino							
33	Metamino	Metamino							
34	Metamino	Metamino							
35	Metamino	Metamino							
36	Metamino	Metamino							
37	Metamino	Metamino							
38	Metamino	Metamino							
39	Metamino	Metamino							
40	Metamino	Metamino							
41	Metamino	Metamino							
42	Metamino	Metamino							
43	Metamino	Metamino							
44	Metamino	Metamino							
45	Metamino	Metamino							
46	Metamino	Metamino							
47	Metamino	Metamino							
48	Metamino	Metamino							
49	Metamino	Metamino							
50	Metamino	Metamino							
51	Metamino	Metamino							
52	Metamino	Metamino							
53	Metamino	Metamino							
54	Metamino	Metamino							
55	Metamino	Metamino							
56	Metamino	Metamino							
57	Metamino	Metamino							
58	Metamino	Metamino							
59	Metamino	Metamino							
60	Metamino	Metamino							
61	Metamino	Metamino							
62	Metamino	Metamino							
63	Metamino	Metamino							
64	Metamino	Metamino							
65	Metamino	Metamino							
66	Metamino	Metamino							
67	Metamino	Metamino							
68	Metamino	Metamino							
69	Metamino	Metamino							
70	Metamino	Metamino							
71	Metamino	Metamino							
72	Metamino	Metamino							
73	Metamino	Metamino							
74	Metamino	Metamino							
75	Metamino	Metamino							
76	Metamino	Metamino							
77	Metamino	Metamino							
78	Metamino	Metamino							
79	Metamino	Metamino							
80	Metamino	Metamino							
81	Metamino	Metamino							
82	Metamino	Metamino							
83	Metamino	Metamino							
84	Metamino	Metamino							
85	Metamino	Metamino							
86	Metamino	Metamino							
87	Metamino	Metamino							
88	Metamino	Metamino							
89	Metamino	Metamino							
90	Metamino	Metamino							
91	Metamino	Metamino							
92	Metamino	Metamino							
93	Metamino	Metamino							
94	Metamino	Metamino							
95	Metamino	Metamino							
96	Metamino	Metamino							
97	Metamino	Metamino							
98	Metamino	Metamino							
99	Metamino	Metamino							
100	Metamino	Metamino							

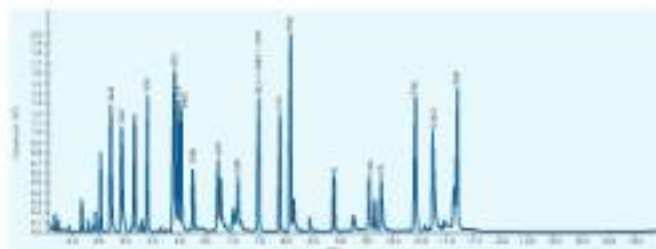
Met 17 = Metamino

GC/MS kit

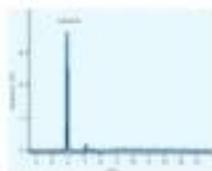
Year	State	Population	Quarantine	Cost	Cost	Quarantine Cost	Cost	Cost
1900	Alabama	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Alaska	100,000		10,000	10,000	10,000	10,000	10,000
1900	Arizona	100,000		10,000	10,000	10,000	10,000	10,000
1900	Arkansas	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	California	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Colorado	100,000		10,000	10,000	10,000	10,000	10,000
1900	Connecticut	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Delaware	100,000		10,000	10,000	10,000	10,000	10,000
1900	District of Columbia	100,000		10,000	10,000	10,000	10,000	10,000
1900	Florida	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Georgia	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Idaho	100,000		10,000	10,000	10,000	10,000	10,000
1900	Illinois	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Indiana	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Iowa	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Kansas	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Kentucky	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Louisiana	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Maine	100,000		10,000	10,000	10,000	10,000	10,000
1900	Maryland	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Massachusetts	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Michigan	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Minnesota	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Mississippi	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Missouri	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Montana	100,000		10,000	10,000	10,000	10,000	10,000
1900	Nebraska	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Nevada	100,000		10,000	10,000	10,000	10,000	10,000
1900	New Hampshire	100,000		10,000	10,000	10,000	10,000	10,000
1900	New Jersey	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	New Mexico	100,000		10,000	10,000	10,000	10,000	10,000
1900	New York	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	North Carolina	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	North Dakota	100,000		10,000	10,000	10,000	10,000	10,000
1900	Ohio	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Oklahoma	100,000		10,000	10,000	10,000	10,000	10,000
1900	Oregon	100,000		10,000	10,000	10,000	10,000	10,000
1900	Pennsylvania	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	Rhode Island	100,000		10,000	10,000	10,000	10,000	10,000
1900	South Carolina	1,000,000		100,000	100,000	100,000	100,000	100,000
1900	South Dakota	100,000		10,000	10,000	10,000	10,000	10,000
1900	Tennessee	1,000,000		100,000	100,000	100,000	100,000	

GC/MS separation

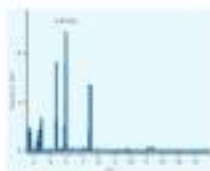
Typical chromatogram of the amino acid standard solution included in the kit



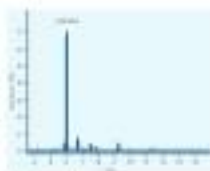
Chromatogram of standard solution (allowed)



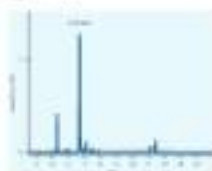
ILE (EC 312)



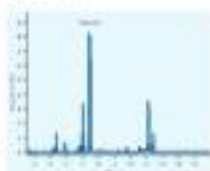
LEU (EC 283)



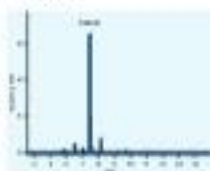
PRO (EC 284)



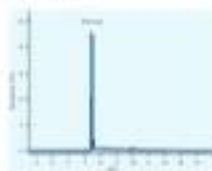
ASP (EC 254)



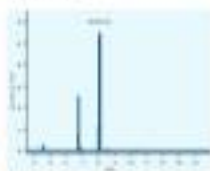
GLU (EC 282)



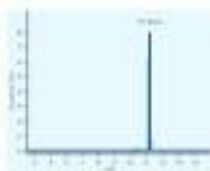
MET (EC 138)



4-HIP (EC 313)



PHE (EC 311)



TRP (EC 139)

Met-EC - Metabolite Chromatography

CENTRIFUGAL FILTERS



Micro-Safe 15 mL Micro-Safe 15 mL



Aqueous Filter and water



Hanks Sport Culture Hanks Sport F10

[illegible]

CENTRIFUGAL FILTERS

CENTRIFUGAL FILTERS

Centrifugal Filter Mid-type and Max-type (excluding open hole) with a porosity of 0.3 µm and 0.45 µm are suitable for sample purification, pre-filtration, removal of particles and clearing of suspensions to sample using continuous (batch, FTSE, IVOL, PL, CA, MC, BE).



Mid-Filter



Max-Filter

Designation	Membrane	Capacity	Weight	Part number
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90702
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90703
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90704
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90705
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90706
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90707
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90708
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90709
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90710
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90711
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90712
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90713
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90714
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90715
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90716
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90717
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90718
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90719
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90720
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90721
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90722
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90723
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90724
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90725
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90726
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90727
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90728
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90729
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90730
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90731
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90732
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90733
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90734
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90735
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90736
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90737
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90738
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90739
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90740
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90741
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90742
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90743
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90744
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90745
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90746
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90747
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90748
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90749
Centrifugal Filter 0.3 µm Mid - 100 cc capacity	PS	4.5 cc	20.5 g	90750

SYRINGE FILTERS

Our laboratory storage flasks are suitable for flammable solvents and solvent mixtures, where it is necessary to have a low content of extractable substances. The Neobutran Stylen, PPS, PTFE, MCL, PPS have good chemical resistance and high strength.



the authors

[illegible]

VIALS and CAPS

2mL crimp vials

Description	Qty	Part number
Crimp vials		
2mL crimp vial, 12 x 32 mm, clear	100 pcs	245-2-02
2mL crimp vial, 12 x 32 mm, clear with label	100 pcs	245-2-03
2mL crimp vial, 12 x 32 mm, green with label	100 pcs	245-2-04

Description	Qty	Part number
Caps for 2mL crimp vials		
11mm Ø crimp caps with inserts of glass PTFE	100 pcs	245-A-11-007-2
11mm Ø crimp caps with inserts of glass PTFE	100 pcs	245-A-11-010
11mm Ø crimp caps with inserts of glass PTFE	1000 pcs	245-A-11-019
11mm Ø crimp caps with inserts of glass PTFE	100 pcs	245-A-11-020-2
11mm Ø crimp caps with inserts of glass PTFE	1000 pcs	245-A-11-020-3
11mm Ø crimp caps with inserts of glass PTFE	100 pcs	245-A-11-021-3
11mm Ø crimp caps with inserts of glass PTFE	1000 pcs	245-A-11-021-3
11mm Ø crimp caps with inserts of glass PTFE	100 pcs	245-A-11-022-2
11mm Ø crimp caps with inserts of glass PTFE	1000 pcs	245-A-11-022-3

Description	Qty	Part number
Available pack sizes crimp vials + caps with inserts		
2mL crimp vial, 12 x 32 mm, clear and 11mm Ø crimp caps with inserts of glass PTFE	1000 pcs	245-2-02-1000-3
2mL crimp vial, 12 x 32 mm, clear and 11mm Ø crimp caps with inserts of glass PTFE	1000 pcs	245-2-03-1000-3
2mL crimp vial, 12 x 32 mm, clear and 11mm Ø crimp caps with inserts of glass PTFE	1000 pcs	245-2-04-1000-3
2mL crimp vial, 12 x 32 mm, clear and 11mm Ø crimp caps with inserts of glass PTFE	1000 pcs	245-2-02-1000-3
2mL crimp vial, 12 x 32 mm, clear with label and 11mm Ø crimp caps with inserts of glass PTFE	1000 pcs	245-2-03-1000-3
2mL crimp vial, 12 x 32 mm, clear with label and 11mm Ø crimp caps with inserts of glass PTFE	1000 pcs	245-2-04-1000-3
2mL crimp vial, 12 x 32 mm, clear with label and 11mm Ø crimp caps with inserts of glass PTFE	1000 pcs	245-2-03-1000-3
2mL crimp vial, 12 x 32 mm, clear with label and 11mm Ø crimp caps with inserts of glass PTFE	1000 pcs	245-2-04-1000-3

2mL crimp vials

Description	Qty	Part number
Inserts for crimp vials and for glass vials of various sizes		
200 µL, 1.4 x 28 mm, curved glass inserts with glass beads	100 pcs	245-2-05-020
200 µL, 1.4 x 28 mm, curved glass inserts without glass beads	1000 pcs	245-2-05-020
200 µL, 1.4 x 28 mm, curved glass inserts with glass beads	100 pcs	245-2-05-020
400 µL, 1.4 x 28 mm, curved glass inserts with glass beads	100 pcs	245-2-05-020



2mL crimp vials



200 µL, 1.4 x 28 mm, curved glass inserts

VIALS and CAPS

2mL screw robotic vials

Description	Qty	Part number
Short threaded 2mL robotic screw vials		
2mL short threaded robotic screw vial, 11 x 32 mm, clear without label	100 pcs	145-2-100
2mL short threaded robotic screw vial, 11 x 32 mm, clear with label	100 pcs	145-2-100-L
2mL short threaded robotic screw vial, 11 x 32 mm, amber with label	50 pcs	145-2-100-A

Description	Qty	Part number
Caps for short threaded 2mL robotic screw vials		
Blue plastic cap for robotic vial with 1 septa rubber PTFE	100 pcs	145-PH-001-B
Blue plastic cap for robotic vial with 2 septa rubber PTFE	100 pcs	145-PH-01-B
Blue plastic cap for robotic vial with 3 septa rubber PTFE	100 pcs	145-PH-02-B
Blue plastic cap for robotic vial with 4 septa rubber PTFE	100 pcs	145-PH-03-B
Blue plastic cap for robotic vial with 5 septa rubber PTFE	100 pcs	145-PH-001-B
Blue plastic cap for robotic vial with 6 septa rubber PTFE	100 pcs	145-PH-002-B
Blue plastic cap for robotic vial with 7 septa rubber PTFE	100 pcs	145-PH-003-B
Blue plastic cap for robotic vial with 8 septa rubber PTFE	100 pcs	145-PH-004-B
Blue plastic cap for robotic vial with 9 septa rubber PTFE	100 pcs	145-PH-005-B
Blue plastic cap for robotic vial with 10 septa rubber PTFE	100 pcs	145-PH-006-B

Description	Qty	Part number
Spacer caps for caps for short threaded robotic screw vials		
Spacer caps 10mm PTFE	100 pcs	145-S-01-P
Spacer caps 15mm PTFE	100 pcs	145-S-02-P
Spacer caps 20mm PTFE	100 pcs	145-S-03-P
Spacer caps 25mm PTFE	100 pcs	145-S-04-P

Description	Qty	Part number
Cartridge caps into short threaded robotic vials + caps with septa		
Short threaded 2mL robotic screw vial, 11 x 32 mm, clear with polyimide/bromophenyl caps with septa rubber PTFE	100 pcs	145-2-100-001-B-PTF
Short threaded 2mL robotic screw vial, 11 x 32 mm, clear with polyimide/bromophenyl caps with fused silica septa rubber PTFE	100 pcs	145-2-100-001-B-PTF-FS
Short threaded 2mL robotic screw vial, 11 x 32 mm, clear with polyimide/bromophenyl caps with pre-wetted septa rubber PTFE	100 pcs	145-2-100-001-B-PTF-PW
Short threaded 2mL robotic screw vial, 11 x 32 mm, amber with septa and blue plastic caps with septa rubber PTFE	100 pcs	145-2-100-001-B-PTF-B
Short threaded 2mL robotic screw vial, 11 x 32 mm, amber with septa and blue plastic caps with pre-wetted septa rubber PTFE	100 pcs	145-2-100-001-B-PTF-PW

Note: Robot short threaded vials threaded 11 x 32 mm, cap will permit safe pre-ignition between systems.

VIALS and CAPS

4mL screw vials

Description	Qty	Part number
Screw vials 4 mL, 13-420 threaded		
4mL screw vials, 13 x 40 mm clear without label	100/box	1345-4-0131
4mL screw vials, 13 x 40 mm clear with label	100/box	1345-4-0132
4mL screw vials, 13 x 40 mm amber with label	50/box	1345-4-0134

Description	Qty	Part number
Caps for 4mL screw vials, 13-420 threaded		
13-425 P/Freezeable caps with caps closure PTFE	100/box	1375-1312-1
13-425 P/Freezeable caps with caps closure PTFE	1000/box	1375-1312-1p
13-425 P/Freezeable caps with pre- et caps closure PTFE	100/box	1375-1312-2

Description	Qty	Part number
Space septa 12 mm for caps 13-420 threaded		
12 mm caps closure PTFE	100/box	1375-1400-1
12 mm caps closure PTFE	1000/box	1375-1400-1p

VIALS and CAPS

Headspace crimp vials

Description	Qty	Part number
Headspace crimp vials		
20ml headspace crimp vial, 23 x 45 mm, clear rounded bottom	100 pcs	105-13-001-48
20ml headspace crimp vial, 23 x 45 mm, clear flat bottom	100 pcs	105-13-001-49
20ml headspace crimp vial, 23 x 45 mm, clear rounded bottom	100 pcs	105-21-001-38
20ml headspace crimp vial, 23 x 25 mm, clear flat bottom	100 pcs	105-21-001-39
20ml headspace crimp vial, 23 x 25 mm, amber rounded bottom	100 pcs	105-21-001-40

Description	Qty	Part number
20mm diameter crimp caps for headspace vials		
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-1
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-2
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-3
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-4
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-5

Description	Qty	Part number
20mm diameter crimp caps for headspace vials		
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-1
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-2
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-3
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-4
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-5

Description	Qty	Part number
20mm diameter crimp caps for headspace vials		
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-1
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-2
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-3
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-4
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-5

Description	Qty	Part number
20mm diameter crimp caps for headspace vials		
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-1
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-2
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-3
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-4
20mm diameter crimp caps with alpha alpha PTFE	100 pcs	105-25-001-5

Note: Alpha alpha PTFE is a trademark of DuPont. It is used here for identification only. It is not a guarantee of quality. It is not a guarantee of quality. It is not a guarantee of quality.



Headspace crimp vials

VIALS and CAPS

Headspace screw vials

Description	Qty	Part number
Headspace screw vials		
20mL headspace screw vials, 12 x 45 mm, clear, no label holder	100/box	0165-12-42-100
20mL headspace screw vials, 12 x 75 mm, clear, no label holder	100/box	0165-20-12-100

Description	Qty	Part number
Magnetic caps with septa for screw headspace vials		
Magnetic cap with septum PTFE septa for screw headspace vials, 10 mm dia, 2 mm	100/box	0160-10-10
Magnetic cap with septum PTFE septa for screw headspace vials, 10 mm dia, 1.5 mm	100/box	0160-10-08

Description	Qty	Part number
Spex caps 10 mm for screw headspace vials		
10 mm caps aluminum PTFE for screw headspace vials, 10 mm dia, 2 mm	100/box	0070-0021-E
10 mm caps aluminum PTFE for screw headspace vials, 10 mm dia, 3 mm	100/box	0070-0021-A
10 mm caps aluminum PTFE for screw headspace vials, 10 mm dia, 1.5 mm	100/box	0070-0021-E
10 mm caps aluminum PTFE for screw headspace vials, 10 mm dia, 1.2 mm	100/box	0070-0021-A

Description	Qty	Part number
Spex magnetic caps for screw headspace vials		
Magnetic cap for screw headspace vials	10/box	10-600



Screw headspace caps with septa

VIALS and CAPS

Crimping and decapping tools

Manual Crimpers and Decappers

- Easy manual adjustment tools
- Strong light weight plastic body
- Bottom pull handle design prevents welding

High Power Crimping tool

Fastest and most powerful CMS crimping tool

- Strong enough for all steel and magnetic caps
- Designed with external power source and cord (no battery)
- Uses non-chargable pen style (indented cap crimp)

Manual crimper	Qty	Part number
20mm Crimper	1 pc	0100000
11mm Crimper	1 pc	0101000
13mm Crimper	1 pc	0101000
13mm Crimper for Flip Off Cap*	1 pc	0101000
20mm Crimper	1 pc	0100000
20mm Crimper for Flip Off Cap*	1 pc	0100000

* Not for use with flip cap cap

Manual decapper	Qty	Part number
11mm Decapper	1 pc	0101000
13mm Decapper	1 pc	0101000
20mm Decapper	1 pc	0100000

High power electric tool	Qty	Part number
High Power Electric Crimping Tool*	1 pc	0100000
20mm Crimper pen	1 pc	0100000
11mm Crimper pen	1 pc	0101000
13mm Crimper pen	1 pc	0101000
13mm Crimper pen for Flip Off Cap*	1 pc	0101000
20mm Crimper pen	1 pc	0100000
20mm Crimper pen for Flip Off Cap*	1 pc	0100000
11mm Decapper pen	1 pc	0101000
13mm Decapper pen	1 pc	0101000
20mm Decapper pen	1 pc	0100000

* Not for use with flip cap cap

* Not for use with flip cap cap



Manual crimper



High power electric crimper

CONTENTS

Chromservis HPLC columns corresponding to Pharmacopoeia methods

ICP Code	Description	Corresponding column
11	Crystals of glass thermally bonded to porous or nonporous silica particles or superfinely porous particles or spheres. Pore particles, 1.5–12 µm in diameter, or a monolithic rod.	AB 20P Plus C18 AB 20P Plus C18 AC18AP C18 AQ AC18AP C18 AQ2 AC18AP C18 AQ D8000AQ2 C18 AQ D8000AQ2 C18 AQ D8000AQ2 C18 Plus D8000AQ2 C18 Plus
12	Fluorinated particles or superfinely porous particles, 1.5–5 µm in diameter, or a monolithic rod.	AB 20P Plus Fluor AB 20P H AC18AP H
17	Crystals thermally bonded to styryl groups or superfinely porous silica particles, 1.5–11 µm in diameter, or a monolithic rod.	AB 20P C18 AC18AP C18 AQ AC18AP C18 AQ2
18	An essentially nonporous silica gel or a thermally bonded to styryl groups or superfinely porous silica particles, 1.5–11 µm in diameter, or a monolithic rod.	AB 20P H4
19	Long-chain or spherical particles or silica gel having a thermally bonded strongly acidic cation exchange coating, 5–15 µm in diameter.	AB 20P 125
113	Hydrophobic particles thermally bonded to porous silica particles or superfinely porous particles, 1.5–15 µm in diameter, or a monolithic silica rod.	AB 20P 121
114	Hydrophobic particles thermally bonded to porous silica particles or superfinely porous silica particles, 1.5–11 µm in diameter, or a monolithic silica rod.	AB 20P Hydrophobic AB 20P Hydrophobic AC18AP Hydrophobic 10
116	Silica gel having a thermally bonded, strongly basic, tertiary amine structure with exchange capacity, 5–15 µm in diameter.	AB 20P 140
117	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 5–12 µm in diameter.	AC18AP Suger 154
118	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the calcium form, 5–15 µm in diameter.	AC18AP Suger 145
120	Hydrophobic groups thermally bonded to porous silica particles, 1.5–10 µm in diameter, or a monolithic silica rod.	AC18AP 204
140	Terminated phenyl groups thermally bonded to porous or superfinely porous silica particles or styryl groups, 1.5–10 µm in diameter.	AB 20P 107
200	Hydrophobic resin with cross-linked structure and strong acidic cation exchange function groups. The cross-structure of styryl groups, 10–15 µm in diameter, or a monolithic silica rod. The resin consists of styryl groups, 10–15 µm in diameter, with surface group not less than 200 µm ² /g. Hydrophobic coated with acid ion exchange gel. It is a bonded silica particles consisting of styryl groups cross-linked with the other groups.	AB 20P 123

Use our application database. The ChemSpider website has a search engine to find an application based on different keywords, e.g. compound name, inchi name, formula etc.

ADT[®] is a trademark registered by ADT Security Services, Inc.

© 2007 The Authors
Journal compilation © 2007 Blackwell Publishing Ltd

©2008 Pearson Education, Inc. All rights reserved. This publication is a trademark registered by Pearson Education, Inc.

bioRxiv preprint doi: <https://doi.org/10.1101/000000>; this version posted January 1, 2016. The copyright holder for this preprint (which was not certified by peer review) is the author/funder, who has granted bioRxiv a license to display the preprint in perpetuity. It is made available under aCC-BY-NC-ND 4.0 International license.

1374[®] is a trademark by (Pronova s.p.a.)

Mediatrix® is a trademark registered to Mediatrix Inc. in

Other trademarks and trade names may be used in this document to refer to either the system starting the marks and/or names or their products and are the property of their respective owners. The data are proprietary to the marks and names of authors.



OUR BROCHURES



NOTES



Armerica

Argentina
Bolivia
Brazil
Canada
Chile
Colombia
Costa Rica
Cuba
Ecuador
El Salvador
Guatemala
Honduras
Mexico
Mongolia
Paraguay
Peru
Singapore
USA
Venezuela

Europe

Albania
Armenia
Austria
Azerbaijan
Belarus
Belgium
Bosnia and Herzegovina
Bulgaria
Croatia
Cyprus
Czech Republic
Denmark
Estonia
Finland
France
Georgia
Germany
Greece
Hungary
Iceland
Italy
Latvia
Lithuania
Luxembourg
Malta
Moldova
Montenegro
The Netherlands
Norway
Poland
Portugal
Romania
Russia
Serbia
Slovakia
Slovenia
Spain
Sweden
Switzerland
Ukraine
United Kingdom

Asia

Bangladesh
Cambodia
China
India
Israel
Jordan
Kazakhstan
Lebanon
Mongolia
Pakistan
Qatar
South Korea
Thailand
Turkey
Turkmenistan
United Arab Emirates
Uzbekistan
Vietnam

Australia/Oceania and Pacific

Australia
Japan
Malaysia
New Zealand
Philippines
Singapore
Taiwan
South Korea

Distributor:

 CHROMSERVIS

 DataApex



Some chromatograms were evaluated by Clarity™
Chromatography Station (DataApex Ltd.)
www.chromservis.eu

Chromatography
Station Apex
version 3.2.1