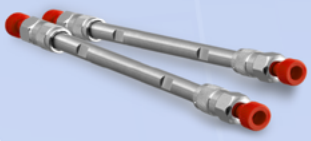
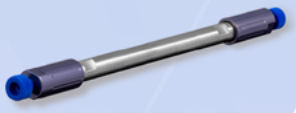
ECOM

ANALYTICAL AND PREPARATIVE
CHROMATOGRAPHY COLUMNS





COLUMNS
Product Guide

WHAT IS NEW

ASTRA® 2 µm HPLC columns

New ASTRA® HPLC columns are complementary to our ARION® brand. These columns offer not only a high-endcapped C18 phase, but also a unique DM phase with dual modification. Another novel phase C18-AQ offers dual chemistry bonding for analyses in aqueous mobile phases.
See page 54.

ARION® BIO and Biphenyl

New ARION® SAX and SCX columns extend the HPLC column range into ion-exchanged chromatography. The reversed phases have been extended with the Biphenyl phase to offer a wider range of selectivities.
See page 46.

ARION® preparative guard cartridges

The ARION® preparative guard system (PGS) offers protection for 21.2 mm ID columns.

SpeExtra™ SPE columns

SpeExtra™ is a new range of SPE column for your sample preparation. Florisil® and HLB columns are suitable for use in the environmental and toxicology area.
See details on page 70.

MetAmino™ sample preparation kit

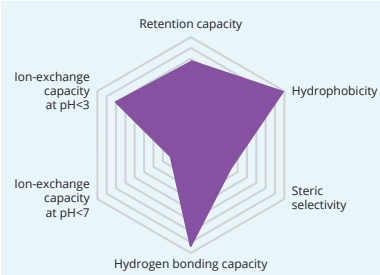
The MetAmino™ kit offers an easy sample preparation method for your LC/MS or GC/MS analysis. It has been developed in the Czech Republic in co-operation with Biology Centre CAS.
See page 72.

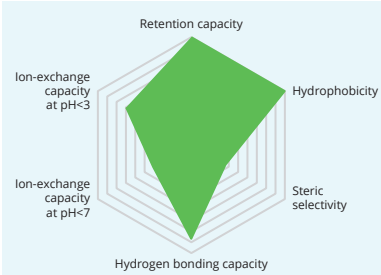
HPLC COLUMN SELECTION

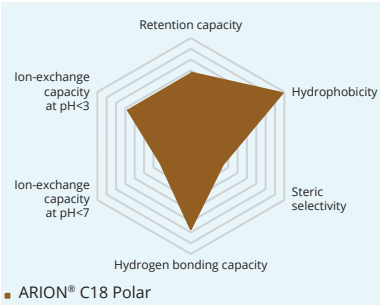
HPLC column selectivity

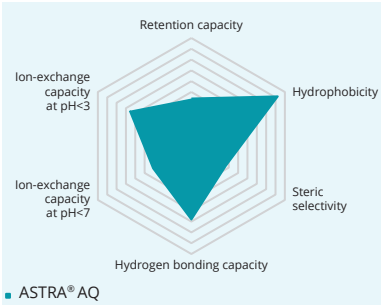
The selectivity is defined as the capability of stationary phases to separate analytes under certain conditions. The selectivity mainly depends on the structure, metal content and modification of base silica gel, type of chemical bonding or silica gel end-capping. The HPLC column selectivity has been measured according to the Tanaka plots (Tanaka, N. et al., Journal of Chromatographic Science, 27 (1989), 721–728), shown below. This allows users a quick comparison of different phases in order to choose the best possible HPLC columns for their application.

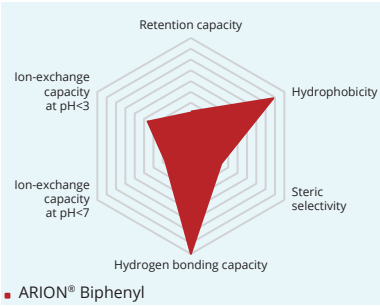
Property	Synonym	Measured parameter
Retention capacity	Hydrophobicity	k' (pentyl benzene)
Hydrophobicity	Methylene selectivity	α (pentyl benzene, butyl benzene)
Steric selectivity	–	α (triphenylene, o-terphenyl)
Hydrogen bonding capacity	Capacity of silanol	α (caffeine, phenol)
Ion-exchange capacity at pH>7	–	α (benzyl amine, phenol)
Ion-exchange capacity at pH<3	–	α (benzyl amine, phenol)

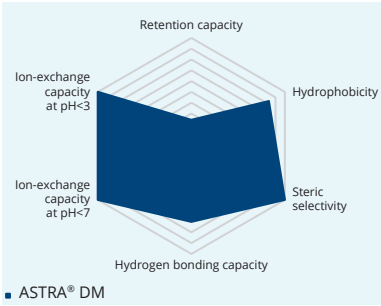


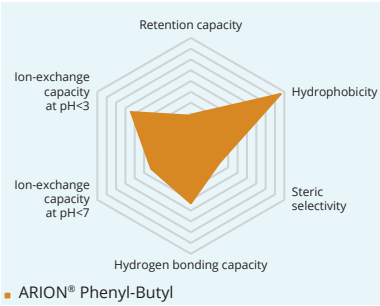








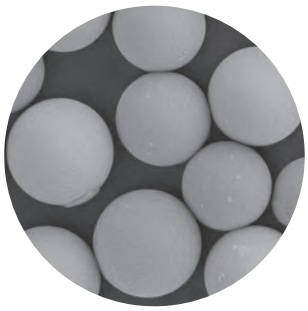




ARION®

As ARION® is one of the latest objects found in space, so it is also the best workhorse for your applications. Explore our new line of ARION® HPLC columns. What innovations 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

Particle size	5 µm	2.2 µm
Metal content	<10 ppm	<10 ppm
Temperature stability	100 °C*	100 °C*
Mean particle diameter	5.3 ± 0.9 µm	2.5 ± 0.5 µm
Proximity to the shape of a sphere	0.96 ± 0.04	0.97 ± 0.03

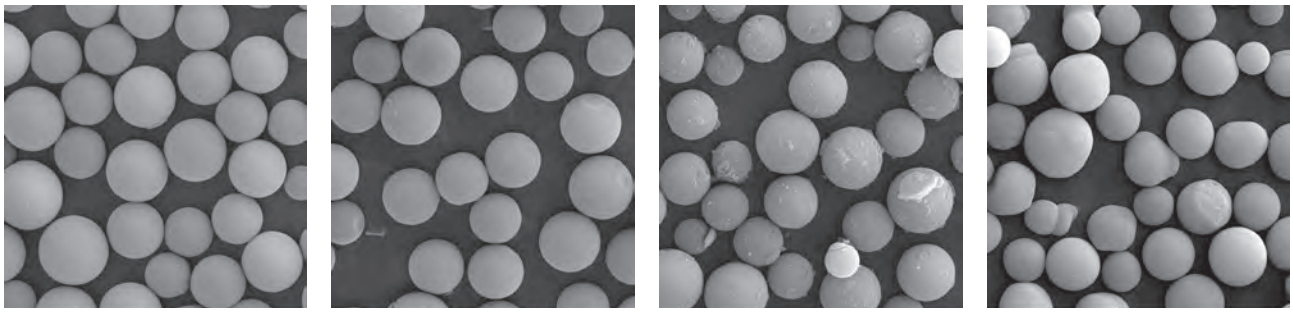
* Depends on mobile phase used and silica bonding.

ARION® phases	Particle size (µm)	Pore size (Å)	Surface area (m^2/g)	Carbon load	pH stability	Endcapping	100% aqueous mobile phase	USP code
Plus C18	1.7, 2.2, 3, 5, 10, 15	100	420	18 %	1.0 to 10	Multi-step	×	L1
Polar C18*	2.2, 3, 5, 10, 15	120	325	16 %	1.5 to 7	Multi-step	✓	L1
C8	3, 5	120	325	11 %	2.0 to 7	Single-step	×	L7
Biphenyl	5	100	325	12 %	2.0 to 7.5	Proprietary	✓	L11
Phenyl-Butyl	2.2, 3, 5	100	300	12 %	1.5 to 7.5	Single-step	×	L11
NH_2	2.2, 3, 5	120	325	5 %	2.0 to 6.5	Proprietary	×	L8
CN	3, 5, 10	120	325	8 %	2.0 to 7	Single-step	×	L10
HILIC Plus	2.2, 3, 5	100	420	–	1.5 to 7	Proprietary	✓	L3
Si	2.2, 3, 5, 10	100	420	–	1.5 to 7	–	×	L3
SAX	5	120	325	–	1.0 to 7.5	–	×	L14
SCX	5	120	325	–	1.0 to 7.5	–	×	L50

* Note: Unique selectivity for Amino Acid and small molecules.

What does ARION® quality look like?

ARION® particles have a very tight distribution and the closest proximity to the shape of a spherical particle (c=0.9618 ± 0.0353). This ensures high separation power and separation reproducibility.



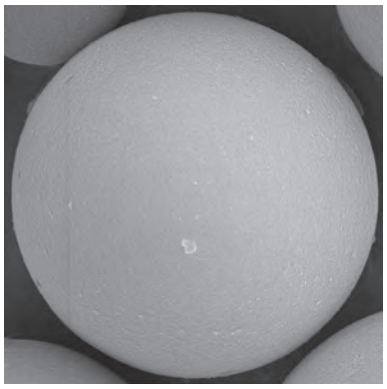
ARION® | Competitor L | Competitor X | Competitor E

SEM HV analysis 20.0 kV, view field 30 µm (by independent laboratory)

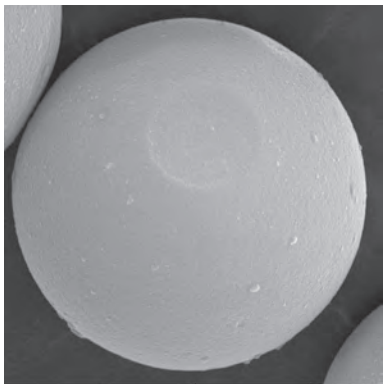
The ARION® medium does not include broken or "potato-shaped" particles. The silica spherical shape is unique; both surface uniformity and surface smoothness enable better packing into HPLC columns and therefore paramount chromatography resolution and reproducibility.

Up close

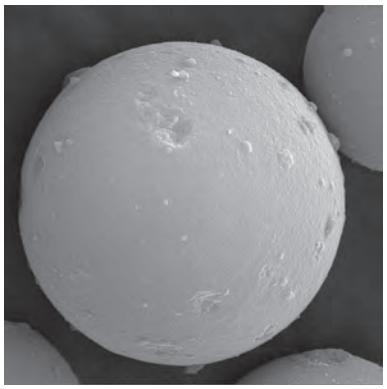
The 5-micron electron microscope field clearly shows the highest quality of ARION® 5µm particles.



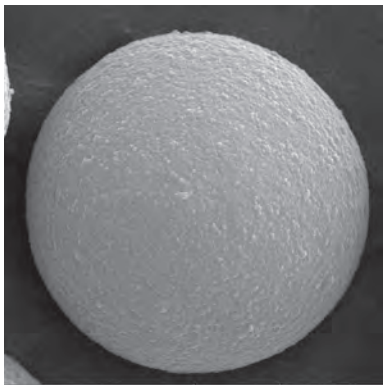
ARION® particle 5 µm



Competitor L particle 5 µm



Competitor X particle 5 µm

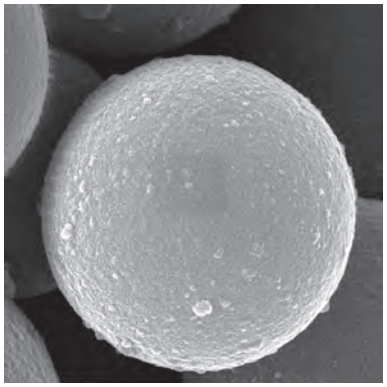


Competitor E particle 5 µm

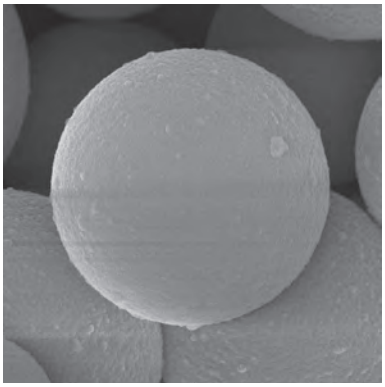
Main particle characteristics:

- The closest proximity to a sphere.
- Unique surface smoothness shown in the pictures above.
- Tight particle size distribution.
- No broken particles.
- No presence of clustered particles.
- No “Moon craters or mountains”.

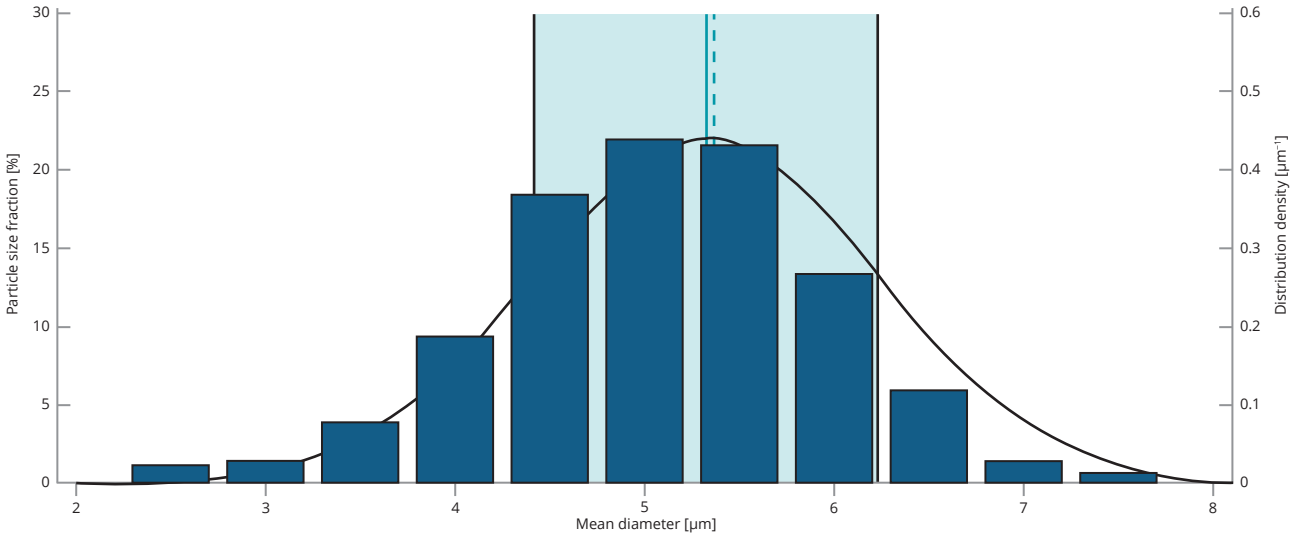
Particle size distribution



ARION® particle 1.7 µm



ARION® particle 2.2 µm

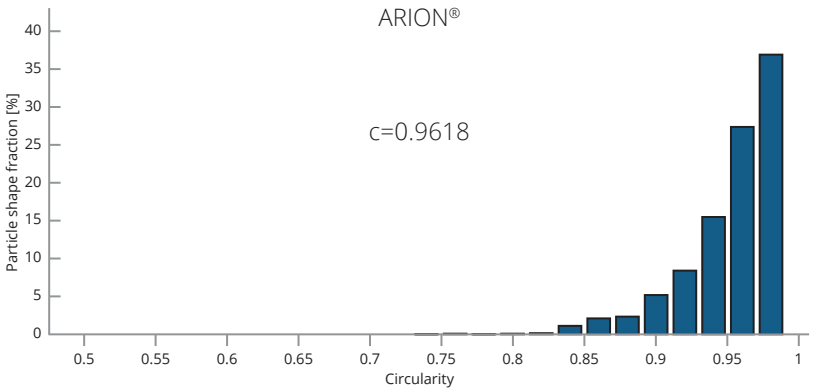


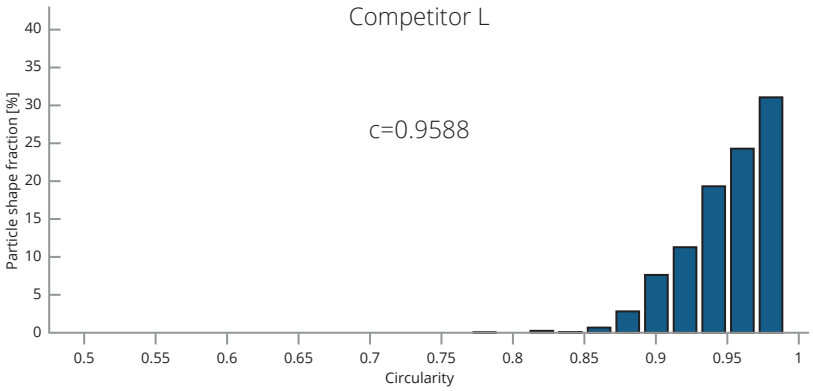
Particle size distribution of ARION® 5 µm particles shows a tight profile calculated from ferret figures by SEM.

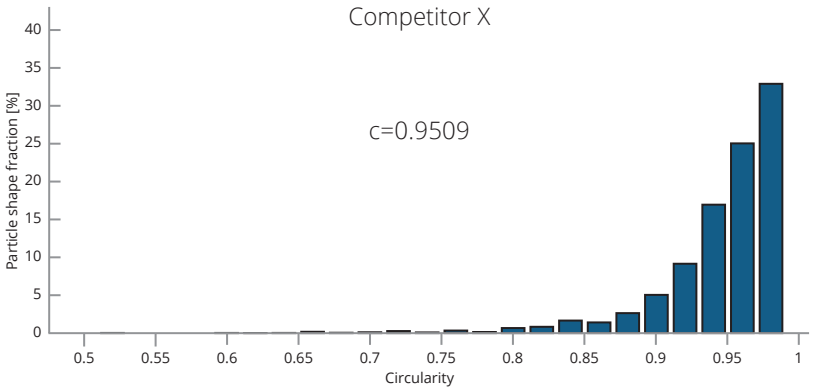
ARION® column hardware:

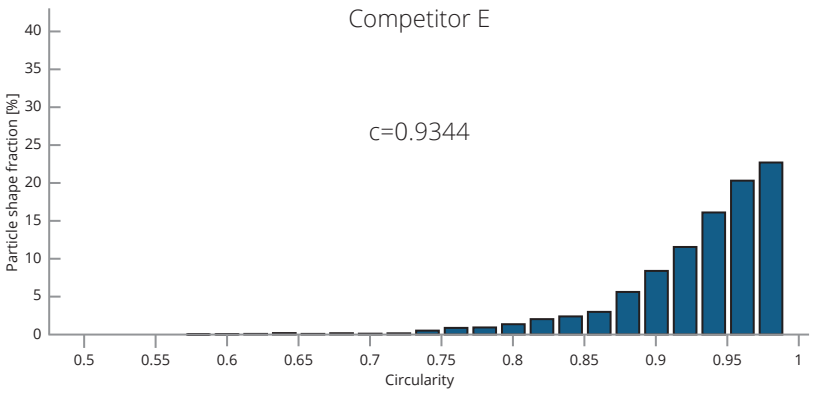
- Modern column hardware for easy handling in a narrow space.
- UHPLC grade Stainless Steel with an amazingly smooth internal surface.
- Colour coded fittings.

Circularity



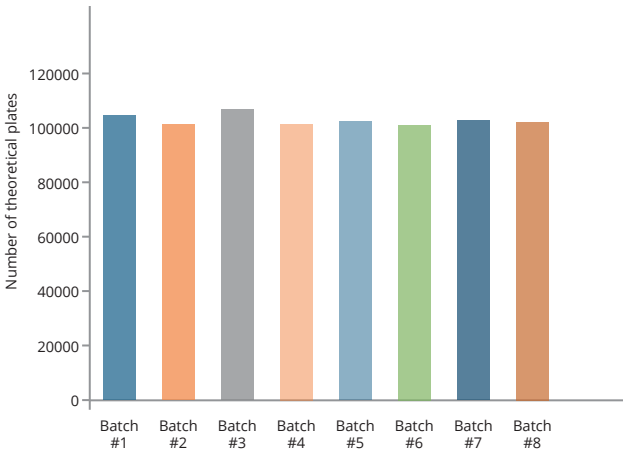




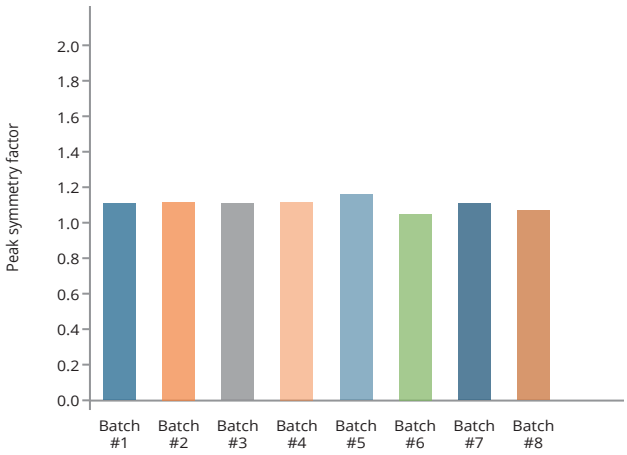


Batch to batch reproducibility

Batch-to-batch reproducibility is shown in the two bar graphs below. The silica batches are strictly controlled and checked for symmetry, and efficiency (number of theoretical plates/meter).



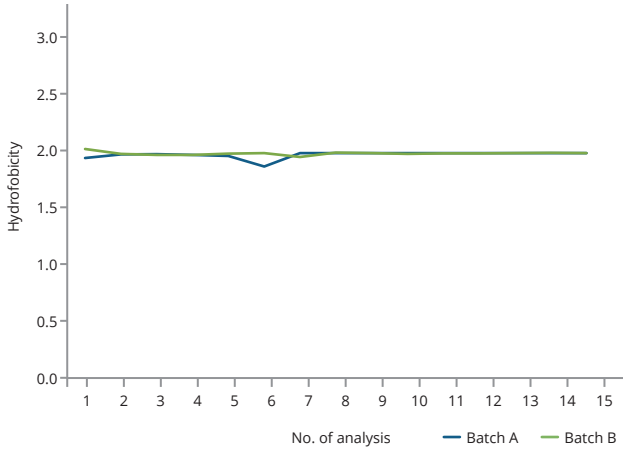
Theoretical plates reproducibility



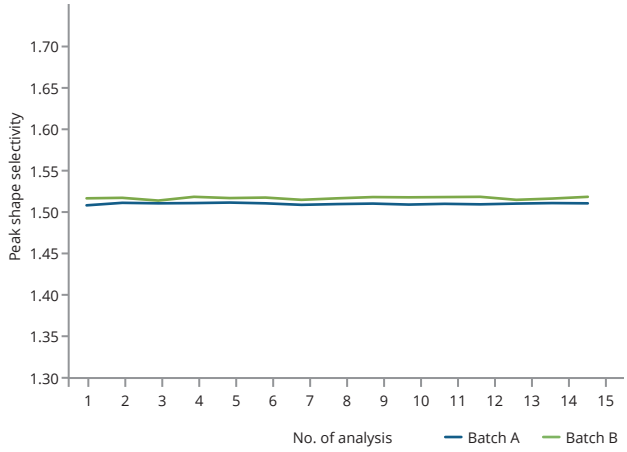
Symmetry reproducibility

Both the silanol activity and hydrofobicity tests are defined e.g. by the Engelhardt test. The hydrofobicity test is based on calculation of the ratio of retention factors $\mathbf{k}_{ethylbenzene}/\mathbf{k}_{toluene}$. The first picture of the Engelhardt test shows a comparison of 2 batches to UHPLC columns for 15 replicates.

Peak shape selectivity is based on a calculation of ratio of $\mathbf{k}_{triphenylene}/\mathbf{k}_{o\text{-}terpenyl}$.

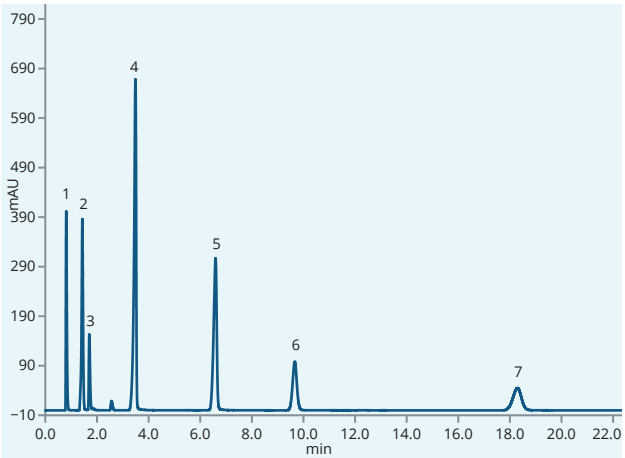


Hydrofobicity test

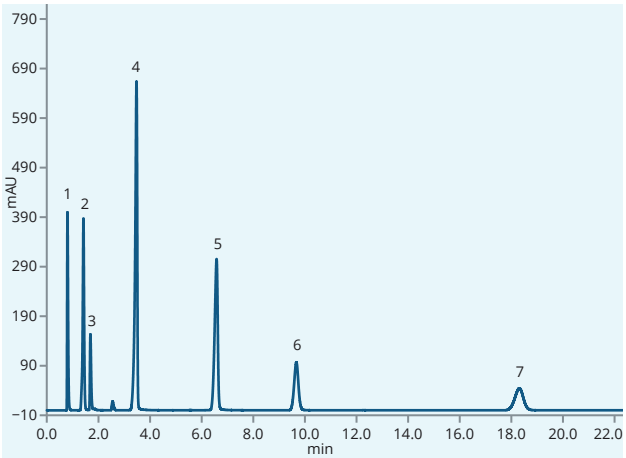


Peak shape selectivity

Batch to batch reproducibility



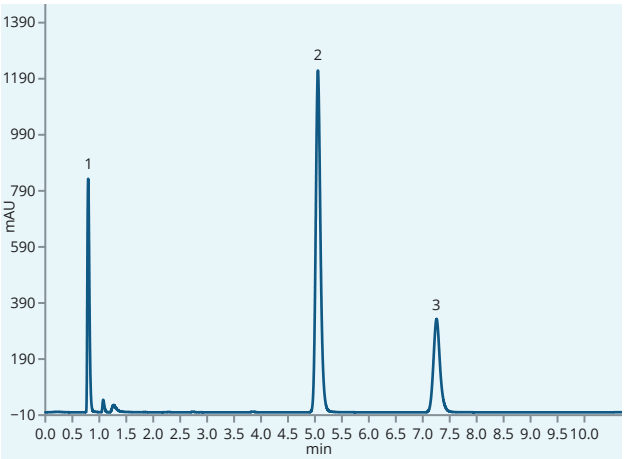
Batch A



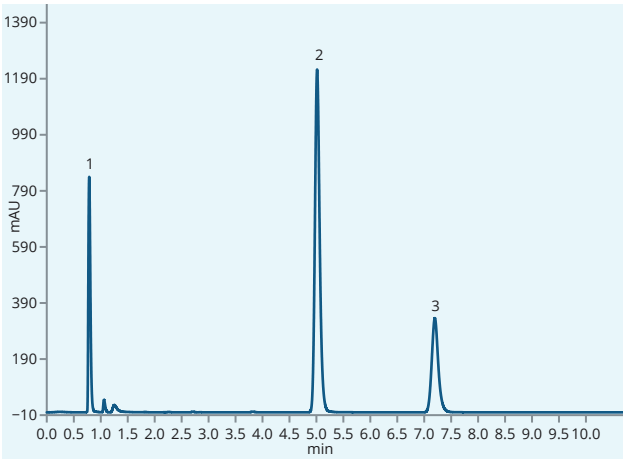
Batch B

Analysis of two batches based on the Engelhardt test.

Column	ARION® Plus C18, 1.7 µm
Dimensions	100 mm × 2.1 mm
Mobile phase	Methanol : water 49/51 (v/v) Isocratic elution
Flow rate	0.3 ml/min
Temperature	40 °C
Analytes	**1. Uracil** (t_0) **2. Aniline** **3. Phenol** **4. N,N-dimethyl-aniline** **5. p-Ethyl-aniline** **6. Toluene** **7. Ethylbenzene**



Batch A



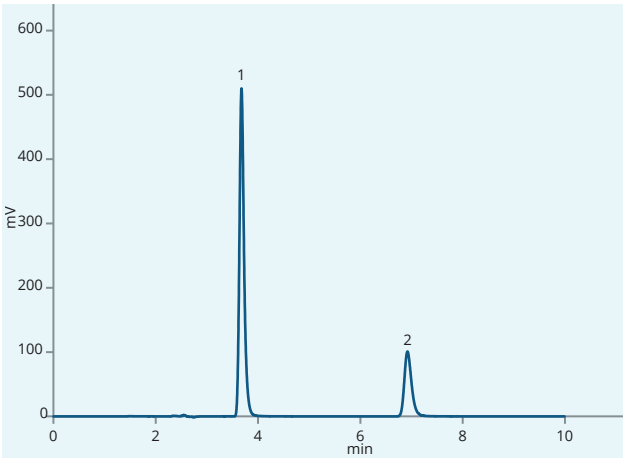
Batch B

Analysis of two batches based on the Shape selectivity test.

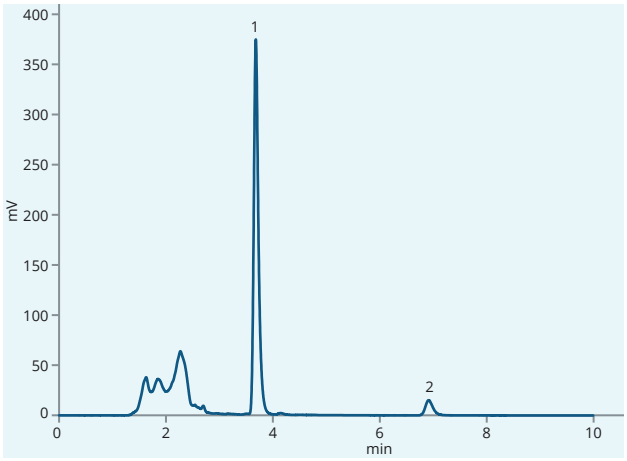
Column	ARION® Plus C18, 1.7 µm
Dimensions	100 mm × 2.1 mm
Mobile phase	Methanol : water 79/21 (v/v) Isocratic elution
Flow rate	0.3 ml/min
Temperature	40 °C
Analytes	**1. Uracil** (t_0) **2. Triphenylene** **3. o-Terpenyl**

Alcaloids – xanthine derivatives

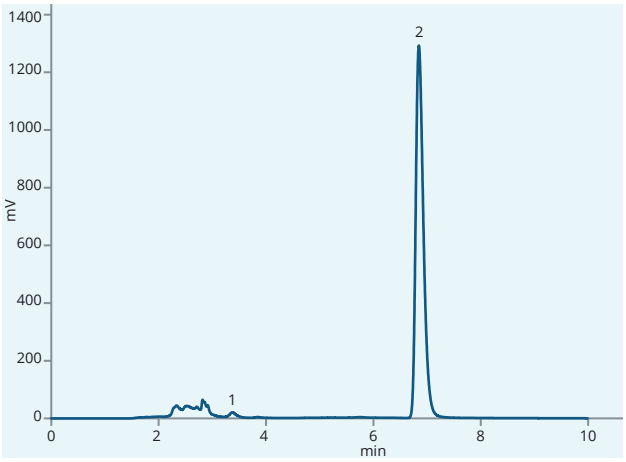
Xanthine alkaloids occur naturally in various plants, such as cocoa, tea and coffee trees. They are commonly used for their effects as mild stimulants. Xanthine alkaloids are monitored in food and drinks, e.g. in chocolate, cocoa powder, and energy drinks.



Theobromine and caffeine standard



Cocoa sample

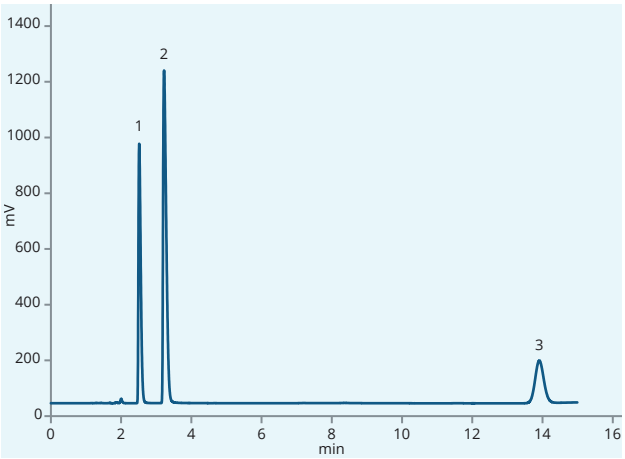


Energy drink

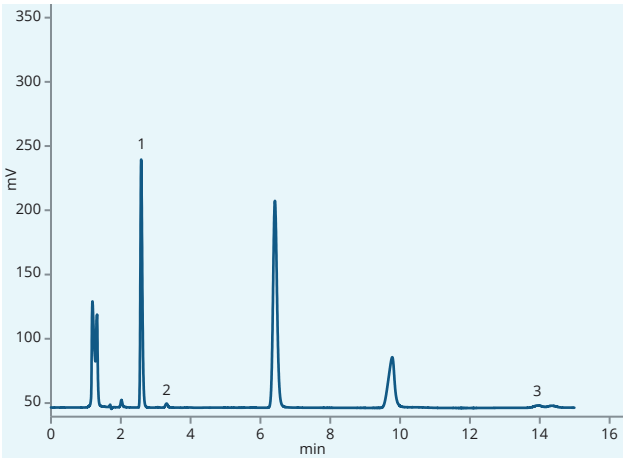
Column	ARION® Plus C18, 5.0 µm
Dimensions	250 mm × 4.6 mm
Part number	ARI-5720-LM46
Mobile phase	Methanol : water 30/70 (v/v)
Flow rate	1.0 ml/min
Temperature	30 °C
Detection	UV @280 nm
Analytes	**1. Theobromine** **2. Caffeine**

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

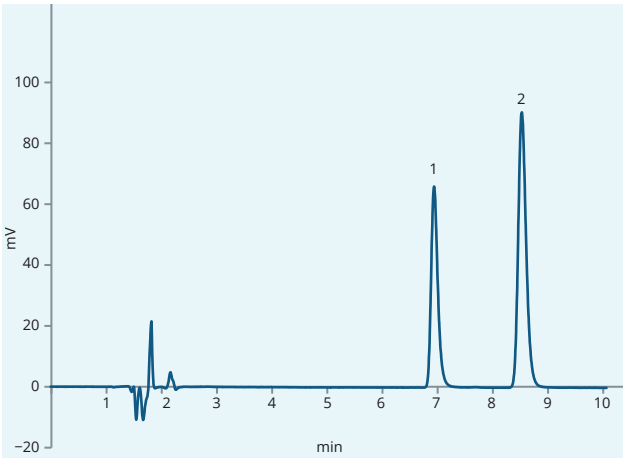


Energy drink

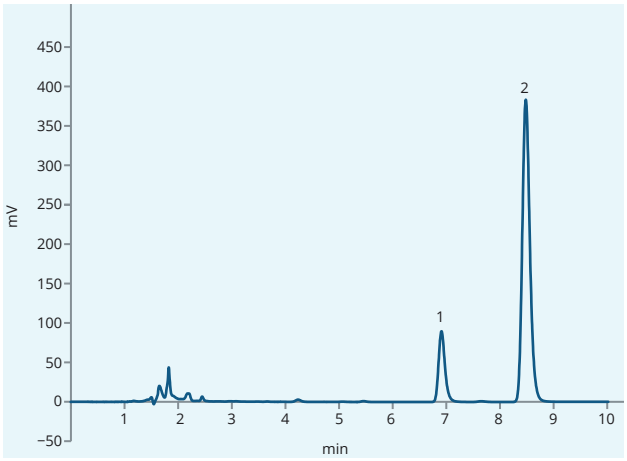
Column	ARION® Plus C18, 5.0 µm
Dimensions	250 mm × 4.6 mm
Part number	ARI-5720-LM46
Mobile phase	20 mM KH_2PO_4 : ACN 90/10 (v/v)
Flow rate	2.0 ml/min
Temperature	30 °C
Detection	UV @220 nm
Analytes	**1. Acesulfame-K (ACS-K)** **2. Saccharin (SAC)** **3. Aspartame (ASP)**

Preservatives in syrup

Sodium and potassium salts of benzoic acid and sorbic 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 1333/2008 sets the rules on food additives: definitions, conditions of use, labelling and procedures.



Standard mixture



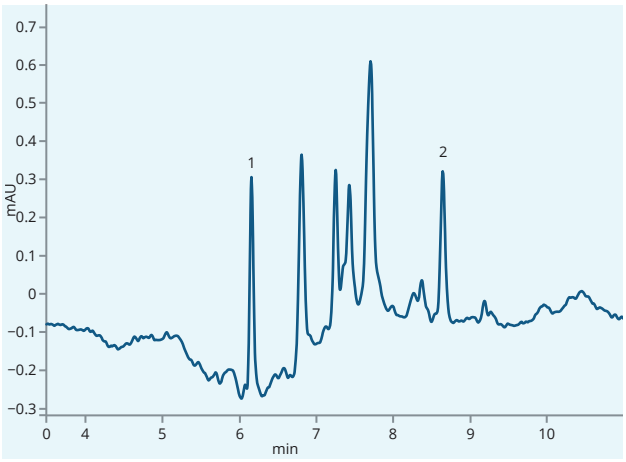
Fruit syrup sample

Column	ARION® Plus C18, 5.0 µm
Dimensions	250 mm × 4.6 mm
Part number	ARI-5720-LM46
Mobile phase	Citrate buffer pH 4.1 : ACN : MeOH 70/20/10 (v/v/v)

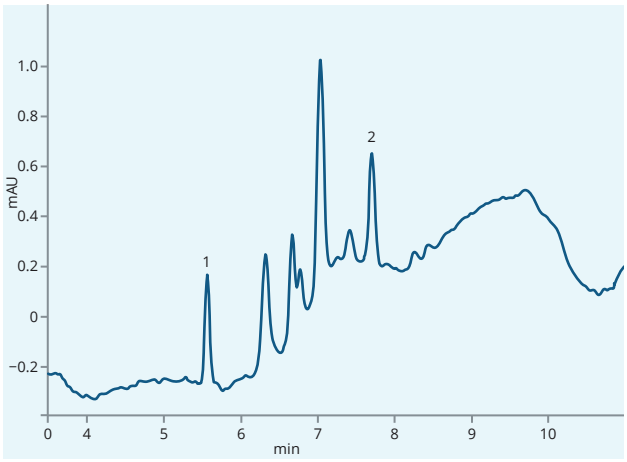
Flow rate	1.5 ml/min
Temperature	30 °C
Detection	UV @240 nm
Analytes	**1. Sodium benzoate** **2. Potassium sorbate**

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 recognized as being safe for use in food if the total amount does not exceed 0.02 % fat or oil (FDA). It is suspected of being a human carcinogen.



Matrix standard on ARION® column



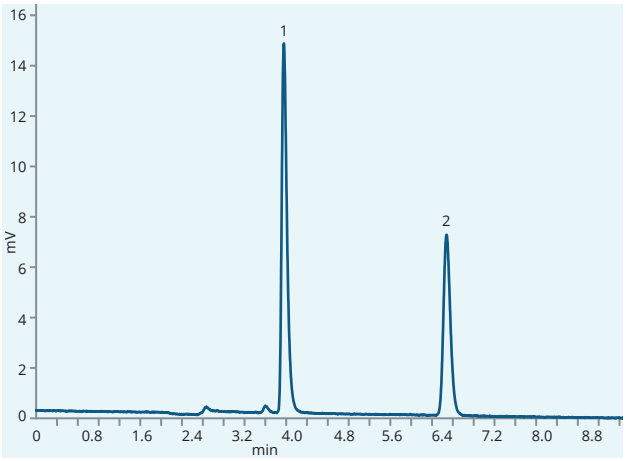
Matrix standard on competitive column (Competitor LI)

Column	ARION® Plus C18, 5.0 µm
Dimensions	250 mm × 4.6 mm
Part number	ARI-5720-LM46
Mobile phase	Citrate buffer pH 4.1 : ACN : MeOH 70/20/10 (v/v/v)

Flow rate	Proprietary
Temperature	Proprietary
Detection	UV (wavelength proprietary)
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 flavour, stability and keeping quality. Organic acids are generated during the aerobic oxidation of carbohydrates, proteins and fats in most biological systems.

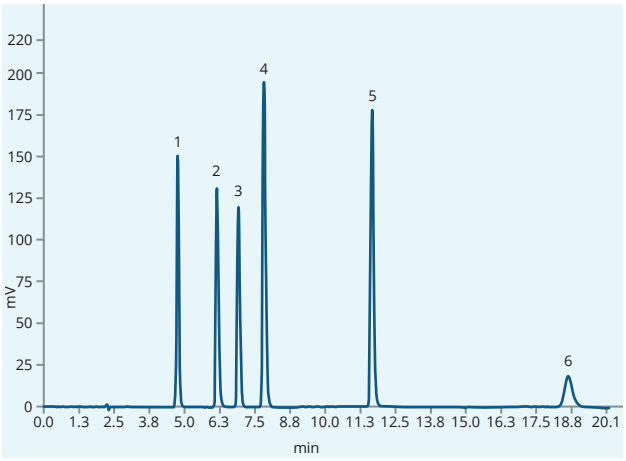


Standard mixture

Column	ARION® Polar C18, 5.0 µm
Dimensions	250 mm × 4.6 mm
Part number	ARI-5721-LM46
Mobile phase	0.05% H_3PO_4
Flow rate	1.0 ml/min
Temperature	30 °C
Detection	UV @207 nm
Analytes	**1. Formic acid** **2. Acetic acid**

Drink additives

This application shows the separation of three groups of compounds in parallel: non-nutritive sweeteners, preservatives (organic acids) and xanthine derivatives.



Standard mixture

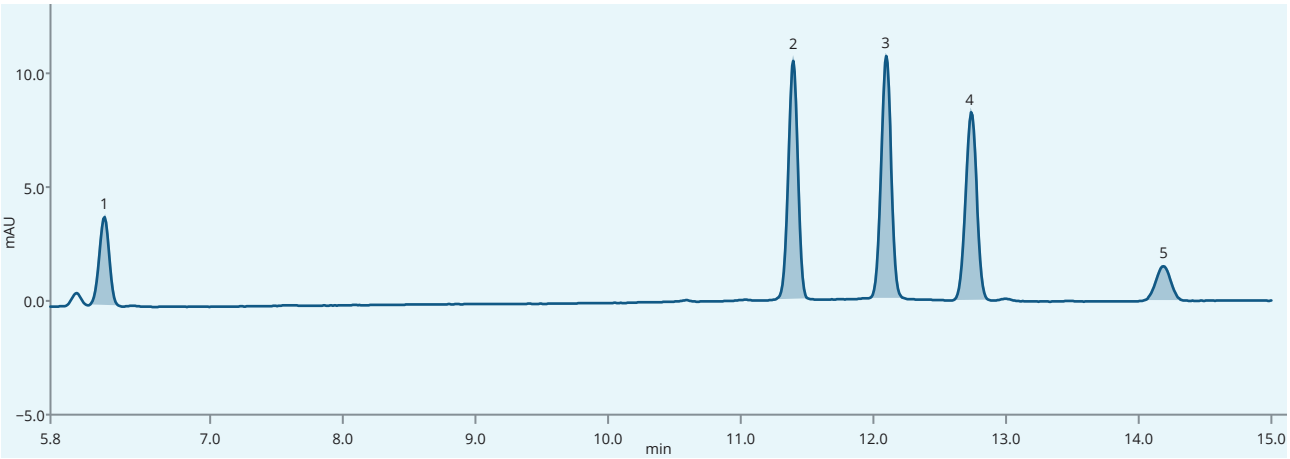
Column	ARION® Plus C18, 5.0 µm
Dimensions	150 mm × 4.6 mm
Part number	ARI-5720-LK46
Mobile phase	Acetonitril : methanol : 17.5 mmol/l KH_2PO_4 0.1 mol/l NaOH > pH=6.0 gradient according table below*
Temperature	Ambient
Detection	UV @214 & 230 nm
Analytes	**1. Acesulfame-K** **2. Benzoic acid** **3. Saccharin** **4. Sorbic acid** **5. Caffeine** **6. Aspartame**

* Gradient program

Time (min)	Flow rate (ml/min)	Wavelength (nm)	A (%) (Water)	B (%) 17.5M KH_2PO_4	C (%) Acetonitrile	D (%) Methanol
0	1.3	230	0	90	2	8
7	1.5	214	0	80	8	12
14	1.5	214	0	80	8	12
15	1.3	214	0	90	2	8
17	1.3	214	0	90	2	8

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.

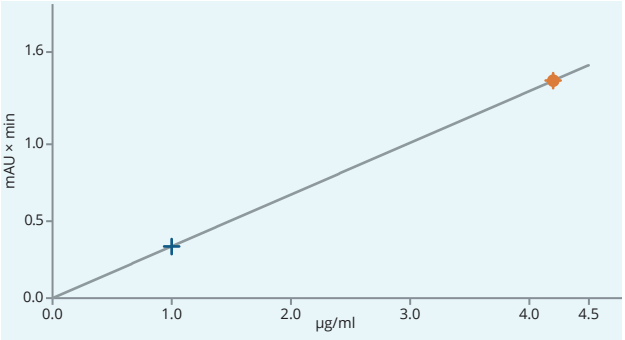


Standard on ARION® column

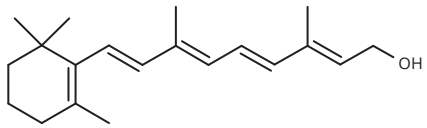
Column	ARION® Plus C18, 3 µm		
Dimensions	100 mm × 4.6 mm		
Part number	ARI-5720-II46		
Mobile phase	A: Water B: Methanol		
Gradient elution	**Time**	**A (%)**	**B (%)**
	0	15	85
	10	0	100
	18	0	100
Flow rate	1.0 ml/min		
Temperature	40 °C		
Injection volume	5.0 µl		
Detection	UV @284 nm		
Analytes	**1. Retinol (Vitamin A)** **2. Delta-tocopherol (D-Vitamin E)** **3. Gamma-tocopherol (Vitamin E γ)** **4. Alfa-tocopherol (Vitamin E α)** **5. Alpha-Tocopheryl acetate (Vitamin E acetate)**		

Vitamins A and E

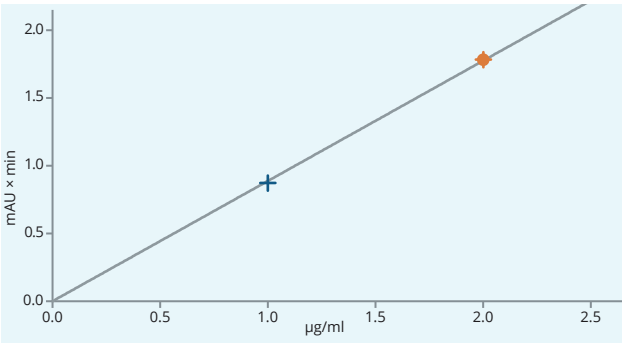
Calibration curves of analytes



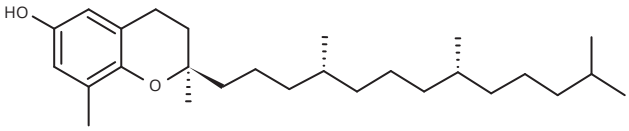
Retinol (Vitamin A)



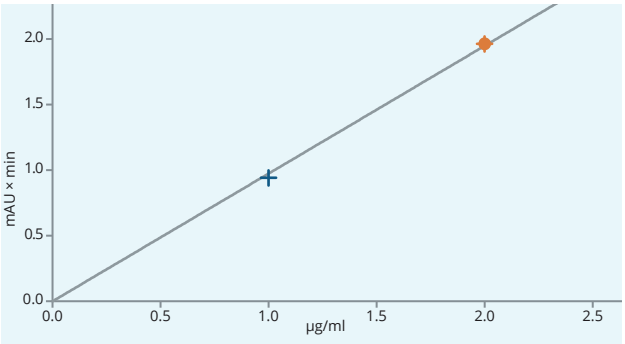
Retinol (Vitamin A)



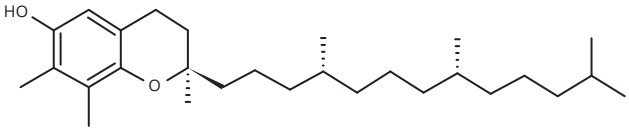
Delta-tocopherol (D-Vitamin E)



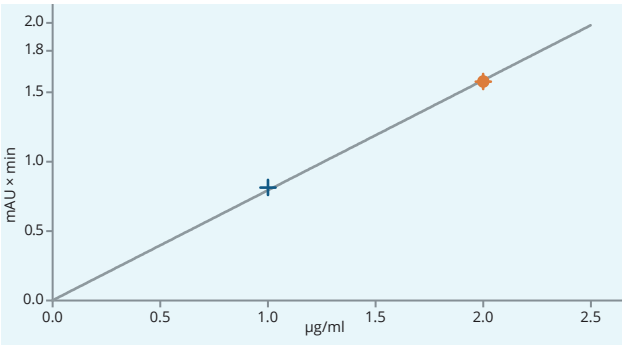
Delta-tocopherol (D-Vitamin E)



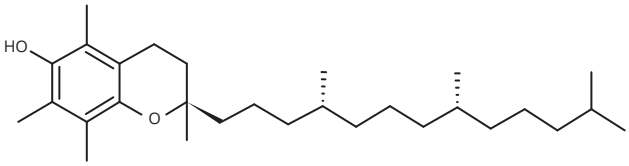
Gamma-tocopherol (Vitamin E γ)



Gamma-tocopherol (Vitamin E γ)



Alfa-tocopherol (Vitamin E α)

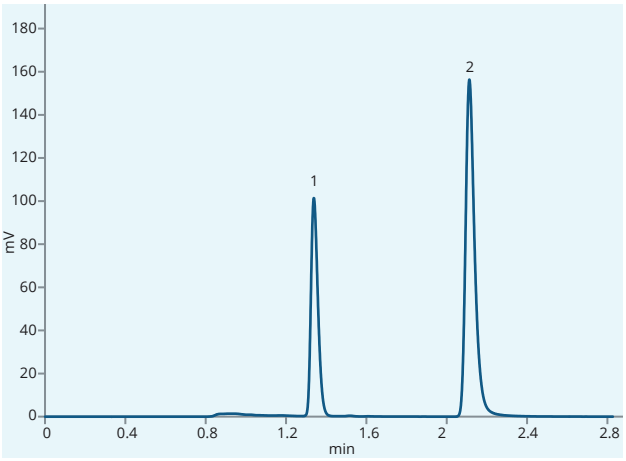


Alfa-tocopherol (Vitamin E α)

This application has been developed by WESSLING Hungary Kft.

Denatonium Benzoate

Denatonium benzoate (CAS Number 3734-33-6) is sold under various brand names, e.g. Denatrol, BITTERANT-b, BITTER+PLUS, Bitrex and Aversion. It is considered the most bitter compound by the whole world, which is why it is used as a denaturant of ethanol to prevent its misuse. This application shows fast isocratic elution to enhance productivity in the laboratory.

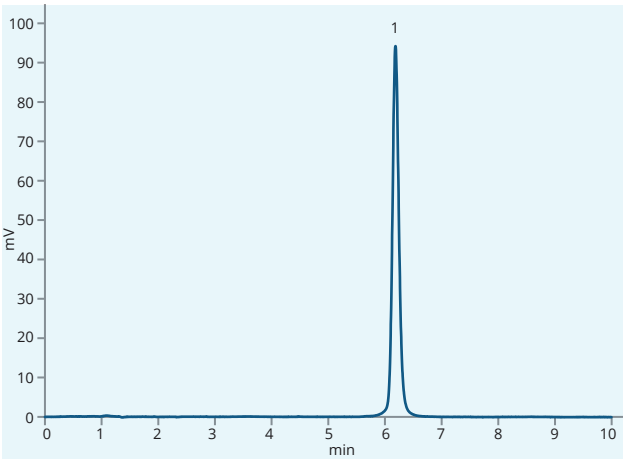


Ethanol sample

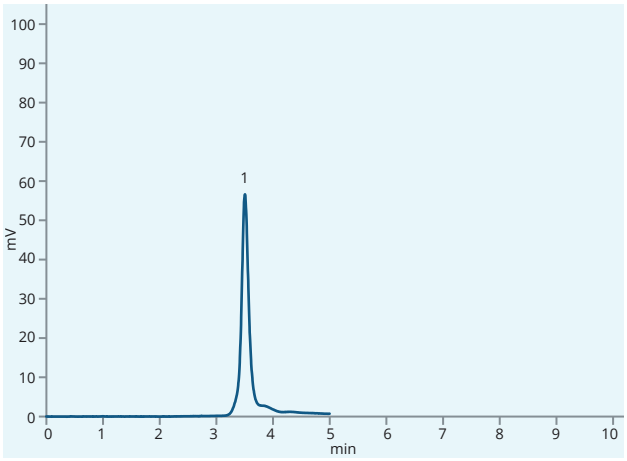
Column	ARION® Plus C18, 5.0 µm
Dimensions	250 mm × 4.6 mm
Part number	ARI-5720-LM46
Mobile phase	A : B 50/50 (v/v) A: Acetonitrile B: 0.5% H_3PO_4 in mili-Q water, (pH = 2) Isocratic elution
Flow rate	2.0 ml/min
Temperature	Ambient
Detection	UV @230 nm (ref. 550 nm, 100 nm BW)
Analytes	**1. Benzoic acid** **2. Denatonium**

HMF in syrup

5-Hydroxymethylfurfural (5-HMF) is formed from fructose or glucose by the heat treatment of food. HMF and its derivates/ metabolites are genotoxic, mutagenic and may be carcinogenic, which is why HMF is analysed in various food matrices, such as in fruit and vegetable products, instant coffee and honey.



Standard mixture on ARION® column

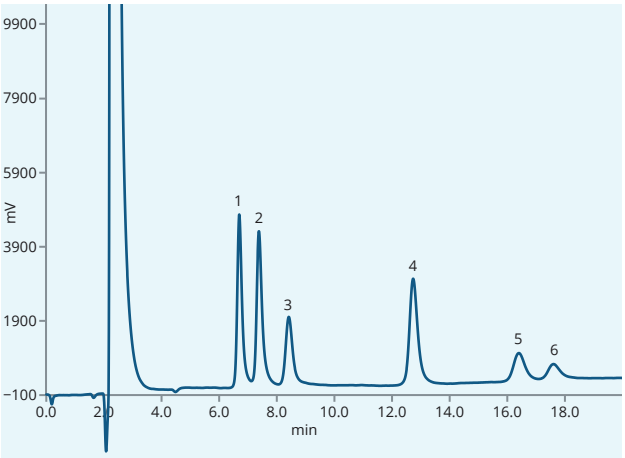


Comparison with core-shell column (Competitor K)

Column	ARION® Plus C18, 5.0 µm
Dimensions	250 mm × 4.6 mm
Part number	ARI-5720-LM46
Mobile phase	Methanol : water 10/90 (v/v) Isocratic elution
Flow rate	1.5 ml/min
Temperature	30 °C
Detection	UV @285 nm
Analytes	**1. Hydroxymethylfurfural**

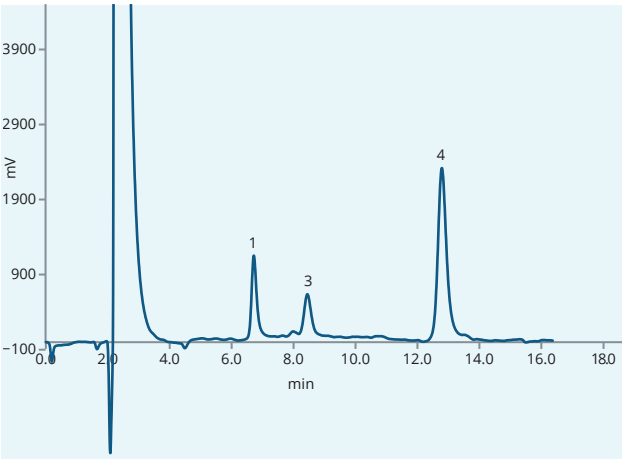
Monosaccharides, disaccharides and sugar alcohol

The analysis of saccharides and sugar alcohol is one of the most common criteria in food and beverage analyses in the QC departments of manufacturers and the monitoring of authorities. This analysis of sugars and sugar alcohols is also used to detect food and beverage adulteration.

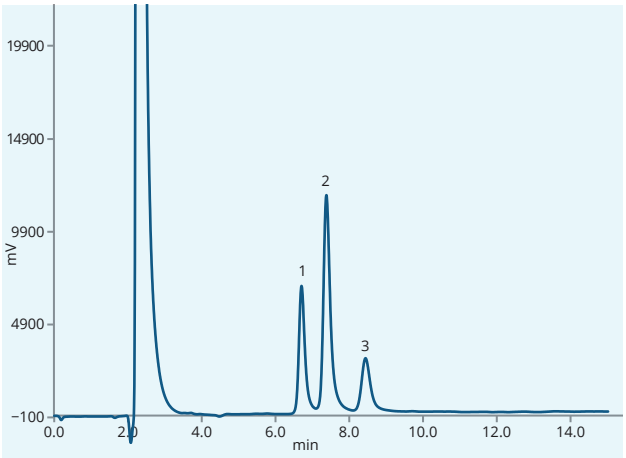


Analysis of standard on ARION® column

Column	ARION® NH_2, 5 µm
Dimensions	250 mm × 4.6 mm
Part number	ARI-5736-LM46
Mobile phase	ACN/water 75/25 (v/v) Isocratic elution
Flow rate	1.5 ml/min
Temperature	35 °C
Detection	RID
Analytes	**1. Fructose** **2. Sorbitol** **3. Glucose** **4. Sucrose** **5. Maltose** **6. Lactose**



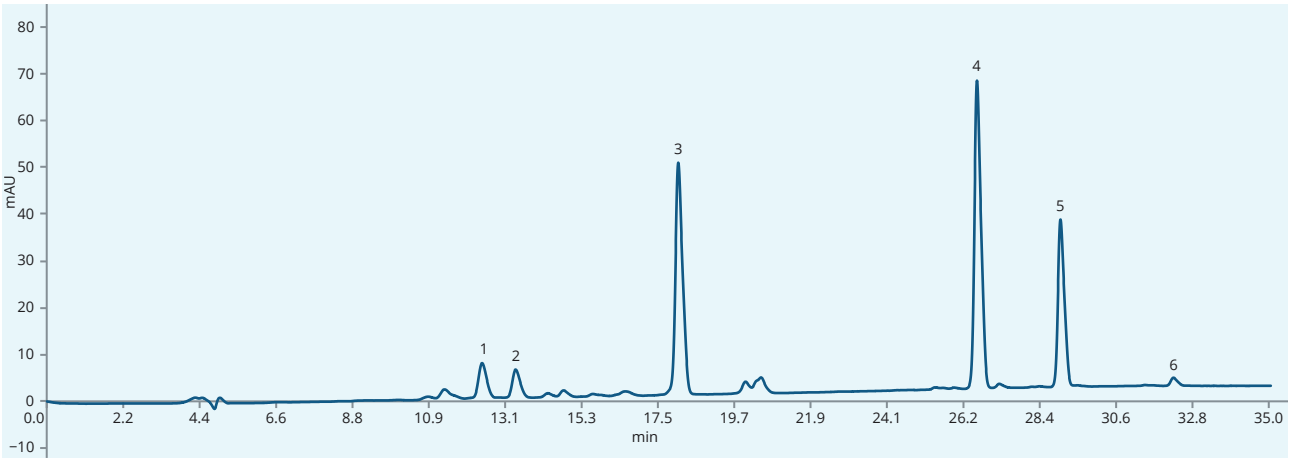
Analysis of carrot juice on ARION® column



Analysis of Aronia (chokeberry) juice on ARION® column

Wheat pigments

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

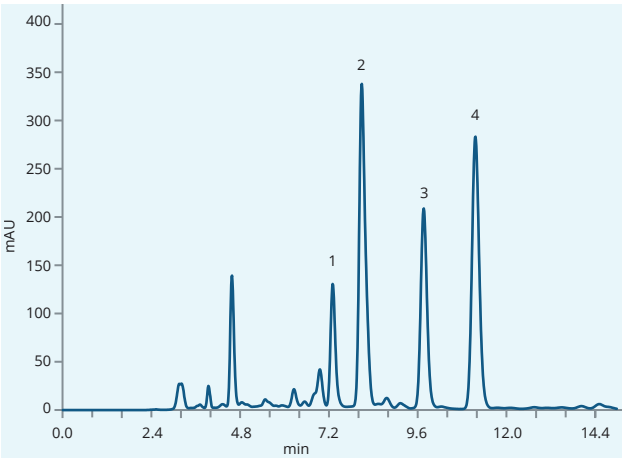


Wheat extract on ARION® column

Column	ARION® C8, 5 µm
Dimensions	250 mm × 4.6 mm
Part number	ARI-5734-LM46
Mobile phase	A: Methanol : Acetonitrile : 0.25M pyridine 32/14/54 (v/v/v) B: Methanol : Acetonitrile : Acetone 20/60/20 (v/v/v)
Gradient	Linear gradient of solvent B (60–100 % in 25 min) followed by 100 % solvent B
Flow rate	0.8 ml/min
Temperature	40 °C
Detection	DAD @450 nm
Analytes	**1. Neoxanthin** **2. Violaxanthin** **3. Lutein** **4. Chlorophyll b** **5. Chlorophyll a** **6. β-Carotene**

Bitter acids in hop

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

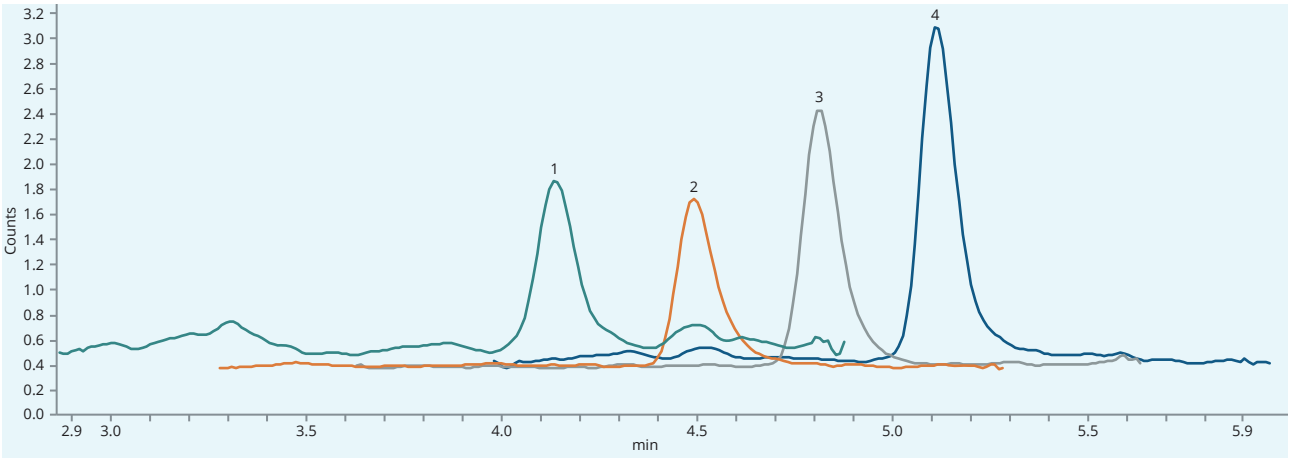


Alpha- & beta- acids in hop sample

Column	ARION® Plus C18, 5.0 µm
Dimensions	250 mm × 4.6 mm
Part number	ARI-5720-LM46
Mobile phase	MeOH : water : phospohoric acid 850/150/5 (v/v/v) Isocratic elution
Flow rate	0.8 ml/min
Temperature	40 °C
Detection	UV @314 nm
Analytes	**1. Co-humulone** **2. Humulone** **3. Co-lupulone** **4. Lupulone**

Aflatoxins by LC/MS

Aflatoxins are Group 1 carcinogens and are a natural product of mould. Mycotoxines 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.

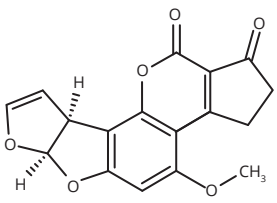


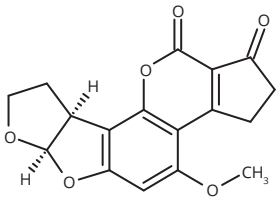
Stress test – test mixture on ARION® column

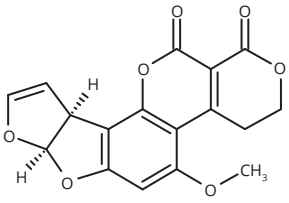
Column	ARION® Plus C18, 2.2 µm
Dimensions	100 mm × 2.1 mm
Part number	ARI-5720-EI21
Mobile phase	A: 5mM ammonium formate / 0.2% formic acid B: Methanol / 0.2% formic acid
Gradient elution	**Time** **A (%)** 0.0 70 0.5 70 8.0 0 10.5 0 10.6 70
Flow rate	0.35 ml/min
Temperature	40 °C
Analytes	**1. Aflatoxin B1** **2. Aflatoxin B2** **3. Aflatoxin G1** **4. Aflatoxin G2**

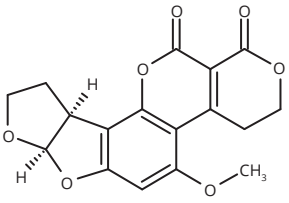
MS method:

Compound name	Precursor Ion	Product Ion	Collision energy
Aflatoxin B1	313.07	284.9	25
Aflatoxin B1	313.07	240.9	45
Aflatoxin B2	315.09	286.9	33
Aflatoxin B2	315.09	259	33
Aflatoxin G1	329.07	310.9	25
Aflatoxin G1	329.07	198.9	57
Aflatoxin G2	331.08	312.9	25
Aflatoxin G2	331.08	189.1	49


Aflatoxin B1

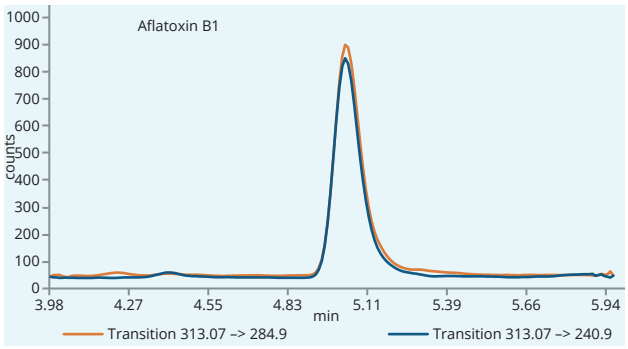

Aflatoxin B2

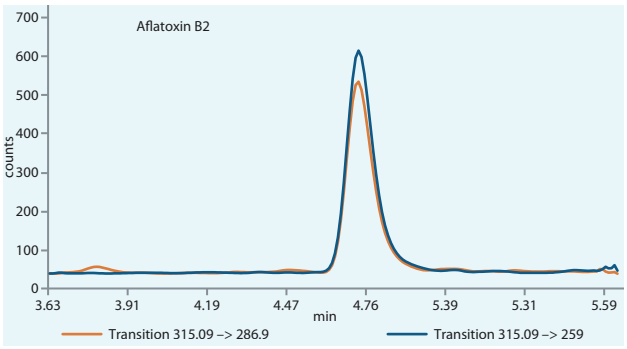

Aflatoxin G1

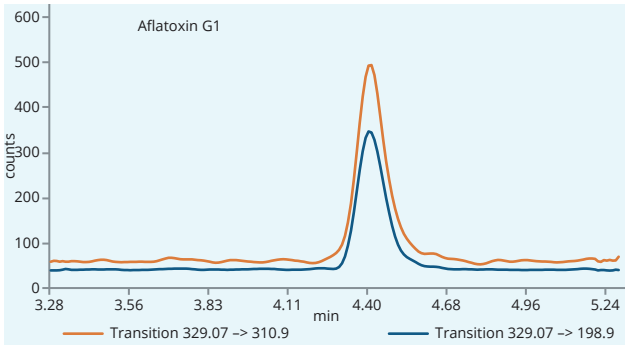

Aflatoxin G2

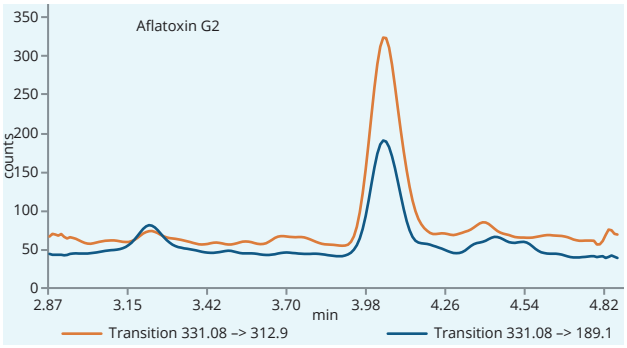
Aflatoxins by LC/MS

This page shows analyses of peppers and Brazil nuts.

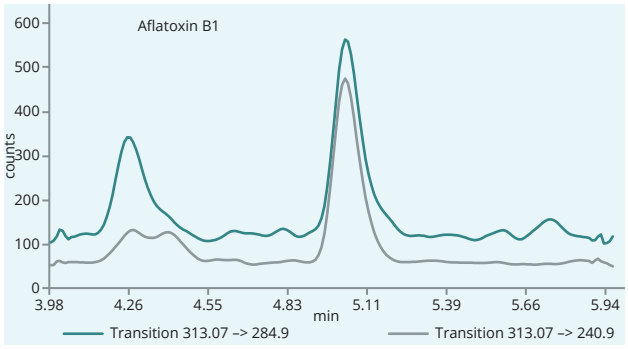


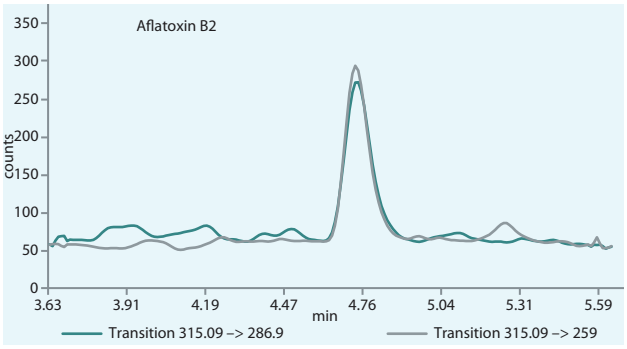


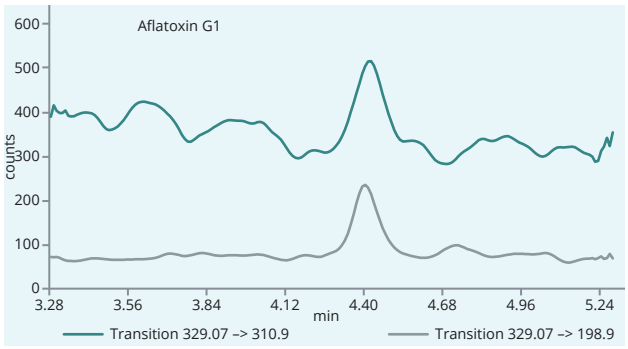


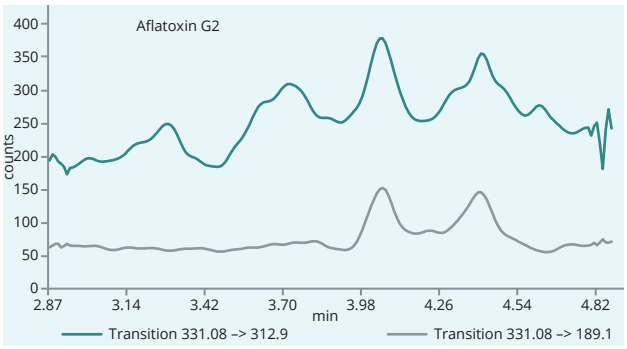


LC/MS analyses of aflatoxins in Brazil nuts





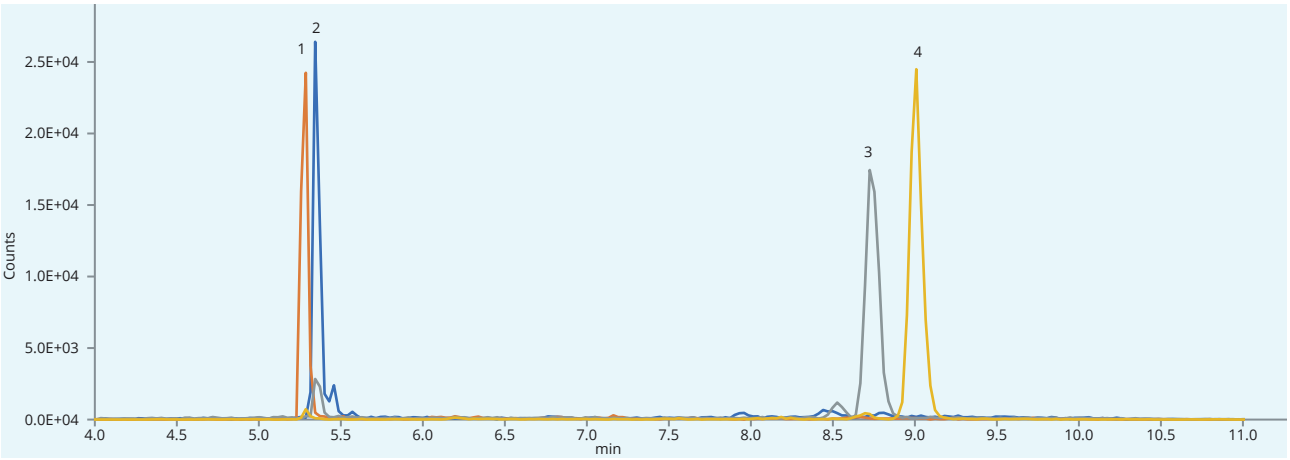




LC/MS analyses of aflatoxins in peppers

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:

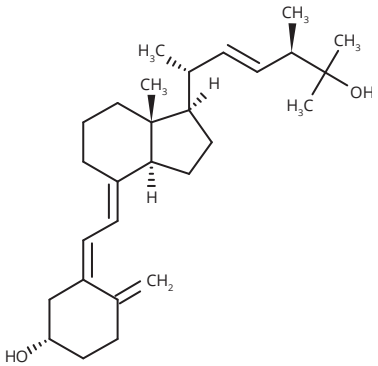
Column	ARION® Polar C18, 2.2 µm		
Dimensions	100 mm × 2.1 mm		
Part number	ARI-5720-EI21		
Mobile phase	A: H_2O, 0.1% formic acid B: MeOH, 0.1% formic acid		
Gradient elution	**Time**	**A (%)**	**B (%)**
	0.0	70	30
	2.0	0	100
	7.0	0	100
	7.1	30	70
	12.0	30	70
Flow rate	0.4 ml/min		
Temperature	25 °C		
Injection volume	10 µl		
Detection	UV @280 nm		
Analytes	**1. 25-OH-Vitamin D3** **2. 25-OH-Vitamin D2** **3. Vitamin D2** **4. Vitamin D3**		

Vitamin D in dry blood spot

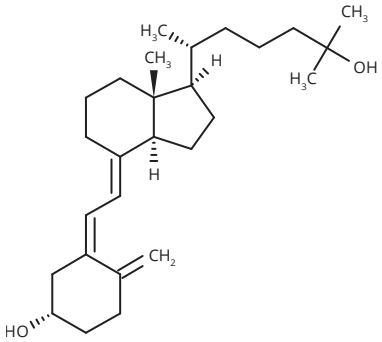
MS method:

Ionisation	Positive APCI		
Collision gas	Nitrogen		
MRM transition	**Analyte**	**Q1 (Da)**	**Q3 (Da)**
	25-OH-Vitamin D2	413.32	395.30
	25-OH-Vitamin D3	401.22	365.40
	Vitamin D2 397.44	379.20	
	Vitamin D3 385.32	259.40	
Dwell time	150 ms		

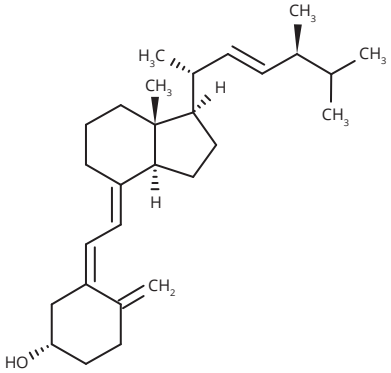
This application was developed by Ján Šmoldas.



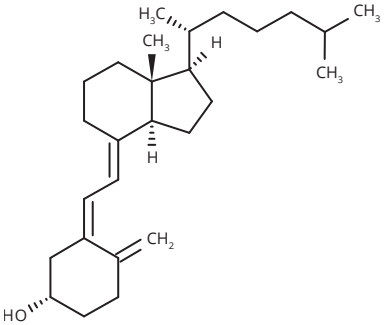
25-OH-Vitamin D2



25-OH-Vitamin D3



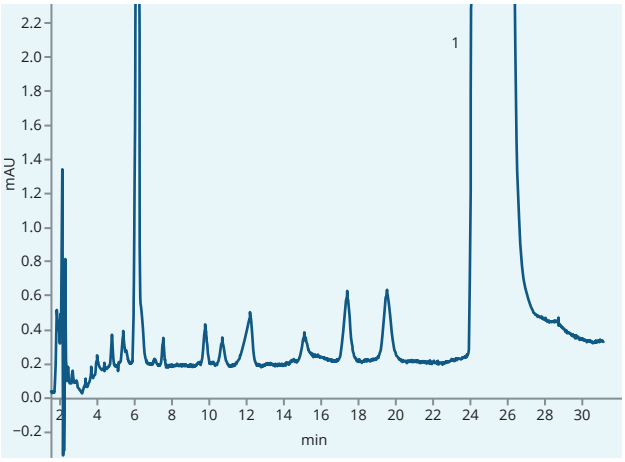
Vitamin D2



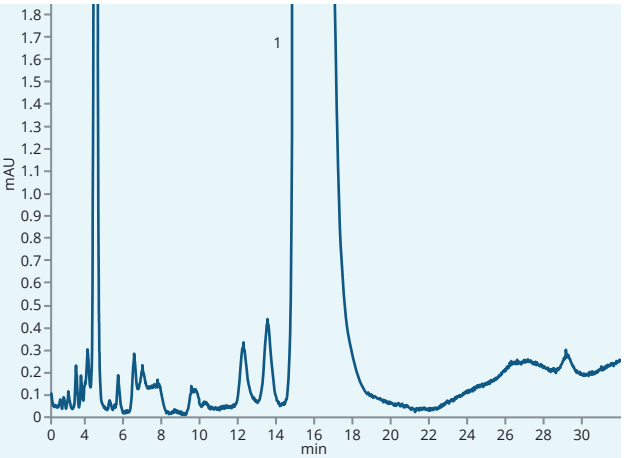
Vitamin D3

Pharmaceutical drugs

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



Separation on ARION® column

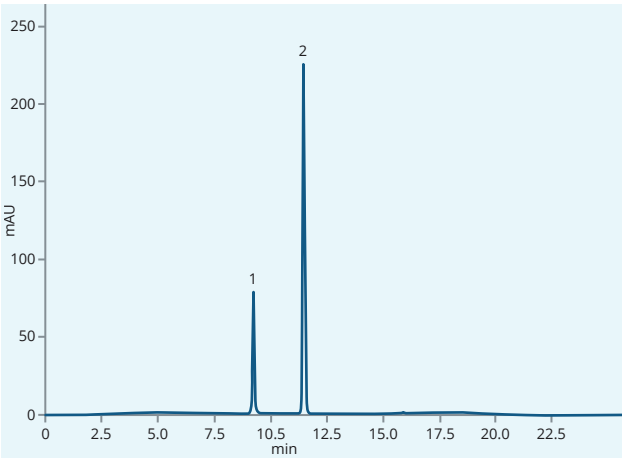


Separation on competitive column (Competitor LI)

Column	ARION® Plus C18, 5.0 µm
Dimensions	250 mm × 4.6 mm
Part number	ARI-5720-LM46
Mobile phase	Gradient elution (proprietary)
Flow rate	1.2 ml/min
Detection	UV @254 nm
Analytes	**1. Penicillin**

Ipidacrine

Ipidacrine is a drug inhibitor of acetylcholinesterase produced for the treatment of memory disorders caused by various diseases. It was first synthetized by the National Research Centre for Biologically Active Compounds (Russian Federation).

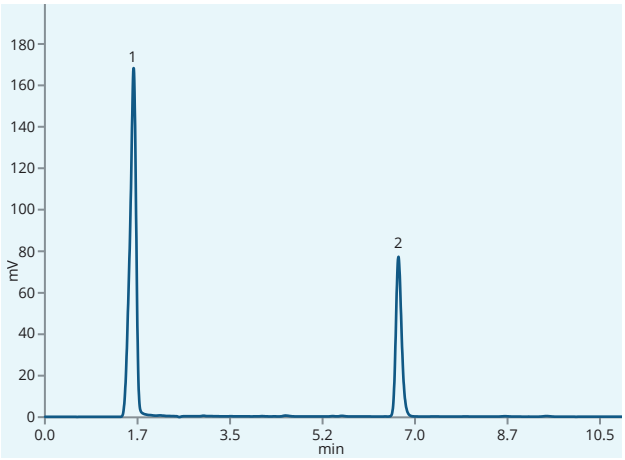


Standard mixture

Column	ARION® Plus C18, 5.0 µm
Dimensions	250 mm × 4.6 mm
Part number	ARI-5720-LM46
Mobile phase	Proprietary
Flow rate	Proprietary
Temperature	Proprietary
Detection	DAD
Analytes	**1. Impurity A** **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 (gradual release for up to 30 days), binding to a polymeric carrier is used.

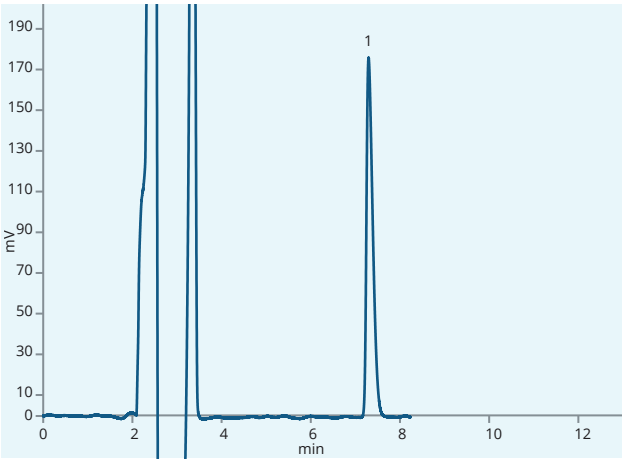


Standard mixture

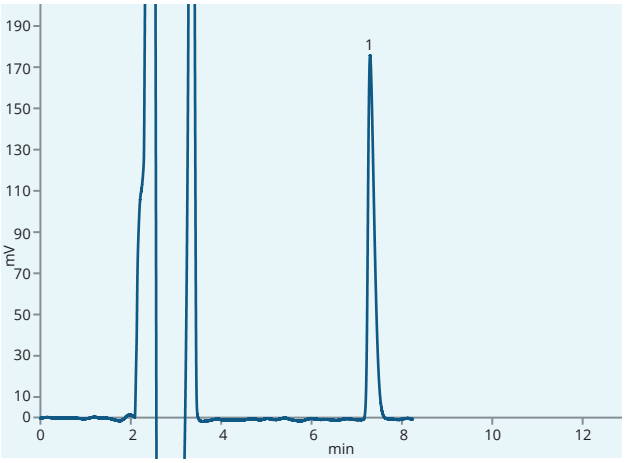
Column	ARION® Plus C18, 5.0 µm
Dimensions	250 mm × 4.6 mm
Part number	ARI-5720-LM46
Mobile phase	ACN : water 70/30 (v/v) + 0.1% formic acid Isocratic elution
Flow rate	1.0 ml/min
Temperature	Ambient
Detection	UV @265 nm
Analytes	**1. Ibuprofen on polymer carrier** **2. Ibuprofen**

Pharmaceutical drugs

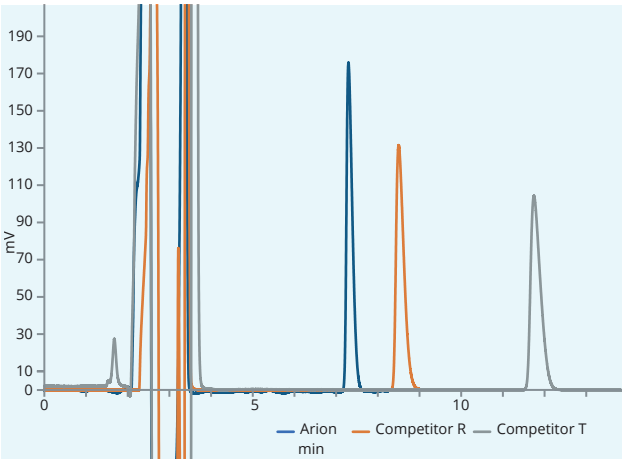
Tamsulosin hydrochloride is used to treat the symptoms of an enlarged prostate. Tamsulosin hydrochloride is an alpha-blocker which is used to treat the symptoms of an enlarged prostate by relaxing the muscles of the prostate and bladder. Tamsulosin is sold under various trade names, e.g. Flomax, Urimax, Contiflo XL, Mesir LP, Prostanil MR, Tamsin and Fokusin. Shown below is a chromatogram of the determination of the tamsulosin hydrochloride content according to the proprietary method.



Standard mixture



Drug sample

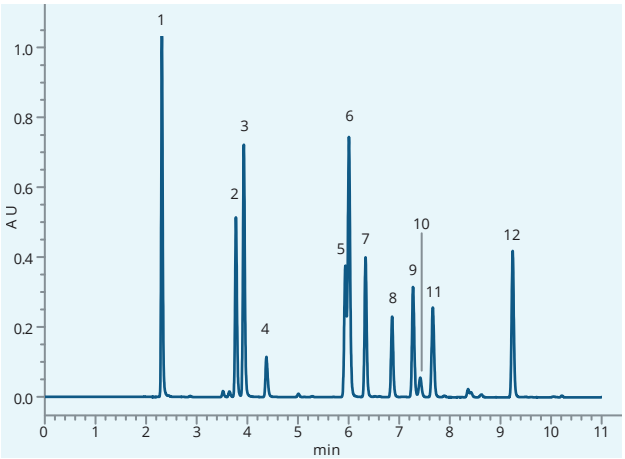


Comparison of fully porous particles

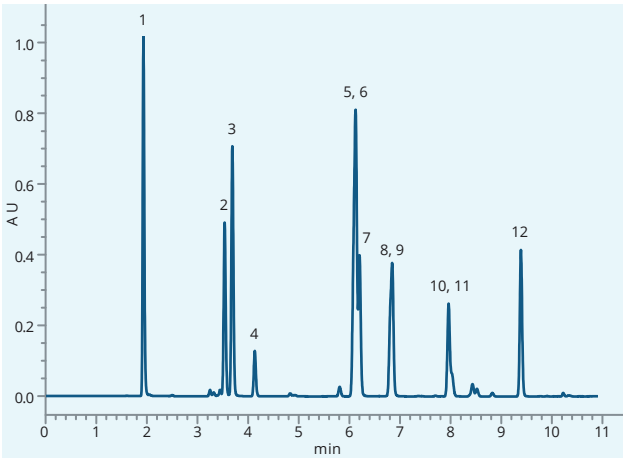
Column	ARION® Plus C18, 5.0 µm
Dimensions	250 mm × 4.6 mm
Part number	ARI-5720-LM46
Mobile phase	Acetate buffer : acetonitrile
Flow rate	1.0 ml/min
Temperature	30 °C
Detection	UV @225 nm
Analytes	**1. Tamsulosin hydrochloride**

Fluorinated compounds

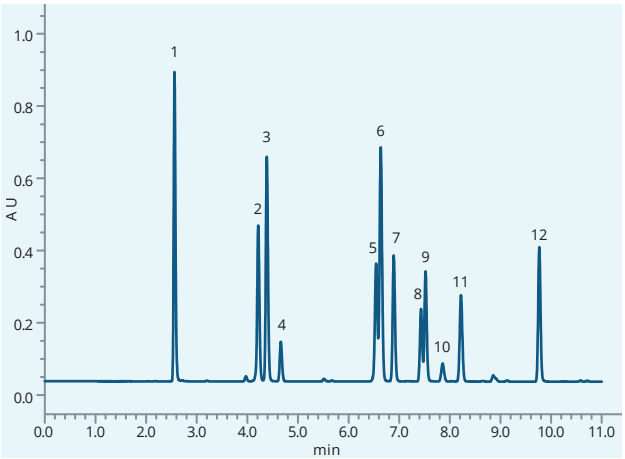
This application shows the ARION® column overcomes a co-elution of two critical pairs of fluoro- and des-fluoro-compounds. Separation of these compounds is problematic in general.



Sample on ARION® column



Sample on Competitive hybrid column TE

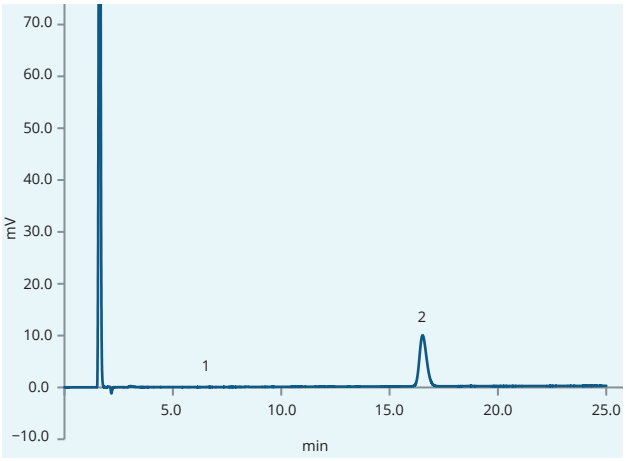


Sample on Competitive hybrid column TS

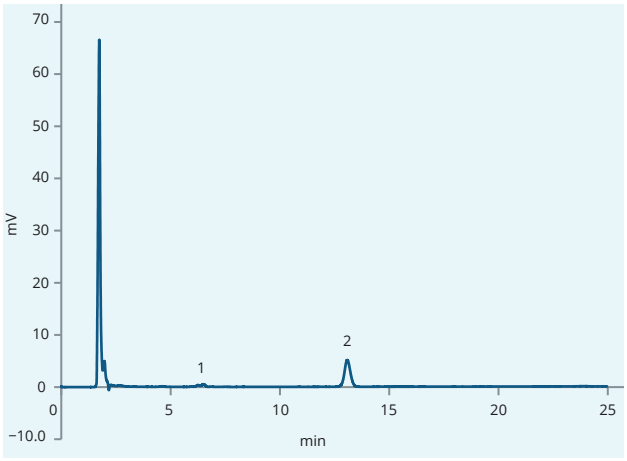
Column	ARION® Plus C18, 3.0 µm		
Dimensions	150 mm × 4.6 mm		
Part number	ARI-5720-IK46		
Mobile phase	A: 0.1% formic acid (dissolve 1 ml of formic acid in 1000 ml of Milli-Q water) B: ACN		
Gradient elution	**Time**	**A (%)**	**B (%)**
	0	60	40
	9	20	80
	10	5	95
	14	5	95
	14.1	60	40
	15.5	60	40
Flow rate	1.0 ml/min		
Temperature	30 °C		
Detection	UV @275 nm		
Analytes	**5. Fluoro-compound** **6. Fluoro-compound** **7. Des-fluoro-compound** **8. Des-fluoro-compound** **All other compounds are confidential.**		

Veterinary drugs

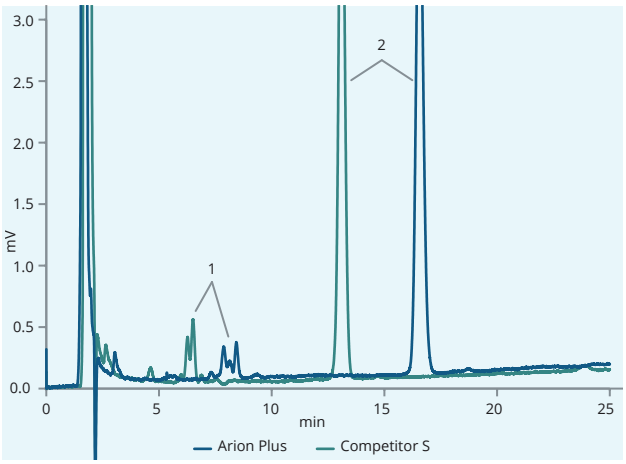
Tiamulin hydrogen fumarate is a semisynthetic drug with an antibacterial effect. It is used to treat animal diseases, such as swine dysentery (caused by *Brachyspira hyodysenteriae*), swine pneumonia or mycoplasmal arthritis. Tiamulin is also used for the prevention and treatment of chronic respiratory diseases in domestic chickens and turkeys.



Sample – 2% premix on ARION® column



Sample – 2% premix on competitive column (Competitor S)

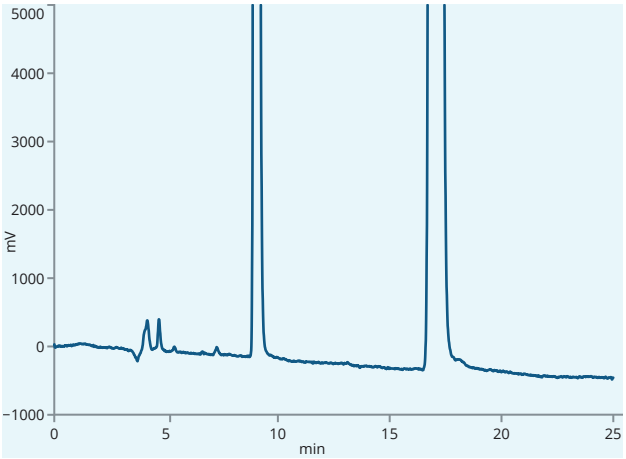


Detailed view on impurities

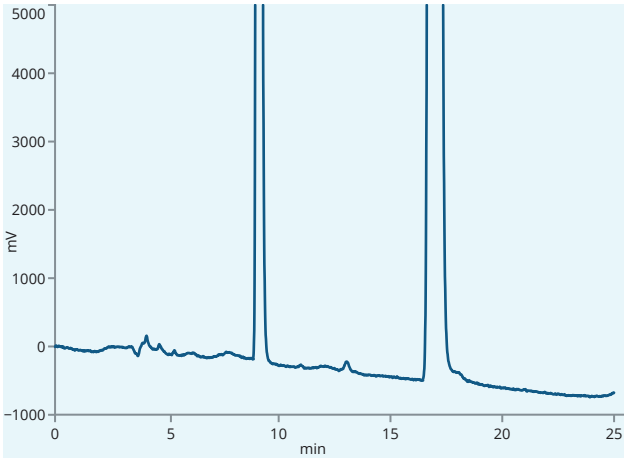
Column	ARION® Plus C18, 5.0 µm
Dimensions	250 mm × 4.6 mm
Part number	ARI-5720-LM46
Mobile phase	Confidential, optimized method of Czech Pharmacopoeia (2017, 6.0:1659)
Analytes	**1. Impurities** **2. Tiamulin hydrogen fumarate**

Veterinary drugs

Trimetoprim and Sulfamethazine are veterinary drugs used to treat animals of various species with gastrointestinal and respiratory tract infections. This drug is used in diseases of various species of animals.



Standard on ARION® column

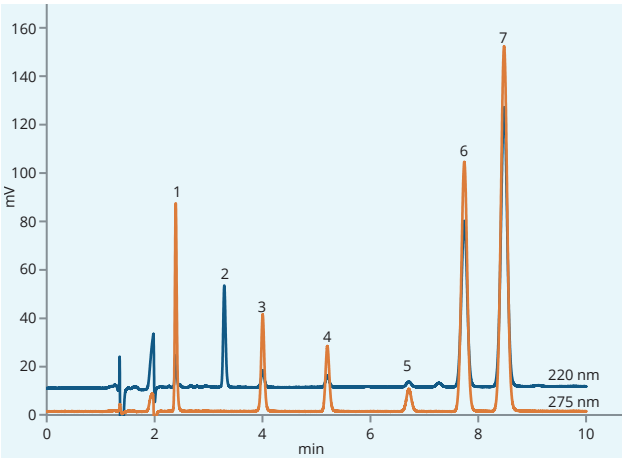


Drug sample

Column	ARION® Plus C18, 5.0 µm
Dimensions	250 mm × 4.6 mm
Part number	ARI-5720-LM46
Mobile phase	0.1% TEA : Methanol : ACN 80/10/10 (v/v/v) Isocratic elution
Flow rate	1.0 ml/min
Temperature	40 °C
Detection	UV @254 nm
Analytes	**1. Trimetoprim** **2. Sulfamethazine sodium**

Furans in transformer oil

Furans analysis, together with an oil soluble metal deactivator, is an important analysis used to monitor the degradation of the winding insulation in the transformers. The presence of furans in transformer oils show the stage of the insulation degradation and a need for transformer replacement.



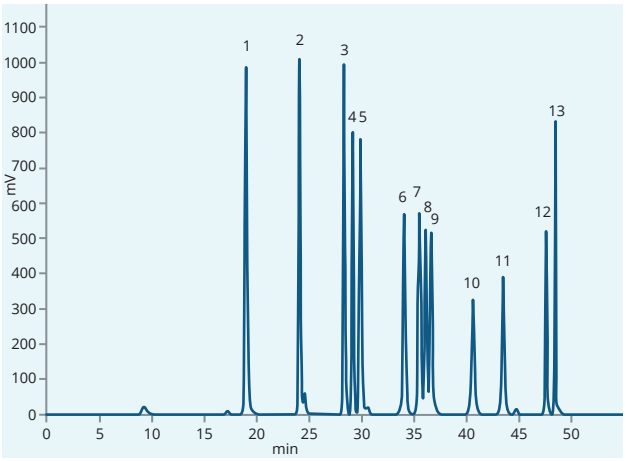
Mixture of furans and passivator in water

Column	ARION® Plus C18, 3.0 µm
Dimensions	150 mm × 4.6 mm
Part number	ARI-5720-IK46
Mobile phase	Ammonium acetate 20 mM, pH 8.5 (ammonia) : ACN 80/20 (v/v) Isocratic elution
Flow rate	1.0 ml/min
Temperature	30 °C
Detection	UV @220, 275 nm
Analytes	**1. 5-Hydroxymethyl-2--furaldehyde (5HMF)** **2. 2-Furfuryl alcohol (2FOL)** **3. 2-Furaldehyde (2FAL)** **4. 2-Acetyl furan (2ACF)** **5. 5-Methylfurfural (5MEF)** **6. + 7. Ciba® Irgamet® 39 isomers***

* Ciba® Irgamet® 39 isomers:
N,N-bis(2-ethylhexyl)-4-methyl-1H-benzotriazol-1-amine
N,N-bis(2-ethylhexyl)-5-methyl-1H-benzotriazol-1-amine

Aldehyde/Ketone DNPH derivatives

Carbonyl compounds are part of the group of parameters which are analyzed in the workplace. Occupational hygiene and contract laboratories mostly use the HPLC method for aldehydes and ketones analysis. HPLC separation requires the derivatization with 2,4-dinitrophenyl hydrazine.



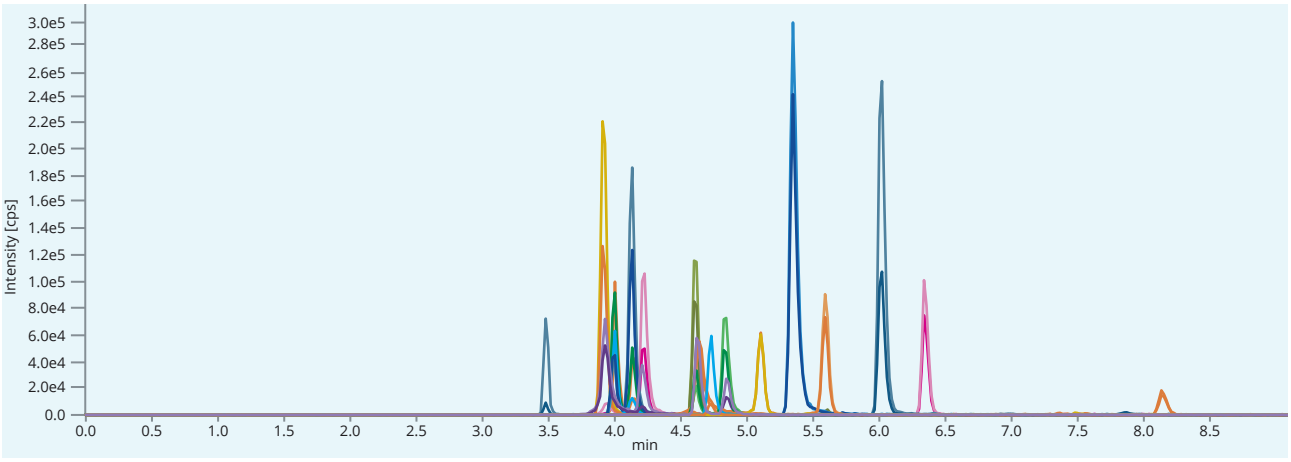
DNPH derivatives standard

Column	ARION® Plus C18, 5.0 µm
Dimensions	250 mm × 4.6 mm
Part number	ARI-5720-LM46
Mobile phase	Methanol : water
Flow rate	0.2 ml/min
Temperature	40 °C
Detection	UV @360 nm
Analytes	**1. Formaldehyde-2,4-DNPH** **2. Acetaldehyde-2,4-DNPH** **3. Acetone-2,4-DNPH** **4. Acrolein-2,4-DNPH** **5. Propionaldehyde-2,4-DNPH** **6. Crotonaldehyde-2,4-DNPH** **7. Methacrolein-2,4-DNPH** **8. 2-Butanone-2,4-DNPH** **9. Butyraldehyde-2,4-DNPH** **10. Benzaldehyde-2,4-DNPH** **11. Veleraldehyde-2,4-DNPH** **12. m-Tolualdehyde-2,4-DNPH** **13. Hexaldehyde-2,4-DNPH**

Opioids and Tramadol and their metabolites by LC/MS

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

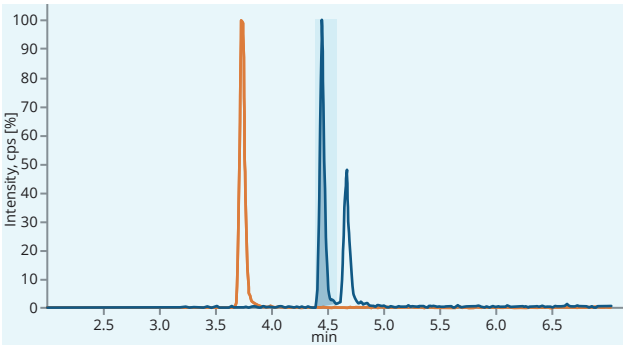
Substance		
	Codeine, CAS Number 76-57-3	**Hydromorphone**, CAS Number 466-99-9
	Morphine, CAS Number 57-27-2	**Oxymorphone**, CAS Number 76-41-5
	6-O-Acetylmorphine, **6-Monoacetylmorphine**, CAS Number 2784-73-8	**Hydrocodone**, CAS Number 125-29-1
	Morphine-6-glucuronide, CAS Number 20290-10-2	**Norbuprenorphine**, CAS Number 78715-23-8
	Buprenorphine, CAS Number 52485-79-7	**Norcodeine**, CAS Number 467-15-2
	Dihydrocodeine, CAS Number 125-28-0	**Norfentanyl**, CAS Number 1609-66-1
	Fentanyl, CAS Number 437-38-7	**Oxycodone**, CAS Number 76-42-6
	Acetylfentanyl, CAS Number 3258-84-2	**Meperidine**, **Pethidine**, CAS Number 57-42-1
	Naloxone, CAS Number 465-65-6	**Tramadol**, CAS Number 27203-92-5
	Naltrexone, CAS Number 16590-41-3	**Methadone**, CAS Number 76-99-3
		EDDP, CAS Number 30223-73-5



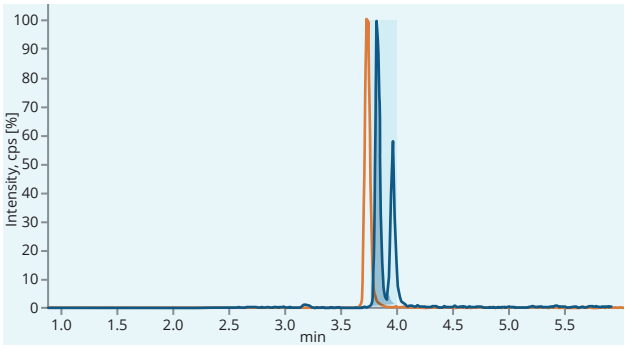
Standard mixture on ARION® column (50 mg/l)

Opioids and Tramadol and their metabolites by LC/MS

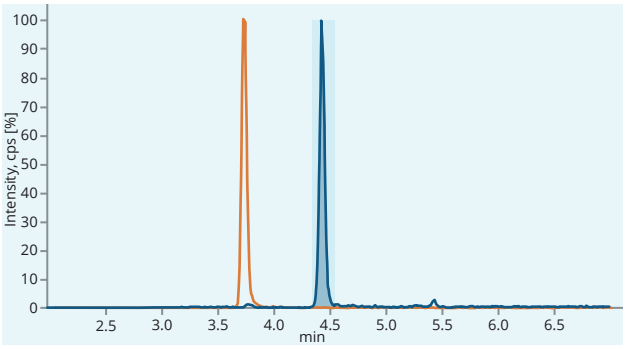
Column	ARION® Plus C18, 3 µm		
Dimensions	50 mm × 3.0 mm		
Part number	ARI-5720-IG30		
Mobile phase	A: 1% ammonium formate in water B: Methanol : 1% ammonium formate in ACN 50/50 (v/v)		
Gradient elution	**Time**	**A (%)**	**B (%)**
	0	100	0
	1	100	0
	6	10	90
	8	10	90
	8.1	100	0
Flow rate	0.5 ml/min		
Temperature	30 °C		
Detection	MS/MS		
Analytes	**See MS/MS method**		



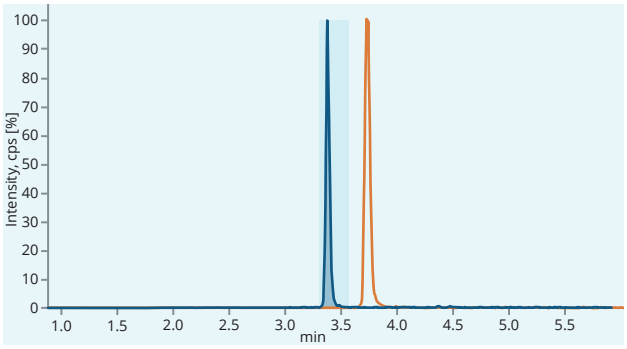
Codeine (300.1->152.0)



Morphine (286.1 -> 152.0)

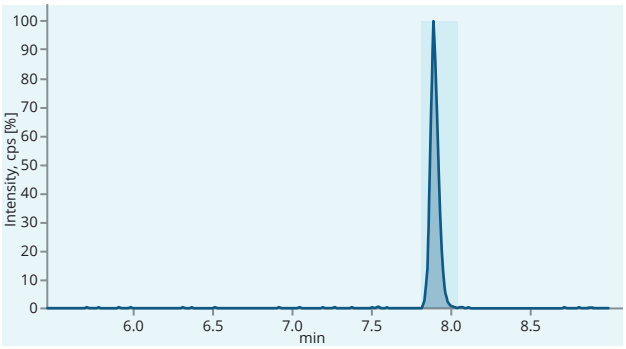


6-O-Acetylmorphine (328.1 -> 165.0)

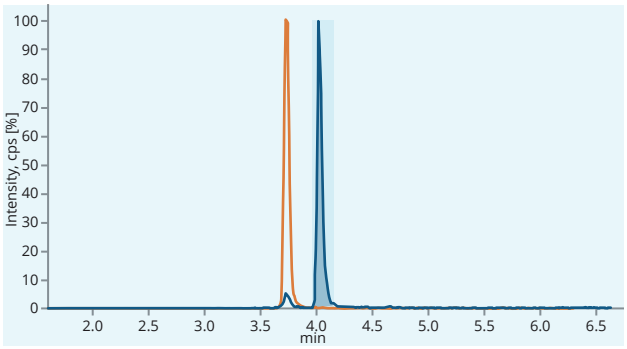


Morphine-6-glucuronide (462.2 -> 286.2)

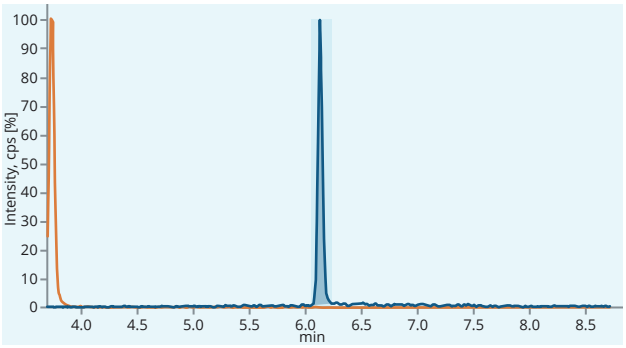
Opioids and Tramadol and their metabolites by LC/MS



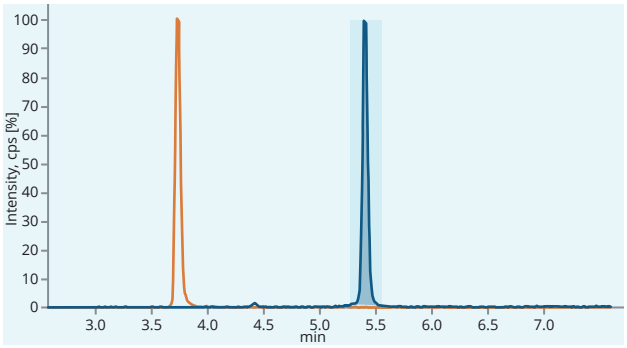
Buprenorphine (468.2 -> 396.0)



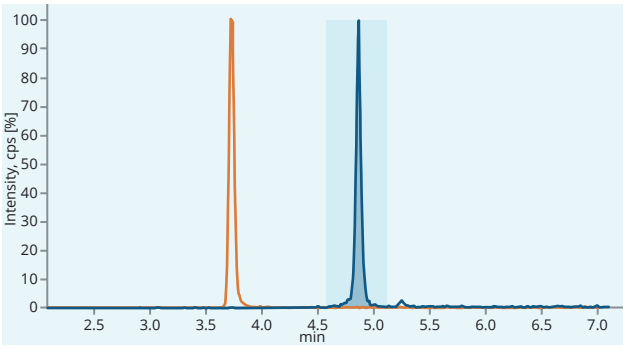
Dihydrocodeine (302.2 -> 199.2)



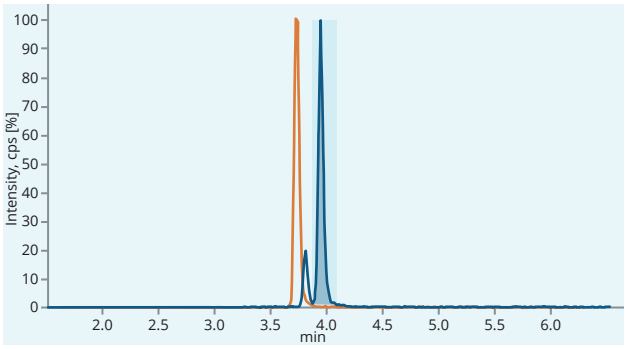
Fentanyl (337.2 -> 105.1)



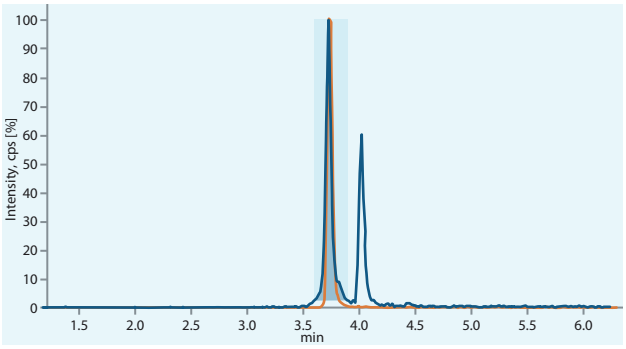
Naloxone (328.1 ->212.1)



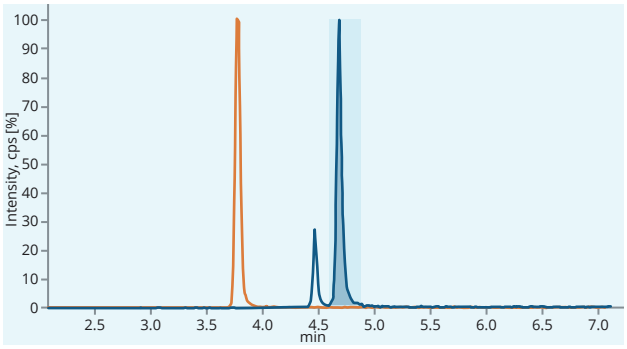
Naltrexone (342.1 -> 267.2)



Hydromorphone (286.1 -> 185.0)

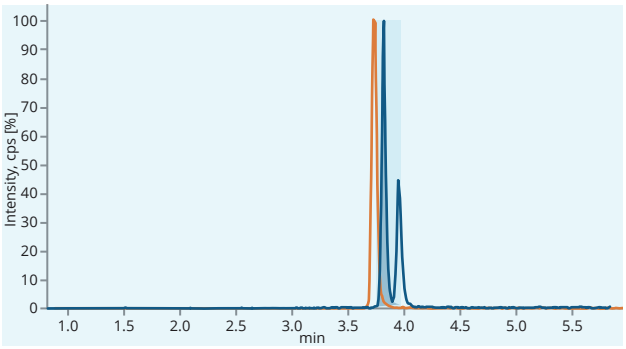


Oxymorphone (302.0 -> 227.1)

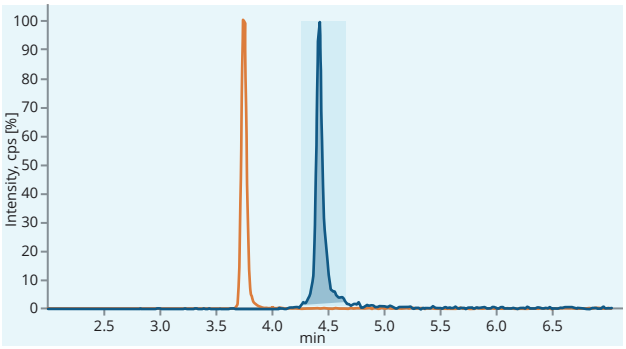


Hydrocodone (300.1 -> 199.0)

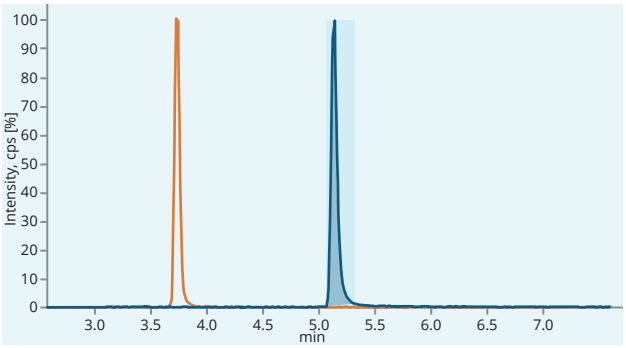
Opioids and Tramadol and their metabolites by LC/MS



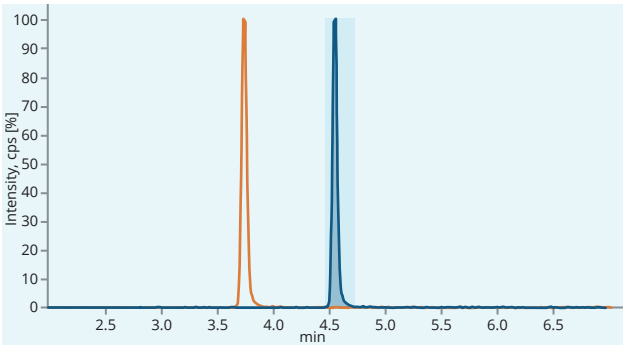
Norcodeine (286.1 -> 152.0)



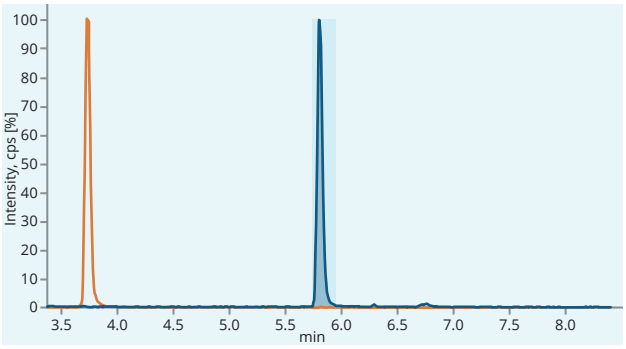
Oxycodone (316.1 -> 241.1)



Meperidine (Pethidine) (248.1 -> 220.1)



Tramadol (264.1 -> 58.1)



Methadone (310.1 -> 265.0)

Opioids and Tramadol and their metabolites by LC/MS

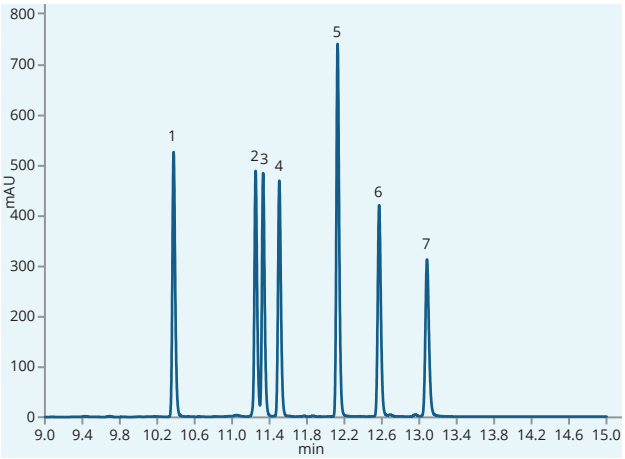
MS/MS method

Compound name	Precursor Mass	Fragment mass	Type	Collision energy
Codeine	300.1	152.0	Quantifier	35 ± 15 eV
	300.1	165.1	Qualifier	35 ± 15 eV
Morphine	286.1	152.0	Quantifier	35 ± 15 eV
	286.1	165.1	Qualifier	35 ± 15 eV
6-O-Acetylmorphine	328.1	165.0	Quantifier	35 ± 15 eV
	328.1	211.0	Qualifier	35 ± 15 eV
Morphine-6-glucuronide	462.2	286.2	Qualifier	35 ± 15 eV
	462.2	201.1	Qualifier	35 ± 15 eV
Buprenorphine	468.2	396.0	Quantifier	35 ± 15 eV
	468.2	414.0	Qualifier	35 ± 15 eV
Dihydrocodeine	302.2	199.2	Quantifier	35 ± 15 eV
	302.2	171.2	Qualifier	35 ± 15 eV
Fentanyl	337.2	105.1	Quantifier	35 ± 15 eV
	337.2	188.2	Qualifier	35 ± 15 eV
Acetylfentanyl*	323.1	188.1	Quantifier	35 ± 15 eV
	323.1	105.1	Qualifier	35 ± 15 eV
Naloxone	328.1	212.1	Quantifier	35 ± 15 eV
	328.1	253.1	Qualifier	35 ± 15 eV
Naltrexone	342.1	267.2	Quantifier	35 ± 15 eV
	342.1	282.1	Qualifier	35 ± 15 eV
Hydromorphone	286.1	185.0	Quantifier	35 ± 15 eV
	286.1	157.0	Qualifier	35 ± 15 eV
Oxymorphone	302.0	227.1	Quantifier	35 ± 15 eV
	302.0	198.1	Qualifier	35 ± 15 eV
Hydrocodone	300.1	199.0	Quantifier	35 ± 15 eV
	300.1	128.0	Qualifier	35 ± 15 eV
Norbuprenorphine*	414.3	55.0	Quantifier	35 ± 15 eV
	414.3	83.0	Qualifier	35 ± 15 eV
Norcodeine	286.1	152.0	Quantifier	35 ± 15 eV
	286.1	165.0	Qualifier	35 ± 15 eV
Norfentanyl*	233.1	84.1	Quantifier	35 ± 15 eV
	233.1	150.1	Qualifier	35 ± 15 eV
Oxycodone	316.1	241.1	Quantifier	35 ± 15 eV
	316.1	256.1	Qualifier	35 ± 15 eV
Meperidine (Pethidine)	248.1	220.1	Quantifier	35 ± 15 eV
	248.1	174.0	Qualifier	35 ± 15 eV
Tramadol	264.1	58.1	Quantifier	35 ± 15 eV
	264.1	42.2	Qualifier	35 ± 15 eV
Methadone	310.1	265.0	Quantifier	35 ± 15 eV
	310.1	105.0	Qualifier	35 ± 15 eV
EDDP*	278.1	234.1	Quantifier	35 ± 15 eV
	278.1	186.1	Qualifier	35 ± 15 eV

* Not shown in chromatogram. Note: Internal standard: Morphine D6.

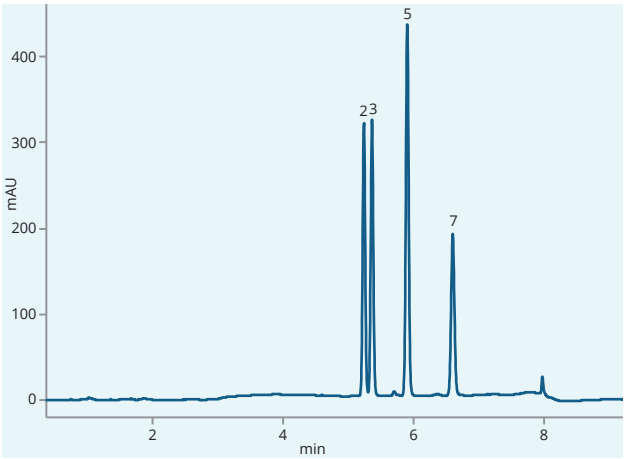
Cannabinoids

Cannabinoids have became more and more popular thanks to their heath effects and the decriminalisation of their use. Analytical columns that can offer a suitable resolution play an important role. The challenge is to achieve the separation of the critical pair – CBD and CBG.



Standard on ARION® Plus C18, 1.7 µm

Columns	ARION® Plus C18, 1.7 µm		
Dimensions	100 mm × 2.1 mm		
Part numbers	ARI-5720-BI21		
Mobile phase	A: Water B: Acetonitrile		
Gradient elution	**Time**	**A (%)**	**B (%)**
	0	70	30
	1	70	30
	5	50	50
	10	10	90
	13	10	90
	14	70	30
	16	70	30
Flow rate	0.3 ml/min		
Temperature	30 °C		
Detection	DAD @220 nm		
Analytes	**1. CBDV** **2. CBG** **3. CBD** **4. THCV** **5. CBN** **6. THC** **7. CBC**		



Fast method – standard on ARION® Plus C18, 3.0 µm

Columns	ARION® Plus C18, 3.0 µm		
Dimensions	150 mm × 4.6 mm		
Part numbers	ARI-5720-IK46		
Mobile phase	A: Acetonitrile B: Water with formic acid (0.1%)		
Gradient elution	**Time**	**A (%)**	**B (%)**
	0	30	70
	0.3	30	70
	2.3	100	0
	5.3	100	0
	8.3	30	70
	11.0	30	70
Flow rate	1.0 ml/min		
Temperature	40 °C		
Injection volume	20 µl		
Detection	DAD @220 nm		
Analytes	**2. CBG** **3. CBD** **5. CBN** **7. CBC**		

The analyses were performed using Lipomed reference materials.

Ordering information

UHPLC and LC/MS columns

1.7 µm ARION® all dimensions in mm							**ARION® Guard Cartridges***
Phase		**30 × 2.1**	**50 × 2.1**	**75 × 2.1**	**100 × 2.1**	**150 × 2.1**	**5 × 2.1**
Plus C18		ARI-5720-BD21	ARI-5720-BG21	ARI-5720-BH21	ARI-5720-BI21	ARI-5720-BK21	AGS-5731-RA2

1.7 µm ARION® all dimensions in mm						**ARION® Guard Cartridges***
Phase		**50 × 3.0**	**75 × 3.0**	**100 × 3.0**	**150 × 3.0**	
Plus C18		ARI-5720-BG30	ARI-5720-BH30	ARI-5720-BI30	ARI-5720-BK30	Inquire**

1.7 µm ARION® all dimensions in mm						**ARION® Guard Cartridges***
Phase		**50 × 4.6**	**75 × 4.6**	**100 × 4.6**	**150 × 4.6**	**5 × 2.1**
Plus C18		ARI-5720-BG46	ARI-5720-BH46	ARI-5720-BI46	ARI-5720-BK46	AGS-5731-RA2

2.2 µm ARION® all dimensions in mm							**ARION® Guard Cartridges***
Phase		**30 × 2.1**	**50 × 2.1**	**75 × 2.1**	**100 × 2.1**	**150 × 2.1**	**5 × 2.1**
Plus C18		ARI-5720-ED21	ARI-5720-EG21	ARI-5720-EH21	ARI-5720-EI21	ARI-5720-EK21	AGS-5731-RB2
Polar C18		ARI-5721-ED21	ARI-5721-EG21	ARI-5721-EH21	ARI-5721-EI21	ARI-5721-EK21	AGS-5731-RB2
Phenyl-Butyl		ARI-5735-ED21	ARI-5735-EG21	ARI-5735-EH21	ARI-5735-EI21	ARI-5735-EK21	AGS-5731-RB2
NH_2		ARI-5736-ED21	ARI-5736-EG21	ARI-5736-EH21	ARI-5736-EI21	ARI-5736-EK21	Inquire**
HILIC Plus		ARI-5738-ED21	ARI-5738-EG21	ARI-5738-EH21	ARI-5738-EI21	ARI-5738-EK21	AGS-5731-HB2
Si		ARI-5739-ED21	ARI-5739-EG21	ARI-5739-EH21	ARI-5739-EI21	ARI-5739-EK21	AGS-5731-NB2

2.2 µm ARION® all dimensions in mm						**ARION® Guard Cartridges***
Phase		**50 × 3.0**	**75 × 3.0**	**100 × 3.0**	**150 × 3.0**	**5 × 2.1**
Plus C18		ARI-5720-EG30	ARI-5720-EH30	ARI-5720-EI30	ARI-5720-EK30	AGS-5731-RB2
Polar C18		ARI-5721-EG30	ARI-5721-EH30	ARI-5721-EI30	ARI-5721-EK30	AGS-5731-RB2
Phenyl-Butyl		ARI-5735-EG30	ARI-5735-EH30	ARI-5735-EI30	ARI-5735-EK30	AGS-5731-RB2
NH_2		ARI-5736-EG30	ARI-5736-EH30	ARI-5736-EI30	ARI-5736-EK30	Inquire**
HILIC Plus		ARI-5738-EG30	ARI-5738-EH30	ARI-5738-EI30	ARI-5738-EK30	AGS-5731-HB2
Si		ARI-5739-EG30	ARI-5739-EH30	ARI-5739-EI30	ARI-5739-EK30	AGS-5731-NB2

2.2 µm ARION® all dimensions in mm						**ARION® Guard Cartridges***
Phase		**50 × 4.6**	**75 × 4.6**	**100 × 4.6**	**150 × 4.6**	**5 × 4.0**
Plus C18		ARI-5720-EG46	ARI-5720-EH46	ARI-5720-EI46	ARI-5720-EK46	AGS-5731-RC4
Polar C18		ARI-5721-EG46	ARI-5721-EH46	ARI-5721-EI46	ARI-5721-EK46	AGS-5731-RC4
Phenyl-Butyl		ARI-5735-EG46	ARI-5735-EH46	ARI-5735-EI46	ARI-5735-EK46	AGS-5731-RC4
NH_2		ARI-5736-EG46	ARI-5736-EH46	ARI-5736-EI46	ARI-5736-EK46	Inquire**
HILIC Plus		ARI-5738-EG46	ARI-5738-EH46	ARI-5738-EI46	ARI-5738-EK46	Inquire**
Si		ARI-5739-EG46	ARI-5739-EH46	ARI-5739-EI46	ARI-5739-EK46	Inquire**

Ordering information

Analytical columns

3 µm ARION® all dimensions in mm							ARION® Guard Cartridges*
Phase		**50 × 2.1**	**75 × 2.1**	**100 × 2.1**	**150 × 2.1**	**250 × 2.1**	**5 × 4.0**
Plus C18		ARI-5720-IG21	ARI-5720-IH21	ARI-5720-II21	ARI-5720-IK21	ARI-5720-IM21	AGS-5731-RC2
Polar C18		ARI-5721-IG21	ARI-5721-IH21	ARI-5721-II21	ARI-5721-IK21	–	AGS-5731-RC2
C8		ARI-5734-IG21	ARI-5734-IH21	ARI-5734-II21	ARI-5734-IK21	–	AGS-5731-RC2
Phenyl-Butyl		ARI-5735-IG21	ARI-5735-IH21	ARI-5735-II21	ARI-5735-IK21	–	AGS-5731-RC2
NH_2		ARI-5736-IG21	ARI-5736-IH21	ARI-5736-II21	ARI-5736-IK21	–	Inquire**
CN		ARI-5737-IG21	ARI-5737-IH21	ARI-5737-II21	ARI-5737-IK21	–	Inquire**
HILIC Plus		ARI-5738-IG21	ARI-5738-IH21	ARI-5738-II21	ARI-5738-IK21	–	AGS-5731-HC2
Si		ARI-5739-IG21	ARI-5739-IH21	ARI-5739-II21	ARI-5739-IK21	–	AGS-5731-NC2

3 µm ARION® all dimensions in mm							ARION® Guard Cartridges*
Phase		**50 × 3.0**	**75 × 3.0**	**100 × 3.0**	**150 × 3.0**	**250 × 3.0**	**5 × 4.0**
Plus C18		ARI-5720-IG30	ARI-5720-IH30	ARI-5720-II30	ARI-5720-IK30	ARI-5720-IM30	AGS-5731-RC4
Polar C18		ARI-5721-IG30	ARI-5721-IH30	ARI-5721-II30	ARI-5721-IK30	ARI-5721-IM30	AGS-5731-RC4
C8		ARI-5734-IG30	ARI-5734-IH30	ARI-5734-II30	ARI-5734-IK30	–	AGS-5731-RC4
Phenyl-Butyl		ARI-5735-IG30	ARI-5735-IH30	ARI-5735-II30	ARI-5735-IK30	ARI-5735-IM30	AGS-5731-RC4
NH_2		–	–	ARI-5736-II30	ARI-5736-IK30	–	Inquire**
CN		–	–	ARI-5737-II30	ARI-5737-IK30	–	Inquire**
HILIC Plus		ARI-5738-IG30	ARI-5738-IH30	ARI-5738-II30	ARI-5738-IK30	–	AGS-5731-HC4
Si		ARI-5739-IG30	ARI-5739-IH30	ARI-5739-II30	ARI-5739-IK30	–	AGS-5731-NC4

3 µm ARION® all dimensions in mm								ARION® Guard Cartridges*
Phase		**50 × 4.6**	**75 × 4.6**	**100 × 4.6**	**125 × 4.6**	**150 × 4.6**	**250 × 4.6**	**5 × 4.0**
Plus C18		ARI-5720-IG46	ARI-5720-IH46	ARI-5720-II46	ARI-5720-IJ46	ARI-5720-IK46	ARI-5720-IM46	AGS-5731-RC4
Polar C18		ARI-5721-IG46	ARI-5721-IH46	ARI-5721-II46	–	ARI-5721-IK46	ARI-5721-IM46	AGS-5731-RC4
C8		ARI-5734-IG46	ARI-5734-IH46	ARI-5734-II46	–	ARI-5734-IK46	ARI-5734-IM46	AGS-5731-RC4
Phenyl-Butyl		ARI-5735-IG46	ARI-5735-IH46	ARI-5735-II46	–	ARI-5735-IK46	ARI-5735-IM46	AGS-5731-RC4
NH_2		ARI-5736-IG46	ARI-5736-IH46	ARI-5736-II46	–	ARI-5736-IK46	ARI-5736-IM46	Inquire**
CN		ARI-5737-IG46	–	ARI-5737-II46	–	ARI-5737-IK46	–	Inquire**
HILIC Plus		ARI-5738-IG46	ARI-5738-IH46	ARI-5738-II46	–	ARI-5738-IK46	–	AGS-5731-HC4
Si		ARI-5739-IG46	ARI-5739-IH46	ARI-5739-II46	–	ARI-5739-IK46	ARI-5739-IM46	AGS-5731-NC4

* ARION® Guard cartridges require ARION® Guard Holder p/n AGS-5731-000 (supplied without cartridges).
**The use of appropriate guard cartridge depends on the application. Please contact us.

Ordering information

Analytical columns

5 µm ARION® all dimensions in mm						ARION® Guard Cartridges*
Phase		**30 × 2.1**	**50 × 2.1**	**100 × 2.1**	**150 × 2.1**	**5 × 4.0**
Plus C18		ARI-5720-LD21	ARI-5720-LG21	ARI-5720-LI21	ARI-5720-LK21	AGS-5731-RD2
Polar C18		ARI-5721-LD21	ARI-5721-LG21	ARI-5721-LI21	ARI-5721-LK21	AGS-5731-RD2
C8		–	–	–	ARI-5734-LK21	AGS-5731-RD2
Biphenyl		ARI-5868-LD21	ARI-5868-LG21	ARI-5868-LI21	ARI-5868-LK21	AGS-5731-RD2
Phenyl-Butyl		ARI-5735-LD21	ARI-5735-LG21	ARI-5735-LI21	ARI-5735-LK21	AGS-5731-RD2
NH_2		–	–	–	ARI-5736-LK21	Inquire**
CN		–	–	–	ARI-5737-LK21	Inquire**
HILIC Plus		ARI-5738-LD21	ARI-5738-LG21	ARI-5738-LI21	ARI-5738-LK21	AGS-5731-HD2
Si		ARI-5739-LD21	ARI-5739-LG21	ARI-5739-LI21	ARI-5739-LK21	AGS-5731-ND2

5 µm ARION® all dimensions in mm						ARION® Guard Cartridges*
Phase		**30 × 3.0**	**50 × 3.0**	**75 × 3.0**	**100 × 3.0**	**5 × 4.0**
Plus C18		ARI-5720-LD30	ARI-5720-LG30	ARI-5720-LH30	ARI-5720-LI30	AGS-5731-RD4
Polar C18		ARI-5721-LD30	ARI-5721-LG30	ARI-5721-LH30	ARI-5721-LI30	AGS-5731-RD4
C8		–	ARI-5734-LG30	–	ARI-5734-LI30	AGS-5731-RD4
Biphenyl		ARI-5868-LD30	ARI-5868-LG30	ARI-5868-LH30	ARI-5868-LI30	AGS-5731-RC4
Phenyl-Butyl		ARI-5735-LD30	ARI-5735-LG30	ARI-5735-LH30	ARI-5735-LI30	AGS-5731-RC4
NH_2		–	ARI-5736-LG30	ARI-5736-LH30	ARI-5736-LI30	Inquire**
CN		–	ARI-5737-LG30	ARI-5737-LH30	ARI-5737-LI30	Inquire**
HILIC Plus		ARI-5738-LD30	ARI-5738-LG30	ARI-5738-LH30	ARI-5738-LI30	AGS-5731-HD4
Si		ARI-5739-LD30	ARI-5739-LG30	ARI-5739-LH30	ARI-5739-LI30	AGS-5731-ND4
SAX		–	ARI-5806-LG30	–	ARI-5806-LI30	–
SCX		–	ARI-5799-LG30	–	ARI-5799-LI30	–

5 µm ARION® all dimensions in mm					ARION® Guard Cartridges*
Phase		**125 × 3.0**	**150 × 3.0**	**250 × 3.0**	**5 × 4.0**
Plus C18		ARI-5720-LJ30	ARI-5720-LK30	–	AGS-5731-RD4
Polar C18		–	ARI-5721-LK30	–	AGS-5731-RD4
C8		–	ARI-5734-LK30	ARI-5734-LM30	AGS-5731-RD4
Biphenyl		ARI-5868-LJ30	ARI-5868-LK30	ARI-5868-LM30	AGS-5731-RC4
Phenyl-Butyl		–	ARI-5735-LK30	–	AGS-5731-RC4
NH_2		–	ARI-5736-LK30	–	Inquire**
CN		–	ARI-5737-LK30	–	Inquire**
HILIC Plus		–	ARI-5738-LK30	–	AGS-5731-HD4
Si		–	ARI-5739-LK30	–	AGS-5731-ND4
SAX		–	ARI-5806-LK30	ARI-5806-LM30	–
SCX		–	ARI-5799-LK30	ARI-5799-LM30	–

* ARION® Guard cartridges require ARION® Guard Holder p/n AGS-5731-000 (supplied without cartridges).

**The use of appropriate guard cartridge depends on the application. Please contact us.

Ordering information

Analytical columns

5 µm ARION® all dimensions in mm						ARION® Guard Cartridges*
Phase		**125 × 4.0**	**30 × 4.6**	**50 × 4.6**	**75 × 4.6**	**5 × 4.0**
Plus C18		ARI-5720-LJ40	ARI-5720-LD46	ARI-5720-LG46	ARI-5720-LH46	AGS-5731-RD4
Polar C18		ARI-5721-LJ40	ARI-5721-LD46	ARI-5721-LG46	ARI-5721-LH46	AGS-5731-RD4
C8		ARI-5734-LJ40	–	–	–	AGS-5731-RD4
Biphenyl		ARI-5868-LJ40	ARI-5868-LD46	ARI-5868-LG46	ARI-5868-LH46	AGS-5731-RD4
Phenyl-Butyl		–	–	–	–	AGS-5731-RD4
NH_2		–	–	–	–	Inquire**
CN		–	–	–	–	Inquire**
HILIC Plus		–	ARI-5738-LD46	ARI-5738-LG46	ARI-5738-LH46	AGS-5731-HD4
Si		–	ARI-5739-LD46	ARI-5739-LG46	ARI-5739-LH46	AGS-5731-ND4
SAX		–	–	ARI-5806-LG46	–	Inquire
SCX		–	–	ARI-5799-LG46	–	Inquire

5 µm ARION® all dimensions in mm						ARION® Guard Cartridges*
Phase		**100 × 4.6**	**125 × 4.6**	**150 × 4.6**	**250 × 4.6**	**5 × 4.0**
Plus C18		ARI-5720-LI46	ARI-5720-LJ46	ARI-5720-LK46	ARI-5720-LM46	AGS-5731-RD4
Polar C18		ARI-5721-LI46	–	ARI-5721-LK46	ARI-5721-LM46	AGS-5731-RD4
C8		ARI-5734-LI46	ARI-5734-LJ46	ARI-5734-LK46	ARI-5734-LM46	AGS-5731-RD4
Biphenyl		ARI-5868-LI46	ARI-5868-LJ46	ARI-5868-LK46	ARI-5868-LM46	AGS-5731-RD4
Phenyl-Butyl		ARI-5735-LI46	–	ARI-5735-LK46	ARI-5735-LM46	AGS-5731-RD4
NH_2		ARI-5736-LI46	–	ARI-5736-LK46	ARI-5736-LM46	Inquire**
CN		ARI-5737-LI46	–	ARI-5737-LK46	ARI-5737-LM46	Inquire**
HILIC Plus		ARI-5738-LI46	–	ARI-5738-LK46	ARI-5738-LM46	AGS-5731-HD4
Si		ARI-5739-LI46	–	ARI-5739-LK46	ARI-5739-LM46	AGS-5731-ND4
SAX		ARI-5806-LI46	–	ARI-5806-LK46	ARI-5806-LM46	Inquire
SCX		ARI-5799-LI46	–	ARI-5799-LK46	ARI-5799-LM46	Inquire

Note: Other dimensions on request.

* ARION® Guard cartridges require ARION® Guard Holder p/n AGS-5731-000 (supplied without cartridges).
** The use of appropriate guard cartridge depends on the application. Please contact us.

ARION® column test mixture 1 for RP columns p/n ARI-MIX-1

4 components in Acetonitrile / Water (75/25), 1 ml ampoule

Uracil	[CAS:66-22-8]	20 mg/l
Acetophenone	[CAS:98-86-2]	200 mg/l
Toluene	[CAS:108-88-3]	10000 mg/l
Naphthalene	[CAS:91-20-3]	9000 mg/l

ARION® column test mixture 5 for DIOL/HILIC phases p/n ARI-MIX-5

3 components in Acetonitrile ampoule

Acenaphthene	[CAS:108-88-3]	600 mg/l
Uracil	[CAS:66-22-8]	100 mg/l
Cytosine	[CAS:71-30-7]	200 mg/l

ARION® column test mixture 2 p/n ARI-MIX-2

7 components in Methanol, 1 ml ampoule

Uracil	[CAS:66-22-8]	200 mg/l
Aniline	[CAS:62-53-3]	1000 mg/l
Phenol	[CAS:108-95-2]	2000 mg/l
N,N-Dimethylaniline	[CAS:121-69-7]	400 mg/l
4-Ethylaniline	[CAS:589-16-2]	2000 mg/l
Toluene	[CAS:108-88-3]	10000 mg/l
Ethylbenzene	[CAS:100-41-4]	10000 mg/l

Ordering information

Semi-preparative and preparative columns

5 µm ARION® all dimensions in mm						**ARION® Guard Cartridges**
Phase	**250 × 10**	**50 × 21.2**	**100 × 21.2**	**150 × 21.2**	**250 × 21.2**	
Plus C18	ARI-5720-LM1X	ARI-5720-LG2Y	ARI-5720-LI2Y	ARI-5720-LK2Y	ARI-5720-LM2Y	PGS-5856-UD9**
Polar C18	ARI-5721-LM1X	ARI-5721-LG2Y	ARI-5721-LI2Y	ARI-5721-LK2Y	ARI-5721-LM2Y	Inquire*
Phenyl-Butyl	–	–	–	–	ARI-5735-LM2Y	Inquire*
Si	ARI-5739-LM1X	ARI-5739-LG2Y	ARI-5739-LI2Y	ARI-5739-LK2Y	ARI-5739-LM2Y	PGS-5856-VD9**

Preparative columns

5 µm ARION® all dimensions in mm					**ARION® Guard Cartridges**
Phase	**100 × 30**	**150 × 30**	**250 × 30**	**250 × 50**	
Plus C18	ARI-5720-LI3X	ARI-5720-LK3X	ARI-5720-LM3X	ARI-5720-LM5X	Inquire*
Polar C18	ARI-5721-LI3X	ARI-5721-LK3X	ARI-5721-LM3X	ARI-5721-LM5X	Inquire*
Phenyl-Butyl	–	–	ARI-5735-LM3X	ARI-5735-LM5X	Inquire*
Si	ARI-5739-LI3X	ARI-5739-LK3X	ARI-5739-LM3X	ARI-5739-LM5X	Inquire*

* The use of appropriate guard cartridge depends on the application. Please contact us.
**This guard cartridge requires a Preparative Guard Holder p/n PGS-5856-000

Semi-preparative column 250 × 10 mm

Preparative column 250 × 21.2 mm

Preparative column 250 × 30 mm

Preparative column 250 × 50 mm

Ordering information

Preparative columns

10 µm ARION® all dimensions in mm					**ARION® Guard Cartridges**
Phase	**150 × 4.6**	**250 × 4.6**	**150 × 10**	**250 × 10**	
Plus C18	ARI-5720-PK46	ARI-5720-PM46	ARI-5720-PK1X	ARI-5720-PM1X	Inquire*
Polar C18	ARI-5721-PK46	ARI-5721-PM46	ARI-5721-PK1X	ARI-5721-PM1X	Inquire*
Si	–	–	–	ARI-5739-PM1X	Inquire*

10 µm ARION® all dimensions in mm					**ARION® Guard Cartridges**
Phase	**50 × 21.2**	**100 × 21.2**	**150 × 21.2**	**250 × 21.2**	
Plus C18	ARI-5720-PG2Y	ARI-5720-PI2Y	ARI-5720-PK2Y	ARI-5720-PM2Y	Inquire*
Polar C18	ARI-5721-PG2Y	ARI-5721-PI2Y	ARI-5721-PK2Y	ARI-5721-PM2Y	Inquire*
Si	ARI-5739-PG2Y	ARI-5739-PI2Y	ARI-5739-PK2Y	ARI-5739-PM2Y	Inquire*

10 µm ARION® all dimensions in mm					**ARION® Guard Cartridges**
Phase	**100 × 30**	**150 × 30**	**250 × 30**	**250 × 50**	
Plus C18	ARI-5720-PI3X	ARI-5720-PK3X	ARI-5720-PM3X	ARI-5720-PM5X	Inquire*
Polar C18	ARI-5721-PI3X	ARI-5721-PK3X	ARI-5721-PM3X	ARI-5721-PM5X	Inquire*
Si	ARI-5739-PI3X	ARI-5739-PK3X	ARI-5739-PM3X	ARI-5739-PM5X	Inquire*

* The use of appropriate guard cartridge depends on the application. Please contact us.

Ordering information

Preparative columns

15 µm ARION® all dimensions in mm					**ARION® Guard Cartridges**
Phase	**150 × 4.6**	**250 × 4.6**	**150 × 10**	**250 × 10**	
Plus C18	ARI-5720-QK46	ARI-5720-QM46	ARI-5720-QK1X	ARI-5720-QM1X	Inquire*
Polar C18	ARI-5721-QK46	ARI-5721-QM46	ARI-5721-QK1X	ARI-5721-QM1X	Inquire*

15 µm ARION® all dimensions in mm					**ARION® Guard Cartridges**
Phase	**50 × 21.2**	**100 × 21.2**	**150 × 21.2**	**250 × 21.2**	
Plus C18	ARI-5720-QG2Y	ARI-5720-QI2Y	ARI-5720-QK2Y	ARI-5720-QM2Y	Inquire*
Polar C18	ARI-5721-QG2Y	ARI-5721-QI2Y	ARI-5721-QK2Y	ARI-5721-QM2Y	Inquire*

15 µm ARION® all dimensions in mm					**ARION® Guard Cartridges**
Phase	**50 × 30**	**100 × 30**	**150 × 30**	**250 × 30**	
Plus C18	ARI-5720-QG3X	ARI-5720-QI3X	ARI-5720-QK3X	ARI-5720-QM3X	Inquire*
Polar C18	ARI-5721-QG3X	ARI-5721-QI3X	ARI-5721-QK3X	ARI-5721-QM3X	Inquire*

Note: Bulk media available on request for 10 and 15 µm particles, in quantities: 10 g, 100 g, 1 kg.

* The use of appropriate guard cartridge depends on the application. Please contact us.

ARION® BIO

ARION® BIO columns have been developed for the protein, polypeptide and peptide characterisation and purification. They are offered with C18 and C4 stationary phases. ARION® C18-BIO phase is intended 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 150 kDa.

- Biomolecule separation up to 150 kDA.
- Pre-columns with corresponding media.
- Scale-up to 15 µm.

ARION® BIO Silicagel

Particle size	5 µm	3 µm
Metal content	<20 ppm	<20 ppm
Temperature stability	60 °C*	60 °C*
Mean particle diameter	5.0 ± 0.3 µm	3.0 ± 0.2 µm

* Depends on mobile phase used and silica bonding.

ARION® BIO phases	Particle size (µm)	Pore size (Å)	Surface area (m^2/g)	Carbon load	pH stability	Endcapping	100% aqueous mobile phase	USP code
C18-BIO	3, 5	300	110	11 %	1.5 to 7.5	Single-step	×	L1
C4-BIO	3, 5	300	110	4.5 %	1.5 to 7.5	Single-step	×	L26

Ordering information

Peptides and oligopeptides columns

ARION® BIO C18 all dimensions in mm				**ARION® Guard Cartridges***
Phase	**100 × 4.6**	**150 × 4.6**	**250 × 4.6**	
3 µm	ARI-5840-II46	ARI-5840-IK46	ARI-5840-IM46	AGS-5731-BC4
5 µm	ARI-5840-LI46	ARI-5840-LK46	ARI-5840-LM46	AGS-5731-BD4

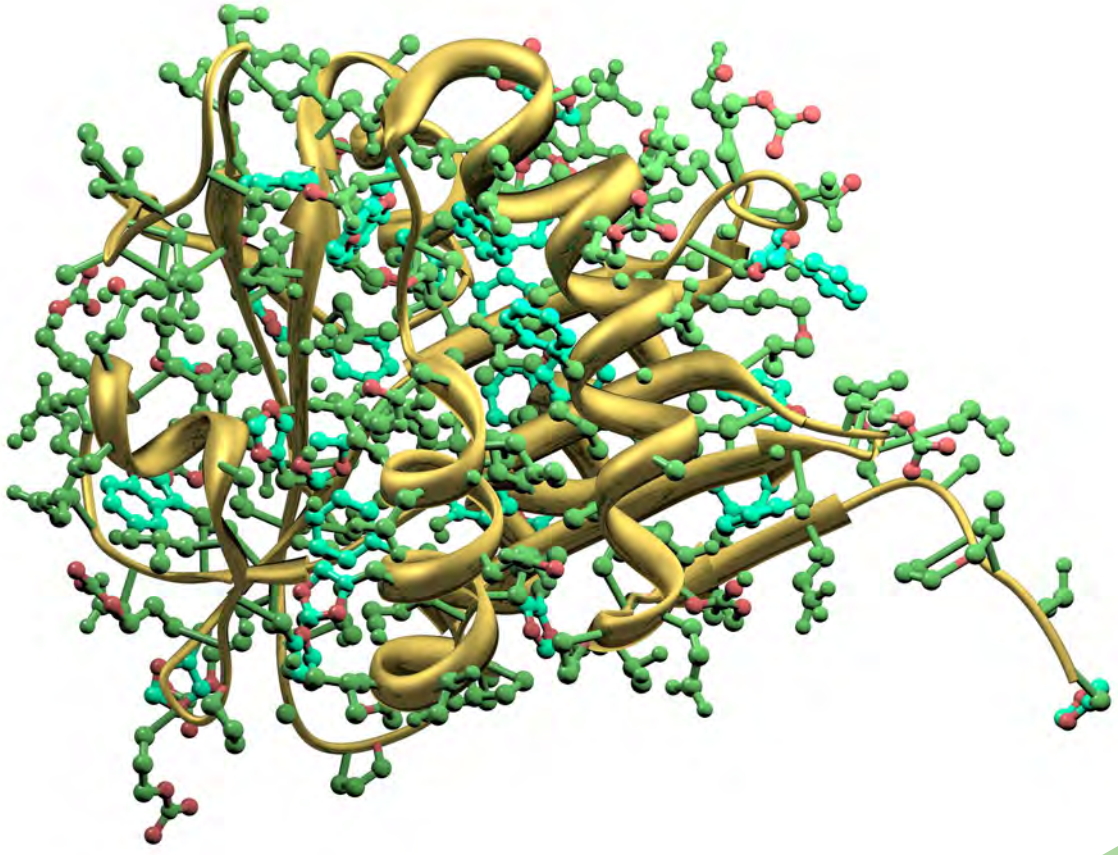
ARION® BIO C18 all dimensions in mm					**ARION® Guard Cartridges***
Phase	**100 × 3.0**	**150 × 3.0**	**50 × 2.1**	**150 × 2.1**	
3 µm	–	–	ARI-5840-IG21	ARI-5840-IK21	–
5 µm	ARI-5840-LI30	ARI-5840-LK30	–	ARI-5840-LK21	AGS-5731-BD2

Proteins and polypeptides

ARION® BIO C4 all dimensions in mm					**ARION® Guard Cartridges***
Phase	**50 × 4.6**	**100 × 4.6**	**150 × 4.6**	**250 × 4.6**	
5 µm	ARI-5846-LG46	ARI-5846-LI46	ARI-5846-LK46	ARI-5846-LM46	AGS-5731-BD4

ARION® BIO C4 all dimensions in mm				**ARION® Guard Cartridges***
Phase	**50 × 2.1**	**150 × 2.1**	**250 × 2.1**	
5 µm	ARI-5846-LG21	ARI-5846-LK21	ARI-5846-LM21	AGS-5731-BD2

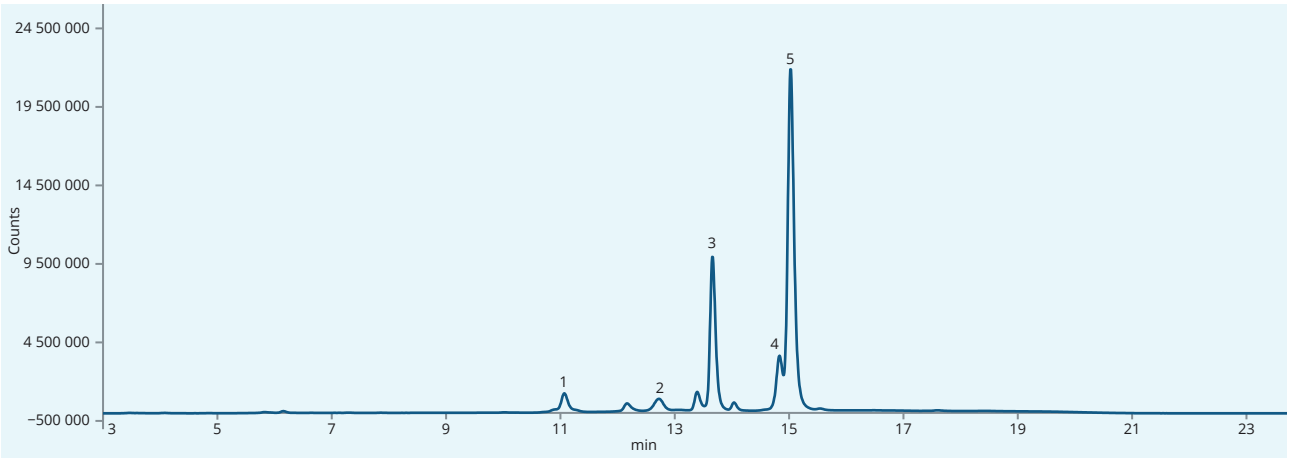
* ARION® Guard cartridges require ARION® Guard Holder p/n AGS-5731-000 (supplied without cartridges).



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 microbial 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 microbiome and healthy skin.

Substance	Lactoferrin (LT)
Synonym	Lactotransferrin (LTF)



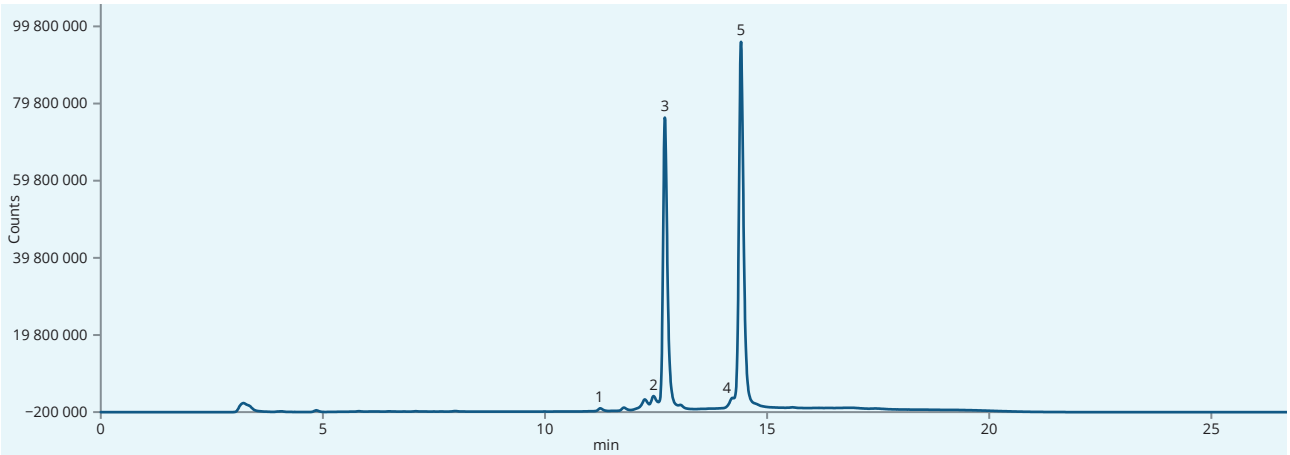
Lactoferrin analysis in bovine milk

Column	Arion® C4-BIO, 5 µm				
Dimensions	250 mm × 4.6 mm				
Part number	ARI-5846-LM46				
Mobile phase	A: 100% acetonitrile (ACN) B: 95 % ACN + 5 % H20+ 0.1 % TFA C: 5 % ACN + 95 % H20 + 0.1 % TFA				
Gradient elution	**Retention (min)**	**Flow (ml/min)**	**%A**	**%B**	**%C**
	0.0	0.5	0.0	20.0	80.0
	0.5	0.5	0.0	30.0	70.0
	6.0	0.5	0.0	35.0	65.0
	10.0	0.5	5.0	40.0	55.0
	15.0	0.5	0.0	50.0	50.0
	16.0	0.5	0.0	20.0	80.0
	19.0	0.5	0.0	20.0	80.0
Temperature	60 °C				
Detection	FLD @280/340 nm*				
Injection volume	10 µl				
Analytes	**1. Lysozyme** **2. Lactorferrin** **3. α-La (α-Lactalbumin)** **4. β-LgB (β-Lactoglobulin B)** **5. β-LgA (β-Lactoglobulin A)**				

* Note: The detection can be at UV @205 nm.

Lactoferrin in goat‘s milk

Substance	Lactoferrin (LT)
Synonym	Lactotransferrin (LTF)



Lactoferrin analysis in goat‘s milk

Column	Arion® C4-BIO, 5 µm				
Dimensions	250 mm × 4.6 mm				
Part number	ARI-5846-LM46				
Mobile phase	A: 100% acetonitrile (ACN) B: 95 % ACN + 5 % H20+ 0.1 % TFA C: 5 % ACN + 95 % H20 + 0.1 % TFA				
Gradient elution	**Retention (min)**	**Flow (ml/min)**	**%A**	**%B**	**%C**
	0.0	0.5	0.0	20.0	80.0
	0.5	0.5	0.0	30.0	70.0
	6.0	0.5	0.0	35.0	65.0
	10.0	0.5	5.0	40.0	55.0
	15.0	0.5	0.0	50.0	50.0
	16.0	0.5	0.0	20.0	80.0
	19.0	0.5	0.0	20.0	80.0
Temperature	60 °C				
Detection	FLD @280/340 nm*				
Injection volume	10 µl				
Analytes	**1. Lysozyme** **2. Lactorferrin** **3. α-La (α-Lactalbumin)** **4. β-LagB (β-Lactoglobulin, BLG)** **5. β-LgA (β-Lactalbumin)**				

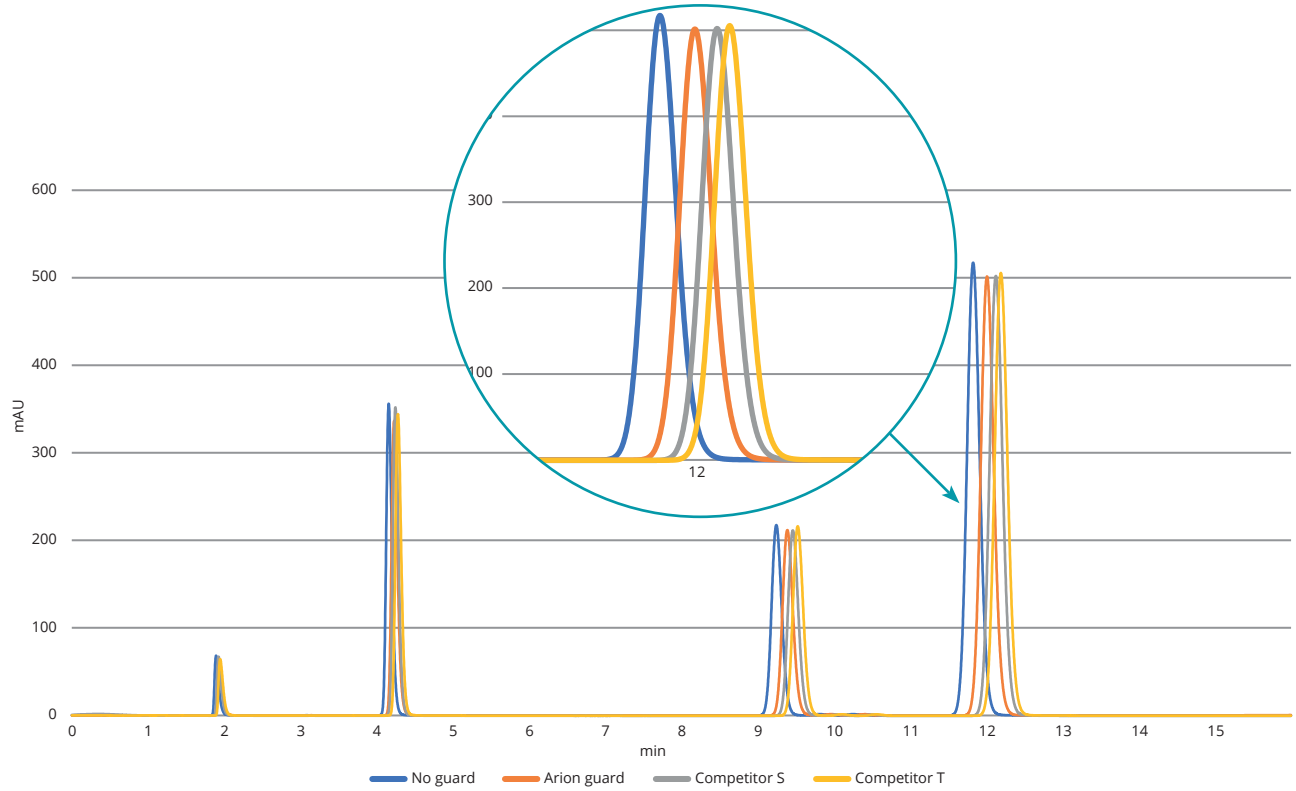
*Note: The detection can be at UV @205 nm.

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 analytes 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.

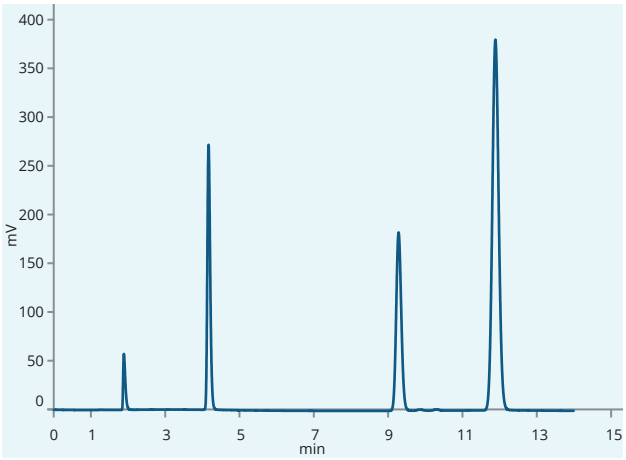
- Universal – fits virtually any column on the market.
- The **lowest influence on retention times** compared with other guard systems.
- Small size for easier installation in the column oven.
- **Any orientation** of the cartridge.
- Pressure rating up to **900 bar**.
- Higher cartridge capacity.

AGS system holder

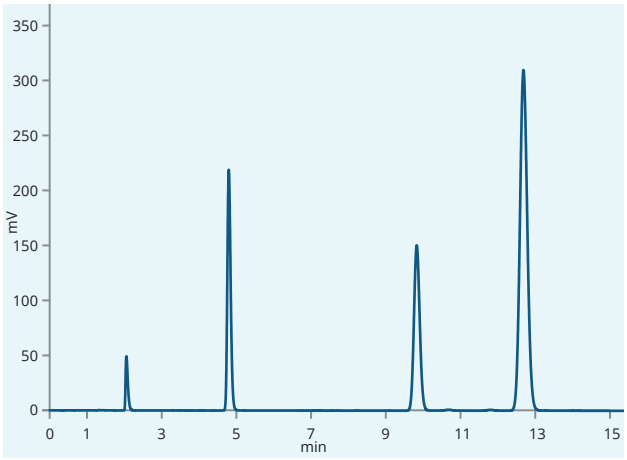


Comparison of guard systems from various manufacturers

Guard column system



ARION® Plus with ARION® Guard System



ARION® Polar with ARION® Guard System

Both chromatograms above show the separation of Uracil, Acetophenone, Toluene and Naphthalene with the ARION® Guard system in Acetonitrile/Water (65:35) 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 higher sorbent bed (5 × 4 mm ID) offers a **raised capacity** without needing to couple two cartridges together. All this ensures lower running costs.

Ferrule Connection to the column Guard cartridge Input from the pump

ARION® Guard exploded view

Guard System Selection Guide

Material	Pore size	pH Stability	Column ID 2.1–3.0 5.0 × 2.1 mm	Column ID 3.0–4.6 5.0 × 4.0 mm	100% aqueous mobile phase
					
			Package of 3 pcs	Package of 3 pcs	
RP 1.7 µm	100 Å	1 to 10	AGS-5731-RA2	–	×
RP 2.2 µm	100 Å	1 to 10	AGS-5731-RB2	–	✓
RP 3.0 µm	100 Å	1 to 10	AGS-5731-RC2	AGS-5731-RC4	✓
RP 5.0 µm	100 Å	1 to 10	AGS-5731-RD2	AGS-5731-RD4	✓
HILIC 2.2 µm	100 Å	1.5 to 7	AGS-5731-HB2	–	OM/W*
HILIC 3.0 µm	100 Å	1.5 to 7	AGS-5731-HC2	AGS-5731-HC4	OM/W*
HILIC 5.0 µm	100 Å	1.5 to 7	AGS-5731-HD2	AGS-5731-HD4	OM/W*
NP 2.2 µm	100 Å	n/a	AGS-5731-NB2	–	n/a
NP 3.0 µm	100 Å	n/a	AGS-5731-NC2	AGS-5731-NC4	n/a
NP 5.0 µm	100 Å	n/a	AGS-5731-ND2	AGS-5731-ND4	n/a
BIO RP 3.0 µm	300 Å	1.5 to 7	AGS-5731-BC2	AGS-5731-BC4	×
BIO RP 5.0 µm	300 Å	1.5 to 7	AGS-5731-BD2	AGS-5731-BD4	×

* OM/W – Organic modifier (water-miscible)/water mobile phase recommended.

Ferrules for ARION® Guard System

Material	Pressure	10 pcs
PEEK	<400 bar*	AGS-5731-Y00
Stainless Steel, Type 316	<689 bar	AGS-5731-Z00

* Maximum pressure of PEEK ferrules depends on the tubing used. Max. pressure of 400 bar is for 1/16: OD tubing with ID 0.05 to 0.18 mm. ARION® Guard System includes one Stainless Steel ferrule in standard package.

AGS holder with PEEK ferrule
p/n AGS-5731-00P

AGS holder with Stainless Steel ferrule
p/n AGS-5731-000

Guard system for preparative columns

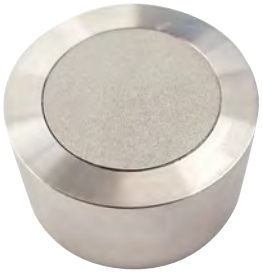
Preparative guard column system (PGS) is intended to use with 21.2 mm ID preparative HPLC columns.

Preparative Guard System cartridges

Material	Pore size	pH Stability	Column ID	p/n	100% aqueous mobile phase
C18 5.0 µm	100 Å	1 to 10	21.2	PGS-5856-UD9*	×
C8 5.0 µm	120 Å	2 to 7	21.2	PGS-5856-TD9*	×
Si 5.0 µm	100 Å	1.5 to 7	21.2	PGS-5856-VD9*	×

Note: Other phases on request.
* Requires holder PGS-5856-000

PGS holder
p/n PGS-5856-000

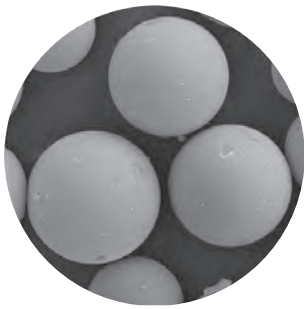


Preparative guard system cartridge

ASTRA®

ASTRA® HPLC columns extend our ARION® and CHROMSHELL® 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.

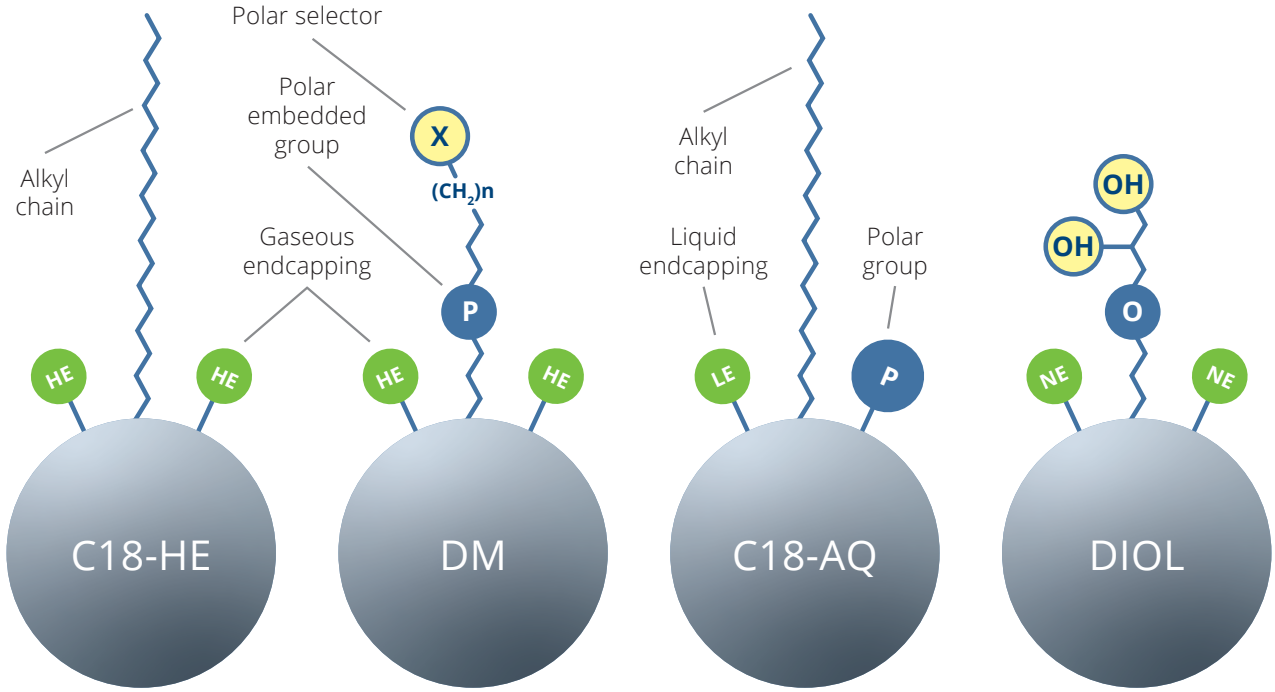
- Unique and high endcapped C18 phases.
- 330 m^2/g surface area.



ASTRA® Silicagel

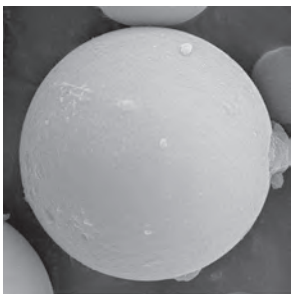
Particle size	5 µm	3 µm	2 µm
Metal content	<10 ppm	<10 ppm	<10 ppm
Mean particle diameter	4.6 ± 1.2 µm	3.0 ± 0.7 µm	2.1 ± 0.4 µm
Proximity to the shape of sphere	0.97 ± 0.04	0.97 ± 0.03	0.97 ± 0.03

ASTRA® phases	Particle size (µm)	Pore size (Å)	Surface area (m^2/g)	Carbon load	pH stability	Endcapping	100% aqueous mobile phase	USP code
C18-HE	2, 3, 5	100	330	17 %	2 to 9	High	×	L1
C18-AQ	2, 3, 5	100	330	13 %	2 to 9	Mixed	✓	L1
DM	3, 5	100	205	12 %	2 to 9	High	×	–
Diol	3, 5	100	330	5 %	2 to 7.5	–	✓	L20

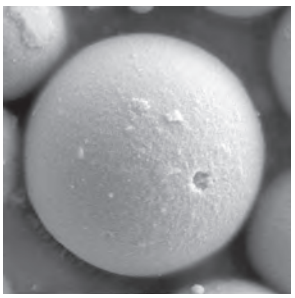


Up close

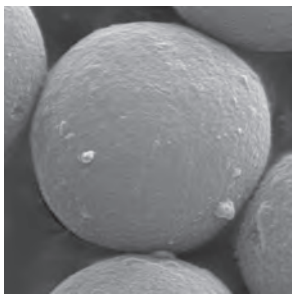
As with all phases developed by Chromservis, ASTRA® HPLC column particles are continuously analysed by SEM. The electron microscope shows the very high quality of ASTRA® 3 and 5µm particles.



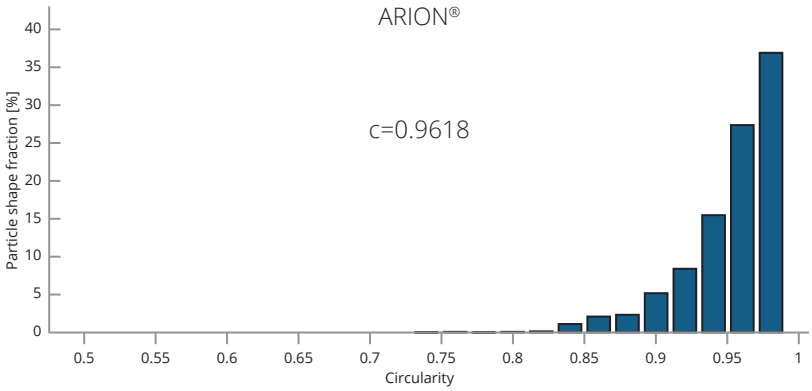
ASTRA® particle 5 µm



ASTRA® particle 3 µm



ASTRA® particle 2 µm



Main particle characteristics:

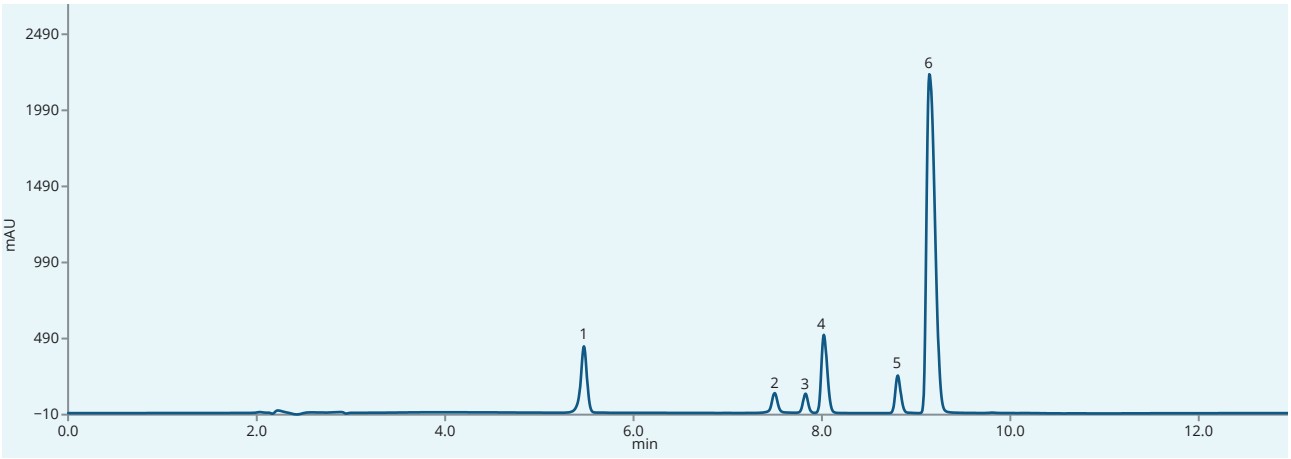
- Close proximity to a sphere.
- Highly effective endcapping.
- No broken particles.
- Robustness to high pressures.
- Lot-to-lot reproducibility.
- Unique modern embedded phases.

ASTRA® column hardware

- Electropolished with very low Ra reduces wall effect
- Rated up to 20000 psi (1300 bar), ideal for the UHPLC applications

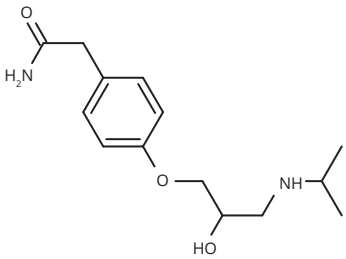
Beta Blockers

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

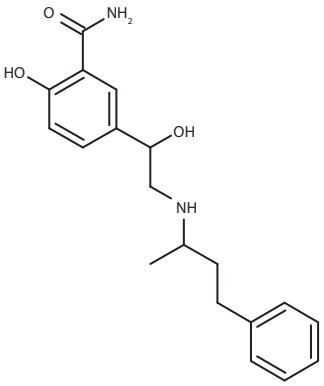


Standard mixture on ASTRA® C18-HE column

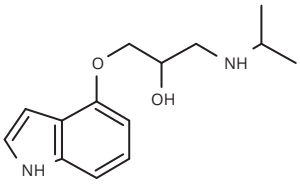
Columns	ASTRA® C18-HE, 5 µm			
Dimensions	150 mm × 4.6 mm			
Part numbers	AST-5732-LK46			
Mobile phase	A: Phosphate buffer 20mM, pH 2.5 B: ACN			
Gradient elution	**Time**	**A (%)**	**B (%)**	**Flow rate (ml/l)**
	0	95	5	0.75
	3	85	15	1.00
	8	50	50	1.00
	12	95	5	1.00
	13	95	5	0.75
Flow rate	See gradient table (ml/l)			
Temperature	25 °C			
Detection	UV @250 nm			
Analytes	**1. Atenolol, CAS No. 29122-68-7** **2. Pindolol, CAS No. 13523-86-9** **3. Acebutolol, CAS No. 37517-30-9** **4. Metoprolol, CAS No. 37350-58-6** **5. Labetalol, CAS No. 36894-69-6** **6. Propranolol, CAS No. 525-66-6**			



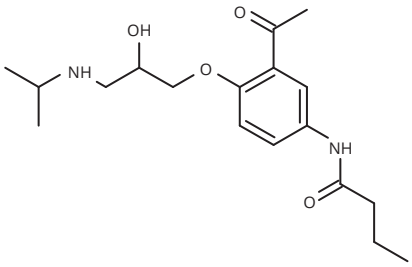
Atenolol



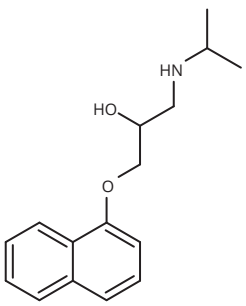
Labetalol



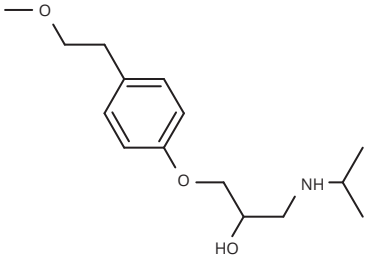
Pindolol



Acebutolol



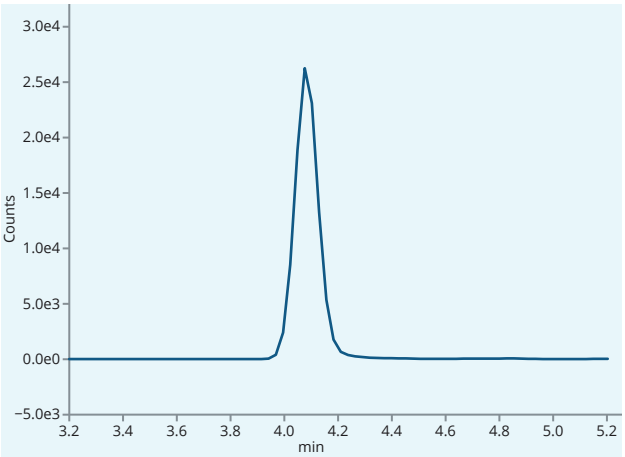
Propranolol



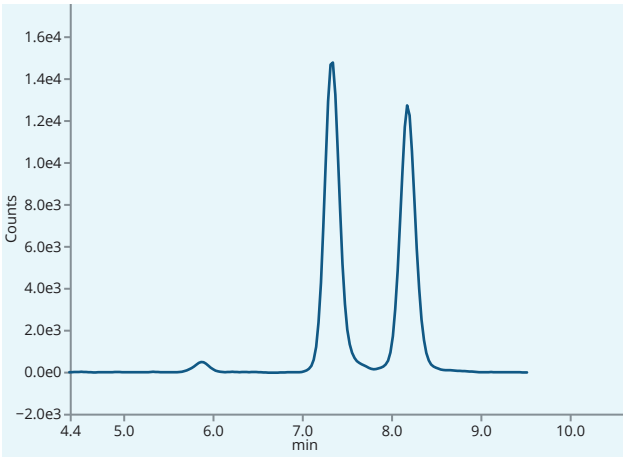
Metoprolol

API glucuronide by LC/MS

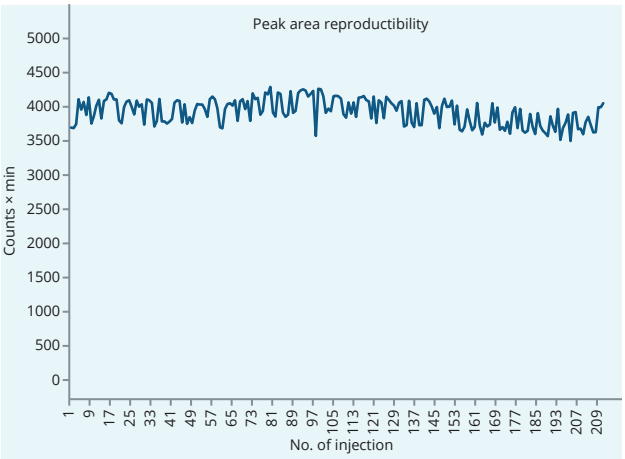
This application shows high ASTRA® HPLC column stability in the pharmacokinetic assay. API is used in hypolipidemic therapy adjusting cholesterol levels in the human body.



Scan 1 – API glucuronide



Scan 2 – API isomers



Plasma sample on ASTRA® C18-HE column

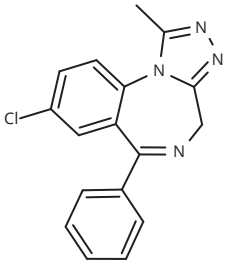
Column	ASTRA® C18-HE, 5 µm
Dimensions	150 mm × 4.6 mm
Part number	AST-5732-LK46
Mobile phase	MeOH : ACN : Water : 0.1% NH_4OH 25/50/20/5 (v/v/v/v) Isocratic elution
Flow rate	0.45 ml/min
Temperature	Ambient
Injection volume	15 µl
Detection	MS/MS
Mode	ESI, Negative 2500 eV
MS Temperature	350 °C (capillary), 380 °C (vaporizer)
Collision gas	Argon
Instrument	TSQ Quantiva (Thermo Fisher Scientific)
Analytes	**1. API (proprietary)**

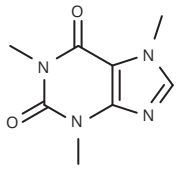
Compound name	Q1 (m/z)	Q2 (m/z)	Collision cell pressure	Collision energy
API Glucuronide D4	588	275	2 mTorr	29 eV
API D	412	275	2 mTorr	29 eV

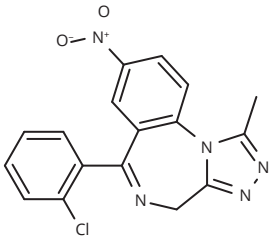
Clonazolam

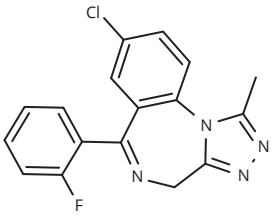
Xanax is an benzodiazepine alprazolam-based anxiolitic. Counterfeit Xanax may contain caffeine as a main component, as well as clonazolam and flualprazolam, both of which have a strong sedative effect, are able to cause amnesia, and belong to the group of new psychoactive drugs.

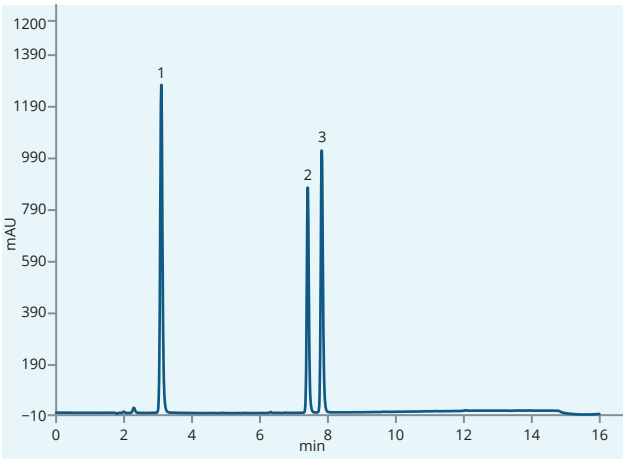
Substance	Alprazolam, CAS Number 28981-97-7 Caffeine, CAS Number 58-08-2 Clonazolam, CAS Number 33887-02-4 Flualprazolam, CAS Number 28910-91-0


Alprazolam

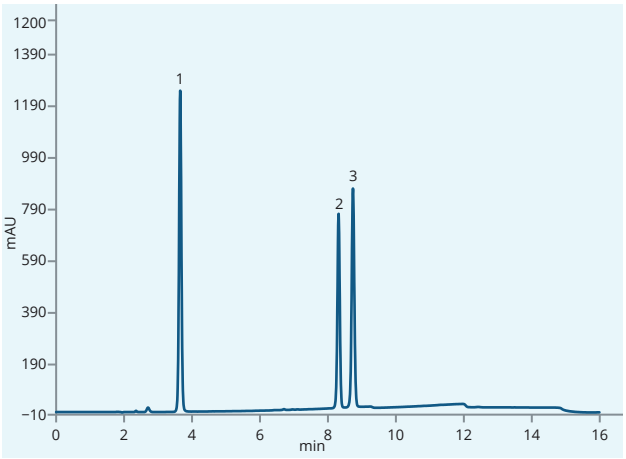

Caffeine


Clonazolam


Flualprazolam



Sample on ASTRA® C18-HE HPLC column



Sample on ASTRA® DM HPLC column

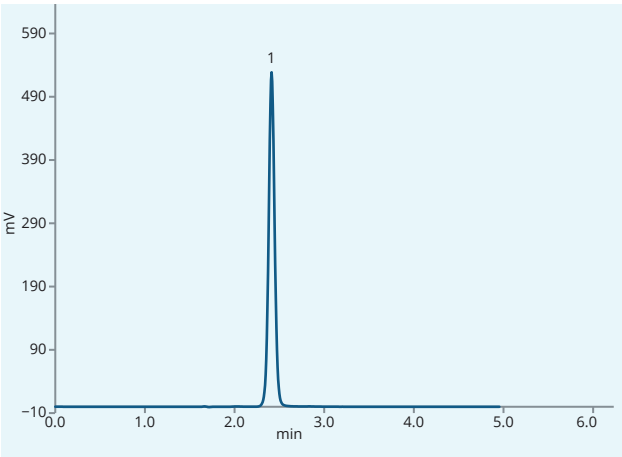
Column	ASTRA® C18-HE, 5 µm / ASTRA® DM, 5 µm			
Dimensions	150 mm × 4.6 mm (for both columns)			
Part number	AST-5732-LK46 / AST-5810-LK46			
Mobile phase	A: H_2O / 0.1% HCOOH + 2 mM $HCOONH_4$ B: CH_3CN / 0.1% HCOOH			
Gradient elution	**Time**	**A (%)**	**B (%)**	**Flow rate (ml/min)**
	0	80	20	1.0
	2	80	20	1.0
	8	20	80	1.0
	11.5	20	80	1.0
	12	80	20	1.0
	15	80	20	1.0
Flow rate	1 ml/min			
Temperature	20 °C			
Injection volume	10 µl			
Detection	UV @254 nm			
Analytes	**1. Caffeine** **2. Clonazolam** **3. Flualprazolam**			

UNIVERSITY OF CHEMISTRY AND TECHNOLOGY PRAGUE

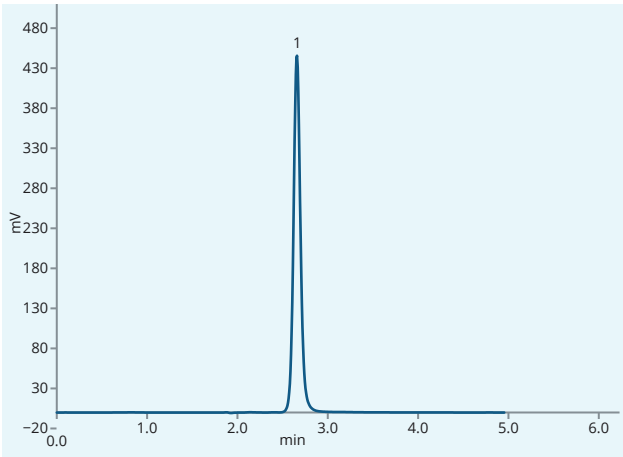
Developed in co-operation with Technical university in Prauge.

HMF in Infusion Solution

The levels of the degradation product, 5-hydroxymethylfurfural (5-HMF), in Dextrose Injection is an important determination in pharmaceutical formulas and pharmacokinetic studies. ASTRA® DM shows better retention for polar compounds.

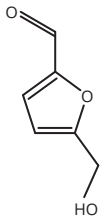


Standard mixture on ASTRA® C18-HE column



Standard mixture on ASTRA® DM column

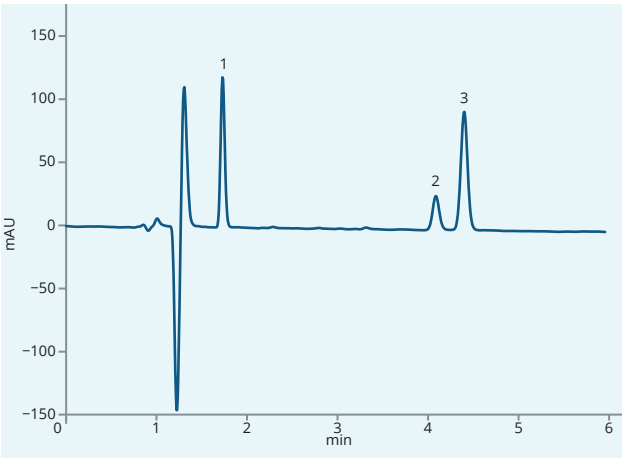
Column	ASTRA® C18-HE, 5 µm / ASTRA® DM, 5 µm
Dimensions	150 mm × 4.6 mm / 150 mm × 4.6 mm
Part number	AST-5732-LK46 / AST-5810-LK46
Mobile phase	Methanol : water 40/60 (v/v) Isocratic elution
Flow rate	1.0 ml/min
Temperature	25 °C
Injection volume	2.5 µl
Detection	UV @284 nm
Analytes	**1. 5-Hydroxymethylfurfural**



5-Hydroxymethylfurfural

Stevia glycosides

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

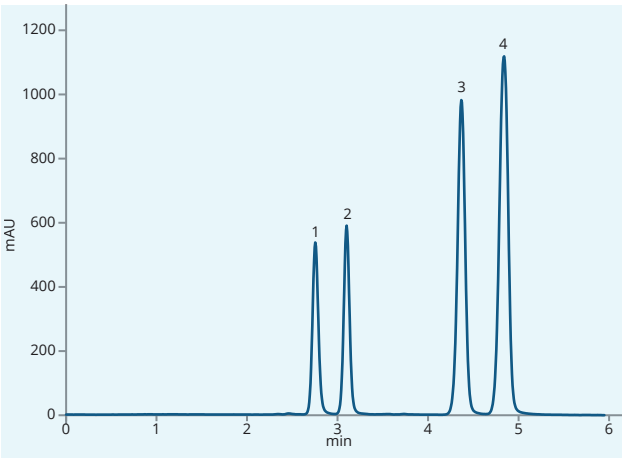


Standard on ASTRA® C18-HE

Column	ASTRA® C18-HE, 5 µm
Dimensions	150 mm × 4.6 mm
Part number	AST-5732-LK46
Mobile phase	Acetonitrile + 0.1% formic acid : water (32 : 68 v/v) Isocratic elution
Flow rate	1.6 ml/min
Temperature	65 °C
Detection	UV @210 nm
Analytes	**1. Rebaudioside D** **2. Rebaudioside A** **3. Stevioside**

Triazoles

Triazoles are used as intermediates for API production. This application shows the separation of all triazoles in one analysis.



Standard on ASTRA® DM

Column	ASTRA® DM, 3 µm
Dimensions	150 mm × 4.6 mm
Part number	AST-5810-IK46
Mobile phase	2mM Amonium formate + 0.1% Formic acid, pH 2.83 : MeO H (90:10)
Flow rate	1.0 ml/min
Temperature	25 °C
Injection volume	1 µl
Detection	DAD @210 nm
Analytes	**1. TCA, CAS 4928-87-4** **2. TAM, CAS 3641-08-5** **3. TME, CAS 4928-88-5** **4. TCN, CAS 3641-10-9**

Ordering information

Analytical columns

2 µm ASTRA® all dimensions in mm						AGS Guard System
Phase	**30 × 2.1**	**50 × 2.1**	**75 × 2.1**	**100 × 2.1**	**150 × 2.1**	**2.1 mm Cartridges**
C18-HE	Coming soon	AST-5732-TG21	AST-5732-TH21	AST-5732-TI21	AST-5732-TK21	AGS-5731-RB2*
C18-AQ	Coming soon	AST-5832-TG21	AST-5832-TH21	AST-5832-TI21	AST-5832-TK21	AGS-5731-RB2*

3 µm ASTRA® all dimensions in mm				AGS Guard System
Phase	**50 × 2.1**	**100 × 2.1**	**150 × 2.1**	**2.1 mm Cartridges**
C18-HE	AST-5732-IG21	AST-5732-II21	AST-5732-IK21	AGS-5731-RC2*
C18-AQ	AST-5832-IG21	AST-5832-II21	AST-5832-IK21	AGS-5731-RC2*
DM	AST-5810-IG21	AST-5810-II21	AST-5810-IK21	–

3 µm ASTRA® all dimensions in mm						AGS Guard System
Phase	**100 × 3.0**	**150 × 3.0**	**100 × 4.6**	**150 × 4.6**	**250 × 4.6**	**4.0 mm Cartridges**
C18-HE	AST-5732-II30	AST-5732-IK30	AST-5732-II46	AST-5732-IK46	On request	AGS-5731-RC4*
C18-AQ	AST-5832-II30	AST-5832-IK30	AST-5832-II46	AST-5832-IK46	On request	AGS-5731-RC4*
DM	AST-5810-II30	AST-5810-IK30	AST-5810-II46	AST-5810-IK46	–	AGS-5731-RC4*
Diol	Coming soon	Coming soon	Coming soon	Coming soon	–	–

5 µm ASTRA® all dimensions in mm				AGS Guard System
Phase	**50 × 2.1**	**100 × 3.0**	**150 × 3.0**	**4.0 mm Cartridges**
C18-HE	AST-5732-LG21	AST-5732-LI30	AST-5732-LK30	AGS-5731-RD4*
C18-AQ	AST-5832-LG21	AST-5832-LI30	AST-5832-LK30	AGS-5731-RD4*
DM	–	AST-5810-LI30	AST-5810-LK30	AGS-5790-RD4*
Diol	–	AST-5858-LI30	AST-5858-LK30	–

5 µm ASTRA® all dimensions in mm				AGS Guard System
Phase	**100 × 4.6**	**150 × 4.6**	**250 × 4.6**	**4.0 mm Cartridges**
C18-HE	AST-5732-LI46	AST-5732-LK46	AST-5732-LM46	AGS-5731-RD4*
C18-AQ	AST-5832-LI46	AST-5832-LK46	AST-5832-LM46	AGS-5731-RD4*
DM	AST-5810-LI46	AST-5810-LK46	AST-5810-LM46	AGS-5731-RD4*
Diol	AST-5858-LI46	AST-5858-LK46	AST-5858-LM46	–

* AGS Guard System cartridges require AGS Holder (p/n AGS-5731-000). The holder is supplied with a stainless steel ferrule. For applications up to 400 bar, the PEEK ferrule is recommended for use (p/n AGS-5731-Y00).

AGS-5790-RD4

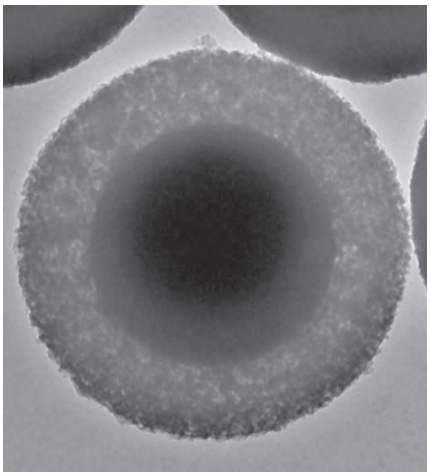
CHROMSHELL®

CHROMSHELL® extends the ARION® phases in the area of core-shell technology (SPP, Superficially-Porous Particles). These columns use an ultra high purity silica of 2.6 and 1.7 µm particles.

- Ultrapure silica with low metal content.
- Various chemistries including Biphenyl, PFP and HILIC for a broad range of applications.
- Temperature stability up to 90 °C.

Metal content	<10 ppm
Temperature stability	100 °C
Mean Particle diameter	2.54 ± 0.18 µm
Proximity to the shape of a sphere	0.95 ± 0.04

CHROMSHELL® phases	Particle size (µm)	Pore size (Å)	Surface area (m^2/g)	Carbon load	pH stability	100% aqueous mobile phase	Endcapping	USP code
C18 Plus	2.6	85	130	9 %	1.5 to 7.5	×	Single-step	L1
C18-XB	2.6	85	130	8 %	1.5 to 8.0	×	Single-step	L1
C18 Plus AD	1.7	100	90	9 %	2.0 to 10.0	×	Proprietary	L1
	2.6	100	130	7 %	2.0 to 10.0	×	Proprietary	L1
C18 Polar	2.6	85	130	6.5 %	1.5 to 7.0	✓	Mixed	L1
C8	1.7	100	90	5 %	2.0 to 10.0	×	Proprietary	L7
	2.6	100	130	7 %	2.0 to 10.0	×	Proprietary	L7
C4	1.7	100	90	4 %	2.0 to 10.0	×	Proprietary	L26
	2.6	100	130	5 %	2.0 to 10.0	×	Proprietary	L26
Biphenyl	1.7	100	90	5 %	2.0 to 10.0	×	Proprietary	L11
	2.6	100	130	6 %	2.0 to 10.0	×	Proprietary	L11
Phenyl-Hexyl	1.7	100	90	5 %	2.0 to 10.0	×	Proprietary	L11
	2.6	100	130	6 %	2.0 to 10.0	×	Proprietary	L11
PFP	1.7	100	90	5 %	2.0 to 10.0	×	Proprietary	L43
	2.6	100	130	4 %	2.0 to 10.0	×	Proprietary	L43
HILIC Plus	2.6	85	130	–	1.5 to 7.0	–	Proprietary	L3
Cyano	1.7	100	90	4 %	2.0 to 10.0	×	Proprietary	L10
	2.6	100	130	3 %	2.0 to 10.0	×	Proprietary	L10



Chromshell® TEM Image

Complementary selectivities

A C18 phase with a balanced retention profile with the highest hydrophobicity

pH Range	1.5 to 7.5
USP Code	L1

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

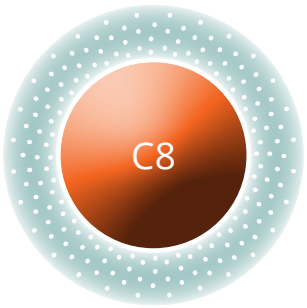
pH Range	1.5 to 8.0
USP Code	L1

A hydrophobic C18 phase with an extended pore size and pH stability

pH Range	2.0 to 10.0
USP Code	L1

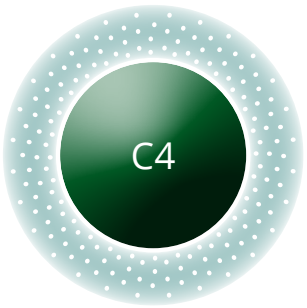
A polar end-capped developed for mid-polar and polar retention together with stability in the 100% aqueous mobile phase

pH Range	1.5 to 7.0
USP Code	L1



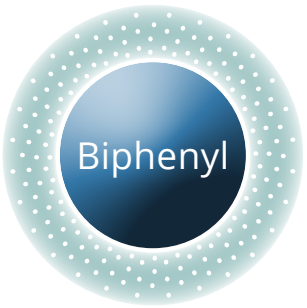
A moderate hydrophobic phase with extended pH stability

pH Range	2.0 to 10.0
USP Code	L7



A weak hydrophobic stationary phase bringing performance to USP L26

pH Range	2.0 to 10.0
USP Code	L26



A reversed phase with aromatic and unsaturated selectivity, ideal for isomer separations

pH Range	2.0 to 10.0
USP Code	L11

A moderate hydrophobic phase with aromatic selectivity

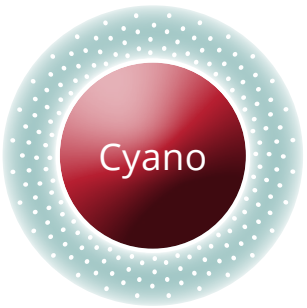
pH Range	2.0 to 10.0
USP Code	L11

A PFP phase for both, reversed phase and HILIC separations, increased retention for halogenated compounds

pH Range	2.0 to 10.0
USP Code	L43

A HILIC stationary phase with the highest polar selectivity

pH Range	2.0 to 10.0
USP Code	L3

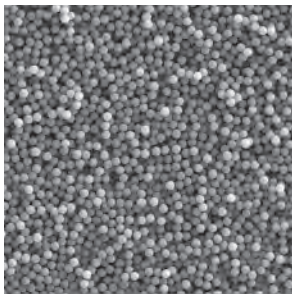


A very polar selectivity bringing performance to USP L10

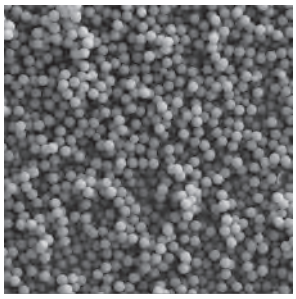
pH Range	2.0 to 10.0
USP Code	L10

Up close

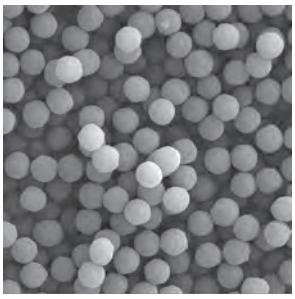
The 2.6-micron electron microscope field clearly shows the superlative quality of CHROMSHELL® particles.



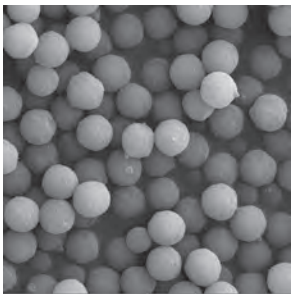
CHROMSHELL®
(100 × 100 µm)



Competitor K
(100 × 100 µm)



CHROMSHELL®
(30 × 30 µm)

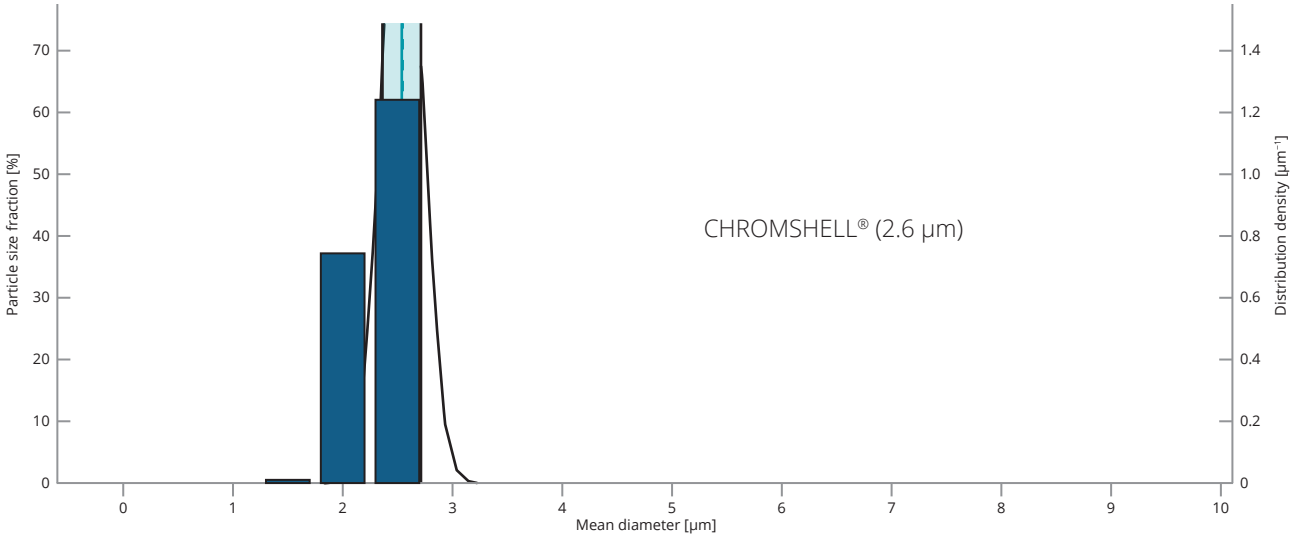


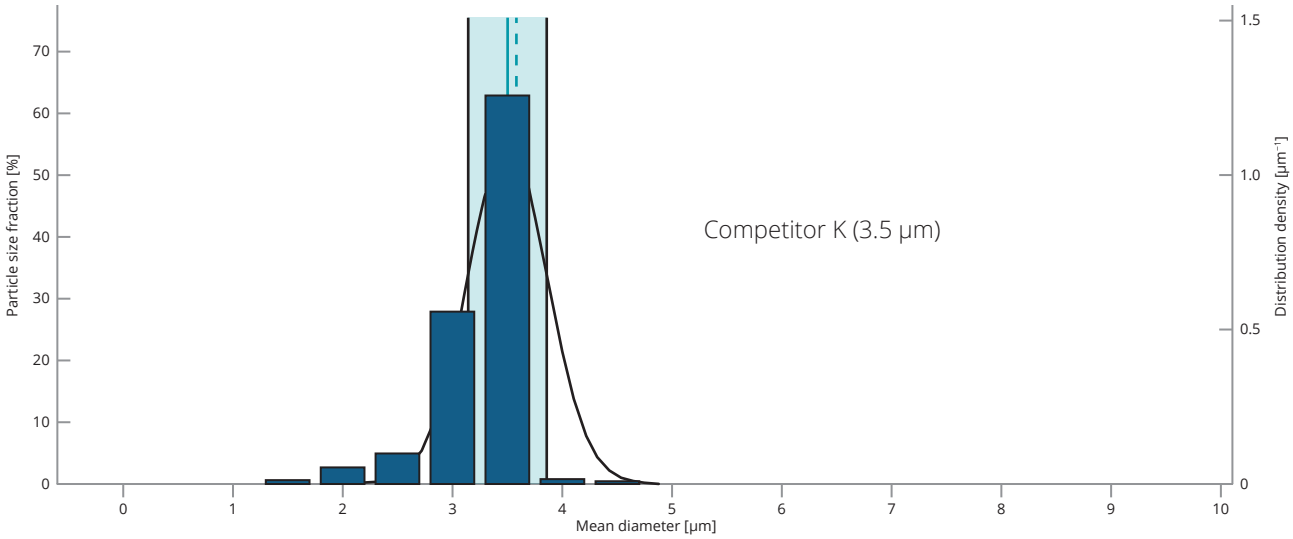
Competitor K
(30 × 30 µm)

The main particle characteristics:

- High proximity to a sphere.
- Tight particle size distribution.
- No broken particles.
- No presence of clustered particles.
- Particle uniformity/homogeneity.

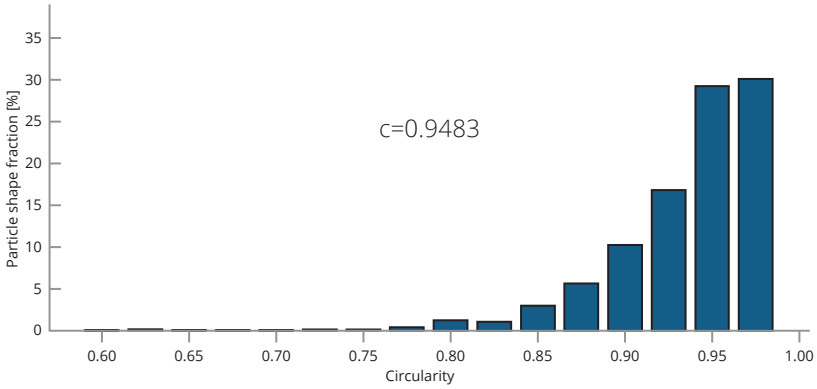
Particle size distribution



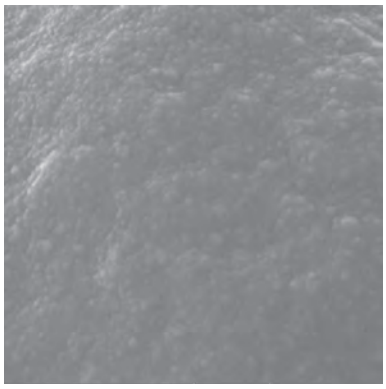


Circularity & surface smoothness

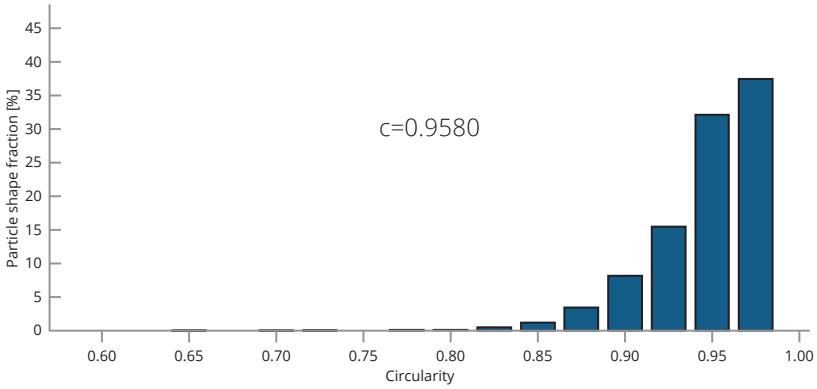
The core-shell particles were subjected to SEM analysis to determine circularity and surface smoothness.



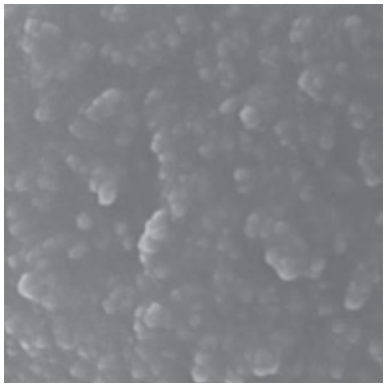
CHROMSHELL® (2.6 µm)



Detail view on pores



Competitor K (3.5 µm)



Detail view on pores up close

Ordering information

1.7 µm CHROMSHELL®
all dimensions in mm

Phase	50 × 2.1	100 × 2.1	150 × 2.1
C18 Plus AD	CSH-5862-BG21	CSH-5862-BI21	CSH-5862-BK21
C8	CSH-5863-BG21	CSH-5863-BI21	CSH-5863-BK21
C4	CSH-5864-BG21	CSH-5864-BI21	CSH-5864-BK21
Biphenyl	CSH-5851-BG21	CSH-5851-BI21	CSH-5851-BK21
Phenyl-Hexyl	CSH-5865-BG21	CSH-5865-BI21	CSH-5865-BK21
PFP	CSH-5866-BG21	CSH-5866-BI21	CSH-5866-BK21
Cyano	CSH-5867-BG21	CSH-5867-BI21	CSH-5867-BK21

1.7 µm CHROMSHELL®
all dimensions in mm

Phase	50 × 3.0	100 × 3.0	150 × 3.0	250 × 3.0
C18 Plus AD	CSH-5862-BG30	CSH-5862-BI30	CSH-5862-BK30	CSH-5862-BM30
C8	CSH-5863-BG30	CSH-5863-BI30	CSH-5863-BK30	CSH-5863-BM30
C4	CSH-5864-BG30	CSH-5864-BI30	CSH-5864-BK30	CSH-5864-BM30
Biphenyl	CSH-5851-BG30	CSH-5851-BI30	CSH-5851-BK30	CSH-5851-BM30
Phenyl-Hexyl	CSH-5865-BG30	CSH-5865-BI30	CSH-5865-BK30	CSH-5865-BM30
PFP	CSH-5866-BG30	CSH-5866-BI30	CSH-5866-BK30	CSH-5866-BM30
Cyano	CSH-5867-BG30	CSH-5867-BI30	CSH-5867-BK30	CSH-5867-BM30

1.7 µm CHROMSHELL®
all dimensions in mm

Phase	50 × 4.6	100 × 4.6	150 × 4.6	250 × 4.6
C18 Plus AD	CSH-5862-BG46	CSH-5862-BI46	CSH-5862-BK46	CSH-5862-BM46
C8	CSH-5863-BG46	CSH-5863-BI46	CSH-5863-BK46	CSH-5863-BM46
C4	CSH-5864-BG46	CSH-5864-BI46	CSH-5864-BK46	CSH-5864-BM46
Biphenyl	CSH-5851-BG46	CSH-5851-BI46	CSH-5851-BK46	CSH-5851-BM46
Phenyl-Hexyl	CSH-5865-BG46	CSH-5865-BI46	CSH-5865-BK46	CSH-5865-BM46
PFP	CSH-5866-BG46	CSH-5866-BI46	CSH-5866-BK46	CSH-5866-BM46
Cyano	CSH-5867-BG46	CSH-5867-BI46	CSH-5867-BK46	CSH-5867-BM46

Ordering information

2.6 µm CHROMSHELL®
all dimensions in mm

Phase	30 × 2.1	50 × 2.1	75 × 2.1	100 × 2.1	150 × 2.1
C18 Plus	CSH-5722-GD21	CSH-5722-GG21	CSH-5722-GH21	CSH-5722-GI21	CSH-5722-GK21
C18-XB	CSH-5749-GD21	CSH-5749-GG21	CSH-5749-GH21	CSH-5749-GI21	CSH-5749-GK21
C18 Plus AD	–	CSH-5862-GG21	–	CSH-5862-GI21	CSH-5862-GK21
C18 Polar	CSH-5751-GD21	CSH-5751-GG21	CSH-5751-GH21	CSH-5751-GI21	CSH-5751-GK21
C8	–	CSH-5863-GG21	–	CSH-5863-GI21	CSH-5863-GK21
C4	–	CSH-5864-GG21	–	CSH-5864-GI21	CSH-5864-GK21
Biphenyl	–	CSH-5851-GG21	–	CSH-5851-GI21	CSH-5851-GK21
Phenyl-Hexyl	–	CSH-5865-GG21	–	CSH-5865-GI21	CSH-5865-GK21
PFP	–	CSH-5866-GG21	–	CSH-5866-GI21	CSH-5866-GK21
HILIC Plus	CSH-5752-GD21	CSH-5752-GG21	CSH-5752-GH21	CSH-5752-GI21	CSH-5752-GK21
Cyano	–	CSH-5867-GG21	–	CSH-5867-GI21	CSH-5867-GK21

2.6 µm CHROMSHELL®
all dimensions in mm

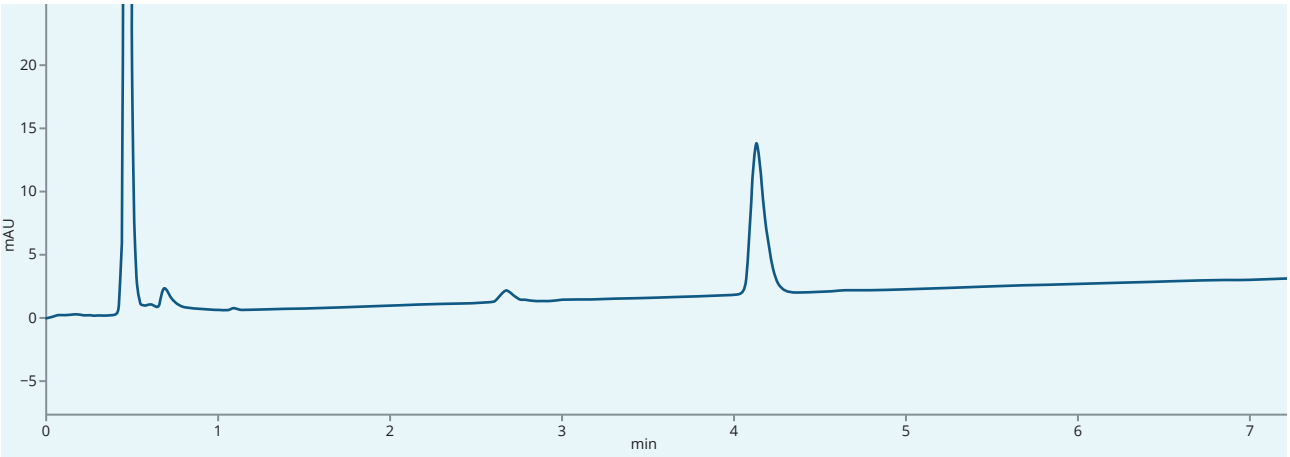
Phase	30 × 3.0	50 × 3.0	75 × 3.0	100 × 3.0	150 × 3.0	250 × 3.0
C18 Plus	CSH-5722-GD30	CSH-5722-GG30	CSH-5722-GH30	CSH-5722-GI30	CSH-5722-GK30	–
C18-XB	CSH-5749-GD30	CSH-5749-GG30	CSH-5749-GH30	CSH-5749-GI30	CSH-5749-GK30	–
C18 Plus AD	–	CSH-5862-GG30	–	CSH-5862-GI30	CSH-5862-GK30	CSH-5862-GM30
C18 Polar	CSH-5751-GD30	CSH-5751-GG30	CSH-5751-GH30	CSH-5751-GI30	CSH-5751-GK30	–
C8	–	CSH-5863-GG30	–	CSH-5863-GI30	CSH-5863-GK30	CSH-5863-GM30
C4	–	CSH-5864-GG30	–	CSH-5864-GI30	CSH-5864-GK30	CSH-5864-GM30
Biphenyl	–	CSH-5851-GG30	–	CSH-5851-GI30	CSH-5851-GK30	CSH-5851-GM30
Phenyl-Hexyl	–	CSH-5865-GG30	–	CSH-5865-GI30	CSH-5865-GK30	CSH-5865-GM30
PFP	–	CSH-5866-GG30	–	CSH-5866-GI30	CSH-5866-GK30	CSH-5866-GM30
HILIC Plus	CSH-5752-GD30	CSH-5752-GG30	CSH-5752-GH30	CSH-5752-GI30	CSH-5752-GK30	CSH-5752-GM30
Cyano	–	CSH-5867-GG30	–	CSH-5867-GI30	CSH-5867-GK30	CSH-5867-GM30

2.6 µm CHROMSHELL®
all dimensions in mm

Phase	50 × 4.6	75 × 4.6	100 × 4.6	150 × 4.6	250 × 4.6
C18 Plus	CSH-5722-GG46	CSH-5722-GH46	CSH-5722-GI46	CSH-5722-GK46	–
C18-XB	CSH-5749-GG46	CSH-5749-GH46	CSH-5749-GI46	CSH-5749-GK46	–
C18 Plus AD	CSH-5862-GG46	–	CSH-5862-GI46	CSH-5862-GK46	CSH-5862-GM46
C18 Polar	CSH-5751-GG46	CSH-5751-GH46	CSH-5751-GI46	CSH-5751-GK46	–
C8	CSH-5863-GG46	–	CSH-5863-GI46	CSH-5863-GK46	CSH-5863-GM46
C4	CSH-5864-GG46	–	CSH-5864-GI46	CSH-5864-GK46	CSH-5864-GM46
Biphenyl	CSH-5851-GG46	–	CSH-5851-GI46	CSH-5851-GK46	CSH-5851-GM46
Phenyl-Hexyl	CSH-5865-GG46	–	CSH-5865-GI46	CSH-5865-GK46	CSH-5865-GM46
PFP	CSH-5866-GG46	–	CSH-5866-GI46	CSH-5866-GK46	CSH-5866-GM46
HILIC Plus	CSH-5752-GG46	CSH-5752-GH46	CSH-5752-GI46	CSH-5752-GK46	CSH-5752-GM46
Cyano	CSH-5867-GG46	–	CSH-5867-GI46	CSH-5867-GK46	CSH-5867-GM46

Tween 80

Tween 80 is used to stabilize aqueous solutions with drugs and also as an emulgator in the pharma industry. It is also used as an additive in vaccine production. Currently it is added to Covid19 vaccines.



Analysis of hydrolyzed PS-80 on CHROMSHELL® C18-XB

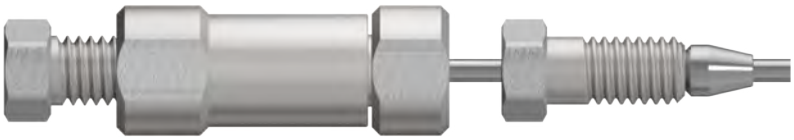
Column	CHROMSHELL® C18-XB, 2.6 µm
Dimensions	100 mm × 4.6 mm
Part number	CSH-5749-GI46
Mobile phase	Proprietary
Temperature	Proprietary
Injection volume	2.5 µl
Detection	UV @195 nm
Analytes	**1. Tween 80**

Column protection

CHROMSHELL® UHPLC columns can be protected by means of a guard system or by using an appropriate guard column filter (in-line filter).
The ARION® Guard System (AGS) is ideal for the protection of CHROMSHELL® UHPLC 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 **900 bar**. More details about this guard system are on page 46.
Protection can be perfectly ensured by installing a pre-column filter holder with a 0.2µm or 0.5µm frit. This in-line filter can withstand pressures of up to 1375 bar and is easy to use. The filter holder consists of a two-piece body and replaceable filter – a metal frit.

Main features and benefits:

- Minimized dead-volume.
- Easy installation and use.
- Pressure rating up to **1375 bar**.
- Works with 1/16inch column connections from all manufacturers.
- Spare frits with various porosities.



FGS in-line filter

In-line filter selection guide

The FGS in-line filter made from 316 stainless steel is designed to reduce the number of connections compared with standard pre-column filters.
The in-line filter guarantees a very small dead volume thanks to the small bore size (0.15 mm in the body and nut). The total length is 46.5 mm.

Replacement frits

FGS in-line filter holder

Description	Amount	Internal volume	Part number
FGS in-line filter holder for 0.2µm frit (including encased type frit)	1 pc	0.59 µl	FGS-5782-0R0
FGS in-line filter holder for 0.5µm frit (including encased type frit)	1 pc	0.61 µl	FGS-5782-0S0

Replacement frits

Description	Amount	Frit volume	Frit OD	Part number
FGS stainless steel frit for in-line filter 0.2 µm, ID 1.96 mm	5 pcs	0.11 µl	1.96 mm	FGS-5782-SRB
FGS stainless steel frit for in-line filter 0.5 µm, ID 1.96 mm	5 pcs	0.13 µl	1.96 mm	FGS-5782-SSB

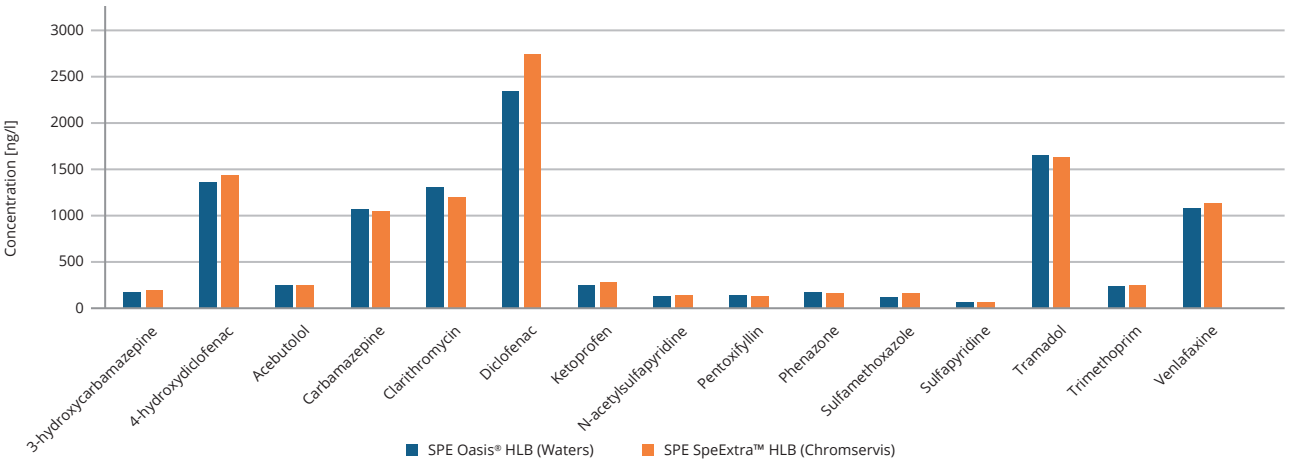
Note: The frit consists of stainless steel frit and PEEK ring. The ring has 2.92 mm OD. The frit porosity values are only nominal. They do not reflect maximum pore size of the frit.

Exploded view

SPEEXTRA™

SPE columns

SpeExtra™ is a new range of SPE columns for your sample preparation.
Florisil® and HLB columns are suitable for use in the environmental and toxicology area. The SpeExtra™ HLB SPE column is based on a modified polymer of 100Å pore size. It offers a high surface area of >825 m^2/g. The working pH range is from pH 1 to pH 13. The loading capacity is 20 %. It has been developed to clean a broad range of hydrophobic/hydrophilic compounds across various matrixes (plasma, urine, oil, water etc.).



Comparison of SpeExtra™ with Waters Oasis® HLB cartridges

SpeExtra™ 30 mg	Particle size µm	Volume 1 ml	Qty
HLB Clinical	30	SPE-5804-AA01	50 pcs

SpeExtra™ 60 mg	Particle size µm	Volume 1 ml	Volume 3 ml	Qty
HLB Enviro	30	SPE-5804-AG01	SPE-5804-AG03	50 pcs
HLB Enviro	60	SPE-5804-EG01	SPE-5804-EG03	50 pcs

SpeExtra™ 50 mg	Particle size µm	Volume 1 ml	Qty
C18	50	SPE-5812-DH01	50 pcs
C8	50	SPE-5813-DH01	50 pcs
SAX	50	SPE-5814-DH01	50 pcs
SCX	50	SPE-5815-DH01	50 pcs

SPE columns

SpeExtra™ 100 mg	Particle size µm	Volume 1 ml	Volume 3 ml	Qty
C18	50	SPE-5812-DB01	–	100 pcs
C18	50	–	SPE-5812-DB03	50 pcs
C8	50	SPE-5813-DB01	–	100 pcs
C8	50	–	SPE-5813-DB03	50 pcs
SAX	50	SPE-5814-DB01	–	100 pcs
SAX	50	–	SPE-5814-DB03	50 pcs
SCX	50	SPE-5815-DB01	–	100 pcs
SCX	50	–	SPE-5815-DB03	50 pcs

SPE columns

SpeExtra™ 200 mg	Particle size µm	Volume 3 ml	Volume 6 ml	Qty
C18	50	SPE-5812-DC03	–	50 pcs
C8	50	SPE-5813-DC03	–	50 pcs
HLB Enviro	30	SPE-5804-AC03	–	50 pcs
HLB Enviro	30	–	SPE-5804-AC06	30 pcs
HLB Enviro	60	SPE-5804-EC03	–	50 pcs
HLB Enviro	60	–	SPE-5804-EC06	30 pcs
SAX	50	SPE-5814-DC03	–	50 pcs
SCX	50	SPE-5815-DC03	–	50 pcs

SpeExtra™ 500 mg	Particle size µm	Volume 3 ml	Volume 6 ml	Qty
C18	50	SPE-5812-DD03	–	50 pcs
C18	50	–	SPE-5812-DD06	30 pcs
C8	50	SPE-5813-DD03	–	50 pcs
C8	50	–	SPE-5813-DD06	30 pcs
HLB Enviro	30	–	SPE-5804-AD06	30 pcs
HLB Enviro	60	–	SPE-5804-ED06	30 pcs
SAX	50	SPE-5814-DD03	–	50 pcs
SCX	50	SPE-5815-DD03	–	50 pcs
Florisil® (pesticide grade)	150/250	SPE-5805-ND03	–	50 pcs

SpeExtra™ 1000 mg	Particle size µm	Volume 6 ml	Qty
Florisil® (ultra pure)*	150/250	SPE-5805-NE06	30 pcs

SpeExtra™ 2000 mg	Particle size µm	Volume 15 ml	Qty
Florisil® (ultra pure)*	150/250	SPE-5805-NF15	20 pcs

Note: Other phases on request

* Florisil® (ultra pure) has low bleed and is ideal for Analysis of Petroleum Hydrocarbons C10-C40.

12-position Vacuum SPE manifold (p/n SPE-5869-000A)

METAMINO™

Sample preparation kit

MetAmino™ kits offer an easy sample preparation method for your LC/MS or GC/MS analysis. MetAmino™ kits include derivatization reagences 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 analyte list. Contact us for further details.

- 76 amino acids, polyamines, biogen amines and coenzymes in 25 minutes (sample preparation and analysis time)
- Easy sample preparation
- Unique clean-up step
- LC/MS and GC/MS kit
- NIST library for GC/MS available
- Possible extension to other analytes on request

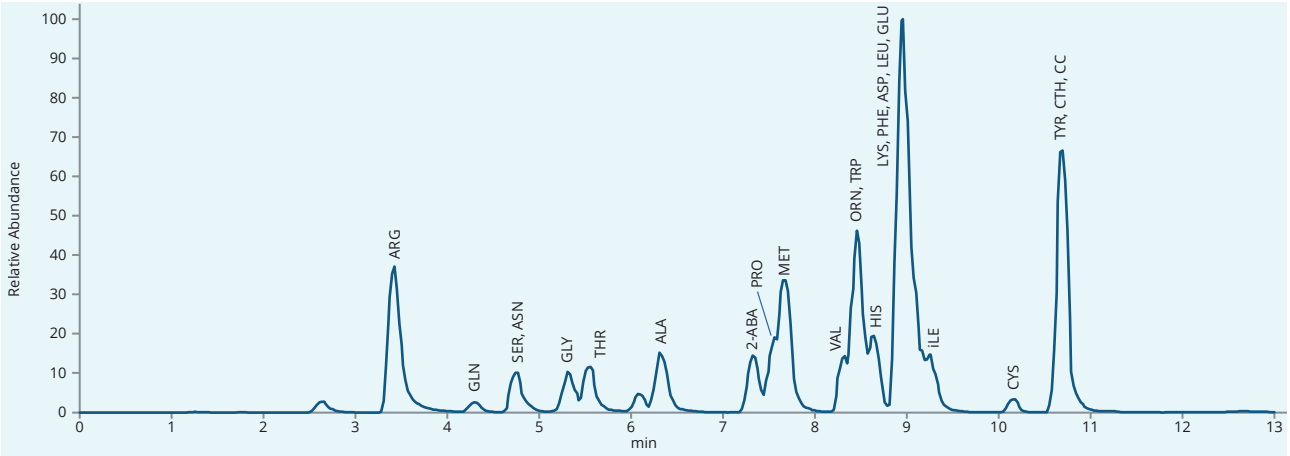
LC/MS kit

No.	Name	Synonyms	Quantification	[min]	$[M+H]^+$	Precursor	Quantifier	CE	Qualifier	CE
1	Cotinine	Syringe standard		1.15	177.1024	177.1	98	24	80	28
2	Putrescine			1.40	189.1599	189.2	72.1	16	115.9	12
3	Cadaverine			1.48	203.1755	203.2	86	20	69.2	28
4	Homoserine	HSER		1.67	202.1074	202.1	146	4	102	8
5	Pyroglutamic acid	PGLU		1.86	186.1125	186.1	84	20	130	8
6	Arginine	ARG	✓	3.35	331.2341	331.2	70.1	48	115.9	32
7	Homoarginine	Internal standard		3.63	345.2497	345.2	84	52	125.9	24
8	Glutamine	GLN	✓	4.12	303.1916	303.2	186	12	84	44
9	Anserine	ANS		4.20	397.2447	397.2	109.1	52	226.2	28
10	Citrulline	CIT	✓	4.20	332.2181	332.2	70.2	36	215	16
11	Methionine sulfoxide	MET-SO		4.29	322.1683	322.2	284.1	12	100	32
12	Methionine sulfone	MET-SO2		4.30	338.1632	338.2	238	12	182	16
13	5-Hydroxylysine	HLY	✓	4.40	345.2021	345.2	82	48	128.1	28
14	1-Methylhistidine	1MHIS	✓	4.52	326.2075	326.2	124	36	224	20
15	3-Methylhistidine	3MHIS	✓	4.55	326.2075	326.2	95.7	52	270.1	24
16	Prolylhydroxyproline	PHP	✓	4.71	385.2333	385.2	170.1	16	114, 70.2	36, 56
17	Serine	SER	✓	4.73	262.1615	262.2	106	16	60.1	40
18	Asparagine	ASN	✓	4.78	271.1653	271.2	240.1	16	254.1	16
19	4-Hydroxyproline	HYP	✓	5.23	288.1807	288.2	86.1	32	188	12
20	Glycine	GLY	✓	5.23	232.1544	232.2	76	12	132	4
21	N-Acetyaspartic acid			5.36	288.1807	288.2	88	28	144.1, 158	20, 8
22	Glycylproline	GPR	✓	5.39	329.2072	329.2	70.1	52	172.1, 115.9	16, 36
23	Threonine	THR	✓	5.45	276.1806	276.2	74.2	28	176.1	12
24	5-Aminolevulinic acid	5-ALA		5.63	288.1807	288.2	158	8	86.1	32
25	Ethanolamine	EAM		6.09	262.1649	262.2	88	16	144.1	4
26	Beta-Alanine	3-ALA		6.22	246.1701	246.2	116	12	90	12
27	Alanine	ALA	✓	6.25	246.1701	246.2	90	16	146	8
28	Spermine			6.39	503.3804	503.4	102	44	229.2	32
29	Histamine	HTA		6.52	312.1919	312.2	212	12	95, 112	40, 20
30	Indoleacetic acid	IAA		6.65	232.1333	232.1	130	24	176	8
31	gamma-Aminobutyric acid	GABA	✓	6.75	260.1857	260.2	87.1	24	86	24
32	Sarcosine	SAR	✓	6.75	246.1701	246.2	90	12	146.1	8
33	4-Aminobenzoic acid	PABA		7.00	294.1701	294.2	134.1	20	91	56
34	β-aminoisobutyric acid	BAIBA	✓	7.05	260.1857	260.2	130	12	112	20
35	2-aminobutyric acid	2-ABA	✓	7.35	260.1857	260.2	160.2	8	104	12
36	Proline	PRO	✓	7.58	272.1857	272.2	70.1	36	172	12
37	Methionine	MET	✓	7.65	306.1735	306.2	204	8	104	20
38	Methionine-d3	Internal standard		7.65	309.1922	309.2	207	8	107	16
39	Thiaproline	TPR	✓	8.03	290.1422	290.1	88	28	134, 190.1	16, 8
40	Asparatame			8.15	451.2439	451.2	120	48	88	44
41	Serotonine			8.22	377.2072	377.2	160	32	303.1	8
42	2,4-diaminobutyric acid	DABA		8.25	375.2490	375.2	201.3	16	245	12
43	Valine	VAL	✓	8.30	274.2014	274.2	72	32	116	12
44	Norvaline			8.35	274.2014	274.2	72.1	24	174	8
45	Alanyl-lysine	ALA-LYS		8.36	474.3174	474.3	84.1	60	400.2	12
46	Carnosine	CAR		8.36	483.2814	483.3	110.1	40	212.1	24
47	Ornithine	ORN	✓	8.45	389.2647	389.3	70.1	60	315.2	8
48	Tryptophan	TRP	✓	8.45	361.2123	361.2	259	12	159	28
49	Ethionine	ETH		8.60	320.1890	320.2	218.1	8	75.1	44
50	Histidine	HIS	✓	8.90	412.2443	412.2	395.3	8	89.2	24
51	Lysine	LYS	✓	8.92	403.2804	403.3	84.1	56	329.1	8
52	Phenylalanine	PHE	✓	9.04	322.2014	322.2	120	36	164	16
53	Leucine	LEU	✓	9.06	288.2170	288.2	86.1	20	188.2, 130.1	8, 12
54	Aspartic acid	ASP	✓	9.06	346.2225	346.2	88.1	24	159.9	12
55	Spermidine			9.11	446.3226	446.3	198.1	28	298.1	12
56	Glutamic acid	GLU	✓	9.17	360.2382	360.2	163	16	105	36
57	Allo-isoleucine	aiLE		9.22	288.2169	288.2	130.1	12	86.1	24
58	Isoleucine	iLE	✓	9.24	288.2170	288.2	130.1	16	86.1	24
59	Norleucine	NLEU		9.40	288.2170	288.2	86.2	24	130.1	12
60	Pipecolic acid	PIP		9.45	286.2013	286.2	128.1	12	84.1	40
61	Homophenylalanine	Internal standard		9.67	336.2170	336.2	91	56	117	32
62	2-Aminoadipic acid	AAA	✓	9.67	374.2538	374.3	98	32	172	16
63	Adrenaline	ADN		10.15	484.2541	484.3	166	36	466.2	4
64	Cysteine	CYS		10.16	378.1946	378.2	120.1	32	204.1	8
65	2-Aminoheptanedioic acid	APA	✓	10.20	388.2695	388.3	112	36	186.1	20
66	Glutathione	GSH		10.27	620.3213	620.3	186.1	28	130.2	44
67	Dopamine	DAM		10.27	454.2435	454.2	196.1	24	152	40
68	Glutamyl-lysine	GLU-LYS		10.44	588.3855	588.4	84.1	56	128.1, 157.9	52, 32
69	Homocysteine	HCYS		10.48	392.2103	392.2	292.2	12	118.1	16
70	Diaminopimelic acid			10.54	503.3328	503.3	82.1	60	127.9	48
71	Tyrosine	TYR	✓	10.61	438.2487	438.2	136	44	179.9	28
72	Cystathionine	CTH	✓	10.68	535.3049	535.3	201.9	24	88.1	56
73	Cystine	C-C	✓	10.76	553.2613	553.3	110	44	312.1	16
74	Kynurenic acid			10.78	346.1649	346.2	246	8	144, 190	52, 24
75	Selenocystine	Se-C-C		11.12	649.1501	649.2	323.9	20	575	12
76	Kynurenine			11.17	465.2596	465.3	146	44	274.2	12
77	Homocystine	HC-CH		11.28	581.2926	581.3	290	16	190	20
78	3,4-dihydroxyphenylalanine	DOPA		11.55	554.2961	554.3	152.1	44	196	40
79	Theanine	THE			331.2228	331.2	On request			

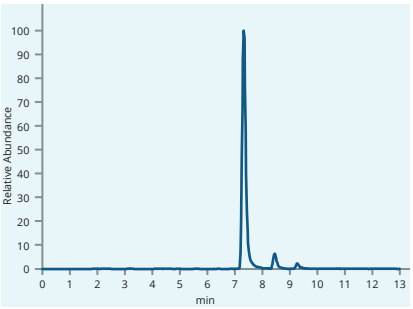
Note: CE = Collision energy

LC/MS separation

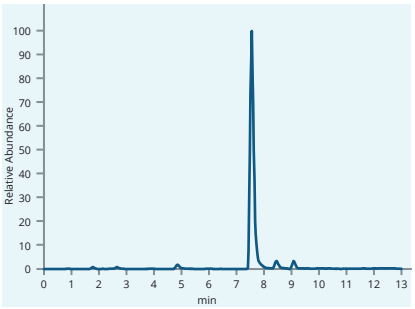
The chromatogram shown below displays TIC and some of the analyte's MRMs.



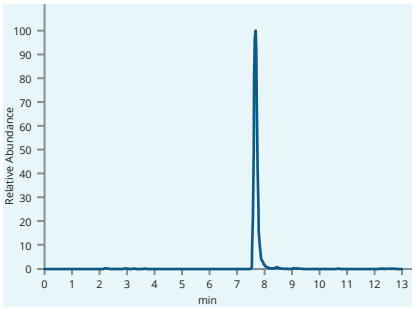
Chromatogram of 24 amino acids



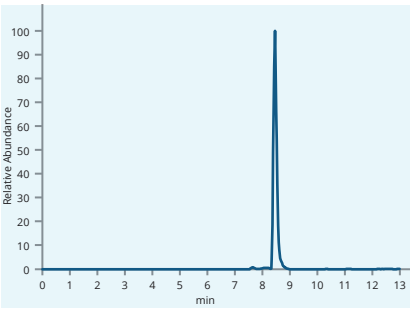
2-ABA (259.7–260.7)



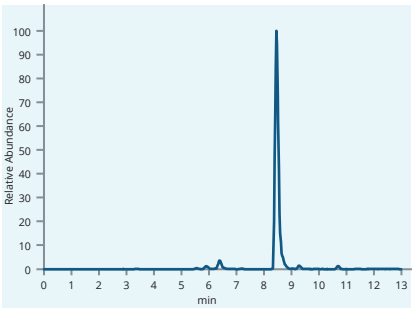
PRO (271.7–272.7)



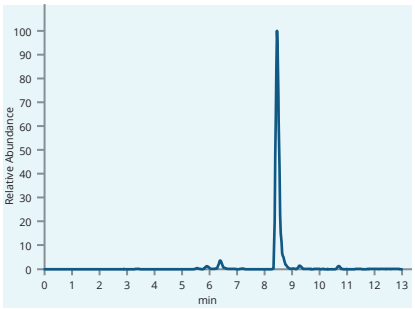
MET (305.7–306.7)



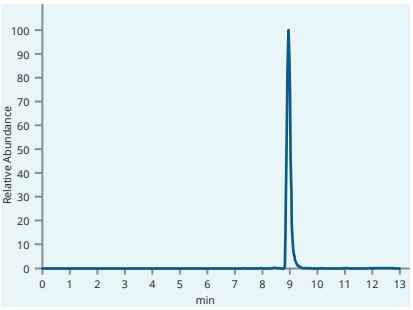
ORN (388.7–389.7)



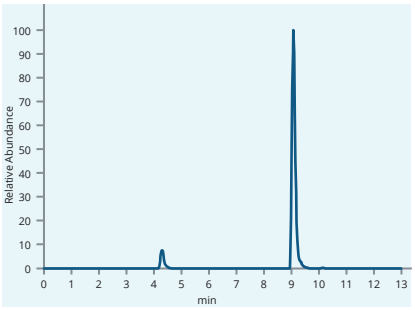
TRP (360.7–361.7)



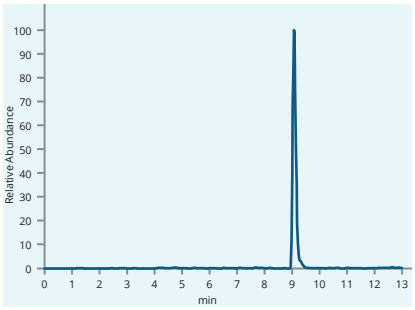
HIS (411.7–412.7)



LYS (420.7–403.7)



PHE (321.7–322.7)



ASP (345.7–346.7)

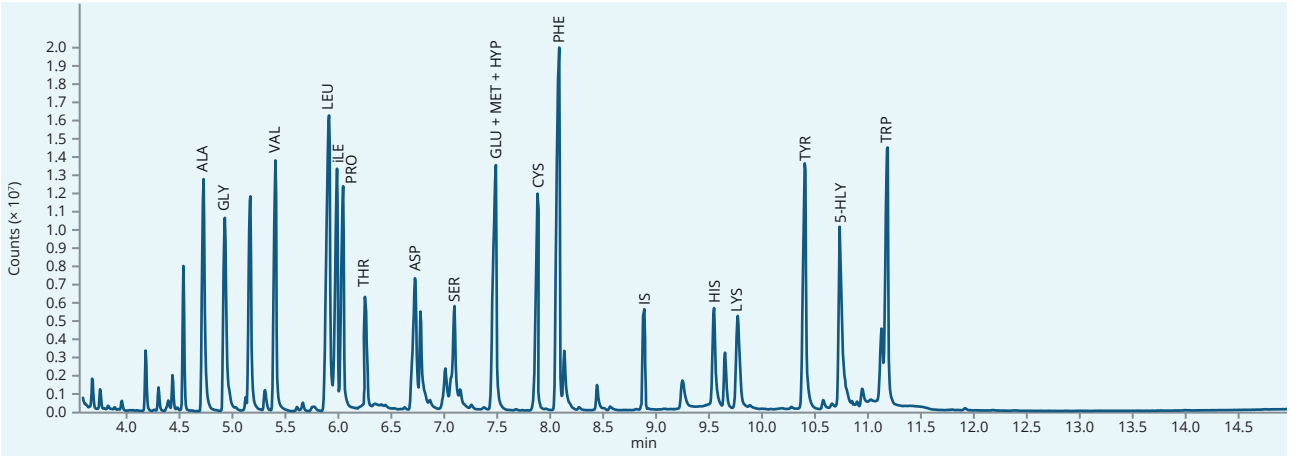
GC/MS kit

Peak No.	Name	Synonyms	Quantification	[min]	Mmi*	Diagnostic ions		
						m/z	m/z	m/z
1	Sarcosine	SAR		4.62	497.0308	270	226	69
2	Alanine	ALA	✓	4.73	497.0308	270	70	69
3	N-Acetylglycine			4.92	299.0392	256	113	212
4	Glycine	GLY	✓	4.93	483.0151	256	212	56
5	3-Methylglutaric acid			4.97	510.0512	311	282	227
6	2-Aminobutyric acid	ABA		5.17	511.0465	284	84	113
7	3-Hydroxymethylglutaric acid			5.34	752.0325	285	311	85
8	3-Alanine			5.36	497.0308	269	256	98
9	Valine	VAL	✓	5.41	525.0621	298	283	98
10	N-Acetylcysteine			5.46	571.0134	282	309	509
11	3-Aminoisobutyric acid	BAIBA		5.47	511.0465	256	112	113
12	3-amino-n-butyric acid			5.52	511.0465	270	227	283
13	Norvalin	NVAL		5.69	525.0621	298	256	98
14	Leucine	LEU	✓	5.92	539.0778	312	270	256
15	Ethanolamine	EAM		5.98	513.0257	256	269	270
16	Isoleucine	iLE	✓	5.99	539.0778	283	312	256
17	Allo-isoleucine	aiLE		6.02	539.0778	312	283	256
18	Homoserine	HSER		6.04	753.0278	100	283	128
19	Proline	PRO	✓	6.05	523.0465	296	297	69
20	4-Aminobutyric acid	GABA		6.20	511.0465	112	256	69
21	Threonine	THR	✓	6.24	527.0415	100	283	483
22	Norleucine	NLEU		6.28	539.0778	312	256	112
23	Pipecolic acid	PIP		6.41	537.0621	310	518	407
24	N-Acetylaspartic acid			6.46	539.0414	270	312	228
25	Asparagine	ASN		6.70	522.0261	295	496	113
26	Aspartic acid	ASP	✓	6.73	723.0173	254	496	296
27	3-Methylcysteine			6.76	543.0185	61	300	316
28	Thioproline	TPR		6.78	541.0029	314	287	86
29	2-Hydroxyglutaric acid			6.78	738.0169	283	239	511
30	Serine	SER	✓	7.07	739.0122	268	295	51
31	Acetylserine			7.09	555.0363	268	312	113
32	Pyroglutamic acid			7.43	537.0000	282	310	510
33	N-Acetylglutamic acid			7.44	567.0727	282	310	510
34	Glutamatic acid	GLU	✓	7.45	737.0329	282	310	510
35	4-Hydroxyproline	HYP	✓	7.47	539.0414	312	294	68
36	Methionine	MET	✓	7.49	557.0342	538	294	494
37	Cysteine	CYS	✓	7.84	754.9895	328	285	113
38	Selenomethionine			7.88	604.9786	282	510	405
39	Ethionine	ETH		7.90	571.0498	282	311	571
40	2-Aminoadipic acid	AAA		8.09	751.0486	124	282	324
41	Phenylalanine	PHE	✓	8.09	573.0621	91	330	92
42	3-Hydroxyproline			8.12	539.0414	312	129	256
43	2,4-Diaminobutyric acid	DABA		8.52	752.0438	282	256	325
44	S-carboxymethyl-cysteine			8.55	769.0050	213	259	314
45	Homocysteine	HCYS		8.59	769.0045	282	342	82
46	2-Aminopimelic acid	APA		8.66	765.0642	338	138	95
47	Homophenylalanine	Internal standard		8.83	587.0778	283	117	483
48	Histamine	HTA		8.78	563.0526	308	320	113
49	Glutamine	GLN		8.86	554.0523	84	282	327
50	4-Aminobenzoic acid	PABA		9.05	545.0308	146	345	346
51	1-Methylhistidine			9.06	577.0682	95	150	350
52	Chloro-phenylalanine			9.16	607.0231	125	364	180
53	Methionine sulfone	MET-SO2		9.18	589.0240	282	82	189
54	Ornithine	ORN		9.25	766.0595	296	256	69
55	Acetyltyrosine			9.49	871.0489	333	289	188
56	Histidine	HIS	✓	9.55	789.0391	307	362	113
57	Glycylproline	GPR		9.69	580.0679	70	153	296
58	Lysine	LYS	✓	9.77	780.0751	310	256	153
59	Tyramine			9.85	589.0570	346	333	289
60	2,6-Diaminopimelic acid (isomers)			10.28	1006.0616	308	536	
61	Tyrosine	TYR	✓	10.41	815.0435	333	289	113
62	5-Hydroxylysine (isomers)	HLY	✓	10.76	1022.0565	269	256	69
63	Cystathionine	CTH		11.12	1038.0337	328	282	69
64	Dopamine	DAM		11.12	831.0000	256	531	113
65	Tryptophan	TRP	✓	11.19	612.0730	130	131	385
66	3,4-Dihydroxyphenylalanine	DOPA		11.32	1057.0249	149	531	575
67	Prolylhydroxyproline	PHP		11.52	862.0806	296	297	294
68	3-Nitrotyrosine			11.68	860.0286	334	113	378
69	Selenocystine	Se-C-C		11.93	1151.879	496	295	268

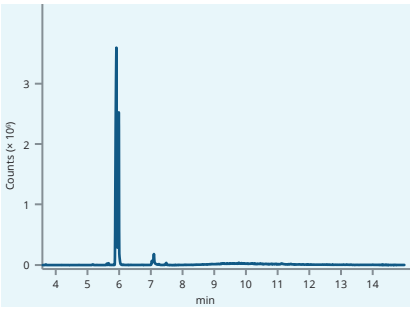
* Mmi = monoisotopic mass of the derivative of the relevant metabolite.

GC/MS separation

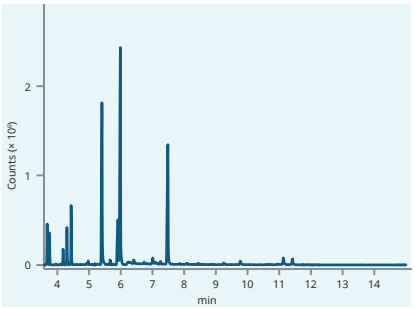
A typical chromatogram of the amino acid standard solution included in this kit.



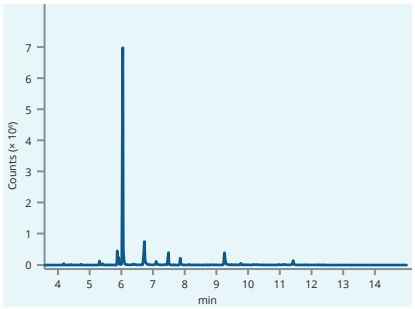
Chromatogram of standard solution (above)



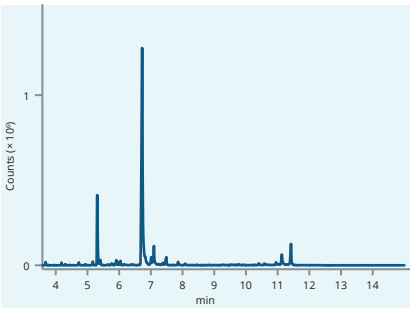
LEU (EIC 312)



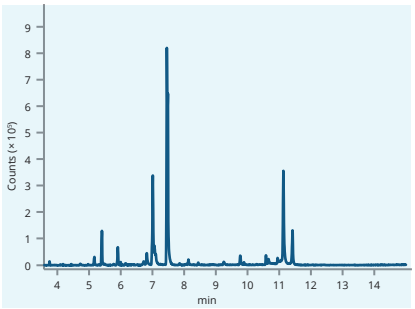
ILE (EIC 283)



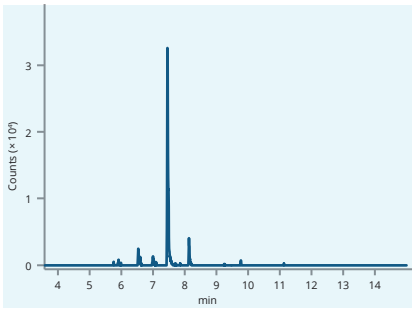
PRO (EIC 296)



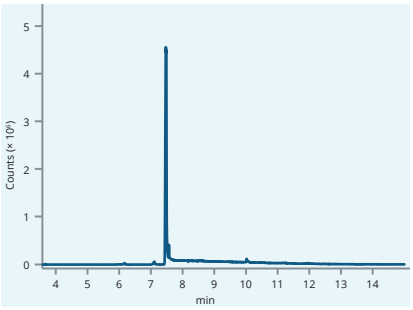
ASP (EIC 254)



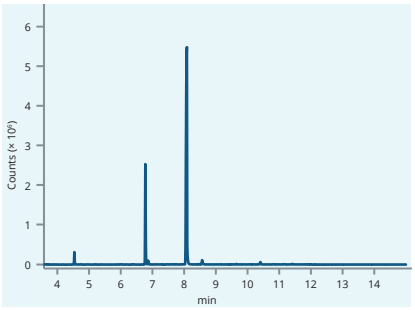
GLU (EIC 282)



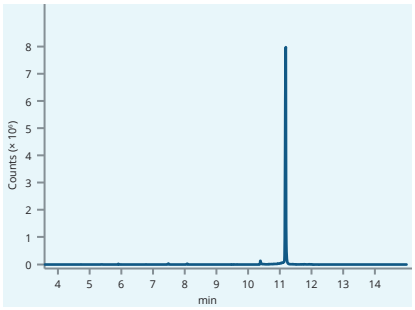
MET (EIC 538)



HYP (EIC 312)



PHE (EIC 91)



TRP (EIC 130)

Note: EIC = Extracted Ion Chromatogram.

Ordering information

Sample preparation kit (CF)	Part number	Samples
MetAmino™ sample preparation LC/MS start-up kit, CF	MAK-5857-AA01	100
MetAmino™ sample preparation GC/MS start-up kit, CF	MAK-5857-BA01	100
MetAmino™ sample preparation LC/MS basic kit, CF	MAK-5857-CA04	400
MetAmino™ sample preparation GC/MS basic kit, CF	MAK-5857-DA04	400

Metabolite sample preparation kit (CF)

- Derivatization reagences
- Derivatization centrifuge filters (set of 100/400 pcs)
- 2ml screw top vials (set of 100/400 pcs)
- Micro tube rack
- LC/MS or GC/MS column
- Sample preparation manual

Sample preparation kit (SPE)	Part number	Samples
MetAmino™ sample preparation LC/MS kit, SPE	MAK-5857-CS01	100

Metabolite sample preparation kit (SPE)

- Derivatization reagences
- Derivatization SPE MetAmino™ columns (set of 100 pcs)
- 2ml screw top vials (set of 100 pcs)
- Micro tube rack
- LC/MS column
- Sample preaparation manual

Note: The SPE metabolite kit has been developed for users who prefer the SPE technique and do not have the possibility to use the much easier MetAmino™ centrifugal filters.

LION™

LION™ GC columns have arrived to offer you a broad range of stationary phases and flexibility in capillary dimensions. What benefits do these GC capillary columns bring you?

- Strict quality control, each column individually tested.
- Column box includes column test mixture and scoring wafer.
- High flexibility in column dimensions and film thickness.
- Customer specific columns available.

LION™ stationary phases

LN-WAX BA	Stationary phase composition	Max. temp. *
LN-1	100% Dimethyl polysiloxane	Up to 350 °C
LN-5	5% Phenyl, 95% methyl polysiloxane	Up to 350 °C
LN-13	13% Phenyl, 87% dimethyl polysiloxane	Up to 340 °C
LN-20	20% Phenyl, 80% dimethyl polysiloxane	Up to 340 °C
LN-35	35% Phenyl, 65% methyl polysiloxane	Up to 340 °C
LN-17	50% Phenyl, 50% methyl polysiloxane	Up to 340 °C
LN-200	Trifluoropropyl methyl polysiloxane	Up to 250 °C
LN-624	6% Cyanopropyl phenyl, 94% methyl polysiloxane	Up to 280 °C
LN-1301	6% Cyanopropyl phenyl, 94% methyl polysiloxane	Up to 280 °C
LN-1701	14% Cyanopropyl phenyl, 86% methyl polysiloxane	Up to 280 °C
LN-225	25% Cyanopropyl, 25% phenyl, 50% methyl polysiloxane	Up to 260 °C
LN-WAX	Polyethylene glycol (PEG)	Up to 250 °C
LN-WAX Plus	Polyethylene glycol (PEG) inert and water resistant	Up to 270 °C
LN-FFAP	Acid modified polyethylene glycol (PEG)	Up to 250 °C
LN-WAX BA	Basic modified polyethylene glycol (PEG)	Up to 250 °C
LN-23	50% Cyanopropyl, 50% methyl polysiloxane	Up to 260 °C
LN-FAME	100% Cyanopropyl polysiloxane	Up to 260 °C
LN-1 MS	100% Dimethyl polysiloxane – low bleeding	Up to 350 °C
LN-5 MS	5% Phenyl, 95% methyl polysiloxane – low bleeding	Up to 360 °C
LN-5 MS Plus	Silphenylene methyl polysiloxane – extra low bleeding and inert	Up to 350 °C
LN-5 Sil MS	Silphenylene methyl polysiloxane – extra low bleeding	Up to 360 °C
LN-XLB **	Proprietary phase for semi-volatiles – low bleeding	Up to 360 °C
LN-35 MS	35% Phenyl, 65% methyl polysiloxane – low bleeding	Up to 340 °C
LN-17 MS	50% Phenyl, 50% methyl polysiloxane – low bleeding	Up to 340 °C
LN-624 MS	6% Cyanopro pylphenyl, 94% methyl polysiloxane – low bleeding	Up to 280 °C
LN-1701 MS	14% Cyanopropyl phenyl, 86% methyl polysiloxane – low bleeding	Up to 280 °C
LN-225 MS	25% Cyanopropyl, 25% phenyl, 50% methyl polysiloxane – low bleeding	Up to 240 °C
LN-WAX MS	Polyethylene glycol (PEG) – low bleeding	Up to 270 °C
LN-1 HT	100% Dimethyl polysiloxane – high temperature	Up to 400 °C
LN-5 HT	5% Phenyl, 95% methyl polysiloxane – high temperature	Up to 400 °C
LN-8 HT	Low to mid proprietary high temperature phase	Up to 400 °C
LN-35 HT	35% Phenyl, 65% methyl polysiloxane – high temperature	Up to 370 °C
LN-17 HT	50% Phenyl, 50% methyl polysiloxane – high temperature	Up to 370 °C
LN-65 HT	65% Phenyl, 35% methyl polysiloxane – high temperature	Up to 370 °C
LN-1701 HT	14% Cyanopropyl phenyl, 86% methyl polysiloxane – high temperature	Up to 320 °C
LN-WAX HT	Polyethylene glycol (PEG) – high temperature	Up to 300 °C

* The max. temperature depends on the stationary phase film thickness.
Other phases are available on request.

**XLB GC column selectivities of various manufacturers may vary.

Cross reference guide

Standard GC phases

LION™	Agilent / Varian	Machery-Nagel	Phenomenex	Restek	SGE	Supelco	UPS Method Classification
LN-1	DB-1, HP-1, CP Sil 5 CB	OPTIMA-1	ZB-1	Rtx-1	BP-1	SPB-1, Equity-1	G1, G2, G9, G38
LN-5	DB-5, HP-5, CP Sil 8 CB	OPTIMA-5	ZB-5	Rtx-5	BP-5	SPB-5, Equity-5	G27, G36, G41
LN-13	–	–	–	–	–	SPB-5, Equity-6	–
LN-20	–	–	–	Rtx-20	–	SPB-20	G28, G32
LN-35	DB-35, HP-35	–	ZB-35	Rtx-35	–	SPB-35, SPB-608	G28, G32, G42
LN-17	DB-17, HP-17, DB-608, CP Sil 24 CB	OPTIMA-17	ZB-50	Rtx-17	BPX-50	SPB-50	G3, G17
LN-200	DB-200, DB-210, VF-200 ms	OPTIMA-210	–	Rtx-200	–	–	G6
LN-624	DB-624, HP-624, VF-624ms	OPTIMA-1301, OPTIMA-624	ZB-624	Rtx-1301, Rtx-624	BP-624	SPB-624, Vocol	G43
LN-1301	DB-624, HP-624, VF-624ms	OPTIMA-1301, OPTIMA-624	ZB-624	Rtx-1301, Rtx-624	BP-624	SPB-624, Vocol	G43
LN-1701	DB-1701, HP-1701, DB-1701P, CP Sil 19 CB	OPTIMA-1701	ZB-1701	Rtx-1701	BP-10	SPB-1701, Equity-1701	G46
LN-225	DB-225, HP-225	OPTIMA-225	–	Rtx-225	BP-225	SPB-225	G7, G19, G26
LN-WAX	DB-Wax, HP-Wax, CP Wax 52 CB	OPTIMA-WAX	ZB-WAX	Rtx-Wax	BP-20	–	G14, G15, G16
LN-WAX Plus	InnoWax	–	ZB-WAXplus	Stabilwax	–	–	G14, G15, G16
LN-FFAP	DB-FFAP	–	ZB-FFAP	Stabilwax-DA	BP-21	Nukol	G14, G15, G16, G25, G35, G39
LN-WAX BA	CAM, HP-BasicWax	–	–	Stabilwax-DB	–	–	–
LN-23	DB-23, VF-23 ms	–	–	Rtx-2330	BPX-70	SP-2330, SP2331, SP2380	G8
LN-FAME	HP-88, CP Sil 88	–	ZB-FAME	Rtx-2560	BPX-70	SP-2560	G5, G8, G48

GC/MS low bleed phases

LION™	Agilent / Varian	Machery-Nagel	Phenomenex	Restek	SGE	Supelco	UPS Method Classification
LN-1 MS	DB-1 ms (UI), HP-1 ms, VF-1 ms	OPTIMA-1 MS Accent	ZB-1 ms	Rxi-1 ms	BP-1	Equity-1	G1, G2, G9, G38
LN-5 MS	HP-5 ms	OPTIMA-5 MS	ZB-5 plus	Rtx-5 MS	BPX-5	Equity-5	G27, G36, G41
LN-5 MS plus	DB-5 ms UI, VF-5 ms	OPTIMA-5 MS Accent	ZB-5 MSplus, ZB-Semivoaltiles	Rxi-5 Sil MS	–	SLB-5 ms	G27, G36, G41
LN-5 Sil MS	DB-5 ms, VF-5 ms	OPTIMA-5 MS Accent	ZB-5 ms	Rtx-5 Sil MS	–	SLB-5 ms	G27, G36, G41
LN-XLB*	DB-XLB	OPTIMA-XLB	ZB-XLB (HT)	Rtx-XLB	–	–	–
LN-35 MS	DB-35 ms (UI), VF-35 ms	OPTIMA-35 MS	ZB-MultiResidue 2 (MR-2)	Rxi-35 Sil MS	BPX-35, BPX-608	–	G28, G32, G42
LN-17 MS	DB-17 ms, VF-17 ms	OPTIMA-17 MS	–	Rxi-17 Sil MS	BPX-50	–	G3, G17
LN-225 MS	DB-225 ms	–	–	–	–	–	G7, G19
LN-624 MS	VF-1301 ms, VF-624 ms	OPTIMA-624 LB	–	Rxi-624 Sil MS	–	–	G43
LN-WAX MS	HP-INNOWax, VF-Wax ms	–	ZB-WAX	Stabilwax MS	–	–	G14, G15, G16

* XLB phases may vary from manufacturer to manufacturer.

LION™

High temperature GC phases

LION™	Agilent / Varian	Machery-Nagel	Phenomenex	Restek	SGE	Supelco	UPS Method Classification
LN-1 HT	DB-1 HT	–	ZB-1 HT inferno	Rxi-1HT	–	–	G1, G2, G9, G38
LN-5 HT	DB-5 HT	OPTIMA-5 HT	ZB-5 HT inferno	Rxi-5HT	–	–	G27, G36, G41
LN-8 HT	–	–	-	–	HT-8	–	–
LN-35 HT	–	–	ZB-35 HT inferno	–	–	–	G28, G32, G42
LN-17 HT	DB-17 HT	–	–	–	–	–	G3, G17
LN-1701 HT	–	–	–	–	–	–	G46
LN-WAX HT	DB-HeavyWax	–	–	–	–	–	G14, G15, G16
LN-65 HT	TAP-CB	–	–	Rtx-65TG	–	–	–

Recent developments

LION™ WAX HT
- Up to 290 °C for column ID 0.25 to 0.32 mm
- Up to 300 °C for column ID 0.10 mm (Fast GC)

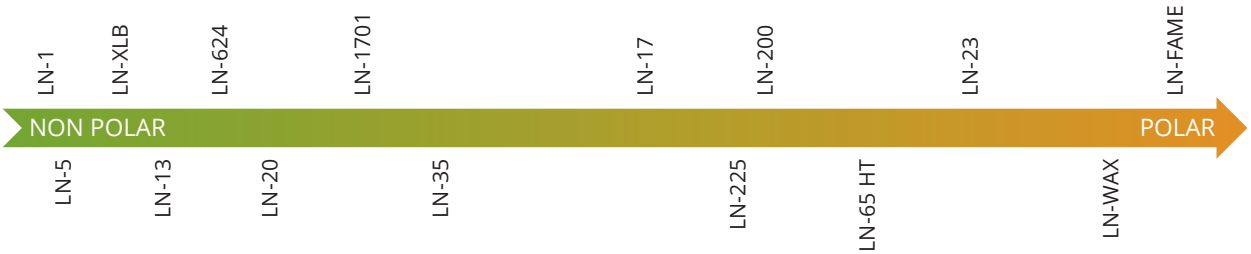
LION™ WAX Plus
- Up to 270 °C
- Higher inertness
- Compatible with water injections

LION™ FFAP Ext
- Up to 260 °C
- Higher inertness
- Compatible with water injections

LION™ 5 MS Plus
- Improved inertness
- Longer lifetime
- Better stability

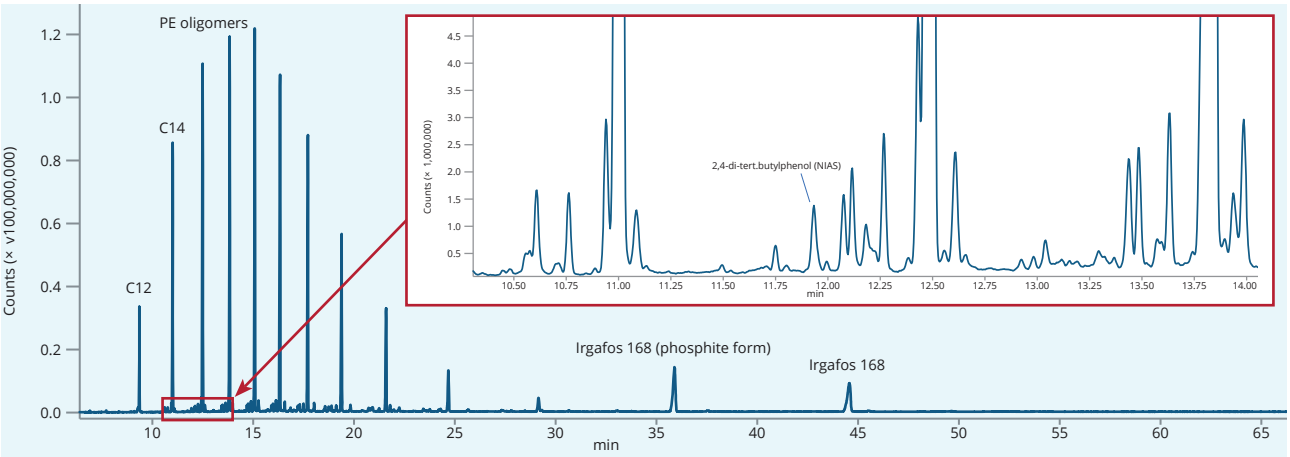
More “PLUS” columns coming soon.

Phases Polarity chart



Non-intentionally added substances (NIAS) in food simulants

2,4-di-tert. butylphenol is the degradation/hydrolysis product from the antioxidant Irgafos 168.



PE sample which has been migrated in 95% ethanol 10 days under 40 °C.

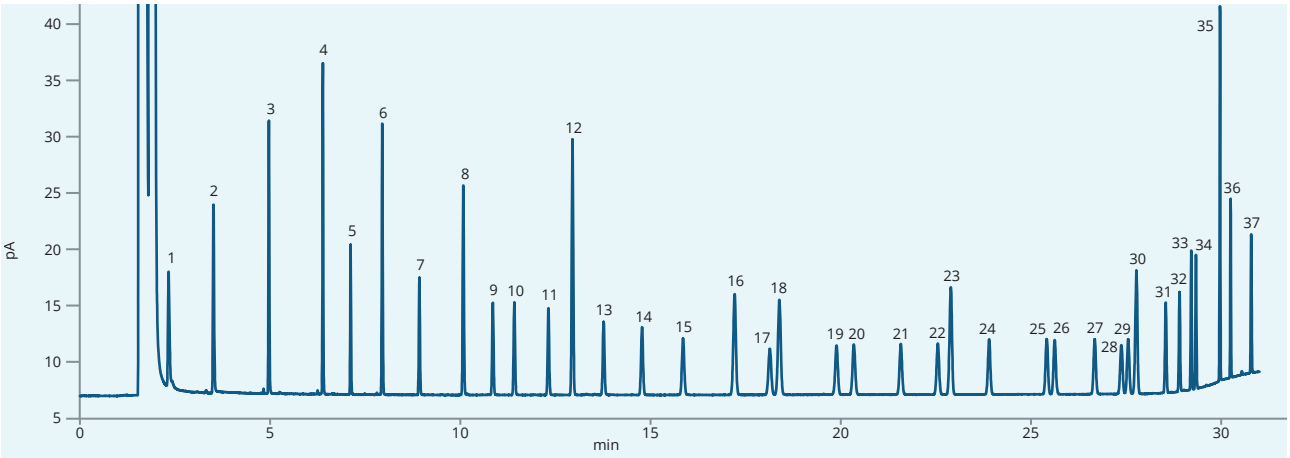
Column	LION™ LN-5 MS
Dimensions	60 m × 0.25 mm × 0.25 µm with integrated guard
Part number	LNI-5767-FF60-G05
Injection volume	2 µl
Injector temperature	PTV 280 °C, 120 °C/min to 335 °C, hold 0.64 min
Column flowrate	2.48 ml/min (40 cm/s)
Total flow	79.7 ml/min, purge 3 ml/min
Oven program	35 °C, hold 0 min 20 °C/min, 280 °C, hold 0 min 10 °C/min, 310 °C, hold 55 min
Detection	MS Shimadzu QP2010 NX
Ionization energy	70 eV
Interface temperature	240 °C
Acquisition	48 to 700 amu

This application was developed by the Institute for testing and certification in The Czech Republic.

FAME

Fatty acids are carboxylic acids with a long side 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.
Capilary column LION™ LN-FAME was designed to provide the required polarity by the high-cyano propyl phase (G48). In this application note you can see a fast, robust and reproducible baseline separation of the 37 most common FAMEs.

Substance	Fatty Acid Methyl Esters (see table below)



FAME standard on LION™ LN-FAME capillary column

Column	LION™ LN-FAME
Dimensions	30 m × 0.25 mm × 0.20 µm
Part number	LNI-5777-FE30
Injection volume	1 µl (air lock 1 µl), cold needle injection
Injector temperature	240 °C
Injection mode	S/SL, Split ratio 10:1
Column flowrate	Carrier Gas- Hydrogen, constant flow, 1ml/min
Oven program	60 °C, hold 2 min 15 °C/min, 140 °C, hold 0 min 3 °C/min, 160 °C, hold 5 min 3 °C/min, 190 °C, hold 0 min 25 °C/min, 240 °C, hold 1 min
Detection	FID @240 °C Air: 350 ml/min Hydrogen: 35 ml/min Make-up gas (nitrogen): 30 ml/min
Sample	Supelco 37 FAME mix in DCM (dilution 1:10)
Analytes	**See table below**

This application was developed by the University of Technology Brno, Faculty of Chemistry.

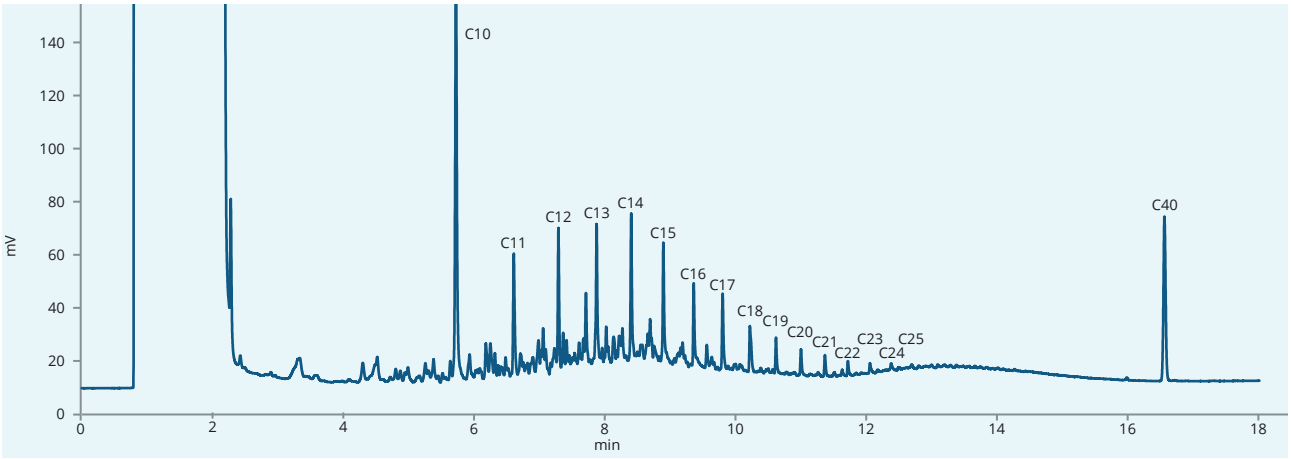
FAME

Peak No.	Compound name	Compound ID	Retention time (min)
1	Butanoic Acid Methyl Ester	C4:0	2.347
2	Hexanoic Acid Methyl Ester	C6:0	3.518
3	Octanoic Acid Methyl Ester	C8:0	4.968
4	Decanoic Acid Methyl Ester	C10:0	6.385
5	Undecanoic Acid Methyl Ester	C11:0	7.115
6	Dodecanoic Acid Methyl Ester	C12:0	7.947
7	Tridecanoic Acid Methyl Ester	C13:0	8.920
8	Myristic Acid Methyl Ester	C14:0	10.075
9	Myristoleic Acid Methyl Ester	C14:1 cis 9	10.848
10	Pentadecanoic Acid Methyl Ester	C15:0	11.415
11	cis-10-Pentadecenoic Acid Methyl Ester	C15:1 cis 10	12.310
12	Hexadecanoic Acid Methyl Ester	C16:0	12.953
13	Palmitoleic Acid Methyl Ester	C16:1 cis 9	13.762
14	Heptadecanoic Acid Methyl Ester	C17:0	14.773
15	cis-10-Heptadecenoic Acid Methyl Ester	C17:1 cis 10	15.852
16	Stearic Acid Methyl Ester	C18:0	17.223
17	Elaidic Acid Methyl Ester	C18:1 trans 9	18.137
18	Oleic Acid Methyl Ester	C18:1 cis 9	18.398
19	Linolelaidic Acid Methyl Ester	C18:2 trans 9,12	19.888
20	Linoleic Acid Methyl Ester	C18:2 cis 9,12	20.345
21	γ-Linolenic Acid Methyl Ester	C18:3 cis 6,9,12	21.575
22	α-Linolenic Acid Methyl Ester	C18:3 cis 9,12,15	22.553
23	Arachidic Acid Methyl Ester	C20:0	22.913
24	cis-11-Eicosenoic Acid Methyl Ester	C20:1 cis 11	23.907
25	cis-11,14-Eicosadienoic Acid Methyl Ester	C20:2 cis 11,14	25.433
26	Heneicosanoic Acid Methyl Ester	C21:0	25.630
27	cis-8,11,14-Eicosatrienoic Acid Methyl Ester	C20:3 cis 8,11,14	26.682
28	Arachidonic Acid Methyl Ester	C20:4 cis 5,8,11,14	27.378
29	cis-11,14,17-Eicosatrienoic Acid Methyl Ester	C20:3 cis 11,14,17	27.560
30	Behenic Acid Methyl Ester	C22:0	27.802
31	Erucic Acid Methyl Ester	C22:1 cis 13	28.548
32	cis-5,8,11,14,17-Eicosapentaenoic Acid Methyl Ester	C20:5 cis 5,8,11,14,17	28.903
33	cis-13,16-Docosadienoic Acid Methyl Ester	C22:2 cis 13,16	29.218
34	Tricosanoic Acid Methyl Ester	C23:0	29.337
35	Lignoceric Acid Methyl Ester	C24:0	29.975
36	Nervonic Acid Methyl Ester	C24:1 cis 15	30.250
37	cis-4,7,10,13,16,19-Docosahexaenoic Acid Methyl Ester	C22:6 cis 4,7,10,13,16,19	30.787

Total Petroleum Hydrocarbons (C10-C40 Hydroxarbon index)

Total petroleum hydrocarbons index (TPH) is a typical environmental analysis. It has replaced the infrared spectroscopy method using problematic solvents, i.e. Freons. 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. Aditionally, the GC method has an important advantage – this can show a type of hadrocarbon contamination (e.g. gasoline, naphtha, motor oil) and weathering status (some n-alkanes disappear during their stay in the enviroment).

Substance	Total petroleum hydrocarbons in the range of C10 to C40

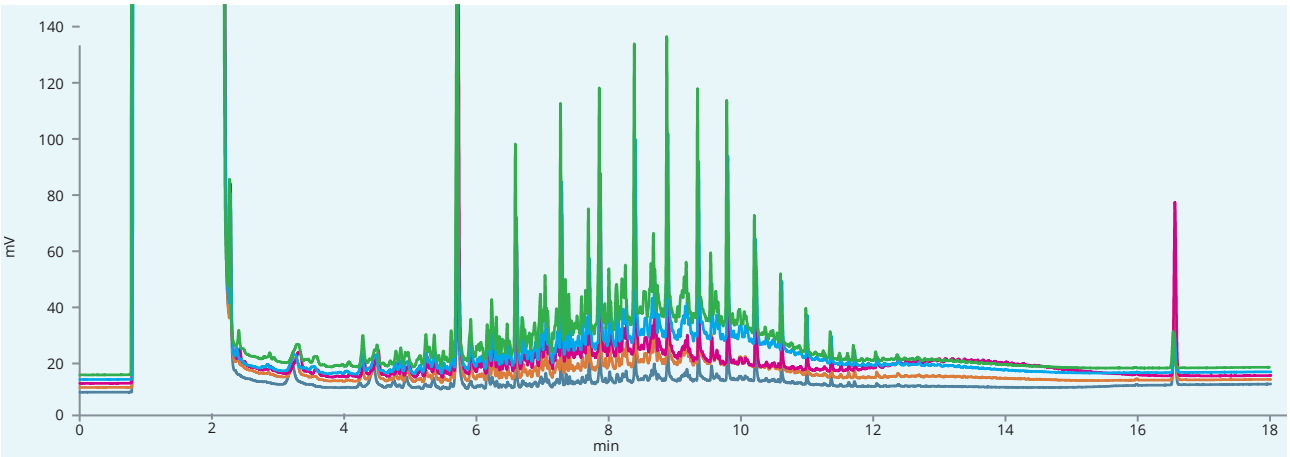


Calibration standard on LION™ LN-5HT capillary column

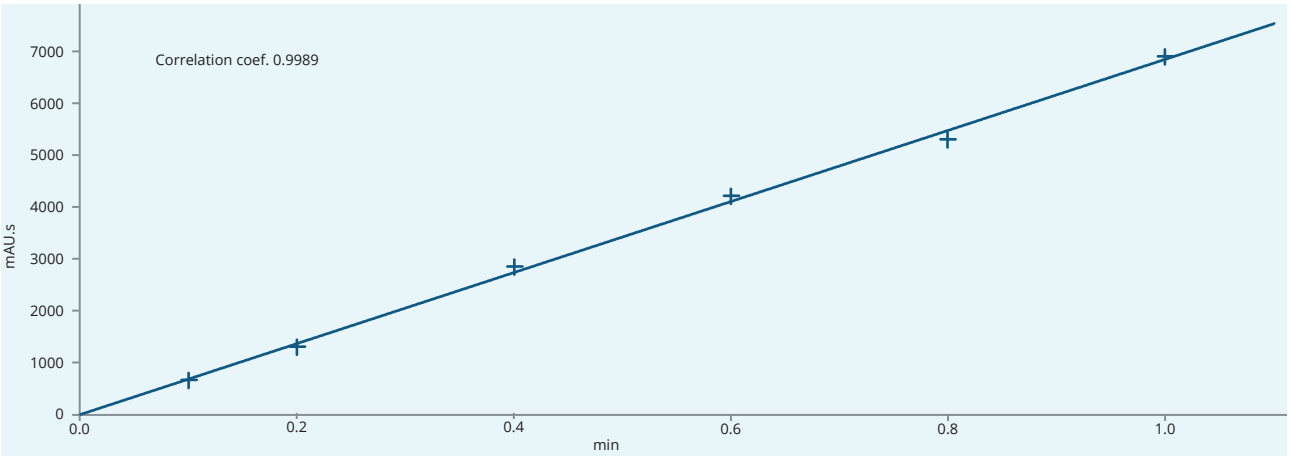
Column	LION™ LN-5HT
Dimensions	15 m × 0.25 mm × 0.10 µm
Part number	LNI-5765-FB15
Injection volume	1 µl
Injector temp.	300 °C
Injection mode	Splitless, hold 1 min, Split purge 50 ml/min, Septum purge 5 ml/min
Column flowrate	1 ml/min, constant flow, nitrogen
Oven program	40 °C, hold 4 min 25 °C/min, 330 °C, hold 2.4 min Total run time 18 min
Detection	FID @350 °C Air: 280 ml/min Hydrogen: 40 ml/min Make-up gas (nitrogen): 30 ml/min
Instrument	Master GC (Dani/Perkin-Elmer)

Note: This method has been also developed on PTV injector.
Ask for more details.

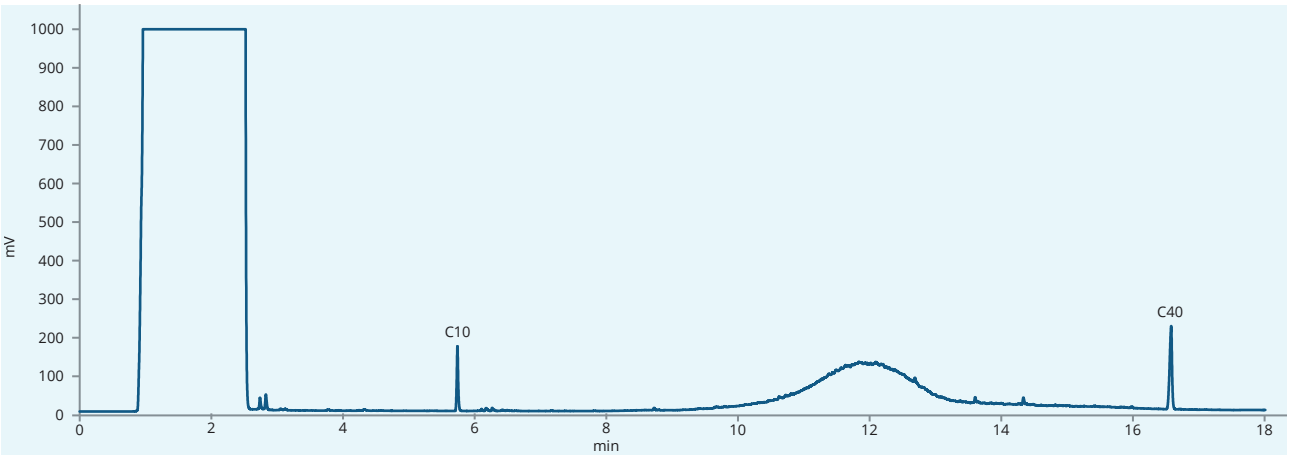
Total Petroleum Hydrocarbons (C10-C40 Hydroxarbon index)



Calibration standards for 5-level calibration



Calibration curve

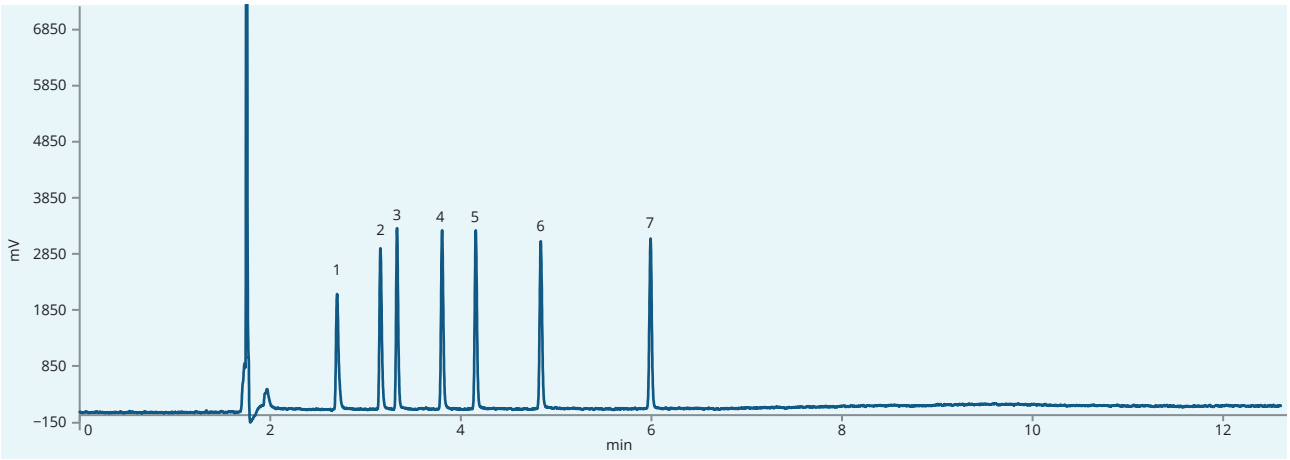


Analysis of sewer water with presence of TPH

Free fatty Acids (FFA)

Free fatty acids (FFA) are the most imortant intermediate of the anaerobic digestion of organic compounds. During methanisation, acetic acid and propionic acid are mainly present. The FFA concentration depends on the substrate composition and the run of the digestion process. FFA are inhibitors of methanisation, but only in an undissociated form in concentrations starting from 40 to 60 mg/l. They are a good marker of digestion quality in biogas stations.

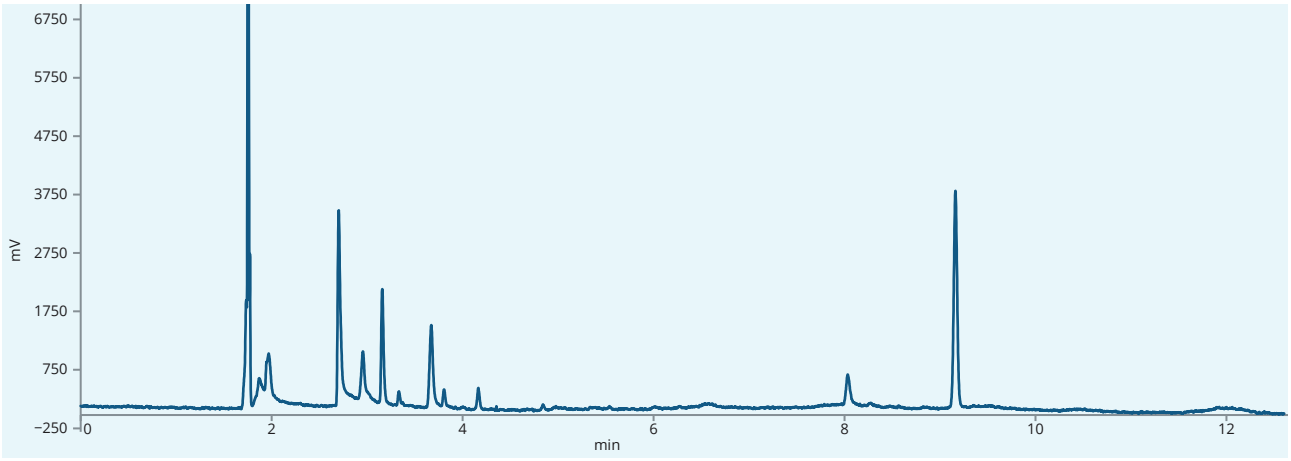
Substance	Acetic acid, CAS Number 64-19-7 Propionic acid, CAS Number 79-09-4 Isobutyric acid, 2-Methylpropanoic acid, CAS Number 79-31-2 Butyric acid, Butanoic acid, CAS Number 107-92-6 Isovaleric acid, 3-methylbutanoic aicd, CAS Number 503-74-2 Valeric acid, Pentanoic acid, CAS Number 109-52-4 Caproic acid, Hexanoic acid, CAS Number 142-62-1



Calibration standard on LION™ LN-FFAP capillary column

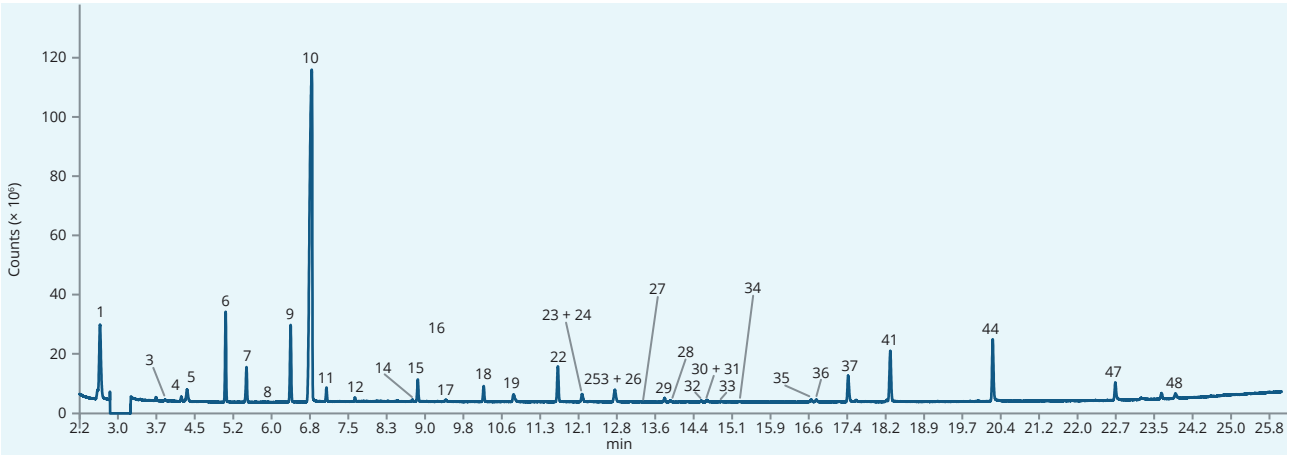
Free fatty Acids (FFA)

Column	LION™ LN-FFAP
Dimensions	30 m × 0.25 mm × 0.25 µm
Part number	LNI-5773-FF30
Injection volume	1 µl
Injector temp.	200 °C
Injection mode	PTV, isothermal, split 1:20 for water samples, 1:30 for sludge samples
Column flowrate	1 ml/min, constant flow, nitrogen, 3 ml/min septum purge
Oven program	145 °C, hold 3 min 7 °C/min, 158 °C, hold 3 min 20 °C/min, 230 °C, hold 5 min
Detection	FID @250 °C Air: 400 ml/min Hydrogen: 40 ml/min Make-up gas (nitrogen): 30 ml/min
Instrument	Master GC (Dani/Perkin-Elmer)
Analytes	**1. Acetic acid** **2. Propionic acid** **3. Isobutyric acid** **4. Butyric acid** **5. Isovaleric acid** **6. Valeric acid** **7. Caproic acid**



Water sample

Wine profile analysis by GC/MS



Calibration standard on LION™ LN-WAX MS GC capillary column

Column	LION™ LN-WAX MS
Dimensions	30 m × 0.25 mm × 0.25 µm
Part number	LNI-5784-FF30
Injector temp.	200 °C
Injection mode	Split, 5:1
Column flowrate	1.2 ml/min
Oven program	45 °C, hold 3.5 min, 15 °C/min, 90 °C, hold 0 min, 6 °C/min, 135 °C, hold 0 min, 9 °C/min, 207 °C, hold 0 min, 15 °C/min, 252 °C, hold 1 min
Detection	MS, Interface @250 °C, 20 to 220 amu
Instrument	Shimadzu GC/MS system 17A/QP-5050A

Analytes

1. **Ethyl acetate**
2. **1,1-Diethoxyethane**
3. **Isobutyl acetate**
4. **Ethyl butyrate**
5. **1-Propanol**
6. **Isobutyl alcohol**
7. **Isoamyl acetate**
8. **1-Butanol**
9. **Cyclopentanone**
10. **Isoamyl alcohol**
11. **Ethyl hexanoate**
12. **1-Hexyl acetate**
13. **Acetone**
14. **Ethyl lactate**
15. **1-Hexanol**
16. **(E)-3-Hexen-1-ol**
17. **(Z)-3-Hexen-1-ol**
18. **Ethyl octanoate**
19. **Acetic acid**
20. **Furfural**
21. **Benzaldehyde**
22. **2-Nonanol**
23. **2,3-Butanediol**
24. **Linalool**
25. **Isobutyric acid**
26. **2,3-Butanediol**
27. **Hotrienol**
28. **Butyric acid**
29. **Ethyl decanoate**
30. **Isovaleric acid.**
31. **2-Methylbutanoic acid**
32. **Diethyl succinate**
33. **alpha-Terpineol**
34. **Methionol**
35. **Nerol**
36. **2-Phenylethyl acetate**
37. **Hexanoic acid**
38. **Ethyl dodecanoate**
39. **Geraniol**
40. **Benzyl alcohol**
41. **2-Phenyl ethanol**
42. **4-Ethylguaiacol**
43. **Diethyl malate**
44. **Octanoic acid**
45. **4-Ethyl phenol**
46. **4-Vinyl guaiacol**
47. **Decanoic acid**
48. **4-Vinyl phenol**
49. **Dodecanoic acid**

This application was developed by the Mendel University in Brno.

2ml crimp vials

Description	Qty	Part number
Crimp vials		
2ml crimp vials, 12 x 32 mm, clear	100 pcs	CHS-2-CC
2ml crimp vials, 12 x 32 mm, clear with label	100 pcs	CHS-2-CCL
2ml crimp vials, 12 x 32 mm, amber with label	100 pcs	CHS-2-CAL

Description	Qty	Part number
Caps for 2ml crimp vials		
11mm Al crimp caps with septa rubber/PTFE	100 pcs	CHS-AL11-RBT-C
11mm Al crimp caps with septa silicone/PTFE	100 pcs	CHS-AL11-ST-C
11mm Al crimp caps with septa silicone/PTFE	1000 pcs	CHS-AL11-ST-M
11mm Al crimp caps with septa orange silicone/PTFE	100 pcs	CHS-AL11-ORST-C
11mm Al crimp caps with septa orange silicone/PTFE	1000 pcs	CHS-AL11-ORST-M
11mm Al crimp caps with pre-slit septa silicone/PTFE	100 pcs	CHS-AL11-PSST-C
11mm Al crimp caps with pre-slit septa silicone/PTFE	1000 pcs	CHS-AL11-PSST-M
11mm Al crimp caps with septa PTFE/silikon/PTFE	100 pcs	CHS-AL11-TST-C
11mm Al crimp caps with septa PTFE/silikon/PTFE	1000 pcs	CHS-AL11-TST-M

Description	Qty	Part number
Combo pack sets crimp vials + caps with septa		
2ml crimp vials, 12 × 32 mm, clear and 11mm Al crimp caps with septa orange silicone/PTFE	1000 pcs	CHS-2-CC-SET CL
2ml crimp vials, 12 × 32 mm, clear and 11mm Al crimp caps with pre-slit septa silicone/PTFE	1000 pcs	CHS-2-CC-SET PS
2ml crimp vials, 12 × 32 mm, clear and 11mm Al crimp caps with septa rubber/PTFE	1000 pcs	CHS-2-CC-SET RB
2ml crimp vials, 12 × 32 mm, clear and 11mm Al crimp caps with septa silicone/PTFE	1000 pcs	CHS-2-CC-SET SIL
2ml crimp vials, 12 × 32 mm, amber with label and 11mm Al crimp caps with septa orange silicone/PTFE	1000 pcs	CHS-2-CAL-SET CL
2ml crimp vials, 12 × 32 mm, amber with label and 11mm Al crimp caps with pre-slit septa silicone/PTFE	1000 pcs	CHS-2-CAL-SET PS
2ml crimp vials, 12 × 32 mm, amber with label and 11mm Al crimp caps with septa rubber/PTFE	1000 pcs	CHS-2-CAL-SET RB
2ml crimp vials, 12 × 32 mm, amber with label and 11mm Al crimp caps with septa silicone/PTFE	1000 pcs	CHS-2-CAL-SET SIL

Description	Qty	Part number
Inserts for crimp vials and for short thread robotic vials		
250 µl, 5.8 × 29 mm, conical glass inserts with plastic feets	100 pcs	CHS-INS-630
250 µl, 5.8 × 31 mm, conical glass inserts without plastic feets	1000 pcs	02-MTVWG
250 µl, 5.8 × 29 mm, conical plastic inserts with plastic feets	100 pcs	CHS-INS-630P
400 µl, 5.8 × 31 mm, glass inserts with flat bottom	500 pcs	C4011-631

Crimp vials

250 µl insert CHS-INS-630

VIALS and CAPS

2ml screw vials

Description	Qty	Part number
Screw vials, 8-425 thread		
2ml screw vials, 8-425 thread, 12 × 32 mm, clear with label	100 pcs	CHS-2-S8CL
2ml screw vials, 8-425 thread, 12 × 32 mm, clear without label	100 pcs	CHS-2-S8C
2ml screw vials, 8-425 thread, 12 × 32 mm, amber with label	100 pcs	CHS-2-S8AL

Description	Qty	Part number
Caps for 2ml vials, 8-425 thread		
8-425 thread plastic caps with septa silicone/PTFE	100 pcs	1076-8002-C
8-425 thread plastic caps with septa silicone/PTFE	1000 pcs	1076-8002-M
8-425 thread plastic caps with pre-slit septa silicone/PTFE	1000 pcs	1076-80021-M
8-425 thread plastic caps with septa PTFE/silicone/PTFE	1000 pcs	1066-8002-M

Description	Qty	Part number
Spare septa 8 mm for caps, 8-425 thread		
8mm septa silicone/PTFE	100 pcs	1076-0315-C
8mm septa silicone/PTFE	1000 pcs	1076-0315-M
8mm pre-slit septa silicone/PTFE	100 pcs	1076-03151-C
8mm soft septa silicone/PTFE for Shimadzu	1000 pcs	C4013-61

Description	Qty	Part number
Inserts for vials, 8-425 thread		
150 µl, 4.8 × 29 mm, conical glass inserts with plastic feets	100 pcs	CHS-INS-530
200 µl, 4.8 × 31 mm, glass inserts with flat bottom	500 pcs	C4012-465

2ml screw robotic vials

Description	Qty	Part number
Short thread 2ml robotic screw vials		
2ml short thread robotic screw vials, 12 × 32 mm, clear without label	100 pcs	CHS-2-S9C
2ml short thread robotic screw vials, 12 × 32 mm, clear with label	100 pcs	CHS-2-S9CL
2ml short thread robotic screw vials, 12 × 32 mm, amber with label	100 pcs	CHS-2-S9AL

Description	Qty	Part number
Caps for short thread 2ml robotic screw vials		
Blue plastic caps for robotic vials with septa rubber/PTFE	100 pcs	CHS-P9-RBT-C
Blue plastic caps for robotic vials with septa silicone/PTFE	100 pcs	CHS-P9-ST-C
Blue plastic caps for robotic vials with septa silicone/PTFE	1000 pcs	CHS-P9-ST-M
Blue plastic caps for robotic vials with bonded septa silicone/PTFE	100 pcs	CHS-P9-BST-C
Blue plastic caps for robotic vials with bonded septa silicone/PTFE	1000 pcs	CHS-P9-BST-M
Blue plastic caps for robotic vials with bonded ULB septa silicone/PTFE	100 pcs	CHS-P9-BST-ULB-C
Blue plastic caps for robotic vials with pre-slit septa silicone/PTFE	100 pcs	CHS-P9-PSST-C
Blue plastic caps for robotic vials with pre-slit septa silicone/PTFE	1000 pcs	CHS-P9-PSST-M
Blue plastic caps for robotic vials with bonded pre-slit ULB septa silicone/PTFE	100 pcs	CHS-P9-BPSST-ULB-C

Description	Qty	Part number
Spare septa 9 mm for caps for short thread robotic screw vials		
9mm septa silicone/PTFE	100 pcs	CHS-9-ST-C
9mm septa silicone/PTFE	1000 pcs	CHS-9-ST-M
9mm septa PTFE/silicone/PTFE	100 pcs	CHS-9-TST-C
9mm septa PTFE/silicone/PTFE	1000 pcs	CHS-9-TST-M

Description	Qty	Part number
Combo pack sets short thread robotic vials + caps with septa		
Short thread 2ml robotic screw vials, 12 × 32 mm, clear with label and blue plastic caps with septa silicone/PTFE	1000 pcs	CHS-2-S9CL-BLUESET CL
Short thread 2ml robotic screw vials, 12 × 32 mm, clear with label and blue plastic caps with bonded septa silicone/PTFE	1000 pcs	CHS-2-S9CL-BLUESET BND
Short thread 2ml robotic screw vials, 12 × 32 mm, clear with label and blue plastic caps with pre-slit septa silicone/PTFE	1000 pcs	CHS-2-S9CL-BLUESET PS
Short thread 2ml robotic screw vials, 12 × 32 mm, amber with label and blue plastic caps with septa silicone/PTFE	1000 pcs	CHS-2-S9AL-BLUESET CL
Short thread 2ml robotic screw vials, 12 × 32 mm, amber with label and blue plastic caps with pre-slit septa silicone/PTFE	1000 pcs	CHS-2-S9AL-BLUESET PS

Note: Robotic short thread vials fit to all frequent GC and LC samplers, caps with pre-slit septa are right for Waters LC systems.

2ml screw robotic vials

2ml screw wide opening vials

Description	Qty	Part number
Screw vials 2 ml wide opening, 10-425 thread		
2ml screw vials wide opening, 12 × 32 mm, 10-425, clear without label	100 pcs	CHS-2-S10C
2ml screw vials wide opening, 12 × 32 mm, 10-425, clear with label	100 pcs	CHS-2-S10CL
2ml screw vials wide opening, 12 × 32 mm, 10-425, amber with label	100 pcs	CHS-2-S10AL

Description	Qty	Part number
Caps for screw vials 2 ml wide opening, 10-425 thread		
10-425 thread plastic caps with septa silicone/PTFE	100 pcs	0576-1002-C
10-425 thread plastic caps with septa silicone/PTFE	1000 pcs	0576-1002-M
10-425 thread plastic caps with pre-slit septa silicone/PTFE	100 pcs	0576-10021-C
10-425 thread plastic caps with pre-slit septa silicone/PTFE	1000 pcs	0576-10021-M

Description	Qty	Part number
Spare septa 10 mm for caps, 10-425 thread		
10mm septa silicone/PTFE	100 pcs	0576-0375-C
10mm septa silicone/PTFE	1000 pcs	0576-0375-M
10mm soft septa silicone/PTFE for Shimadzu	100 pcs	C4010-35

2ml screw wide opening vials

2ml amber screw wide opening vials

4ml screw vials

Description	Qty	Part number
Screw vials 4 ml, 13-425 thread		
4ml screw vials, 15 × 45 mm, clear without label	100 pcs	CHS-4-S13C
4ml screw vials, 15 × 45 mm, clear with label	100 pcs	CHS-4-S13CL
4ml screw vials, 15 × 45 mm, amber with label	100 pcs	CHS-4-S13AL

Description	Qty	Part number
Caps for 4ml screw vials, 13-425 thread		
13-425 thread plastic caps with septa silicone/PTFE	100 pcs	1076-1302-C
13-425 thread plastic caps with septa silicone/PTFE	1000 pcs	1076-1302-M
13-425 thread plastic caps with pre-slit septa silicone/PTFE	100 pcs	1076-13021-C

Description	Qty	Part number
Spare septa 12 mm for caps 13-425 thread		
12mm septa silicone/PTFE	100 pcs	1076-0465-C
12mm septa silicone/PTFE	1000 pcs	1076-0465-M

Headspace crimp vials

Description	Qty	Part number
Headspace crimp vials		
10ml headspace crimp vials, 23 × 46 mm, clear, rounded bottom	100 pcs	CHS-10-CCL-RB
10ml headspace crimp vials, 23 × 46 mm, clear, flat bottom	100 pcs	CHS-10-CCL-FB
20ml headspace crimp vials, 23 × 75 mm, clear, rounded bottom	100 pcs	CHS-20-CCL-RB
20ml headspace crimp vials, 23 × 75 mm, clear, flat bottom	100 pcs	C4020-20
20ml headspace crimp vials, 23 × 75 mm, amber, rounded bottom	125 pcs	20-CV(A)

Description	Qty	Part number
20mm bimetalic crimp caps for headspace vials		
20mm bimetalic crimp caps with septa silicone/PTFE	100 pcs	CHS-BM20-ST-C
20mm bimetalic crimp caps with septa silicone/PTFE	1000 pcs	CHS-BM20-ST-M
20mm bimetalic crimp caps with septa silicone translucent (soft)/PTFE	100 pcs	CHS-BM20-ST-TRL-C
20mm bimetalic crimp caps with septa silicone translucent (soft)/PTFE	1000 pcs	CHS-BM20-ST-TRL-M

Description	Qty	Part number
20mm magnetic steel crimp caps for headspace vials		
20mm magnetic steel crimp caps with septa silicone/PTFE	100 pcs	CHS-MG20-ST-C
20mm magnetic steel crimp caps with septa silicone/PTFE	1000 pcs	CHS-MG20-ST-M
20mm magnetic steel crimp caps with ULB septa silicone/PTFE	100 pcs	CHS-MG20-ST-ULB-C
20mm magnetic steel crimp caps with ULB septa silicone/PTFE	1000 pcs	CHS-MG20-ST-ULB-M

Description	Qty	Part number
20mm aluminium crimp caps for headspace vials		
20mm aluminium crimp caps with septa silicone/PTFE	100 pcs	CHS-AL20-ST-C
20mm aluminium crimp caps with septa silicone/PTFE	1000 pcs	CHS-AL20-ST-M
20mm aluminium crimp caps with ULB septa silicone/PTFE	100 pcs	CHS-AL20-ST-ULB-C
20mm aluminium crimp caps with ULB septa silicone/PTFE	1000 pcs	CHS-AL20-ST-ULB-M
20mm aluminium crimp caps with septa silicone translucent (soft)/PTFE	100 pcs	CHS-AL20-ST-TRL-C
20mm aluminium crimp caps with septa silicone translucent (soft)/PTFE	1000 pcs	CHS-AL20-ST-TRL-M

Description	Qty	Part number
Spare septa 20 mm for crimp headspace vials		
20mm septa silicone/PTFE, thickness 3 mm	100 pcs	CHS-20-ST-C
20mm septa silicone/PTFE, thickness 3 mm	1000 pcs	CHS-20-ST-M
20mm septa silicone translucent (soft)/PTFE, thickness 3 mm	100 pcs	CHS-20-ST-TRL-C
20mm septa silicone translucent (soft)/PTFE, thickness 3 mm	1000 pcs	CHS-20-ST-TRL-M

Note: Headspace vials with rounded bottom fit to CTC and other frequent modern samplers, headspace vials with flat bottom fit to Agilent headspace and Dani headspace systems.

Headspace vials

Headspace screw vials

Description	Qty	Part number
Headspace screw vials		
10ml headspace screw vials, 22 × 45 mm, clear, rounded bottom	100 pcs	CHS-10-SC-RB
20ml headspace screw vials, 22 × 75 mm, clear, rounded bottom	100 pcs	CHS-20-SC-RB

Description	Qty	Part number
Magnetic caps with septa for screw headspace vials		
Magnetic caps with silicone/PTFE septa for screw headspace vials, thickness 2 mm	100 pcs	CHR-1414
Magnetic caps with silicone/PTFE septa for screw headspace vials, thickness 1.5 mm	100 pcs	CHR-1309

Description	Qty	Part number
Spare septa 18 mm for screw headspace vials		
18mm septa silicone/PTFE for screw headspace vials, thickness 3 mm	100 pcs	0900-0691-C
18mm septa silicone/PTFE for screw headspace vials, thickness 3 mm	1000 pcs	0900-0691-M
18mm septa silicone/PTFE for screw headspace vials, thickness 1.3 mm	100 pcs	0905-0691-C
18mm septa silicone/PTFE for screw headspace vials, thickness 1.3 mm	1000 pcs	0905-0691-M

Description	Qty	Part number
Spare magnetic caps for screw headspace vials		
Magnetic caps for screw headspace vials	125 pcs	18-MSC

Screw headspace caps with septa

Crimping and decapping tools

Manual Crimpers and Decappers

- Easily-viewed adjustment knob
- Strong light-weight plastic body
- Bottom-pull handle design prevents wobbling

High Power Crimping Tool

Fastest and most powerful CRS crimping Tool

- Strong enough for all steel and magnetic caps
- Designed with external power source and cord (no battery)
- Uses interchangeable jaw sets (ordered separately)

Manual crimpers	Qty	Part number
8mm Crimper	1 pc	C*308990
11mm Crimper	1 pc	C*311990
13mm Crimper	1 pc	C*313990
13mm Crimper for Flip Off Caps*	1 pc	C*313992
20mm Crimper	1 pc	C*320990
20mm Crimper for Flip Off Caps*	1 pc	C*320992

* Not for use with Flip-Up Caps.

Manual decappers	Qty	Part number
11mm Decapper	1 pc	C*311991
13mm Decapper	1 pc	C*313991
20mm Decapper	1 pc	C*320991

High power electronic tool	Qty	Part number
High Power Electronic Crimping Tool**	1 pc	C*6AHPS0
8mm Crimper Jaw	1 pc	C*308955
11mm Crimper Jaw	1 pc	C*311955
13mm Crimper Jaw	1 pc	C*313955
13mm Crimper Jaw for Flip Off Caps*	1 pc	C*313956
20mm Crimper Jaw	1 pc	C*320955
20mm Crimper Jaw for Flip Off Caps*	1 pc	C*320956
11mm Decapper Jaw	1 pc	C*311965
13mm Decapper Jaw	1 pc	C*313965
20mm Decapper Jaw	1 pc	C*320965

* Not for use with Flip-Up Caps.
**Jaws have to be ordered separately.

Manual crimper

High power electric crimper

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Applications and Keywords

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

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