ChromLine

Astra® ChromLine | Arion® ChromLine | Chromshell® ChromLine | EasyFlash™ ChromLine | MetAmino® ChromLine | SPEextra™ ChromLine

CHROMATOGRAPHY

Product Guide

CHROMLINE: THE PREMIUM BRAND OF CHROMSERVIS

Astra® ChromLine | Arion® ChromLine | Chromshell® ChromLine | Lion™ ChromLine | SPEextra™ ChromLine | EasyFlash™ ChromLine | MetAmino® ChromLine | Sensors ChromLine

ChromLine, the new premium brand of Chromservis, brings together our proprietary chromatography solutions focused on outstanding performance and superior quality. ChromLine represents our commitment to quality, consistency, and technical support across the entire analytical workflow.

The ChromLine brand is backed by a team of experienced chromatography professionals and more than 35 years of Chromservis expertise in the field.

In-House Development and Production

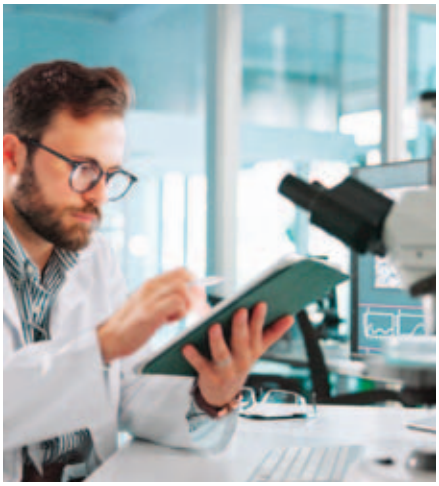
We develop, manufacture, and test ChromLine products in our state-of-the-art laboratory in Prague, including comprehensive output quality control. We collaborate on a number of projects with prestigious universities in the Czech Republic, for example on the development of novel stationary phases and their applications in HPLC.

100% Quality

Precision and superior performance of our products are our top priorities. In-house manufacturing gives us complete control over these parameters and enables us to stand behind the highest quality of our products. We hold ISO 9001:2015 certification along with other quality and sustainability credentials.

Tailored Application Development

We provide professional laboratory services in (U)HPLC/MS and (U)HPLC-UV/DAD/RID analysis on a routine basis. We provide product quality control, method development and optimization, as well as the analysis of diverse samples tailored to customer needs. We guarantee reliability, accuracy, and a customized approach.



CONTENT

WHAT IS NEW

ASTRA® C18-Hybrid

Hybrid silica fuses the robustness of inorganic silica with the versatility of organic chemistry, creating a material engineered for superior performance.

High density end-capping together with fully hybrid particles synthetised from scratch deliver superior high alkaline durability of ASTRA® C18-Hybrid phase compared to partially hybrid solutions.

ASTRA® Pesticides

We have extended range of ASTRA® HPLC columns with the ASTRA® Pesticides column, which has been optimized for selected pesticides analysis.

ASTRA® Preparative Columns

ASTRA® preparative columns extended our product portfolio with two types of column hardware. There are standard nut fittings or **long-life DAC ASTRA® columns**.

Diagnostic kits

Chromservis has introduced the extended MetAmino® kit. Expanded from 3 to 17 isotopically labelled standards, the new LC/MS kit delivers **improved accuracy and precision**. For all that new LipoEasy™ kit has been born. It offers easy sample preparation for **total fatty acids** and **lipid-bound fatty acids** as the option.

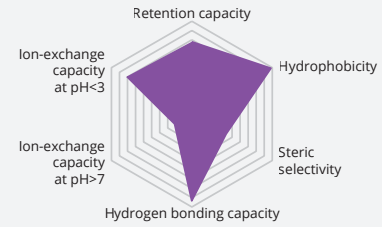
HPLC COLUMNS

HPLC column selectivity

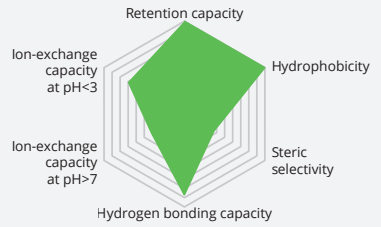
The selectivity is defined as the capability of stationary phases to separate analytes under certain conditions. The selectivity mainly depends on the structure, metal content and modification of base silica gel, type of chemical bonding or silica gel end-capping. The HPLC column selectivity has been 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	–	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)

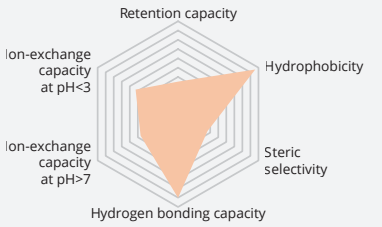
Arion® Plus C18 ChromLine



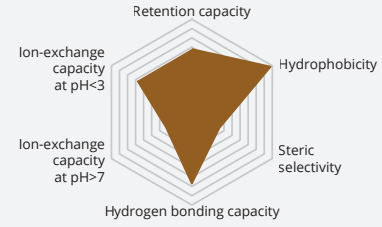
Astra® C18-HE ChromLine



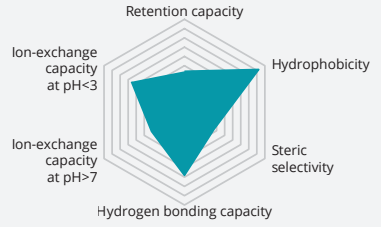
Astra® C18-BDS ChromLine



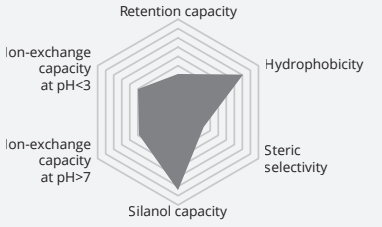
Arion® C18 Polar ChromLine



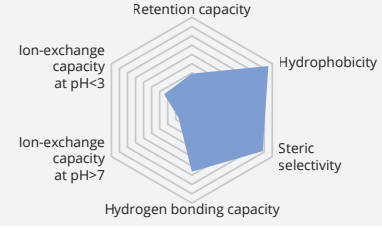
Astra® C18-AQ ChromLine



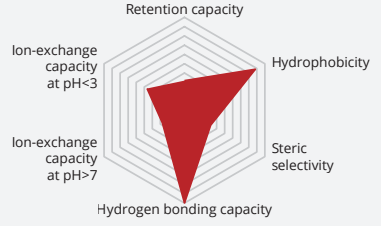
Astra® C18-Hybrid ChromLine



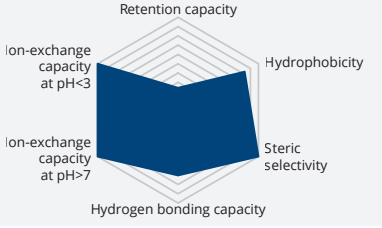
Arion® PFP ChromLine



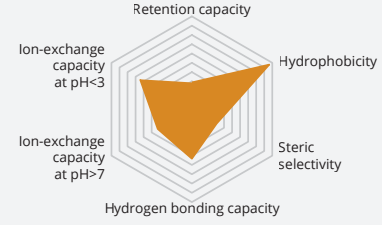
Arion® Biphenyl ChromLine



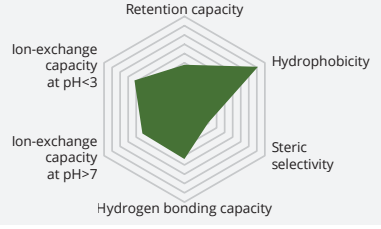
Astra® DM ChromLine



Arion® Phenyl-Butyl ChromLine



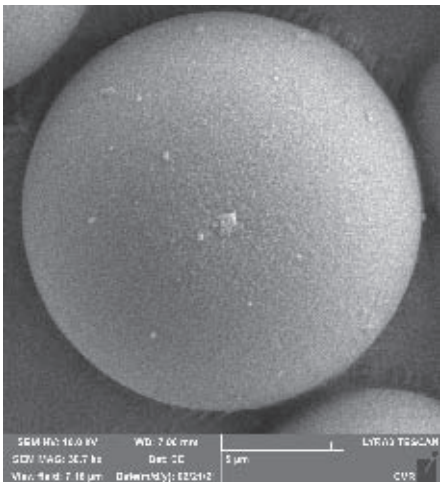
Astra® Phenyl-Hexyl-HE ChromLine



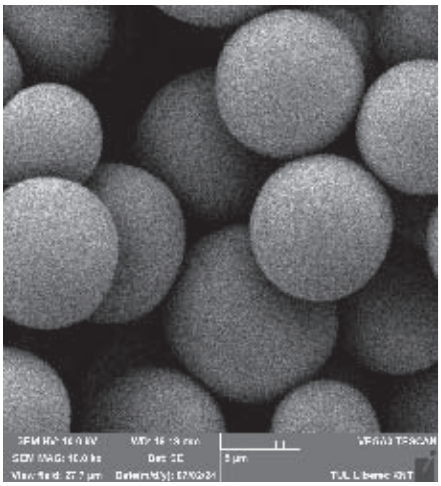
ASTRA®

The ASTRA® has been developed in the Czech Republic to offer an alternate to a broad range of general and application specific HPLC columns. ASTRA® brings completely new and unique stationary phases.

- Polar embedded group to offer a complementary selectivity
- Fully hybrid technology for use under high pH conditions
- Unique and high end-capped C18 phases
- Modern BDS technology to replace old type of BDS silica gel
- Specially embedded group together with polar head for steric selectivity
- Unique phase for cyclodextrin analysis



ASTRA® silica gel



ASTRA® polymer-based particle

ASTRA® silica gel

ASTRA® Phase	Particle size [µm]	Pore size [Å]	Surface area [m²/g]	Carbon load	pH stability	End-capping	100% aqueous mobile phase	USP code
C18-HE	2, 3, 5, 10	100	330	17%	2 to 9	High	×	L1
C18-AQ	2, 3, 5, 10	100	330	13%	2 to 9	Mixed	✓	L1, L96
C18-Hybrid	3, 5	150	185	16%	1 to 12	Proprietary	✓	L1
C18-BDS	3, 5	140	170	11%	2 to 8	Proprietary	×	L1
C8-HE	3, 5	100	330	11%	2 to 9	High	×	L7
C8-BDS	5	140	170	6%	2 to 8	Proprietary	×	L7
Phenyl-Hexyl-HE	3, 5	100	330	11%	2 to 7.5	High	×	L11
DM	3, 5, 15	100	205	12%	2 to 9	Proprietary	×	–
Diol	3, 5	100	330	5%	2 to 7.5	-	✓	L20
Si	3, 5	100	330	-	4 to 7	-	✓	L3

ASTRA® application specific columns

ASTRA® Phase	Particle size [µm]	Pore size [Å]	Surface area [m²/g]	Carbon load	pH stability	End-capping	100% aqueous mobile phase	USP code
Pesticides	3	100	330	17%	2 to 9	Proprietary	×	–
CavitySelect	5	100	360	11%	2 to 9	Proprietary	×	–

ASTRA® polymer-based columns

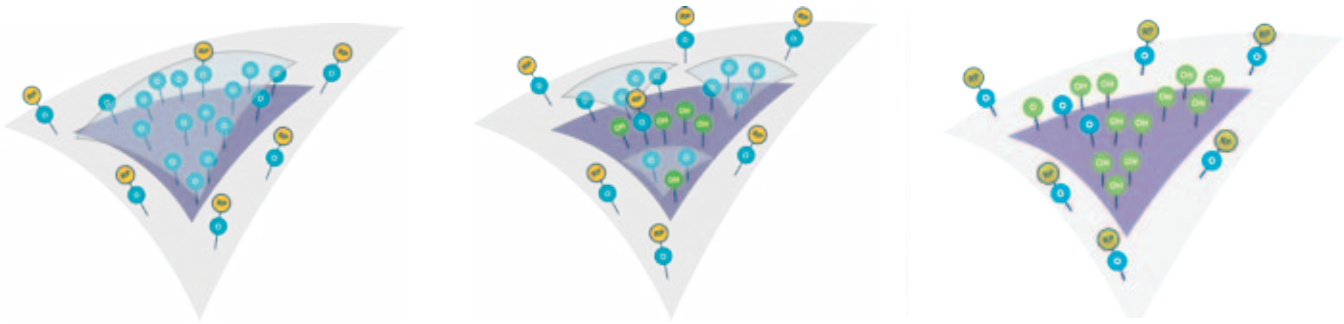
ASTRA® Phase	Particle size [µm]	Crosslinking	Max. Flow rate [mL/min]	Max. Pressure [bar]	Max. Temperature [°C]	USP code
Sugar Ca (S)	9, 10	Proprietary	1.5 mL/min	60	90	L19
Sugar H (S)	9, 10	Proprietary	1.5 mL/min	60	90	L17
Sugar K (S)	10	Proprietary	1.5 mL/min	60	90	-
Sugar Na (S)	10	Proprietary	1.5 mL/min	60	90	L58

Quality Without Compromise

Our policy is based on quality. We introduced latest technologies of silica gel particles and various end-capping chemistries.

ASTRA® end-capping

We use latest technology of end-capping on the silica gel surface. This brings together with selector particle selectivity.



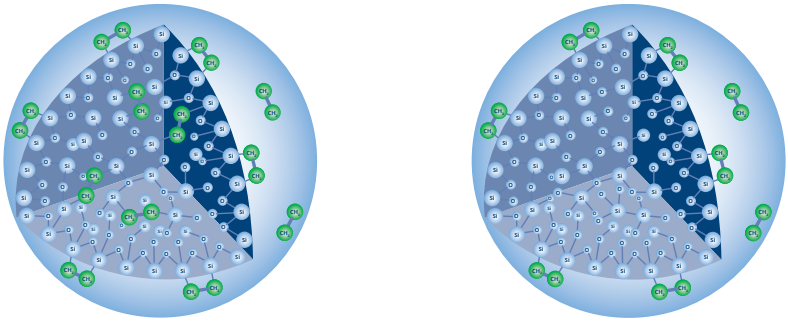
High End-capping | Low End-capping | No End-capping

ASTRA® hybrid technology

Hybrid silica fuses the robustness of inorganic silica with the versatility of organic chemistry, creating a material engineered for superior performance. With enhanced durability and refined surface functionality, hybrid silica enables smarter, longer lasting solutions across advanced industrial and technological applications.

Key benefits

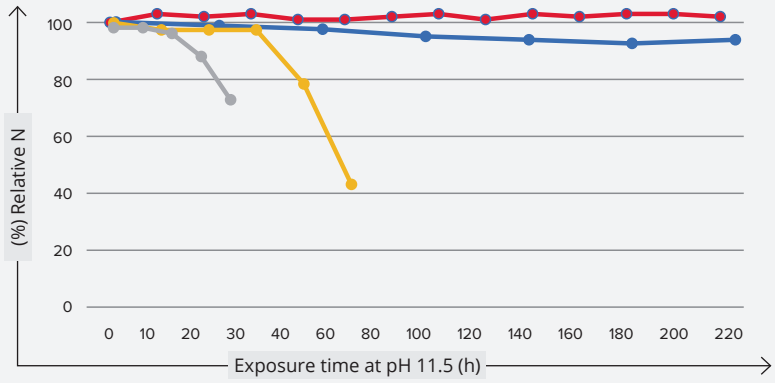
- Fully hybrid columns **stable over a pH range of 1 to 12**
- C18 with improved selectivity for basic compounds
- Narrow peaks at low pH
- Enhanced method development flexibility



Fully hybrid particle | Partially hybrid particle

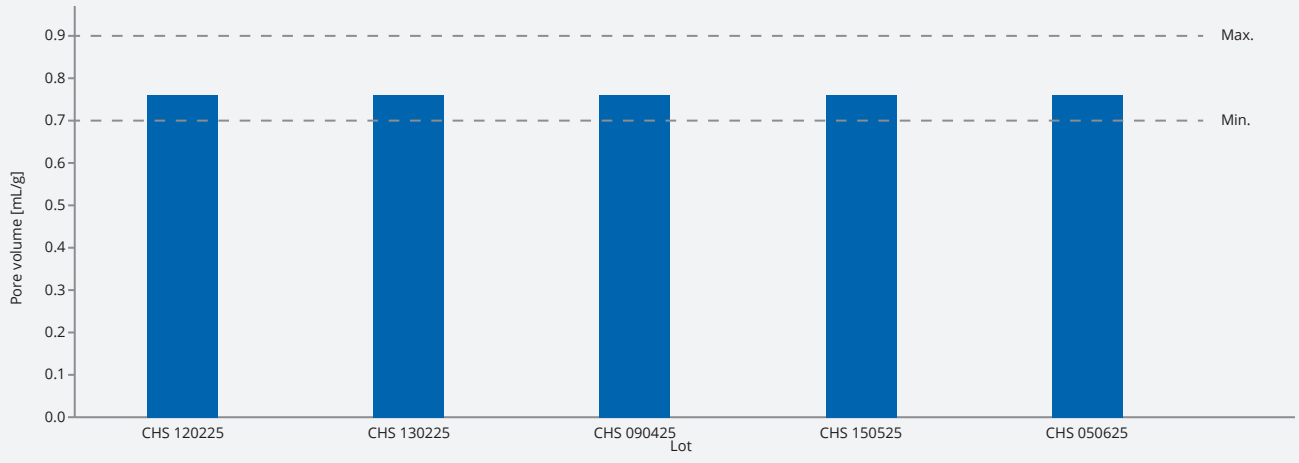
Comparison of durability of hybrid columns at pH 11.5

Astra C18-Hybrid maintains performance under pH 11.5 stress, while partially hybrid columns degrade much earlier.



Astra C18-Hybrid (fully hybrid)	
Competitor A (fully hybrid)	
Competitor B (partially hybrid)	
Competitor C (partially hybrid)	
Column dimension	*150 × 4.6 mm*
Mobile phase	*Methanol/50 mM Potassium phosphate pH 11.5 = 10/90*
Flow rate	*1.0 mL/min, Temperature: 40 °C*

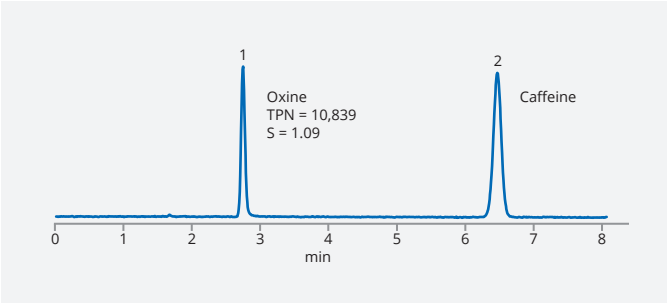
Lot-to-lot consistency of ASTRA® C18-Hybrid



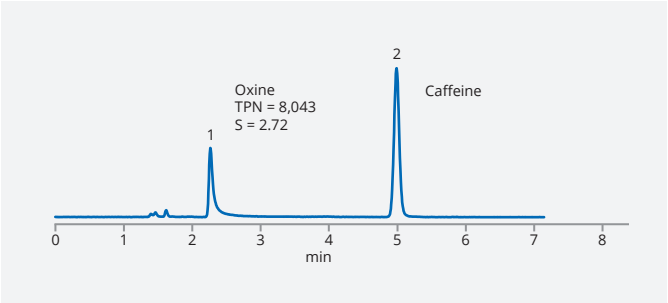
Comparison of various hybrid columns at chelating compounds separation

Chromatograms show excellent separation on ASTRA® C18-Hybrid column compare to fully hybrid and partialy hybrid particles. ASTRA® C18-Hybrid shows better performance even to 1.7 µm column.

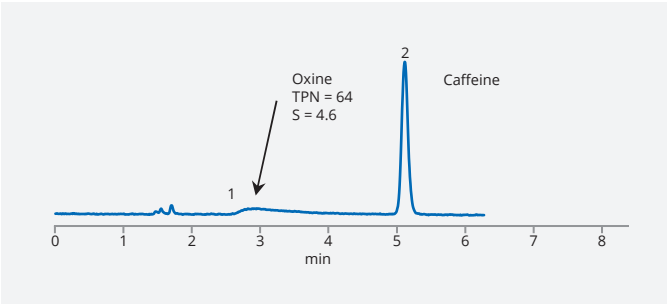
ASTRA® C18-Hybrid 5 µm



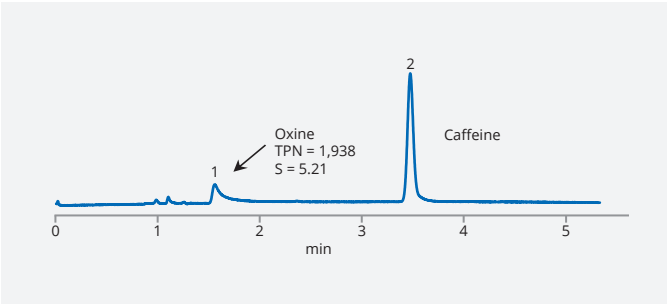
Competitor A 3.5 µm



Competitor B 5 µm



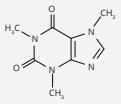
Competitor C 1.7 µm



Column	ASTRA® C18-Hybrid, 5 µm
Dimensions	150 × 4.6 mm for 3.5 and 5 µm, 100 × 2.1 mm for 1.7 µm
Part number	AST-6016-LK46 (ASTRA® C18-Hybrid)
Mobile phase	Acetonitrile/20 mM Phosphoric acid = 10/90
Flow rate	1.0 mL/min for 3.5 and 5 µm, 0.2 mL/min for 1.7 µm
Temperature	40 °C
Detection	UV @250 nm
Analytes	**1. Oxine** **2. Caffeine**

Oxine

Caffeine



Preparative DAC columns

Preparative ASTRA® columns with dynamic axial compression offer IDs from 25 to 70 mm.

Main benefits:

- No channeling and bed disruption
- Longer column lifetime
- Higher resolution

See available dimensions – page 31.

Estrogens analysis with ASTRA® C18-Hybrid column

Abstract

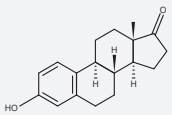
This application describes a quick and robust LC-MS/MS method for analysis of estrone (E1 – shown in the upper chromatograms) and estradiol (E2 – shown in the lower chromatograms), two naturally occurring estrogens in the human body. The ASTRA® C18-Hybrid column provides perfect selectivity and peak symmetry for target compounds throughout a long injection sequence.

Introduction

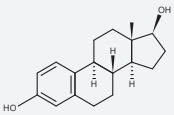
Analysis of endogenous estrogens is challenging due to the low physiological concentrations and weak UV absorption. Multiple metabolites with similar chemical structures and close molecular weights as well as co-eluting substances from biological fluids may cause significant ion suppression in mass spectrometry. Ionization of estrogens is inefficient, introduction of derivatization agents may enhance ionization, but non-specific product ions can be generated. Therefore, the method generating derivatives with product ions specific to individual estrogens is highly demanded.

Column	ASTRA® C18-Hybrid, 5 µm
Dimensions	50 mm × 4.6 mm
Part number	AST-6016-LG46
Mobile phase	70 % MeOH + 10 % 50mM $(NH_4)_2CO_3$ + 20 % UPW Detailed information about gradient table is proprietary
Flow rate	1 mL/min
Temperature	50 °C
Injection volume	60 µL
LC/MS conditions	Proprietary
Analytes	**1. Estrone (E1)** **2. Estradiol (E2)**

Estrone (E1)

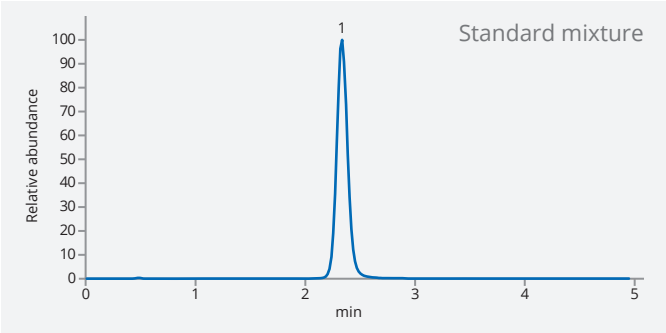


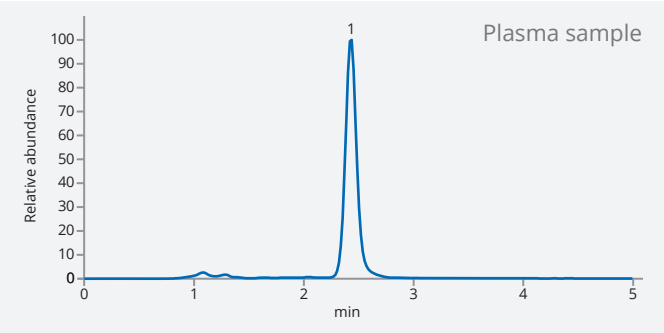
Estradiol (E2)

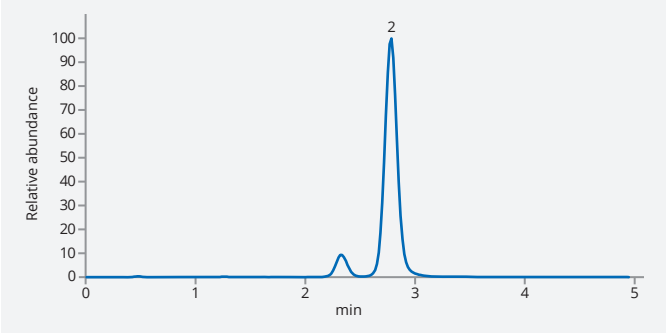


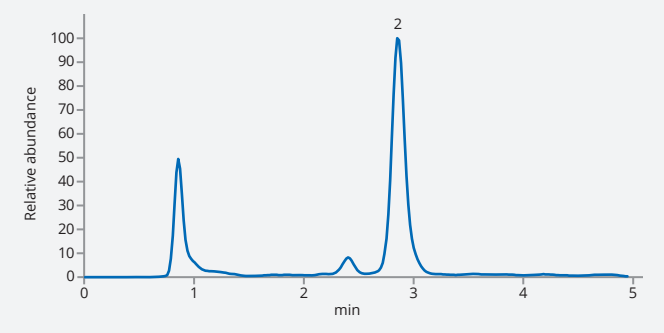
Estrogens analysis with ASTRA® C18-Hybrid column

Analysis of derivatized hormones E1 and E2 in standard mixture and plasma sample on ASTRA® C18-Hybrid column

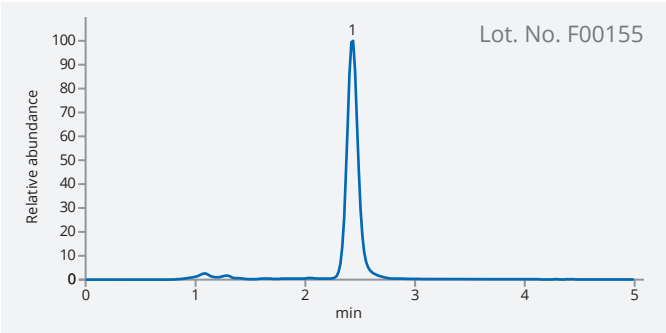


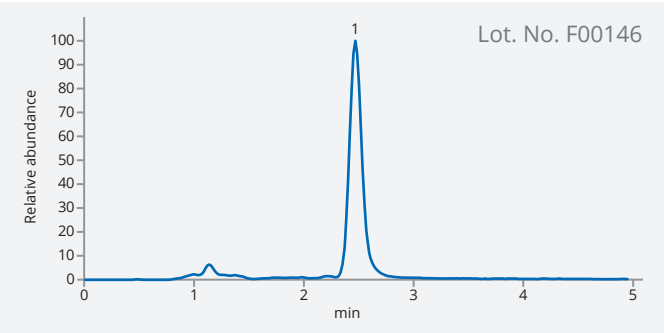


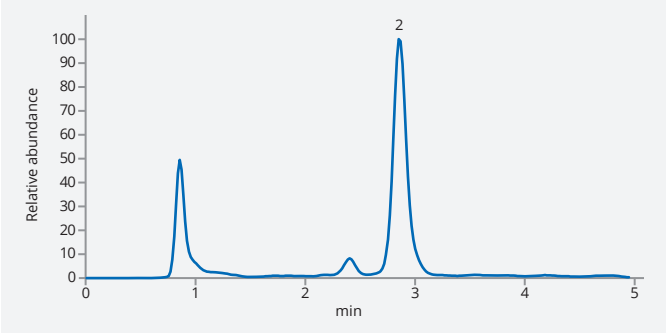


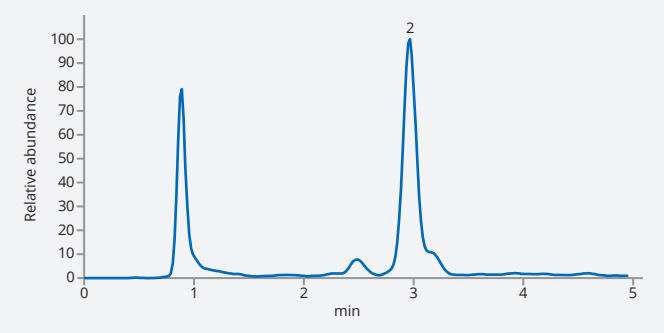


Analysis of plasma sample on different lots of ASTRA® C18-Hybrid column



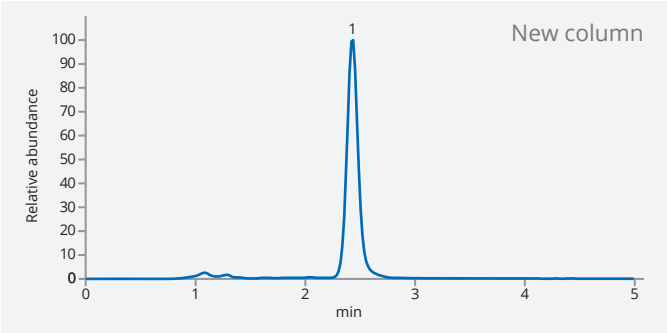


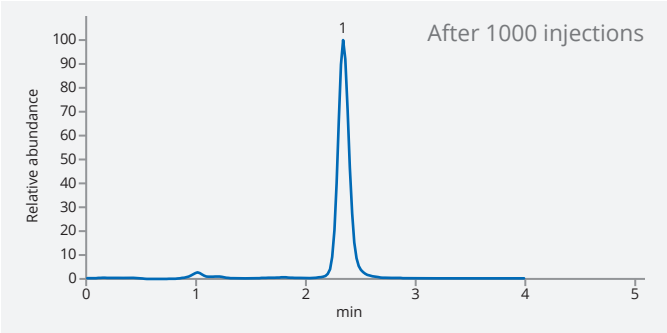


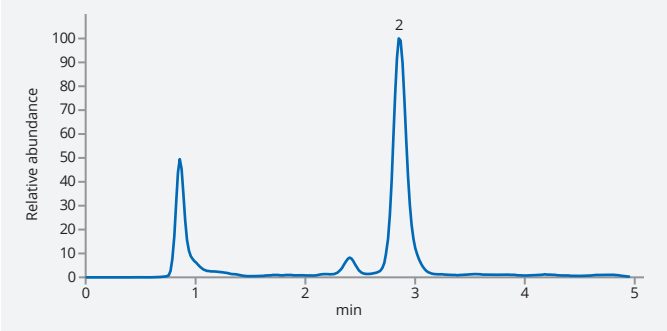


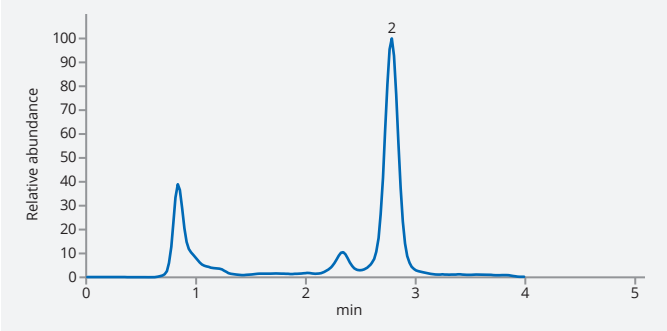
Estrogens analysis with ASTRA® C18-Hybrid column

Analysis of plasma sample on new column ASTRA® C18-Hybrid and after 1000 injections

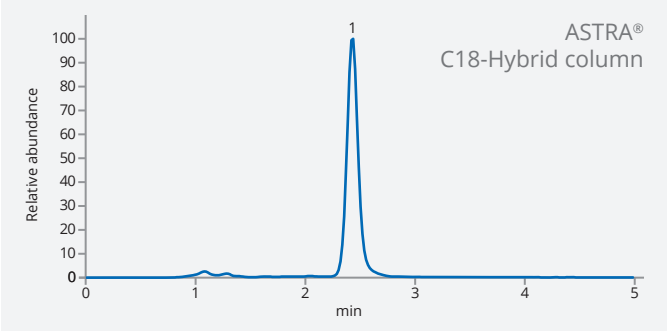


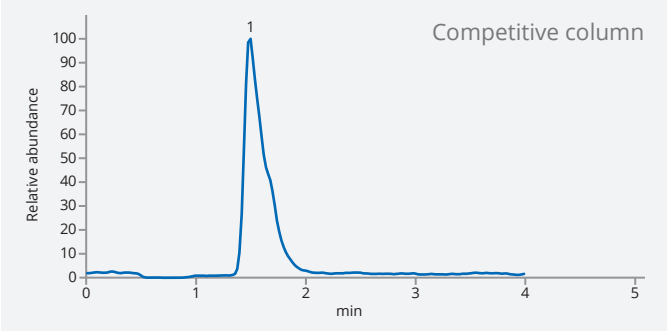


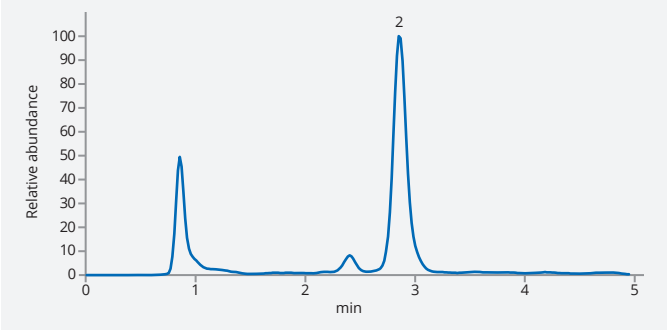


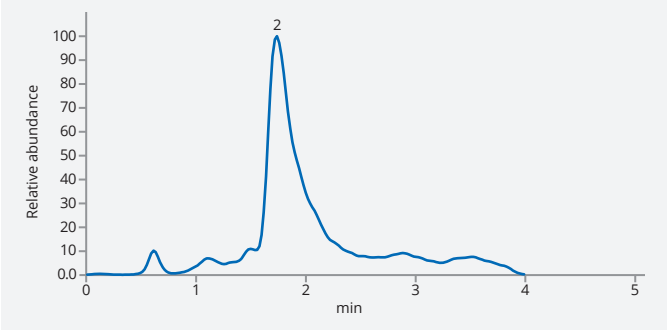


Analysis of plasma sample on column ASTRA® C18-Hybrid and competitive column





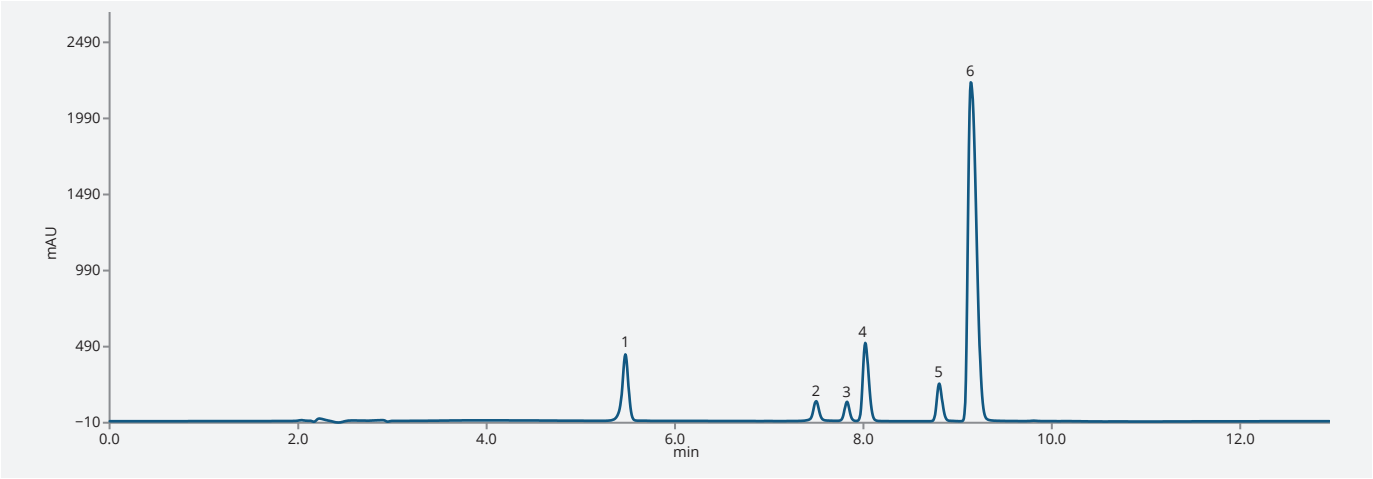




Beta blockers

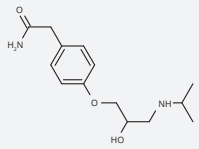
Beta Blockers are also known as beta-adrenergic blocking agents. They are used as a medication that reduces blood pressure.

Standard mixure on ASTRA® C18-HE column

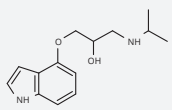


Column	ASTRA® C18-HE, 5 µm			
Dimensions	150 mm × 4.6 mm			
Part number	AST-5732-LK46			
Mobile phase	A: Phosphate buffer 20 mM, pH 2.5			
	B: ACN			
Gradient elution	**Time**	**A [%]**	**B [%]**	**Flow rate [mL/min]**
	0	95	5	0.75
	3	85	15	1.00
	8	50	50	1.00
	12	95	5	1.00
	13	95	5	0.75
Flow rate	See gradient table [mL/min]			
Temperature	25 °C			
Detection	UV @250 nm			
Analytes	**1. Atenolol** **2. Pindolol** **3. Acebutolol** **4. Metoprolol** **5. Labetalol** **6. Propranolol**			

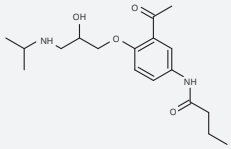
Atenolol



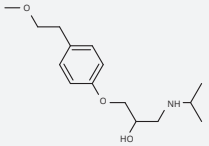
Pindolol



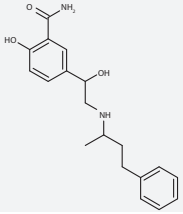
Acebutolol



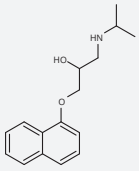
Metoprolol



Labetalol



Propranolol



Oxycodone in Naltrexone

Abstract

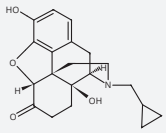
This application shows a simple, precise and stability-indicating HPLC method for simultaneous quantification of oxycodone and naltrexone.

Introduction

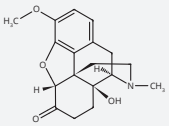
Chronic pain is a therapeutic problem worldwide. Opioids like oxycodone are often used to treat such pain. Long-term therapy with opioids leads to tolerance to their analgesic effect which can result in a need for higher doses to achieve the same analgesic effect. Combination of oxycodone (an opioid agonist) and naltrexone (an opioid antagonist) is used for the management of pain severe enough to require daily, around-the-clock, long-term opioid treatment. Adding of ultra low dose of naltrexone is used for deterring abuse or reducing opioid tolerance, but standard therapeutic doses of naltrexone will block oxycodone's pain-relieving effects and trigger acute withdrawal. So that's why the both compounds should be strictly controlled.

Column	ASTRA® C18-Hybrid, 5 µm		
Dimensions	250 mm x 4.6 mm		
Part number	AST-6016-LM46		
Solution A	Dissolve 1.10 g of 1-octane sulfonic acid sodium salt in 1000 mL of water. Adjust pH to 2.0 with phosphoric acid.		
Mobile phase	A: methanol : tetrahydrofuran : solution A (20:40:940) B: methanol : tetrahydrofuran : solution A (190:40:770)		
Elution	gradient		
Gradient elution	Time [min]	A [%]	B [%]
	0	50	50
	3	50	50
	40	0	100
	45	0	100
	46	50	50
	55	50	50
Flow rate	1.2 mL/min		
Temperature	30 °C		
Detection	UV λ = 230 nm		
Injected volume	10 µL		
Analytes	**1. Naltrexone (4,5α-epoxy-14-hydroxy-3-methoxy-17-methyl-morphinan-6-one)** **2. Oxycodone ((5α)-17-(Cyclopropylmethyl)-3,14-dihydroxy-4,5-epoxymorphinan-6-one)**		

Naltrexone

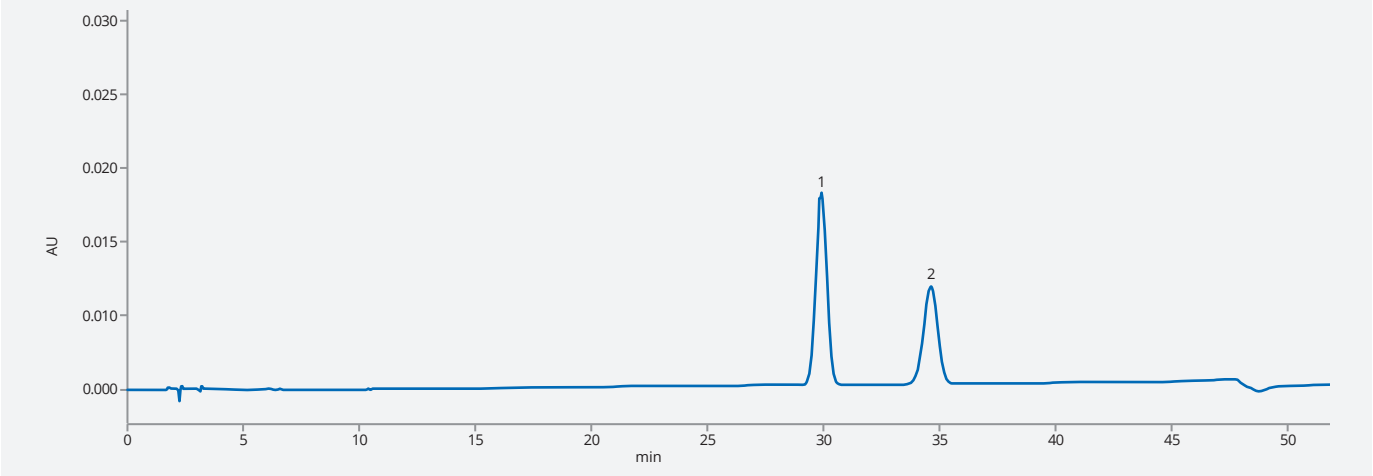


Oxycodone

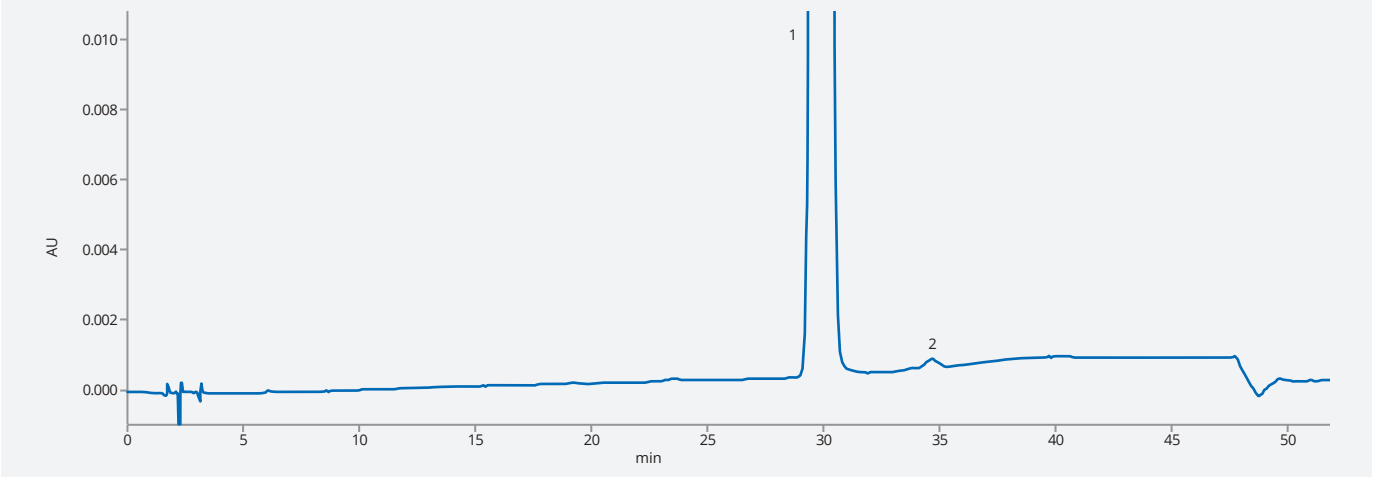


PHARMA APPLICATIONS

Naltrexone and Oxycodone standard



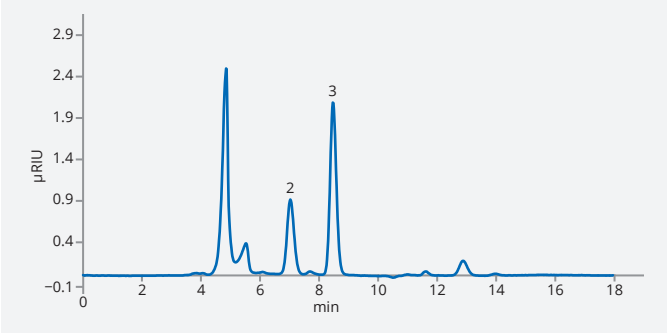
Naltrexone sample spiked with 0.1% of oxycodone

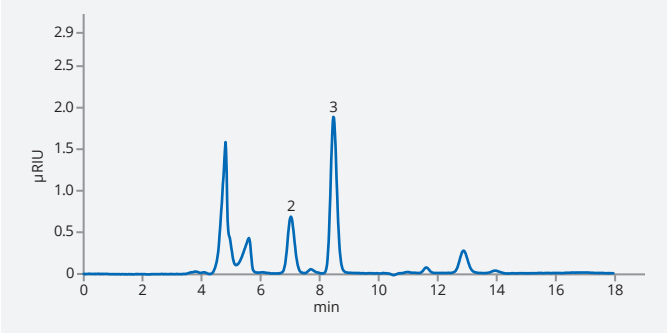


Sugars control in tomatoes and ketchups

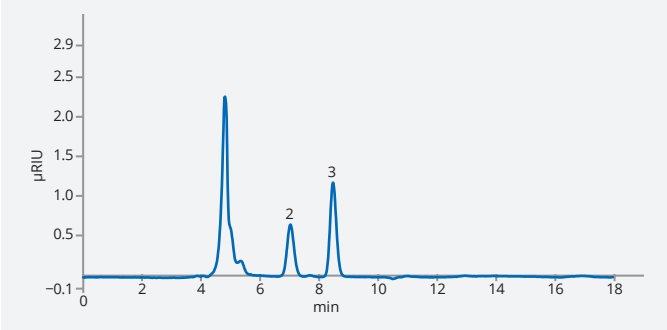
A taste of tomato products depends on content of the main food sugars, such as sucrose, glucose and fructose. Sugars are analysed continuously during the products manufacturing at the different steps of a process. The content of sugars in tomatoes is highly dependent on the geographical origin, ripeness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

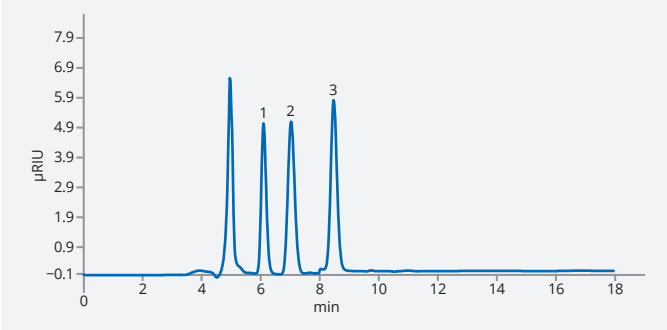
Sugars profile in small and big red tomatoes



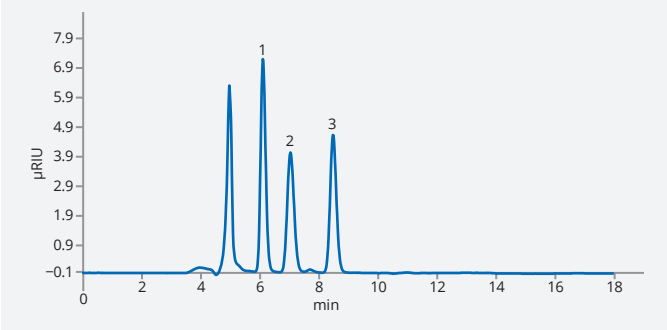


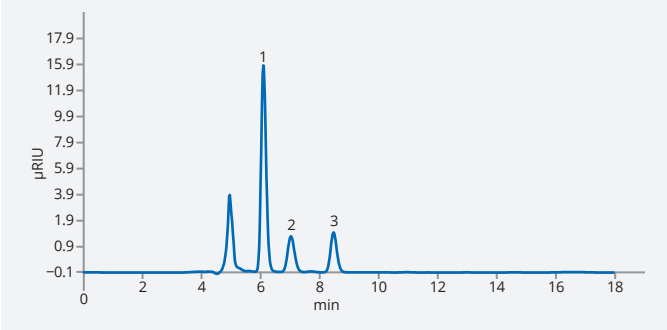
Sugars profile in small orange tomatoes and ketchup Hame spicy





Sugars profile in ketchup Hame sweet and ketchup Hellmann's delicate

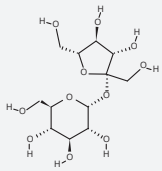




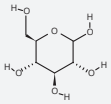
Sugars control in tomatoes and ketchups

Column	ASTRA® Sugar Ca (S), 10 µm
Dimensions	300 mm × 8 mm
Part number	AST-5906-VN80
Mobile phase	100% H_2O
Flow rate	1.0 mL/min
Temperature	80 °C
Detection	UV @250 nm
Injection volume	RID (55 °C)
Analytes	**1. Sucrose** **2. Glucose** **3. Fructose**

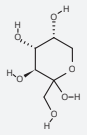
Sucrose



Glucose



Fructose



Pesticides in environmental matrices

Abstract

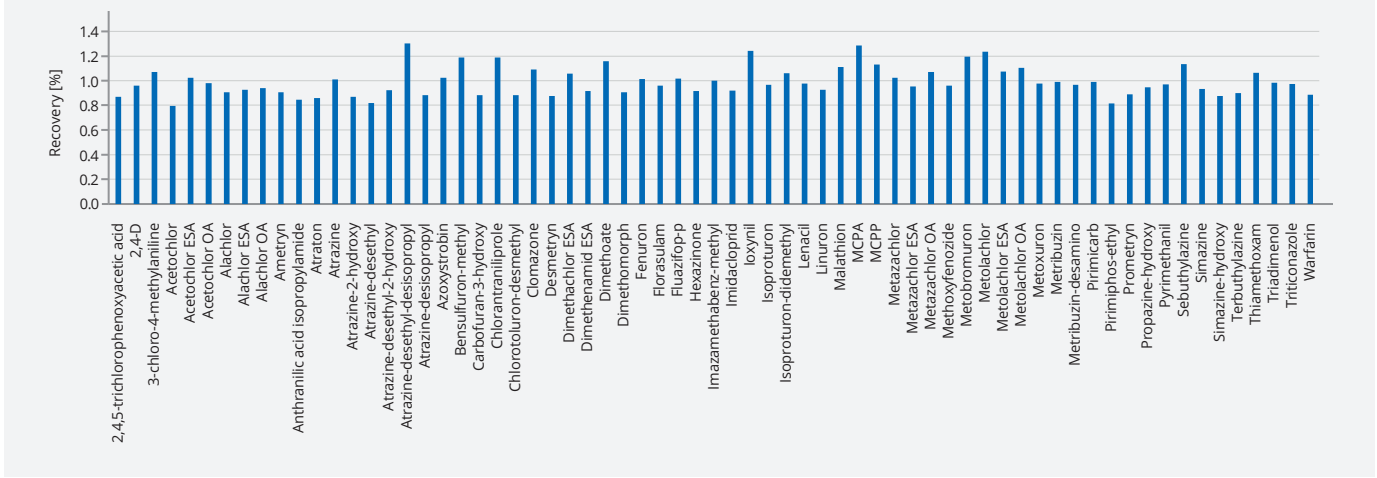
This application describes a quick and robust LC-MS/MS method for simultaneous analysis of residual concentrations of pesticides in water matrices. The method provides a good separation and quantitative determination of pesticides and their isomers. Micro-Solid-Phase Extraction (MSPE) has been used for sample clean-up.

Introduction

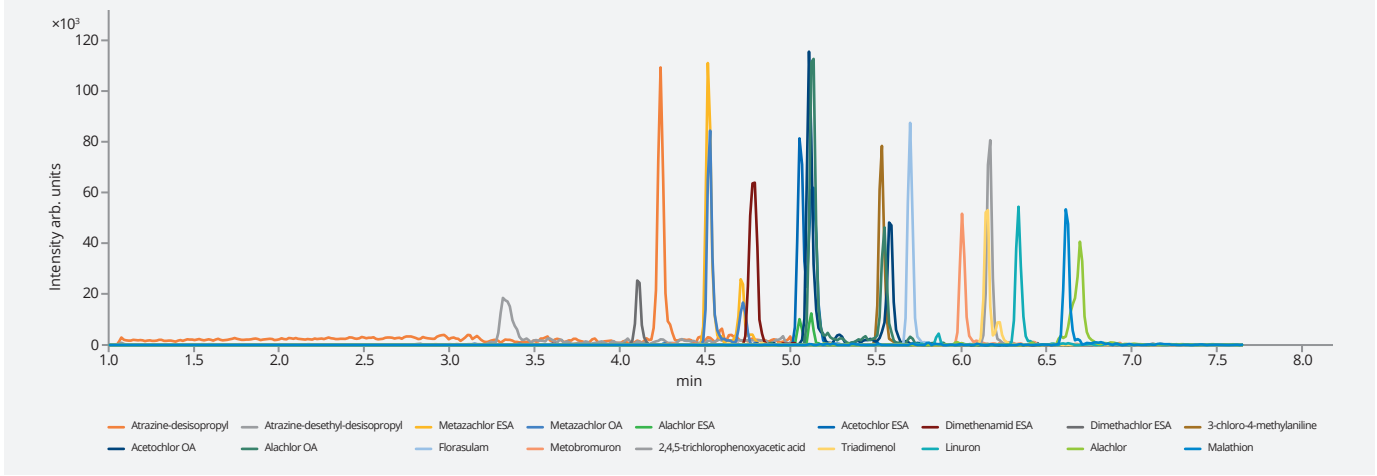
Pesticides play a critical role in food protection against pathogens and pests. However, pesticides pose significant risks to non-target organisms, including animals and humans. The number of pesticides is continuously growing as new active substances are being developed. For this reason, a robust and reliable method for simultaneous determination of multiple analytes, is very relevant today. ASTRA® Pesticides column is designed for routine environmental analysis and provides reliable retention under high-aqueous conditions for wide class of compounds including triazines, chlorophenoxy acids, organophosphates, fungicides and herbicide metabolites.

Pesticides in environmental matrices

Recovery results by MSPE method

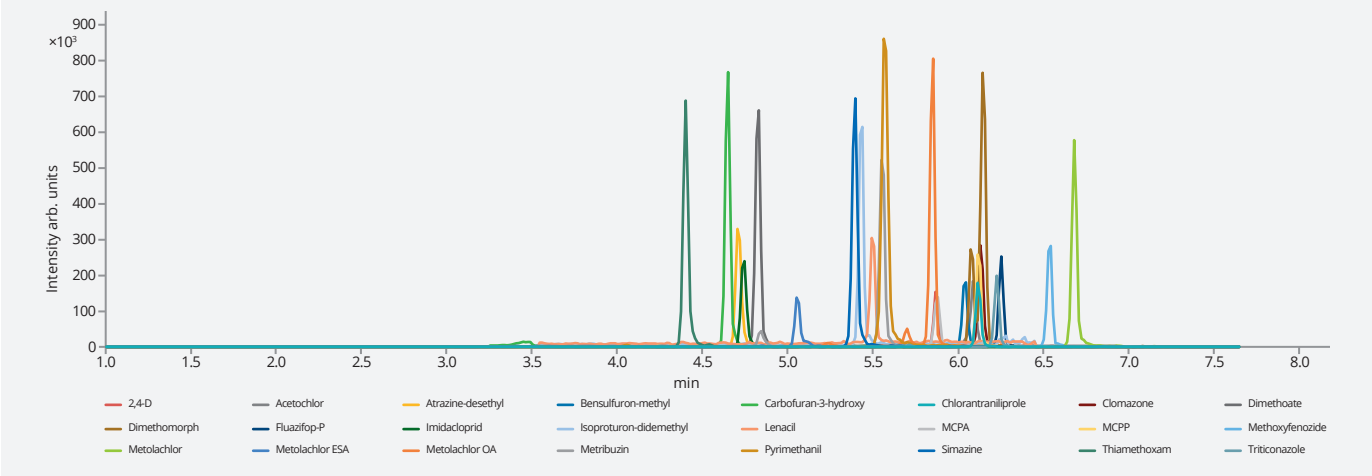


Test solution 1 on ASTRA® Pesticides column

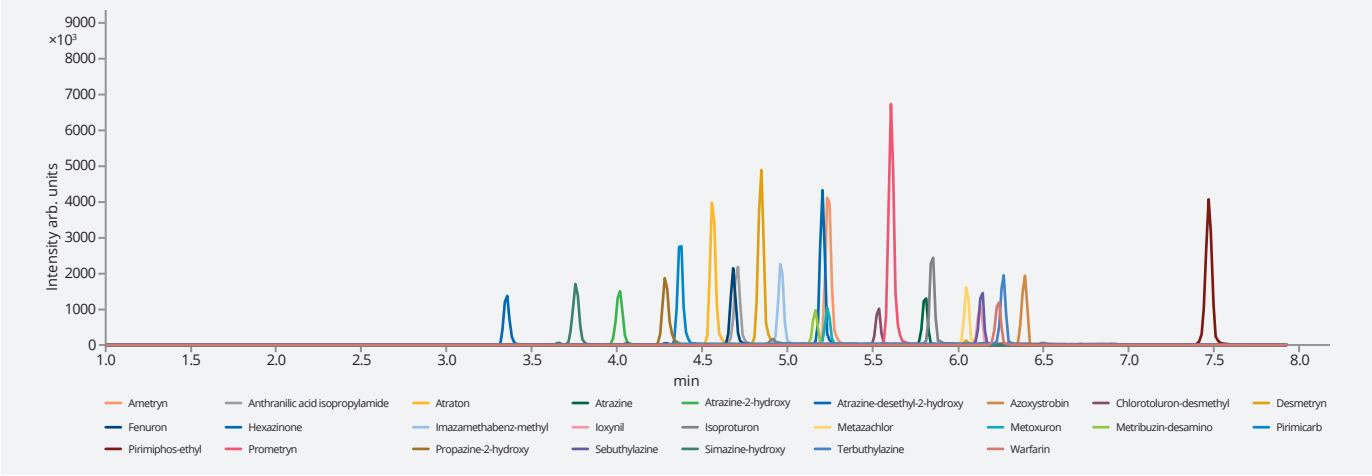


Pesticides in environmental matrices

Test solution 2 on ASTRA® Pesticides column

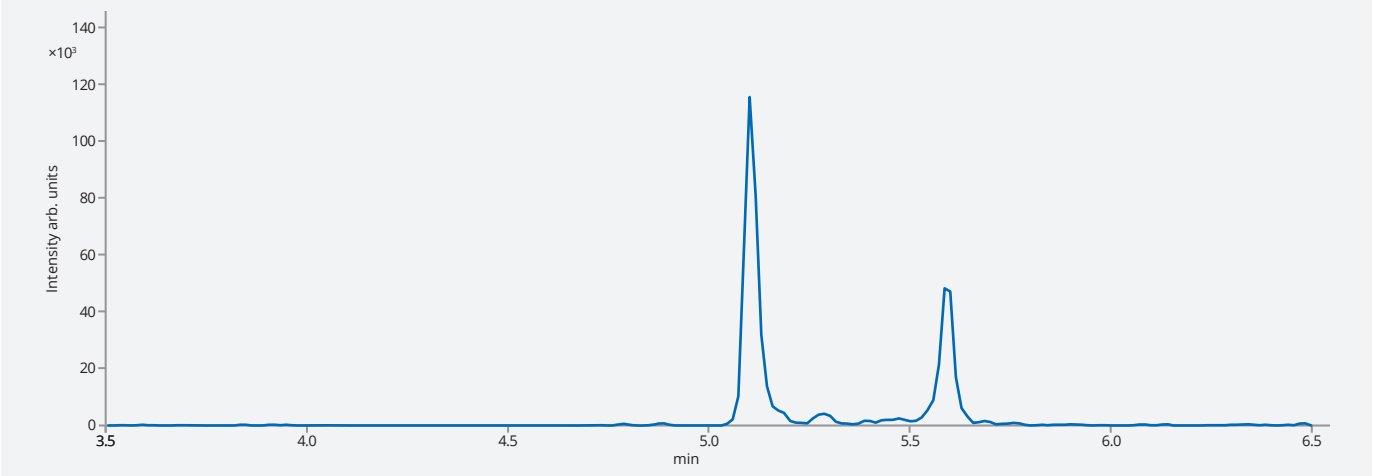


Test solution 3 on ASTRA® Pesticides column

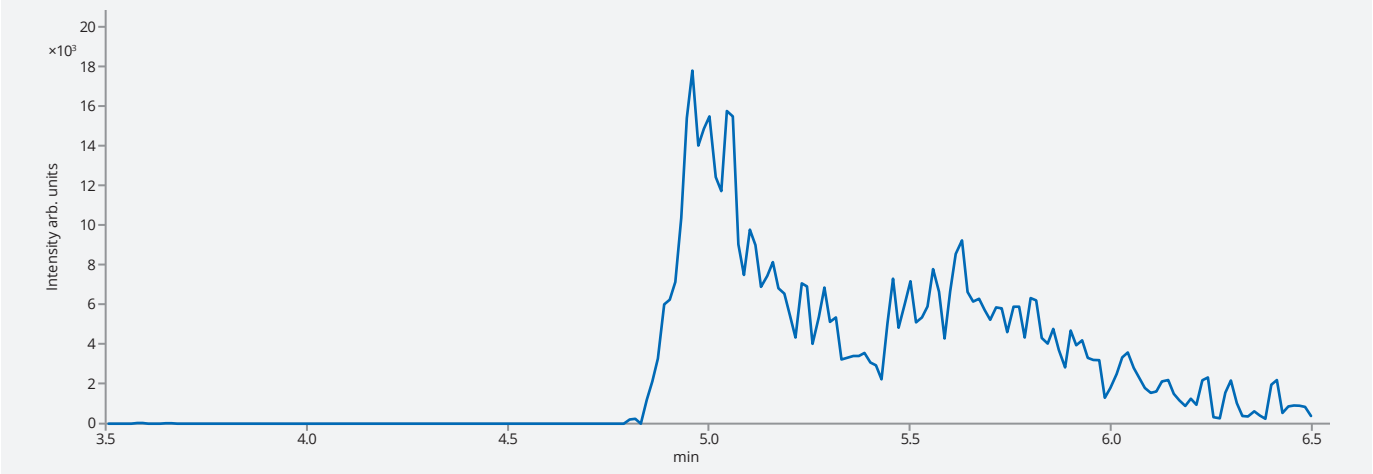


Pesticides in environmental matrices

Acetochlor OA on ASTRA® Pesticides column



Acetochlor OA on Competitive column



ENVIRONMENTAL APPLICATIONS

Pesticides in environmental matrices

MSPE Method

MSPE Column	HLB, 0.22 µm PTFE hydrophilic membrane, 15 mg
Part number	MSP-5877-DA07
Equilibration	650 µL of Methanol, 650 µL of UPW
Sample	650 µL of UPW + std 10 ng/mL
	650 µL of UPW
Elution	650 µL of Methanol

MSPE columns

Centrifugation in Eppendorf minispin under 6000 rpm for 2 min.

HPLC Method

LC/MS conditions	TSQ Quantiva			
Column	ASTRA® Pesticides, 3 µm			
Dimensions	50 mm × 2.1 mm			
Part number	AST-6015-IG21			
Mobile phase	A: DDW + 0.1% Formic Acid			
	B: ACN + 0.1% Formic Acid			
Gradient elution	**Time**	**A [%]**	**B [%]**	**Flow rate [µL/min]**
	0	100	0	300
	1	100	0	300
	4	60	40	350
	6	20	80	400
	9	0	100	400
	10	0	100	400
	10.1	100	0	300
	13	100	0	300
Temperature	30 °C			
Injection volume	10 µL			
Detection	HESI-MRM positive/negative ion mode			

University of South Bohemia in České Budějovice
Faculty of Fisheries and Protection of Waters

This application was developed in collaboration with Research Institute of Fish Culture and Hydrobiology, The Czech Republic

Pesticides in environmental matrices

Analytes	Compound	RT [min]	Chromatogram	Comments
	2,4,5-trichlorophenoxyacetic acid	6.21	Test 1	
	2,4-D	5.91	Test 2	
	3-chloro-4-methylaniline	5.56	Test 1	
	Acetochlor	6.13	Test 2	
	Acetochlor ESA	5.06, 5.14	Test 1	2 peaks
	Acetochlor OA	5.10, 5.60	Test 1	2 peaks
	Alachlor	6.76	Test 1	
	Alachlor ESA	5.06, 5.13	Test 1	2 peaks
	Alachlor OA	5.14, 5.57	Test 1	2 peaks
	Ametryn	5.26	Test 3	
	Anthranilic acid isopropylamide	4.7	Test 3	
	Atraton	4.55	Test 3	
	Atrazine	5.86	Test 3	
	Atrazine-2-hydroxy	3.99	Test 3	
	Atrazine-desethyl	4.7	Test 2	
	Atrazine-desethyl-2-hydroxy	3.3	Test 3	
	Atrazine-desethyl-desisopropyl	3.26	Test 1	
	Atrazine-desisopropyl	4.22	Test 1	
	Azoxystrobin	6.45	Test 3	
	Bensulfuron-methyl	6.1	Test 2	
	Carbofuran-3-hydroxy	4.64	Test 2	
	Chlorantraniliprole	6.17	Test 2	
	Chlorotoluron-desmethyl	5.56	Test 3	
	Clomazone	6.18	Test 2	
	Desmetryn	4.85	Test 3	
	Dimethachlor ESA	4.1	Test 1	
	Dimethenamid ESA	4.78	Test 1	
	Dimethoate	4.83	Test 2	
	Dimethomorph	6.12, 6.18	Test 2	2 peaks
	Fenuron	4.67	Test 3	
	Florasulam	5.72	Test 1	
	Fluazifop-P	6.29	Test 2	

Pesticides in environmental matrices

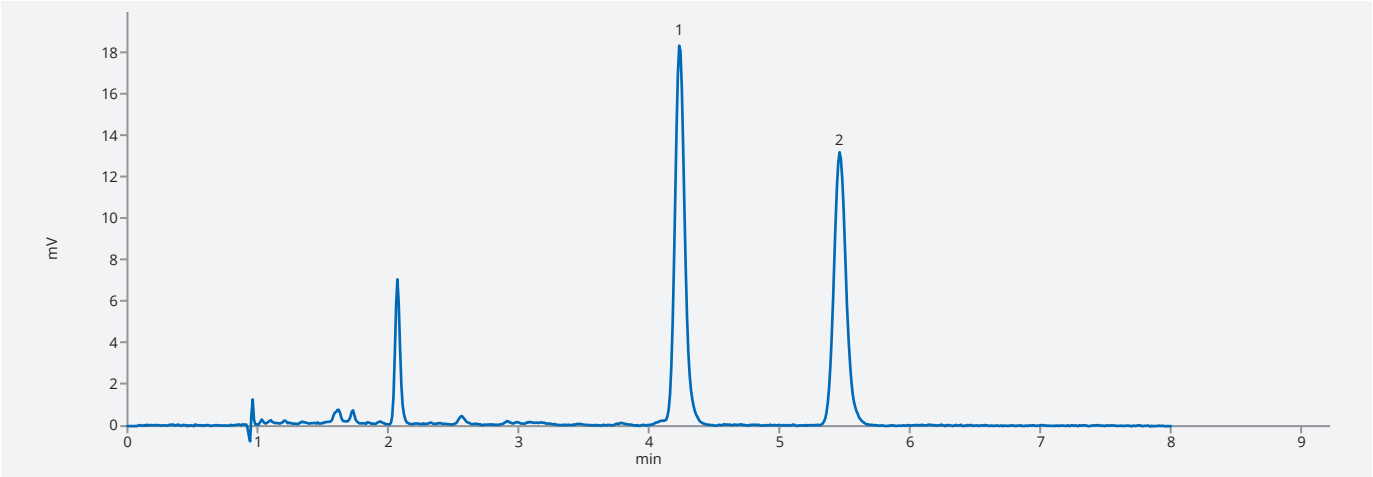
Analytes	Compound	RT [min]	Chromatogram	Comments
	Hexazinone	5.21	Test 3	
	Imazamethabenz-methyl	4.95	Test 3	
	Imidacloprid	4.75	Test 2	
	Ioxynil	6.18	Test 3	
	Isoproturon	5.87	Test 3	
	Isoproturon-didemethyl	5.44	Test 2	
	Lenacil	5.53	Test 2	
	Linuron	6.37	Test 1	
	Malathion	6.66	Test 1	
	MCPA	5.93	Test 2	
	MCPP	6.17	Test 2	
	Metazachlor	6.09	Test 3	
	Metazachlor ESA	4.51, 4.73	Test 1	2 peaks
	Metazachlor OA	4.51, 4.7	Test 1	2 peaks
	Methoxyfenozide	6.58	Test 2	
	Metobromuron	6.05	Test 1	
	Metolachlor	6.73	Test 2	
	Metolachlor ESA	5.05	Test 2	
	Metolachlor OA	5.89	Test 3	
	Metoxuron	5.25	Test 3	
	Metribuzin	5.59	Test 2	
	Metribuzin-desamino	5.17	Test 3	
	Pirimicarb	4.35	Test 3	
	Pirimiphos-ethyl	7.58	Test 3	
	Prometryn	5.63	Test 3	
	Propazine-2-hydroxy	4.26	Test 3	
	Pyrimethanil	5.6	Test 2	
	Sebuthylazine	6.19	Test 3	
	Simazine	5.42	Test 2	
	Simazine-hydroxy	3.72	Test 3	
	Terbuthylazine	6.32	Test 3	
	Thiamethoxam	4.38	Test 2	
	Triadimenol	6.19	Test 1	
	Triticonazole	6.26	Test 2	
	Warfarin	6.28	Test 3	

Notes: OA – oxanilic acid, ESA – ethanesulfonic acid

Pyrethroid insecticides

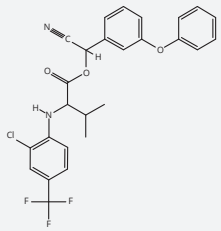
Flumetrin and fluvalinate are pyrethroid insecticides used to control mites in honeybee colonies. The treatment by these insecticides should be strictly controlled due to its toxic effects on health of honeybees. The described method allows to determine flumetrin and fluvalinate in honey and related biological samples matrixes.

Test solution on ASTRA® C18-HE column

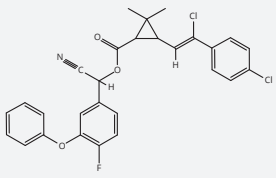


Column	ASTRA® C18-HE, 3 µm
Dimensions	150 mm × 4.6 mm
Part number	AST-5732-IK46
Mobile phase	ACN : water 90/10 (v/v) Isocratic elution
Flow rate	1.5 mL/min
Temperature	25 °C
Detection	PDA at 255 nm
Analytes	**1. Fluvalinate** **2. Flumethrin**

Fluvalinate



Flumethrin



This application was developed by the Beekeeping Research Institute.

Bisphenols by LC-MS/MS

Abstract

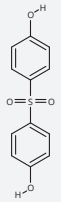
This application shows the simultaneous determination of BPA and other bisphenol analogues at the traces concentrations levels by LC-MS/MS method.

Introduction

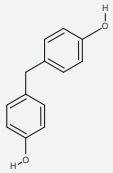
Bisphenols are a class of chemical additives used to impart the desired properties of plastic materials. They are added to food packaging internal coatings to protect food and beverage from direct contact with metal. Residues of bisphenols can migrate into foods and has been found in various body tissues and fluids. BPAs have a proven toxic effects and can cause heart disease, obesity, diabetes, endocrine disruption and cancer. BPAs should be strictly monitored at low doses due the harmful effects on living organisms.

Column	ASTRA® Phenyl-Hexyl-HE, 3 µm		
Dimensions	100 mm × 2.1 mm		
Part number	AST-5891-II21		
Mobile phase	A: DDW		
	B: MeOH		
Gradient elution	**Time**	**A (%)**	**B (%)**
	0	75	25
	1	75	25
	4	0	100
	9	0	100
	9.1	75	25
Flow rate	350 µL/min		
Temperature	23 °C		
Injection volume	10 µL		
Detection	LC-MS/MS-negative MRM mode		
MS instrument	Bruker EVOQ® DART-TQ+		
Sample	UV @250 nm		
Analytes	**1. Bisphenol S** **2. Bisphenol F** **3. Bisphenol A** **4. Bisphenol B** **5. Bisphenol AF**		

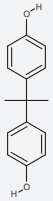
Bisphenol S



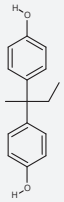
Bisphenol F



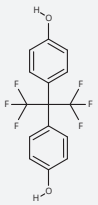
Bisphenol A



Bisphenol B

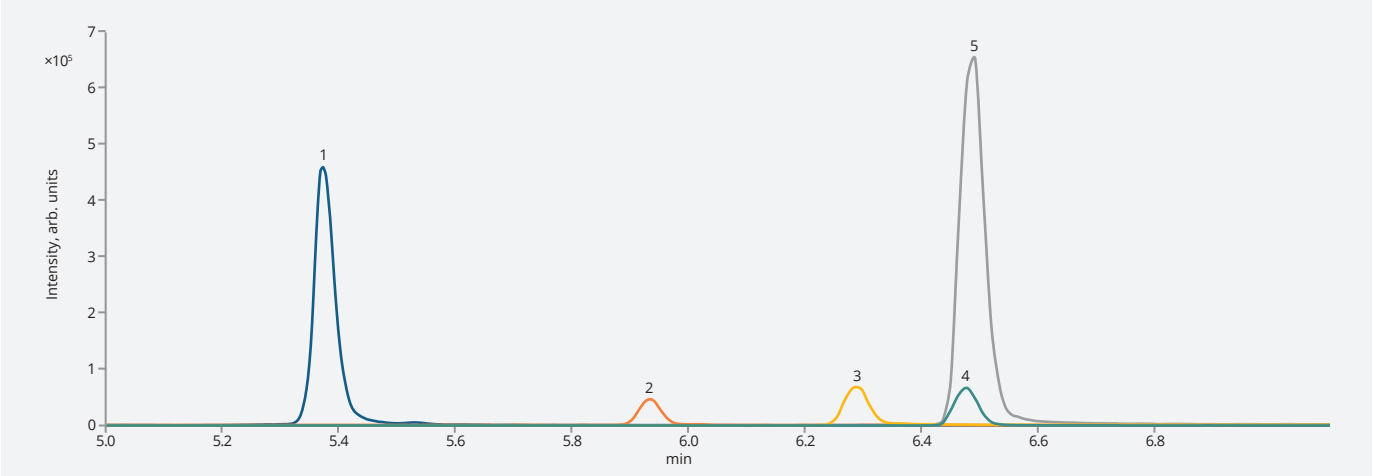


Bisphenol AF



Bisphenols by LC-MS/MS

Bisphenols on ASTRA® Phenyl-Hexyl-HE column



Analyte	Precursor [m/z]	Product [m/z]	Colision energy [V]
Bisphenol S	249	108	20
Bisphenol F	199	93	15
Bisphenol AF	335	265	14
Bisphenol A	227	212	11
Bisphenol B	241	212	11

Ordering information / Analytical columns

2 µm ASTRA®

all dimensions in mm

Phase	30 × 2.1	50 × 2.1	75 × 2.1	100 × 2.1	150 × 2.1	100 × 3.0	AGS Guard System 2.1 mm Cartridges
C18-HE	On request	AST-5732-TG21	AST-5732-TH21	AST-5732-TI21	AST-5732-TK21	AST-5732-TI30	AGS-5731-RB2*
C18-AQ	On request	AST-5832-TG21	AST-5832-TH21	AST-5832-TI21	AST-5832-TK21	On request	AGS-5731-RB2*

2 µm ASTRA®

all dimensions in mm

Phase	50 × 4.6	AGS Guard System 4.0 mm Cartridges
C18-HE	AST-5732-TG46	AGS-5731-RC4*
C18-AQ	On request	AGS-5731-RC4*

3 µm ASTRA®

all dimensions in mm

Phase	30 × 2.1	50 × 2.1	75 × 2.1	100 × 2.1	150 × 2.1	AGS Guard System 2.1 mm Cartridges
C18-HE	AST-5732-ID21	AST-5732-IG21	AST-5732-IH21	AST-5732-II21	AST-5732-IK21	AGS-5731-RC2*
C18-AQ	On request	AST-5832-IG21	AST-5832-IH21	AST-5832-II21	AST-5832-IK21	AGS-5731-RC2*
C18-Hybrid	On request	AST-6016-IG21	On request	On request	On request	On request
C18-BDS	On request	On request	On request	AST-5875-II21	AST-5875-IK21	AGS-5731-RC2*
Phenyl-Hexyl-HE	On request	On request	On request	AST-5891-II21	AST-5891-IK21	AGS-5731-RC2*
DM	On request	On request	On request	AST-5810-II21	AST-5810-IK21	AGS-5731-RC2*
Diol	AST-5858-ID21	On request	On request	AST-5858-II21	AST-5858-IK21	On request
Si	On request	AST-5905-IG21	On request	AST-5905-II21	AST-5905-IK21	On request

3 µm ASTRA®

all dimensions in mm

Phase	50 × 3.0	100 × 3.0	150 × 3.0	AGS Guard System 2.1 mm Cartridges
C18-HE	AST-5732-IG30	AST-5732-II30	AST-5732-IK30	AGS-5731-RC2*
C18-AQ	AST-5832-IG30	AST-5832-II30	AST-5832-IK30	AGS-5731-RC2*
C18-Hybrid	On request	AST-6016-II30	AST-6016-IK30	AGS-5790-XC4*
C18-BDS	On request	AST-5875-II30	AST-5875-IK30	AGS-5731-RC2*
Phenyl-Hexyl-HE	On request	AST-5891-II30	On request	AGS-5731-RC2*
DM	On request	AST-5810-II30	AST-5810-IK30	AGS-5731-RC2*
Diol	On request	AST-5858-II30	AST-5858-IK30	On request
Si	On request	On request	AST-5905-IK30	On request

3 µm ASTRA®

all dimensions in mm

Phase	50 × 4.6	100 × 4.6	150 × 4.6	250 × 4.6	AGS Guard System 4.0 mm Cartridges
C18-HE	AST-5732-IG46	AST-5732-II46	AST-5732-IK46	AST-5732-IM46	AGS-5790-RC4*
C18-AQ	On request	AST-5832-II46	AST-5832-IK46	AST-5832-IM46	AGS-5790-RC4*
C18-Hybrid	AST-6016-IG46	AST-6016-II46	AST-6016-IK46	AST-6016-IM46	AGS-5790-XC4
C18-BDS	On request	AST-5875-II46	AST-5875-IK46	On request	AGS-5790-RC4*
C8-HE	On request	On request	AST-5896-IK46	On request	AGS-5790-RC4*
Phenyl-Hexyl-HE	On request	AST-5891-II46	AST-5891-IK46	On request	AGS-5790-RC4*
DM	On request	AST-5810-II46	AST-5810-IK46	On request	AGS-5790-RC4*
Diol	On request	On request	AST-5858-IK46	AST-5858-IM46	On request

* 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).

Ordering information / Analytical columns

5 µm ASTRA®
all dimensions in mm

Phase	30 × 2.1	50 × 2.1	50 × 3.0	100 × 3.0	150 × 3.0	AGS Guard System 2.1 mm Cartridges
C18-HE	AST-5732-LD21	AST-5732-LG21	AST-5732-LG30	AST-5732-LI30	AST-5732-LK30	AGS-5731-RD2*
C18-AQ	AST-5832-LD21	AST-5832-LG21	On request	AST-5832-LI30	AST-5832-LK30	AGS-5731-RD2*
C18-Hybrid	On request	On request	On request	On request	On request	On request
C18-BDS	On request	On request	On request	AST-5875-LI30	AST-5875-LK30	AGS-5731-RD2*
C8-BDS	On request	On request	On request	AST-5895-LI30	On request	AGS-5731-RD2*
Phenyl-Hexyl-HE	On request	On request	On request	AST-5891-LI30	On request	AGS-5731-RD2*
DM	On request	AST-5810-LG21	On request	AST-5810-LI30	AST-5810-LK30	AGS-5731-RD2*
Diol	On request	On request	On request	AST-5858-LI30	On request	On request
Si	On request	On request	AST-5905-LG30	On request	On request	On request

5 µm ASTRA®
all dimensions in mm

Phase	250 × 4.0	AGS Guard System 4.0 mm Cartridges
C18-HE	AST-5732-LM40	AGS-5790-RD4*
C18-AQ	AST-5832-LM40	AGS-5790-RD4*
C18-Hybrid	AST-6016-LM40	AGS-5790-XD4*
C18-BDS	AST-5875-LM40	AGS-5790-RD4*
C8-HE	AST-5896-LM40	AGS-5790-RD4*
C8-BDS	AST-5895-LM40	AGS-5790-RD4*
Phenyl-Hexyl-HE	On request	AGS-5790-RD4*
DM	On request	AGS-5790-RD4*
Si	AST-5905-LM40	AGS-5731-ND4*

ASTRA® Sugar guard column

5 µm ASTRA®
all dimensions in mm

Phase	30 × 4.6	50 × 4.6	100 × 4.6	150 × 4.6	200 × 4.6	250 × 4.6	AGS Guard System 4.0 mm Cartridges
C18-HE	AST-5732-LD46	On request	AST-5732-LI46	AST-5732-LK46	On request	AST-5732-LM46	AGS-5790-RD4*
C18-AQ	On request	On request	AST-5832-LI46	AST-5832-LK46	On request	AST-5832-LM46	AGS-5790-RD4*
C18-Hybrid	On request	AST-6016-LG46	AST-6016-LI46	AST-6016-LK46	On request	AST-6016-LM46	AGS-5790-XD4*
C18-BDS	On request	On request	AST-5875-LI46	AST-5875-LK46	On request	AST-5875-LM46	AGS-5790-RD4*
C8-HE	On request	On request	On request	AST-5896-LK46	On request	AST-5896-LM46	AGS-5790-RD4*
C8-BDS	On request	On request	On request	AST-5895-LK46	On request	AST-5895-LM46	AGS-5790-RD4*
Phenyl-Hexyl-HE	On request	On request	AST-5891-LI46	AST-5891-LK46	On request	AST-5891-LM46	AGS-5790-RD4*
DM	On request	On request	AST-5810-LI46	AST-5810-LK46	On request	AST-5810-LM46	AGS-5790-RD4*
Diol	On request	On request	On request	AST-5858-LK46	On request	AST-5858-LM46	On request
Si	On request	On request	On request	AST-5905-LK46	AST-5905-LL46	AST-5905-LM46	AGS-5731-ND4*

* 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).

9 µm ASTRA®
all dimensions in mm

Phase	300 × 8.0	Guard column 30 × 8.0
Sugar Ca (S)	AST-5906-WN80	AGS-5906-IFC
Sugar H (S)	On request	AGS-5906-JFC

10 µm ASTRA®
all dimensions in mm

Phase	300 × 8.0	Guard column 30 × 8.0
Sugar Ca (S)	AST-5906-VN80	AGS-5906-IFC
Sugar H (S)	AST-5927-VN80	AGS-5906-JFC
Sugar K (S)	AST-5926-VN80	On request
Sugar Na (S)	AST-5928-VN80	AGS-5906-KFC

Ordering information / Analytical columns / Semi-preparative & Preparative columns

10 µm ASTRA®
all dimensions in mm

Phase	30 × 2.1	250 × 4.0	200 × 4.6	250 × 4.6
C18-HE	On request	On request	AST-5732-PL46	AST-5732-PM46
C18-AQ	AST-5832-PD21	AST-5832-PM40	On request	On request

Application specific columns

3 µm ASTRA®
all dimensions in mm

Phase	30 × 2.1	50 × 2.1
Pesticides	On request	AST-6015-IG21

5 µm ASTRA®
all dimensions in mm

Phase	250 × 4.0
CavitySelect	AST-6022-LM40

On-line SPE columns

3 µm ASTRA®
all dimensions in mm

Phase	30 × 2.1
Diol	AST-5858-ID21

5 µm ASTRA®
all dimensions in mm

Phase	20 × 2.1
C18-HE	AST-5732-LC21

10 µm ASTRA®
all dimensions in mm

Phase	20 × 2.1	30 × 2.1
C18-HE	On request	On request
C18-AQ	AST-5832-PC21	AST-5832-PD21

Semi-preparative columns

5 µm ASTRA®
all dimensions in mm

Phase	250 × 10
C18-HE	AST-5732-LM1X
C18-AQ	AST-5832-LM1X

Preparative columns

10 µm ASTRA®
all dimensions in mm

Phase	250 × 20
C18-HE	AST-5732-PM2Y
C18-AQ	On request

Note: These columns are supplied with standard nut.

ASTRA® semi-preparative column

Ordering information / Semi-preparative & Preparative columns

Semi-preparative columns

15 µm ASTRA®

all dimensions in mm

Phase	250 × 10
DM	AST-5810-QM1X

Preparative DAC columns

5 µm ASTRA®

all dimensions in mm

Phase	150 × 25
C18-HE	ASP-5732-LK2Z-LDAC
C18-AQ	On request
C8-HE	On request

5 µm ASTRA®

all dimensions in mm

Phase	100 × 30	150 × 30	250 × 30	250 × 50
C18-HE	ASP-5732-LI3X-LDAC	ASP-5732-LK3X-LDAC	ASP-5732-LM3X-LDAC	ASP-5732-LM5X-LDAC
C18-AQ	On request	On request	On request	On request
C8-HE	ASP-5896-LI3X-LDAC	On request	On request	ASP-5896-LM5X-LDAC

10 µm ASTRA®

all dimensions in mm

Phase	100 × 30	150 × 30	250 × 30	250 × 70
C18-HE	On request	On request	On request	ASP-5732-PM7X-LDAC
C18-AQ	On request	On request	ASP-5832-PM3X-LDAC	On request
C8-HE	On request	On request	On request	On request

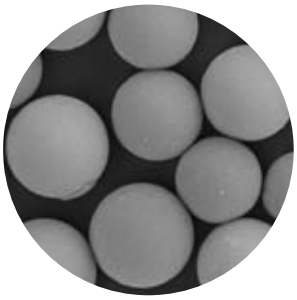
Note: These long-life columns are with Axial Dynamic Compression system.

Preparative DAC column

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

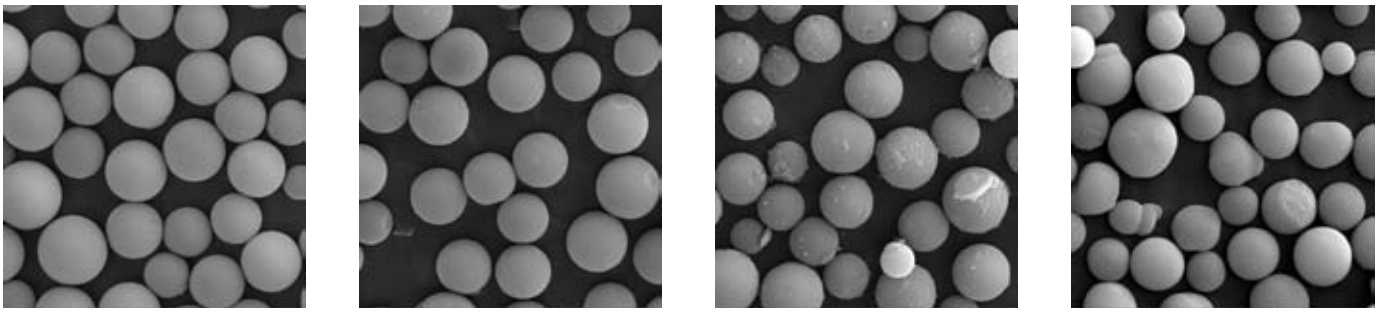
Particle size	5 µm	2.2 µm
Metal content	<10 ppm	<10 ppm
Temperature stability	100 °C*	100 °C*
Mean particle diameter	5.3 ± 0.9 µm	2.5 ± 0.5 µm
Proximity to the shape of a sphere	0.96 ± 0.04	0.97 ± 0.03

* Depends on mobile phase used and silica bonding.

ARION® phases	Particle size [µm]	Pore size [Å]	Surface area [m²/g]	Carbon load	pH stability	End-capping	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, L96
C8	3, 5	120	325	11 %	2.0 to 7	Single-step	×	L7
Biphenyl	3, 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
PFP	5	100	420	14 %	1.5 to 7.5	Single-step	✓	L43
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, 10	120	325	–	1.0 to 7.5	–	×	L14
SCX	5	120	325	–	1.0 to 7.5	–	×	L9

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.



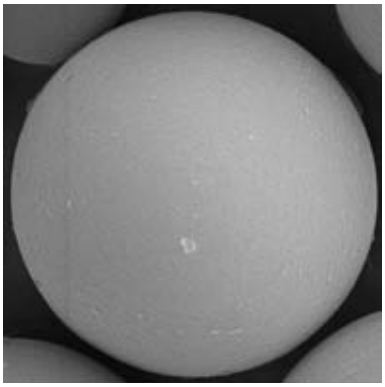
ARION® Competitor L Competitor X Competitor E

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

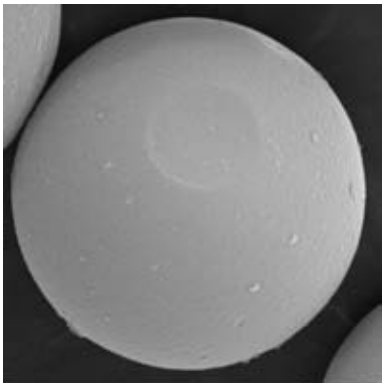
The ARION® medium does not include broken or “potato-shaped” particles. The silica spherical shape is unique; both surface uniformity and surface smoothness enable better packing into HPLC columns and therefore paramount chromatography resolution and reproducibility.

Up close

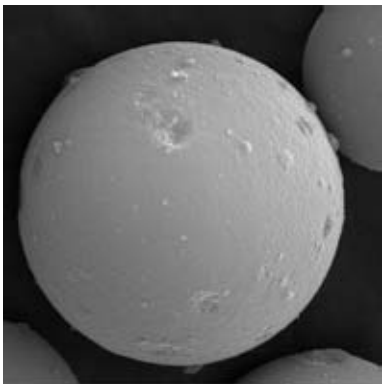
The 5-micron electron microscope field clearly shows the highest quality of ARION® 5µm particles.



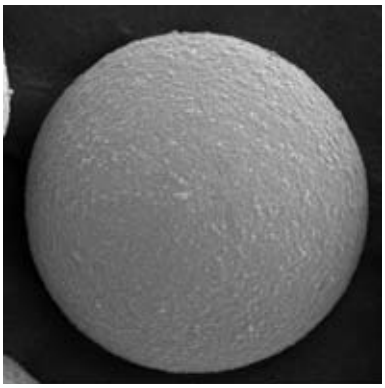
ARION® particle 5 µm



Competitor L particle 5 µm



Competitor X particle 5 µm



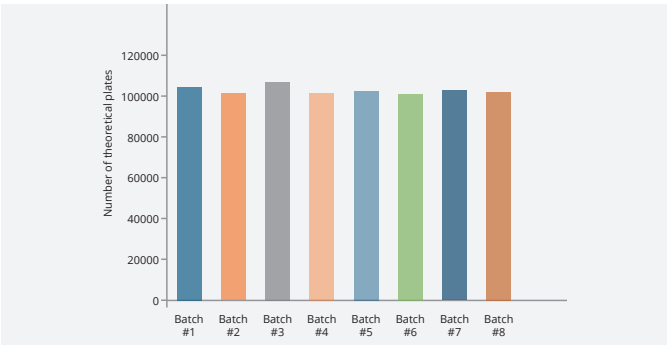
Competitor E particle 5 µm

Main particle characteristics:

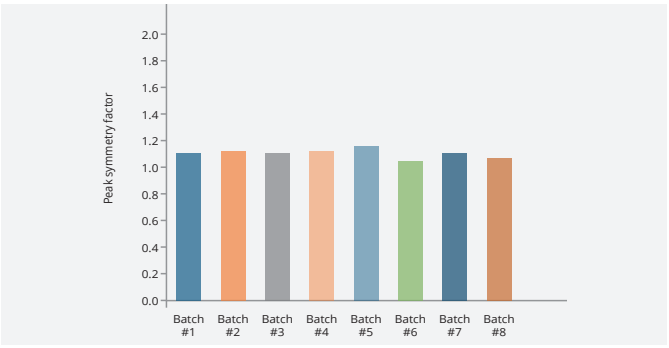
- The closest proximity to a sphere.
- Unique surface smoothness shown in the pictures above.
- Tight particle size distribution.
- No broken particles.
- No presence of clustered particles.
- No “Moon craters or mountains”.

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).



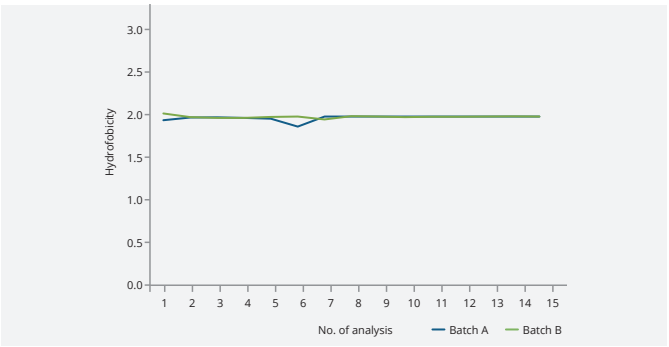
Theoretical plates reproducibility



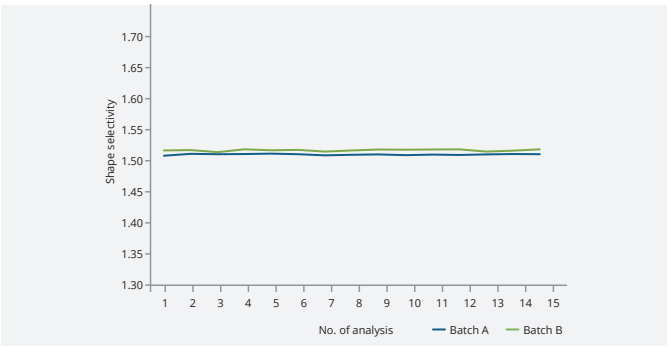
Symmetry reproducibility

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.

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

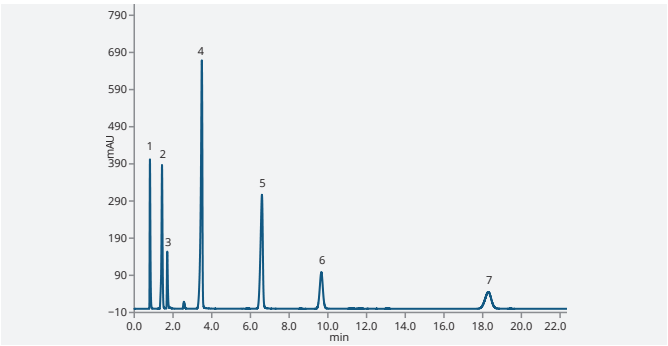


Hydrofobicity test

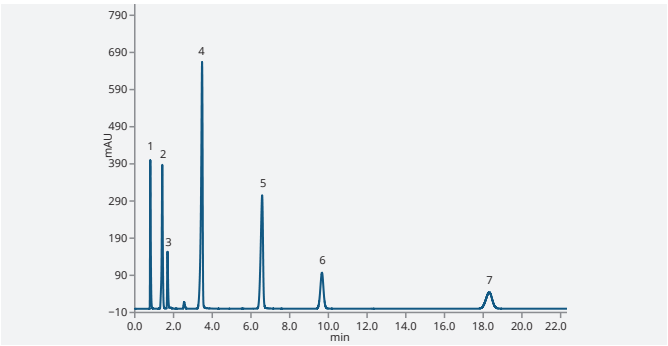


Shape selectivity test

Batch to batch reproducibility



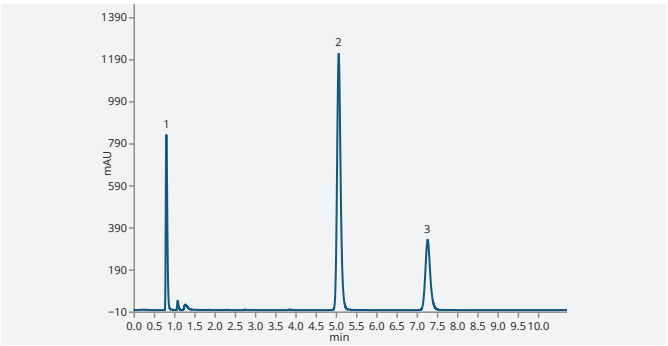
Batch A



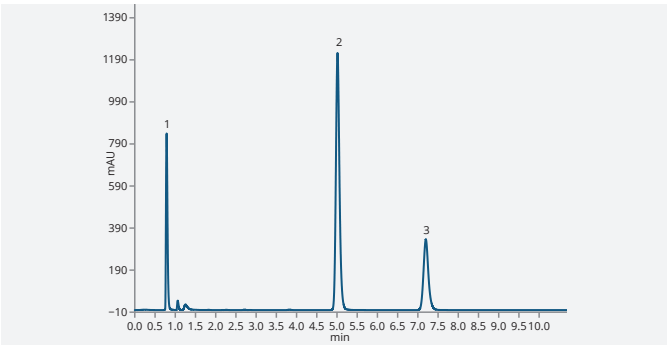
Batch B

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



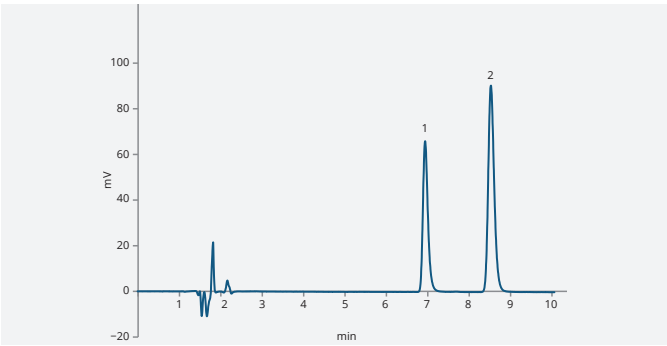
Batch B

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**

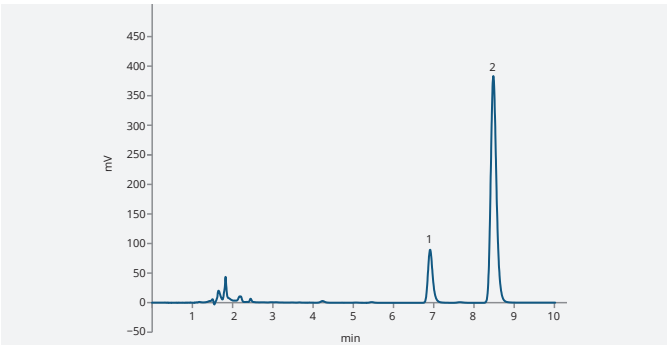
Preservatives in syrup

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

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)

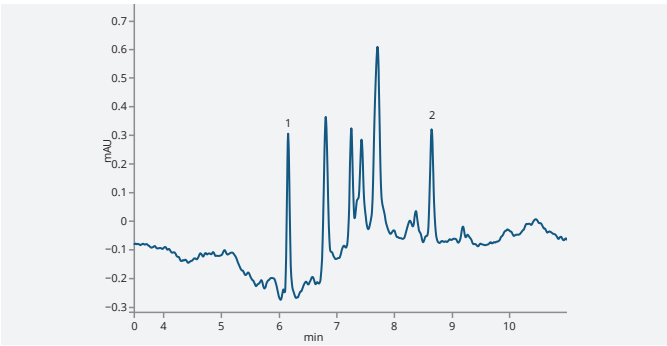


Fruit syrup sample

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

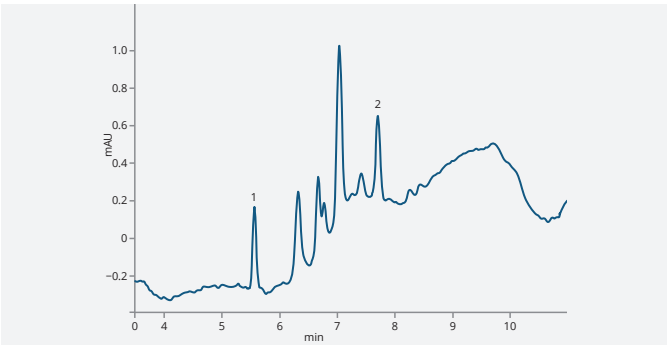
Preservatives in fats and oils

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

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)

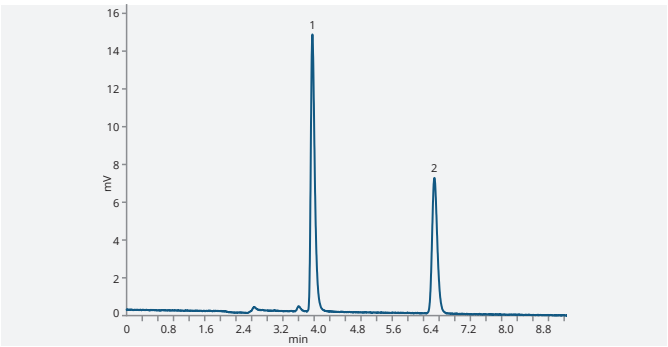


Matrix standard on competitive column (Competitor LI)

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.

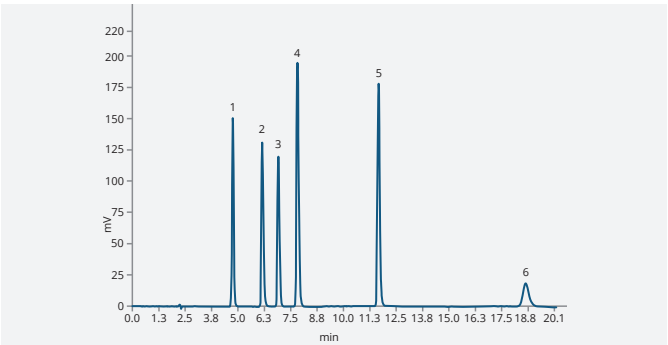


Standard mixture

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**

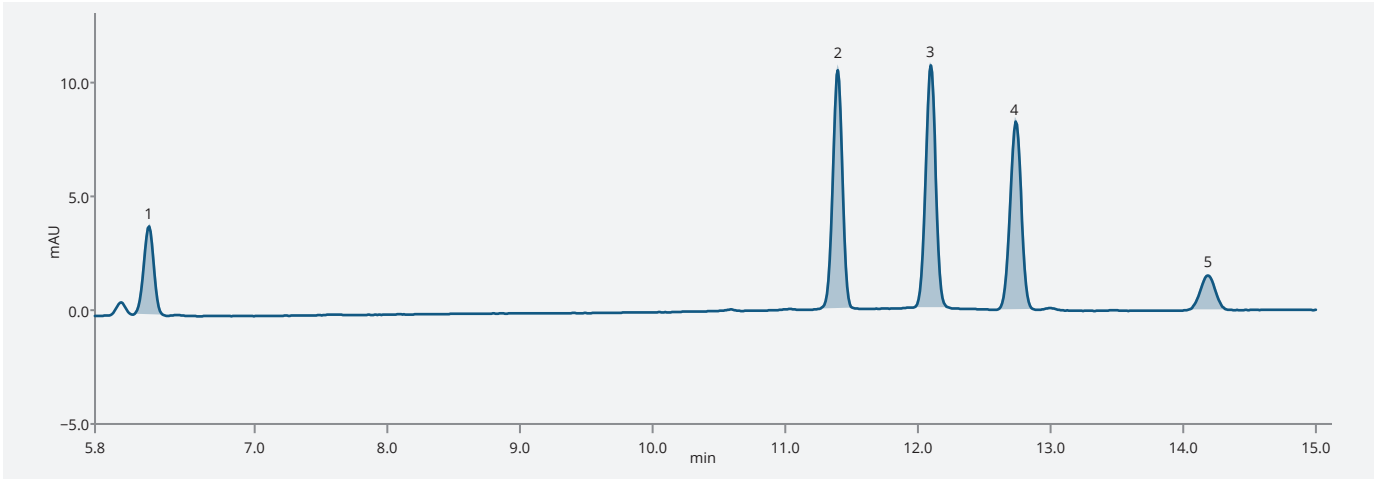
* Gradient program

Time [min]	Flow rate [mL/min]	Wavelength [nm]	A [%] Water	B [%] 17.5 mmol KH_2PO_4 pH = 6	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.

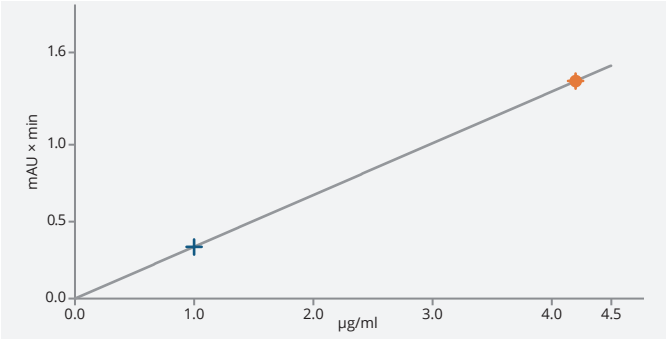
Standard on ARION® Plus C18 column



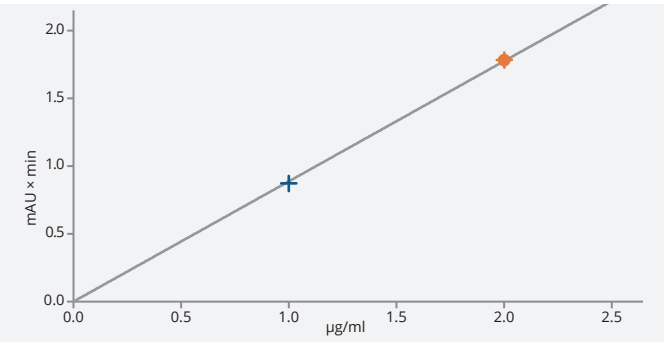
Column	ARION® Plus C18, 3 µm		
Dimensions	100 mm × 4.6 mm		
Part number	ARI-5720-II46		
Mobile phase	A: Water B: Methanol		
Gradient elution	**Time [min]**	**A [%]**	**B [%]**
	0	15	85
	10	0	100
	18	0	100
Flow rate	1.0 mL/min		
Temperature	40 °C		
Injection volume	5.0 µL		
Detection	UV @284 nm		
Analytes	**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

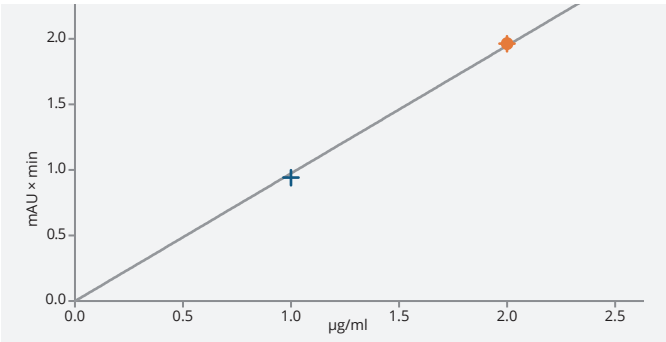
Calibration curves of analytes



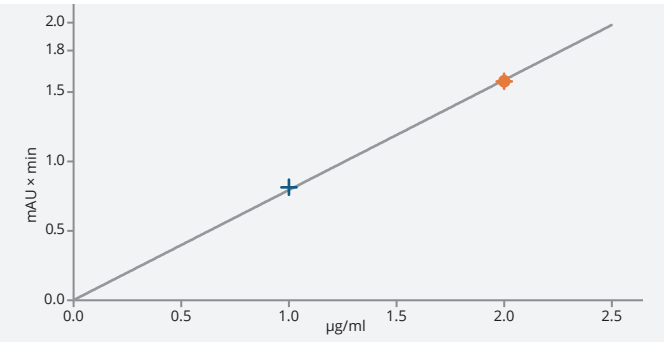
Retinol (Vitamin A)



Delta-tocopherol (D-Vitamin E)

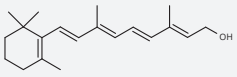


Gamma-tocopherol (Vitamin E γ)

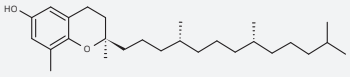


Alfa-tocopherol (Vitamin E α)

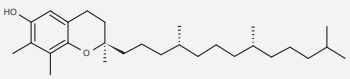
Retinol (Vitamin A)



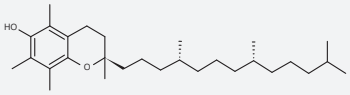
Delta-tocopherol (D-Vitamin E)



Gamma-tocopherol (Vitamin E γ)



Alfa-tocopherol (Vitamin E α)

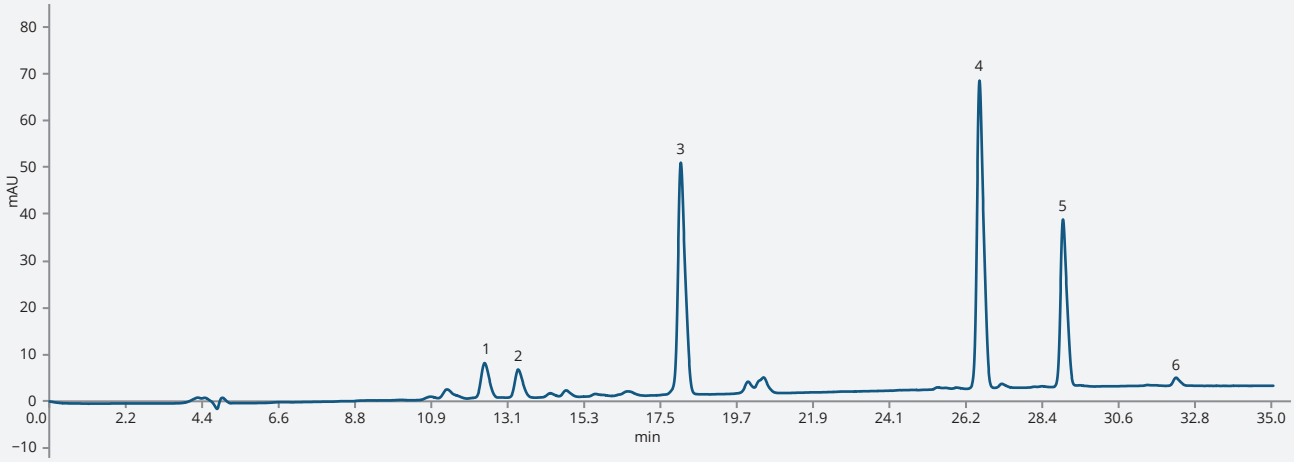


This application has been developed by WESSLING Hungary Kft.

Wheat pigments

This application has been developed by ALGATECH, the Institute of Microbiology of the Academy of Sciences of the 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.

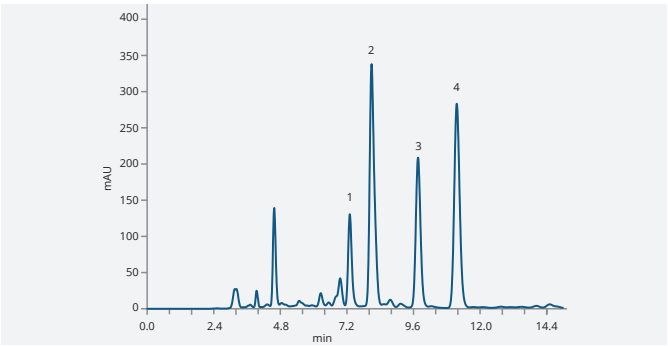
Wheat extract on ARION® C8 column



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.



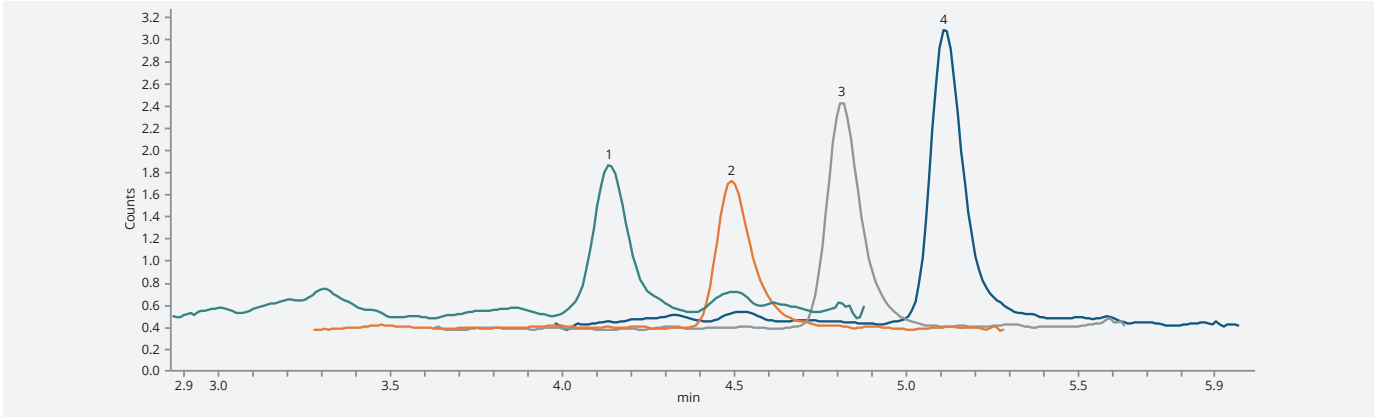
Alpha- & beta- acids in hop sample

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

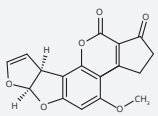


Column	ARION® Plus C18, 2.2 µm
Dimensions	100 mm × 2.1 mm
Part number	ARI-5720-EI21
Mobile phase	A: 5mM ammonium formate / 0.2% formic acid B: Methanol / 0.2% formic acid
Gradient elution	**Time [min] A [%]** 0.0 70 0.5 70 8.0 0 10.5 0 10.6 70
Flow rate	0.35 mL/min
Temperature	40 °C
Analytes	**1. Aflatoxin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

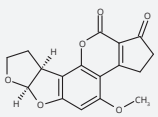
MS method:

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

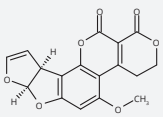
Aflatoxin B1



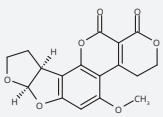
Aflatoxin B2



Aflatoxin G1

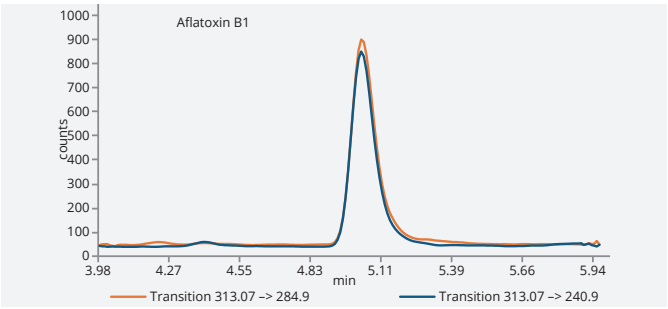


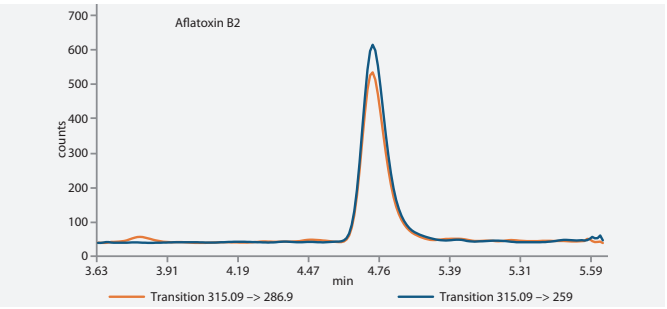
Aflatoxin G2

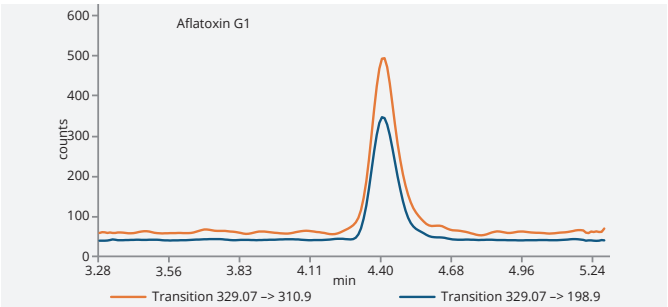


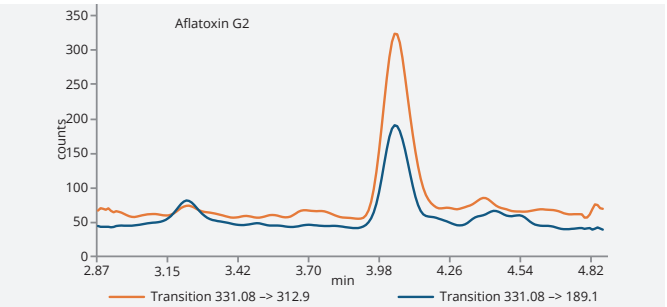
Aflatoxins by LC/MS

This page shows analyses of peppers and Brazil nuts.

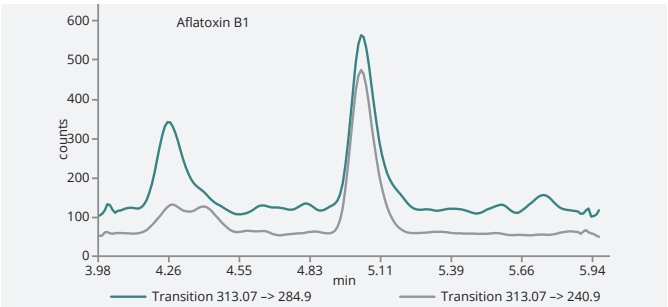


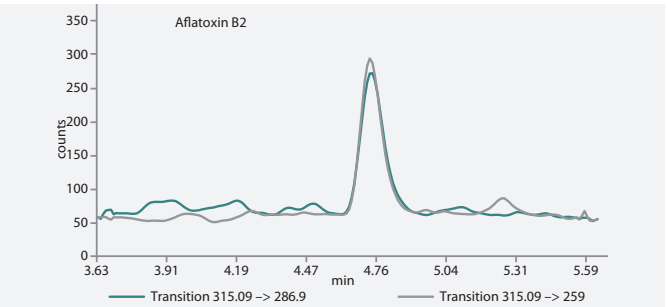


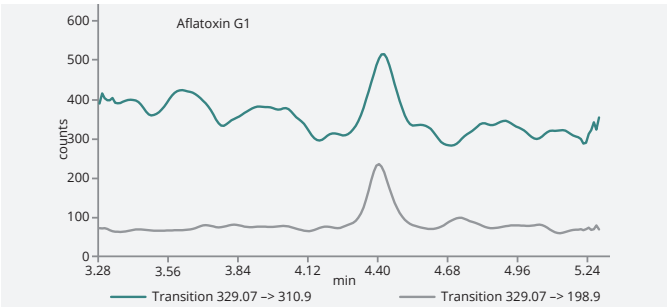


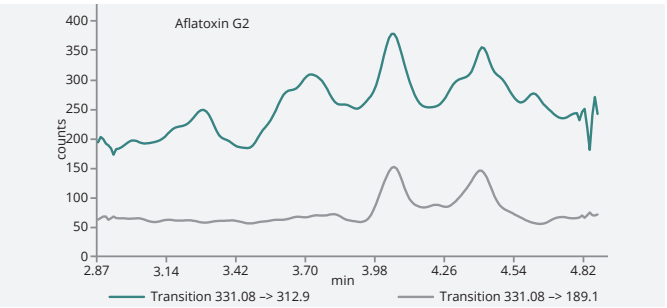


LC/MS analyses of aflatoxins in Brazil nuts







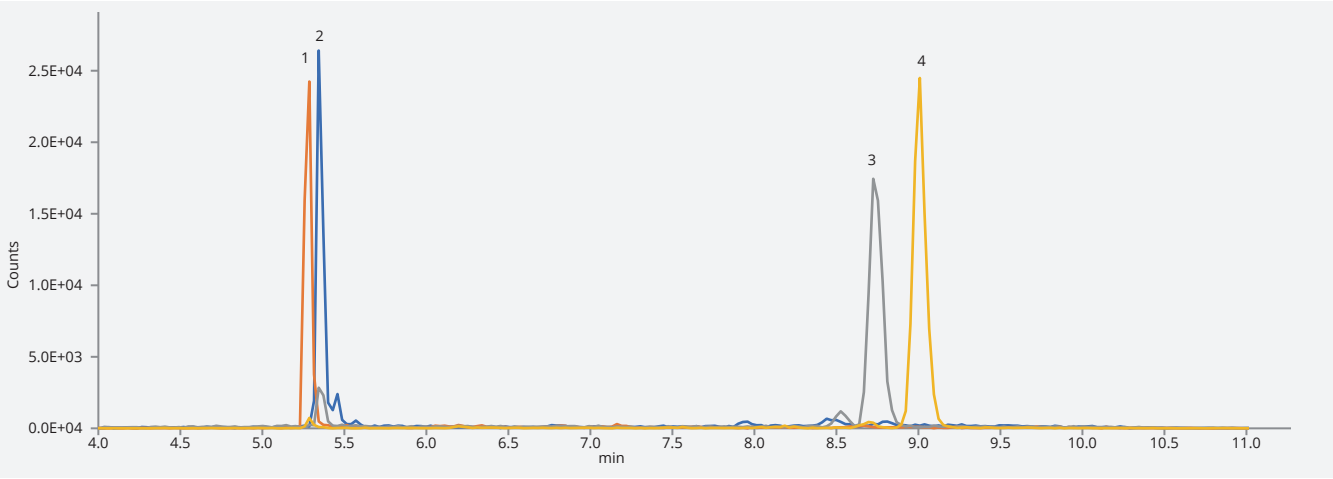


LC/MS analyses of aflatoxins in peppers

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® Plus 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 [min]**	**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**		

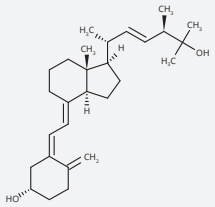
Vitamin D in dry blood spot

MS method:

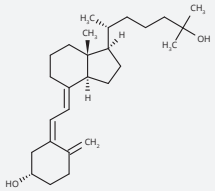
Ionisation	Positive APCI		
Collision gas	Nitrogen		
MRM transition	**Analyte**	**Q1 [Da]**	**Q3 [Da]**
	25-OH-Vitamin D2	413.32	395.30
	25-OH-Vitamin D3	401.22	365.40
	Vitamin D2	397.44	379.20
	Vitamin D3	385.32	259.40
Dwell time	150 ms		

This application was developed by Ján Šmoldas.

25-OH-Vitamin D2

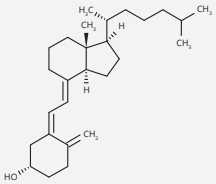


25-OH-Vitamin D3



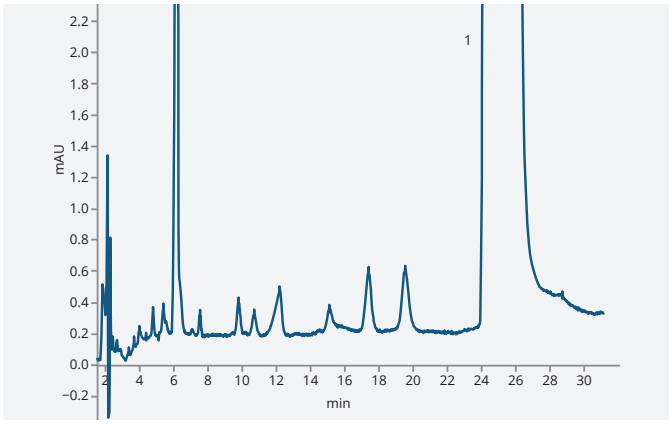
Vitamin D2

Vitamin D3

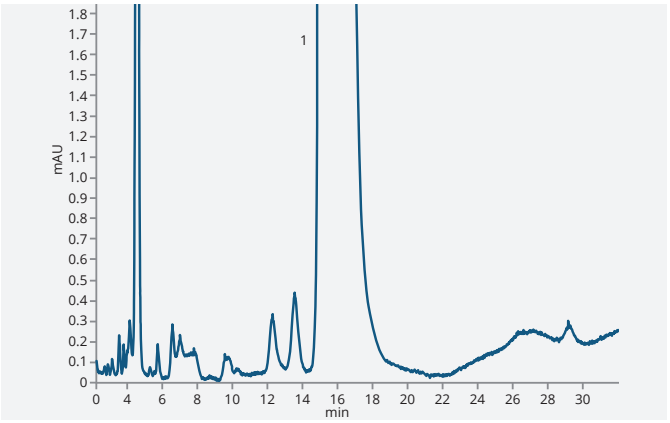


Pharmaceutical drugs

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



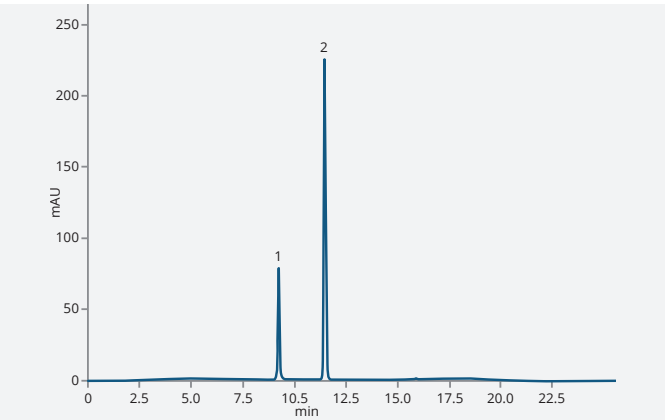
Separation on competitive column (Competitor LI)

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**

PHARMA APPLICATIONS

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).

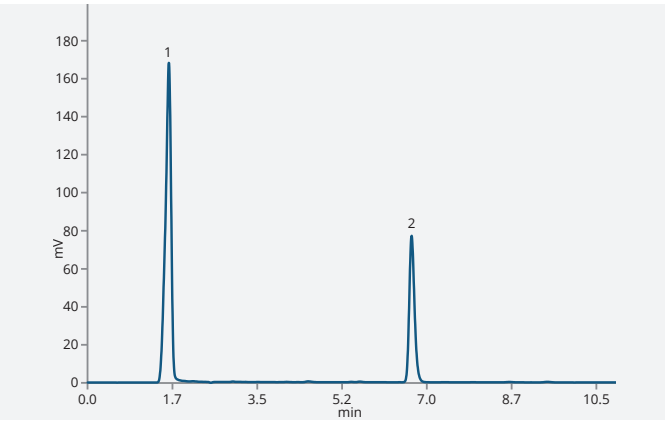


Standard mixture

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.

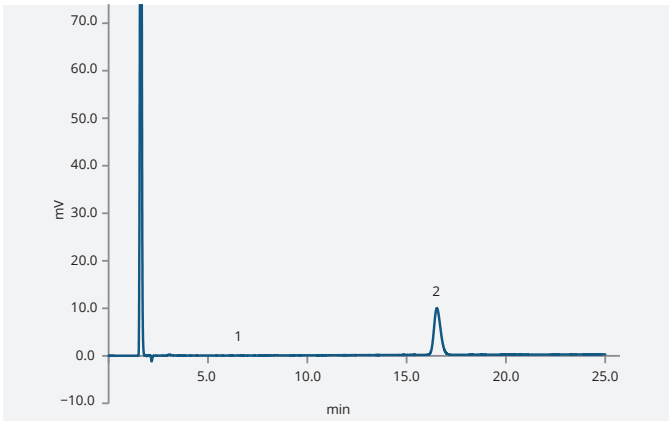


Standard mixture

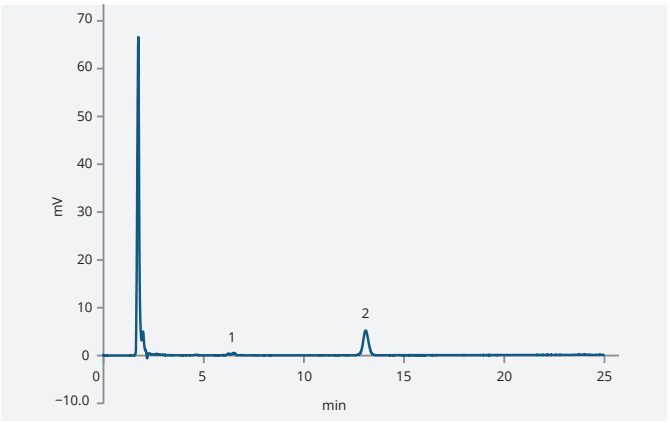
Column	ARION® Plus C18, 5.0 µm
Dimensions	250 mm × 4.6 mm
Part number	ARI-5720-LM46
Mobile phase	ACN : water 70/30 (v/v) + 0.1% formic acid Isocratic elution
Flow rate	1.0 mL/min
Temperature	Ambient
Detection	UV @265 nm
Analytes	**1. Ibuprofen on polymer carrier** **2. Ibuprofen**

Veterinary drugs

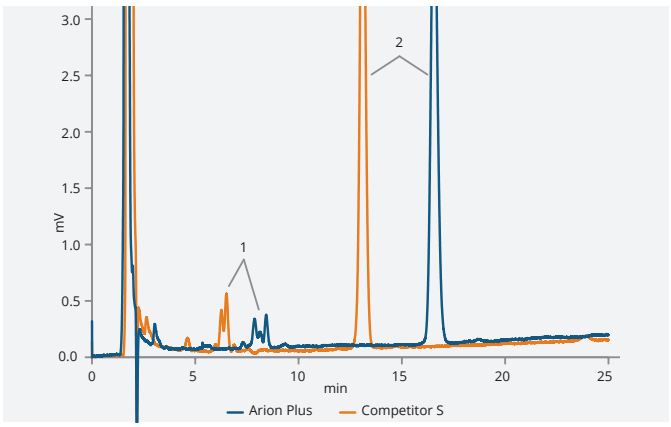
Tiamulin hydrogen fumarate is a semisynthetic drug with an antibacterial effect. It is used to treat animal diseases, such as swine dysentery (caused by *Brachyspira hyodysenteriae*), swine pneumonia or mycoplasmal arthritis. Tiamulin is also used for the prevention and treatment of chronic respiratory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



Sample – 2% premix on ARION® column



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

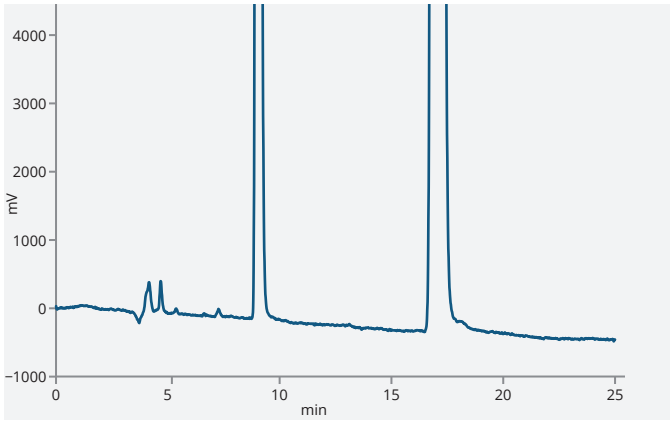


Detailed view on impurities

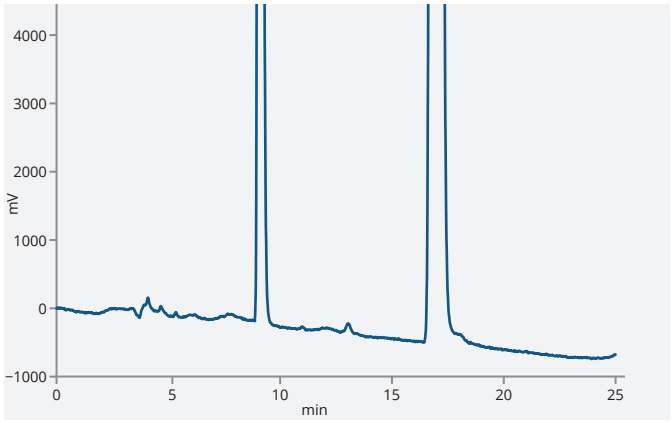
Column	ARION® Plus C18, 5.0 µm
Dimensions	250 mm × 4.6 mm
Part number	ARI-5720-LM46
Mobile phase	Confidential, optimized method of Czech Pharmacopoeia (2017, 6.0:1659)
Analytes	**1. Impurities** **2. Tiamulin hydrogen fumarate**

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.

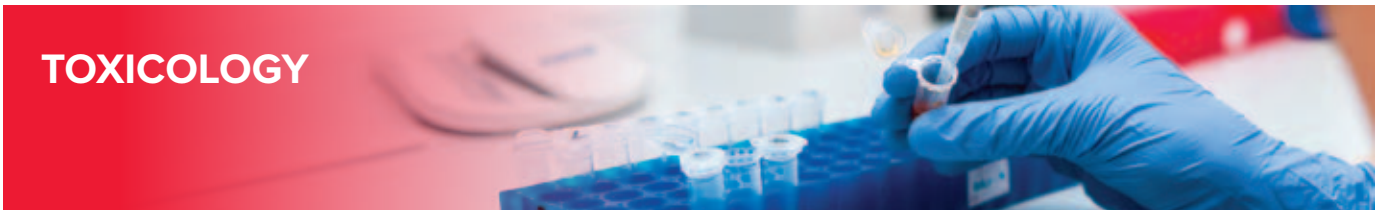


Standard on ARION® column



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**

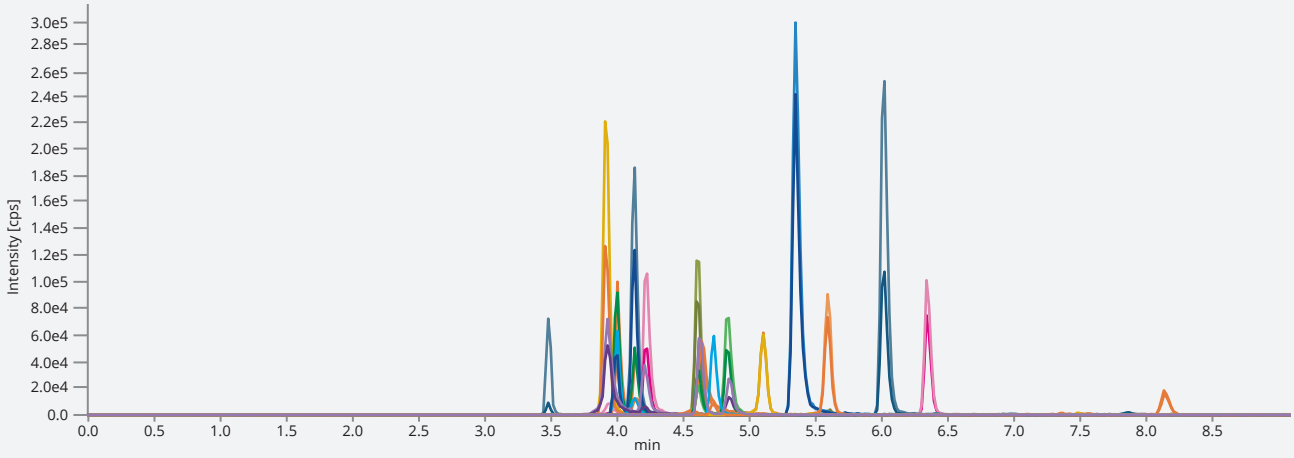


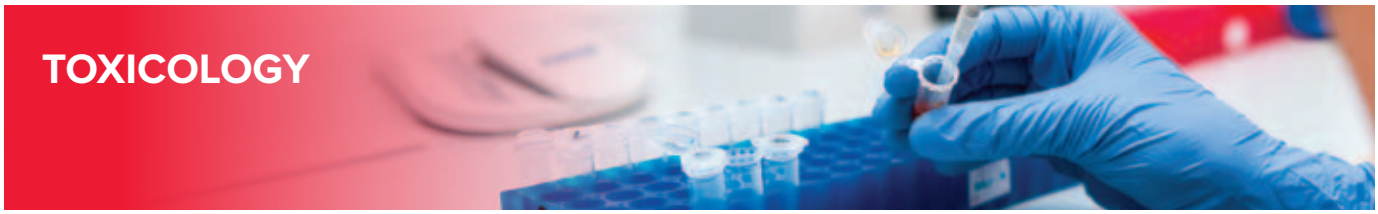
Opioids and Tramadol and their metabolites by LC/MS

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

Substance		
	Codeine	Hydromorphone
	Morphine	Oxymorphone
	6-O-Acetylmorphine	Hydrocodone
	6-Monoacetylmorphine	Norbuprenorphine
	Morphine-6-glucuronide	Norcodeine
	Buprenorphine	Norfentanyl
	Dihydrocodeine	Oxycodone
	Fentanyl	Meperidine, Pethidine
	Acetylfentanyl	Tramadol
	Naloxone	Methadone
	Naltrexone	EDDP

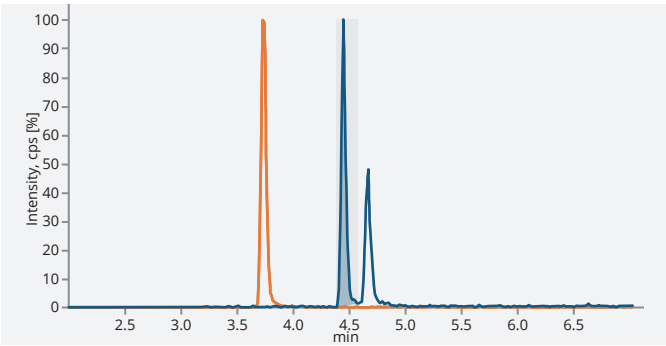
Standard mixture on ARION® column (50 mg/L)



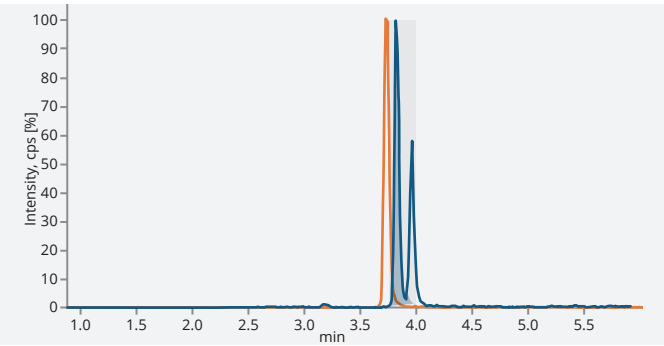


Opioids and Tramadol and their metabolites by LC/MS

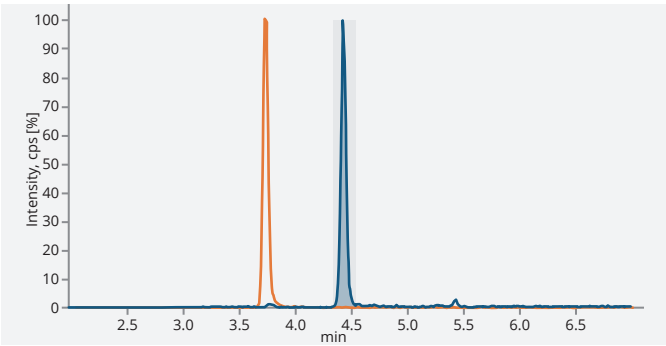
Column	ARION® Plus C18, 3 µm		
Dimensions	50 mm × 3.0 mm		
Part number	ARI-5720-IG30		
Mobile phase	A: 1% ammonium formate in water B: Methanol : 1% ammonium formate in ACN 50/50 (v/v)		
Gradient elution	**Time [min]**	**A [%]**	**B [%]**
	0	100	0
	1	100	0
	6	10	90
	8	10	90
	8.1	100	0
Flow rate	0.5 mL/min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



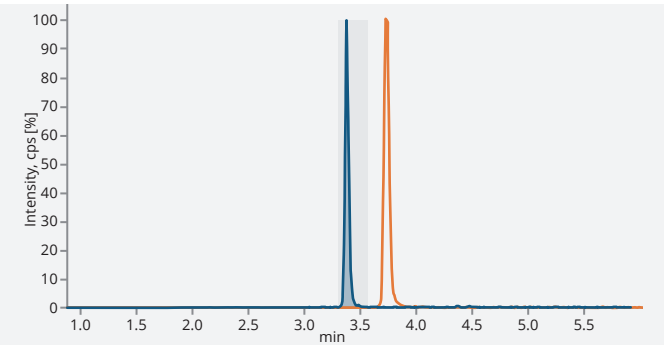
Codeine (300.1->152.0)



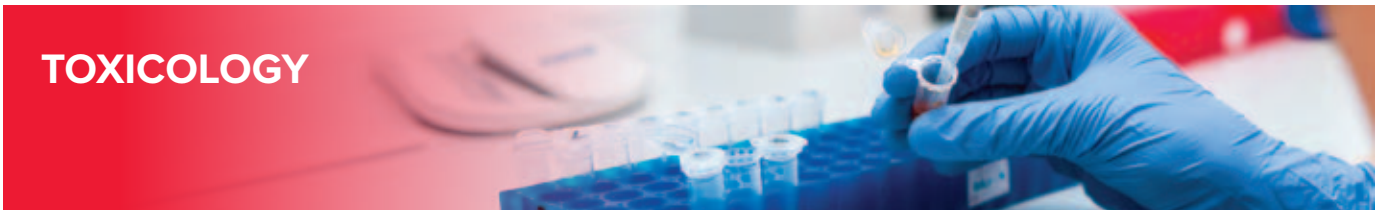
Morphine (286.1 -> 152.0)



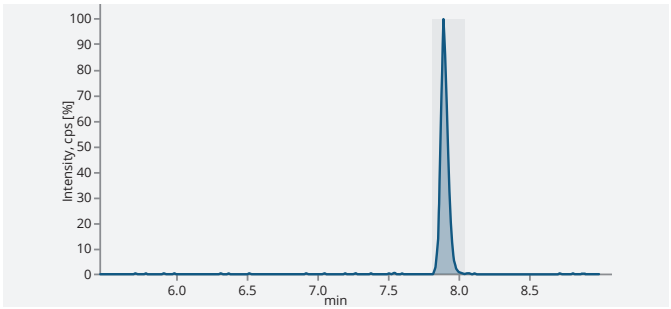
6-O-Acetylmorphine (328.1 -> 165.0)



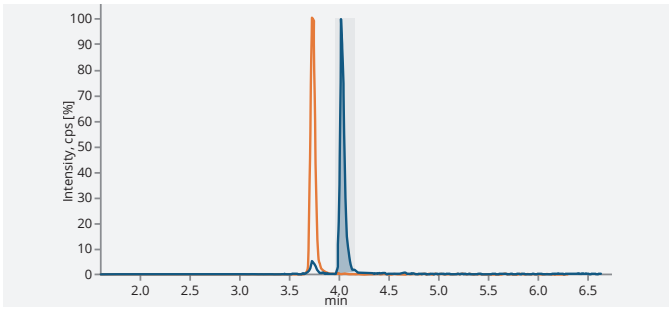
Morphine-6-glucuronide (462.2 -> 286.2)



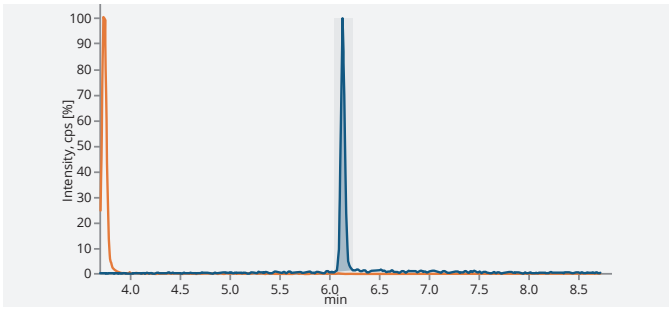
Opioids and Tramadol and their metabolites by LC/MS



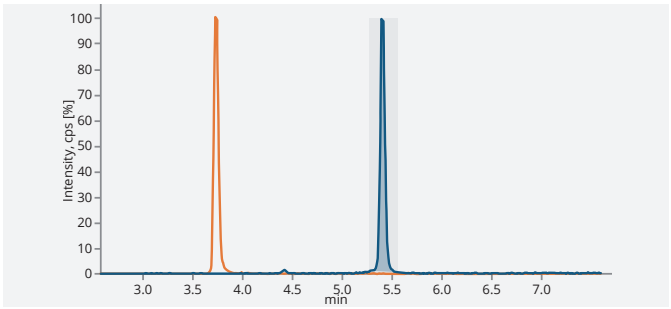
Buprenorphine (468.2 -> 396.0)



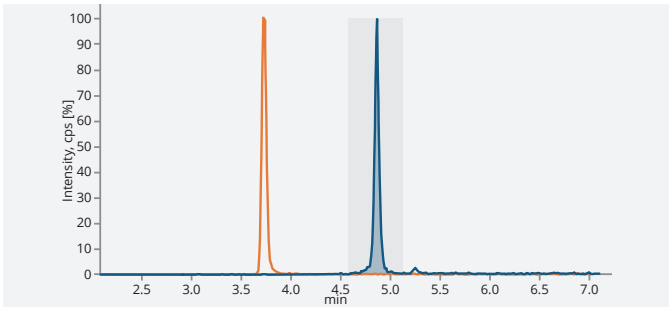
Dihydrocodeine (302.2 -> 199.2)



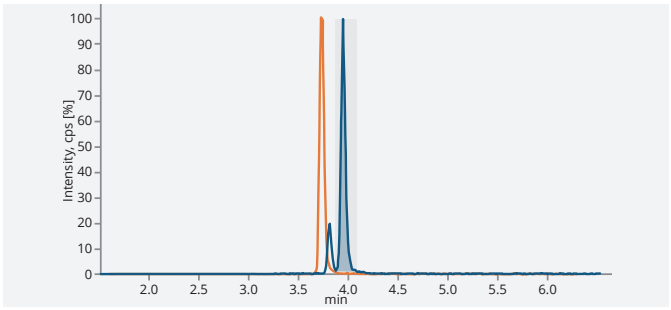
Fentanyl (337.2 -> 105.1)



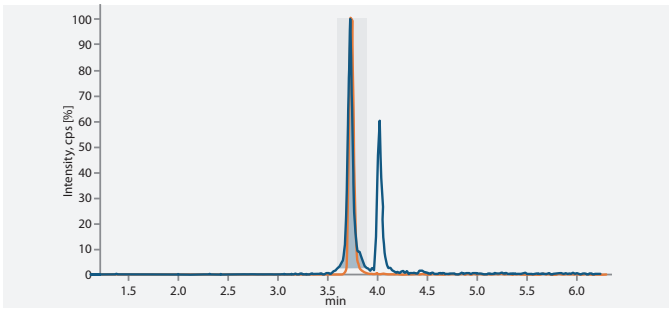
Naloxone (328.1 ->212.1)



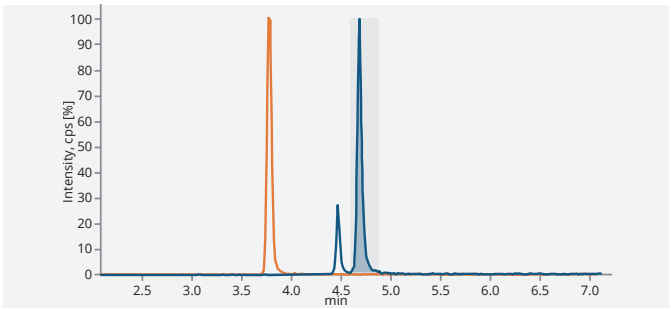
Naltrexone (342.1 -> 267.2)



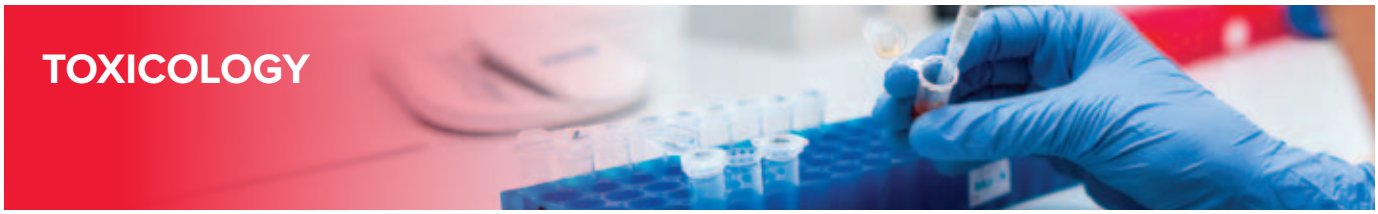
Hydromorphone (286.1 -> 185.0)



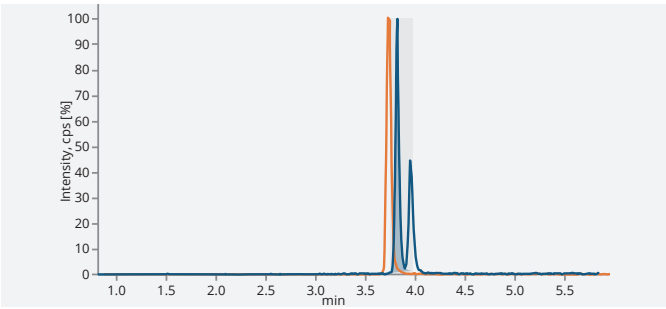
Oxymorphone (302.0 -> 227.1)



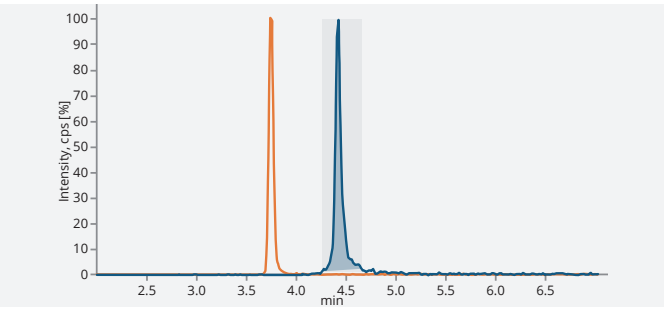
Hydrocodone (300.1 -> 199.0)



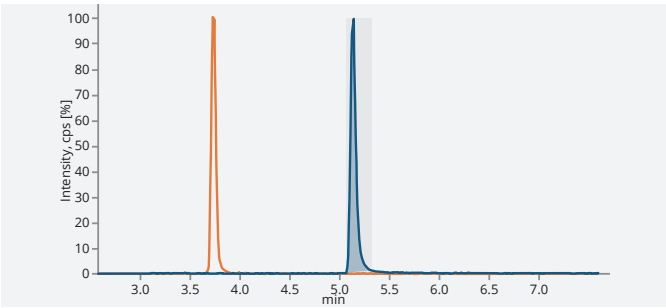
Opioids and Tramadol and their metabolites by LC/MS



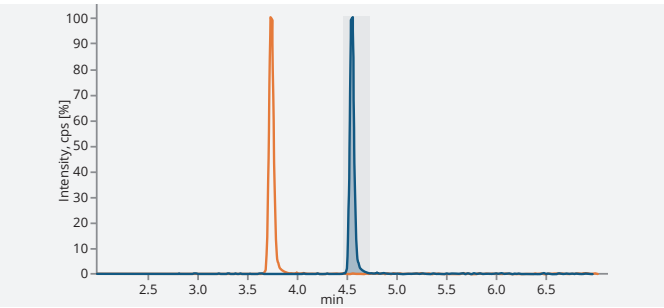
Norcodeine (286.1 -> 152.0)



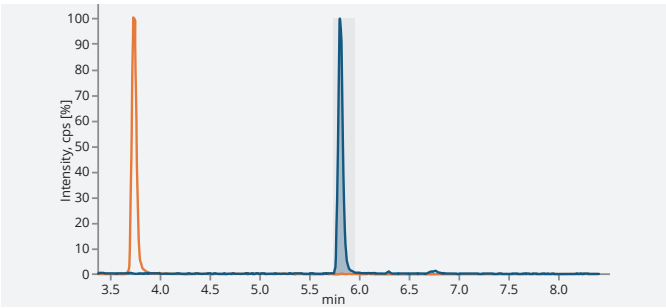
Oxycodone (316.1 -> 241.1)



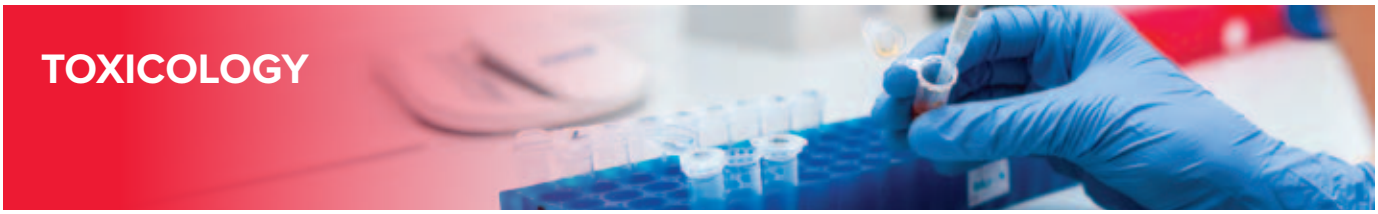
Meperidine (Pethidine) (248.1 -> 220.1)



Tramadol (264.1 -> 58.1)



Methadone (310.1 -> 265.0)



Opioids and Tramadol and their metabolites by LC/MS

MS/MS method

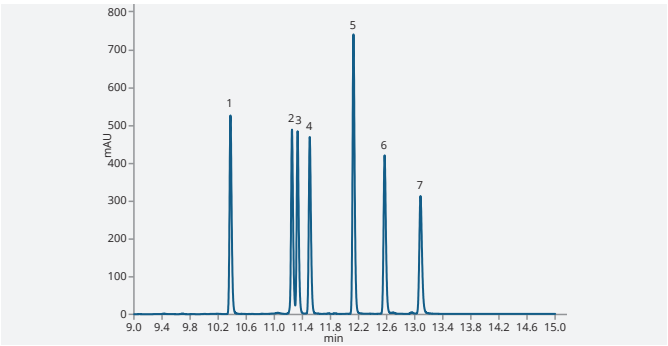
Compound name	Precursor mass	Fragment mass	Type	Collision energy
Codeine	300.1	152.0	Quantifier	35 ± 15 eV
	300.1	165.1	Qualifier	35 ± 15 eV
Morphine	286.1	152.0	Quantifier	35 ± 15 eV
	286.1	165.1	Qualifier	35 ± 15 eV
6-O-Acetylmorphine	328.1	165.0	Quantifier	35 ± 15 eV
	328.1	211.0	Qualifier	35 ± 15 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.

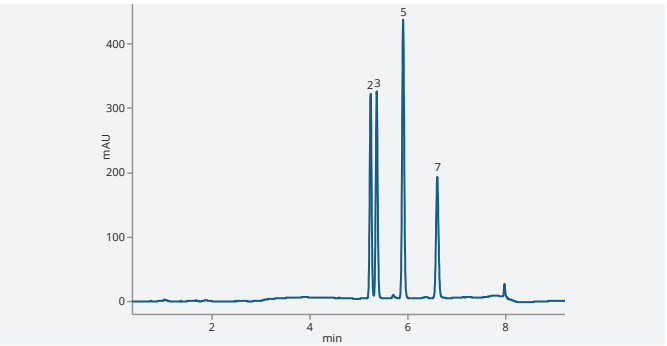
Note: Internal standard: Morphine D6.

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



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

Column	ARION® Plus C18, 1.7 µm		
Dimensions	100 mm × 2.1 mm		
Part number	ARI-5720-BI21		
Mobile phase	A: Water B: Acetonitrile		
Gradient elution	**Time [min]**	**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**		

Column	ARION® Plus C18, 3.0 µm		
Dimensions	150 mm × 4.6 mm		
Part number	ARI-5720-IK46		
Mobile phase	A: Acetonitrile B: Water with formic acid (0.1%)		
Gradient elution	**Time [min]**	**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**		

lipomed SERVICES TO HEALTH

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	5 × 2.1
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 × 4.0
Plus C18	ARI-5720-BG46	ARI-5720-BH46	ARI-5720-BI46	ARI-5720-BK46	Inquire**

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
NH2	ARI-5736-ED21	ARI-5736-EG21	ARI-5736-EH21	ARI-5736-EI21	ARI-5736-EK21	AGS-5731-CB2
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
NH2	ARI-5736-EG30	ARI-5736-EH30	ARI-5736-EI30	ARI-5736-EK30	AGS-5731-CB2
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
NH2	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 × 2.1
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
Biphenyl	ARI-5868-IG21	ARI-5868-IH21	ARI-5868-II21	ARI-5868-IK21	–	AGS-5731-RC2
Phenyl-Butyl	ARI-5735-IG21	ARI-5735-IH21	ARI-5735-II21	ARI-5735-IK21	–	AGS-5731-RC2
PFP	ARI-5873-IG21	–	ARI-5873-II21	ARI-5873-IK21	–	–
NH2	ARI-5736-IG21	ARI-5736-IH21	ARI-5736-II21	ARI-5736-IK21	–	AGS-5731-CC2
CN	ARI-5737-IG21	ARI-5737-IH21	ARI-5737-II21	ARI-5737-IK21	–	AGS-5731-DC2
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
Biphenyl	ARI-5868-IG30	ARI-5868-IH30	ARI-5868-II30	ARI-5868-IK30	ARI-5868-IM30	AGS-5731-RC4
Phenyl-Butyl	ARI-5735-IG30	ARI-5735-IH30	ARI-5735-II30	ARI-5735-IK30	ARI-5735-IM30	AGS-5731-RC4
PFP	ARI-5873-IG30	–	ARI-5873-II30	ARI-5873-IK30	–	–
NH2	–	–	ARI-5736-II30	ARI-5736-IK30	–	AGS-5731-CC4
CN	–	–	ARI-5737-II30	ARI-5737-IK30	–	AGS-5731-DC4
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	125 × 4.0	150 × 4.0	250 × 4.0	300 × 4.0	5 × 4.0
Plus C18	ARI-5720-IJ40	–	–	–	AGS-5731-RC4
Polar C18	ARI-5721-IJ40	ARI-5721-IK40	–	–	AGS-5731-RC4
Si	–	–	ARI-5739-IM40	ARI-5739-IN40	AGS-5731-NC4

Ordering information

Analytical columns

3 µm ARION®

all dimensions in mm

Phase	50 × 4.6	75 × 4.6	100 × 4.6	125 × 4.6	ARION® Guard Cartridges* 5 × 4.0
Plus C18	ARI-5720-IG46	ARI-5720-IH46	ARI-5720-II46	ARI-5720-IJ46	AGS-5731-RC4
Polar C18	ARI-5721-IG46	ARI-5721-IH46	ARI-5721-II46	ARI-5721-IJ46	AGS-5731-RC4
C8	ARI-5734-IG46	ARI-5734-IH46	ARI-5734-II46	–	AGS-5731-RC4
Biphenyl	ARI-5868-IG46	ARI-5868-IH46	ARI-5868-II46	–	AGS-5731-RC4
Phenyl-Butyl	ARI-5735-IG46	ARI-5735-IH46	ARI-5735-II46	–	AGS-5731-RC4
PFP	ARI-5873-IG46	–	ARI-5873-II46	–	–
NH2	ARI-5736-IG46	ARI-5736-IH46	ARI-5736-II46	–	AGS-5731-CC4
CN	ARI-5737-IG46	–	ARI-5737-II46	–	AGS-5731-DC4
HILIC Plus	ARI-5738-IG46	ARI-5738-IH46	ARI-5738-II46	–	AGS-5731-HC4
Si	ARI-5739-IG46	ARI-5739-IH46	ARI-5739-II46	–	AGS-5731-NC4

3 µm ARION®

all dimensions in mm

Phase	150 × 4.6	200 × 4.6	250 × 4.6	ARION® Guard Cartridges* 5 × 4.0
Plus C18	ARI-5720-IK46	–	ARI-5720-IM46	AGS-5731-RC4
Polar C18	ARI-5721-IK46	–	ARI-5721-IM46	AGS-5731-RC4
C8	ARI-5734-IK46	–	ARI-5734-IM46	AGS-5731-RC4
Biphenyl	ARI-5868-IK46	–	ARI-5868-IM46	AGS-5731-RC4
Phenyl-Butyl	ARI-5735-IK46	–	ARI-5735-IM46	AGS-5731-RC4
PFP	ARI-5873-IK46	–	–	–
NH2	ARI-5736-IK46	ARI-5736-IL46	ARI-5736-IM46	AGS-5731-CC4
CN	ARI-5737-IK46	–	–	AGS-5731-DC4
HILIC Plus	ARI-5738-IK46	–	–	AGS-5731-HC4
Si	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	250 × 2.1	5 × 2.1
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	ARI-5721-LM21	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
PFP	ARI-5873-LD21	ARI-5873-LG21	ARI-5873-LI21	ARI-5873-LK21	–	AGS-5731-RD2
NH2	–	–	–	ARI-5736-LK21	–	AGS-5731-CD2
CN	–	–	ARI-5737-LI21	ARI-5737-LK21	–	AGS-5731-DD2
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-RD4
Phenyl-Butyl	ARI-5735-LD30	ARI-5735-LG30	ARI-5735-LH30	ARI-5735-LI30	AGS-5731-RD4
PFP	ARI-5873-LD30	ARI-5873-LG30	ARI-5873-LH30	ARI-5873-LI30	AGS-5731-RD4
NH2	–	ARI-5736-LG30	ARI-5736-LH30	ARI-5736-LI30	AGS-5731-CD4
CN	–	ARI-5737-LG30	ARI-5737-LH30	ARI-5737-LI30	AGS-5731-DD4
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	ARI-5720-LM30	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-RD4
Phenyl-Butyl	–	ARI-5735-LK30	–	AGS-5731-RD4
PFP	ARI-5873-LJ30	ARI-5873-LK30	ARI-5873-LM30	AGS-5731-RD4
NH2	–	ARI-5736-LK30	–	AGS-5731-CD4
CN	–	ARI-5737-LK30	–	AGS-5731-DD4
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	50 × 4.0	125 × 4.0	150 × 4.0	250 × 4.0	300 × 4.0	5 × 4.0
Plus C18	ARI-5720-LG40	ARI-5720-LJ40	ARI-5720-LK40	ARI-5720-LM40	–	AGS-5731-RD4
Polar C18	–	ARI-5721-LJ40	–	ARI-5721-LM40	–	AGS-5731-RD4
C8	–	ARI-5734-LJ40	–	ARI-5734-LM40	–	AGS-5731-RD4
Biphenyl	–	ARI-5868-LJ40	–	–	ARI-5734-LN40	AGS-5731-RD4
PFP	–	ARI-5873-LJ40	–	–	–	AGS-5731-RD4
NH2	–	ARI-5736-LJ40	–	ARI-5736-LM40	–	AGS-5731-RD4
CN	–	–	–	ARI-5737-LM40	–	AGS-5731-DD4
Si	–	–	–	ARI-5739-LM40	–	AGS-5731-ND4
SCX	–	–	–	ARI-5799-LM40	–	–

5 µm ARION®
all dimensions in mm

ARION® Guard Cartridges*

Phase	30 × 4.6	50 × 4.6	75 × 4.6	5 × 4.0
Plus C18	ARI-5720-LD46	ARI-5720-LG46	ARI-5720-LH46	AGS-5731-RD4
Polar C18	ARI-5721-LD46	ARI-5721-LG46	ARI-5721-LH46	AGS-5731-RD4
C8	–	–	ARI-5734-LH46	AGS-5731-RD4
Biphenyl	ARI-5868-LD46	ARI-5868-LG46	ARI-5868-LH46	AGS-5731-RD4
Phenyl-Butyl	–	–	–	AGS-5731-RD4
PFP	ARI-5873-LD46	ARI-5873-LG46	ARI-5873-LH46	AGS-5731-RD4
NH2	–	–	–	AGS-5731-CD4
CN	–	–	–	AGS-5731-DD4
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

Ordering information

Analytical columns

5 µm ARION®
all dimensions in mm

ARION® Guard Cartridges*

Phase	100 × 4.6	125 × 4.6	150 × 4.6	200 × 4.6	250 × 4.6	5 × 4.0
Plus C18	ARI-5720-LI46	ARI-5720-LJ46	ARI-5720-LK46	ARI-5720-ll46	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
PFP	ARI-5873-LI46	ARI-5873-LJ46	ARI-5873-LK46	–	ARI-5873-LM46	AGS-5731-RD4
NH2	ARI-5736-LI46	–	ARI-5736-LK46	ARI-5736-ll46	ARI-5736-LM46	AGS-5731-CD4
CN	ARI-5737-LI46	–	ARI-5737-LK46	–	ARI-5737-LM46	AGS-5731-DD4
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 / Water (75/25), 5 ampoules (10 mL)

Toluene	[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

Phase	100 × 10	150 × 10	250 × 10
Plus C18	–	ARI-5720-LK1X	ARI-5720-LM1X
Polar C18	–	ARI-5721-LK1X	ARI-5721-LM1X
C8	–	–	ARI-5734-LM1X
Phenyl-Butyl	–	–	ARI-5735-LM1X
Si	ARI-5739-LI1X	–	ARI-5739-LM1X

5 µm ARION®
all dimensions in mm

Phase	50 × 21.2	100 × 21.2	150 × 21.2	250 × 21.2
Plus C18	ARI-5720-LG2Y	ARI-5720-LI2Y	ARI-5720-LK2Y	ARI-5720-LM2Y
Polar C18	ARI-5721-LG2Y	ARI-5721-LI2Y	ARI-5721-LK2Y	ARI-5721-LM2Y
C8	–	–	ARI-5734-LK2Y	–
Biphenyl	–	–	ARI-5868-LK2Y	ARI-5868-LM2Y
Phenyl-Butyl	–	–	–	ARI-5735-LM2Y
PFP	–	–	ARI-5873-LK2Y	–
Si	ARI-5739-LG2Y	ARI-5739-LI2Y	ARI-5739-LK2Y	ARI-5739-LM2Y

Preparative columns

5 µm ARION®
all dimensions in mm

Phase	100 × 30	150 × 30	250 × 30	250 × 50
Plus C18	ARI-5720-LI3X	ARI-5720-LK3X	ARI-5720-LM3X	ARI-5720-LM5X
Polar C18	ARI-5721-LI3X	ARI-5721-LK3X	ARI-5721-LM3X	ARI-5721-LM5X
Biphenyl	–	ARI-5868-LK3X	–	–
Phenyl-Butyl	–	–	ARI-5735-LM3X	ARI-5735-LM5X
Si	ARI-5739-LI3X	ARI-5739-LK3X	ARI-5739-LM3X	ARI-5739-LM5X

Ordering information

Semi-preparative and preparative columns

10 µm ARION®
all dimensions in mm

Phase	250 × 4.0	150 × 4.6	200 × 4.6	250 × 4.6	150 × 10	250 × 10
Plus C18	ARI-5720-PM40	ARI-5720-PK46	ARI-5720-PL46	ARI-5720-PM46	ARI-5720-PK1X	ARI-5720-PM1X
Polar C18	–	ARI-5721-PK46	–	ARI-5721-PM46	ARI-5721-PK1X	ARI-5721-PM1X
C8	–	–	–	ARI-5734-PM46	–	ARI-5734-PM1X
Phenyl-Butyl	–	–	–	–	–	ARI-5735-PM1X
CN	–	–	–	ARI-5737-PM46	–	–
Si	–	ARI-5739-PK46	–	ARI-5739-PM46	–	ARI-5739-PM1X
SAX	–	–	–	ARI-5806-PM46	–	–

10 µm ARION®
all dimensions in mm

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
Polar C18	ARI-5721-PG2Y	ARI-5721-PI2Y	ARI-5721-PK2Y	ARI-5721-PM2Y
Si	ARI-5739-PG2Y	ARI-5739-PI2Y	ARI-5739-PK2Y	ARI-5739-PM2Y
Phenyl-Butyl	–	–	–	ARI-5735-PM2Y
CN	–	–	–	ARI-5737-PM2Y

10 µm ARION®
all dimensions in mm

Phase	100 × 30	150 × 30	250 × 30	250 × 50
Plus C18	ARI-5720-PI3X	ARI-5720-PK3X	ARI-5720-PM3X	ARI-5720-PM5X
Polar C18	ARI-5721-PI3X	ARI-5721-PK3X	ARI-5721-PM3X	ARI-5721-PM5X
Si	ARI-5739-PI3X	ARI-5739-PK3X	ARI-5739-PM3X	ARI-5739-PM5X

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

Ordering information

Preparative columns

15 µm ARION®
all dimensions in mm

Phase	150 × 4.6	250 × 4.6	150 × 10	250 × 10	ARION® Guard Cartridges
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*
Phenyl-Butyl	–	–	–	ARI-5735-QM1X	Inquire*
Si	ARI-5739-QK46	ARI-5739-QM46	ARI-5739-QK1X	ARI-5739-QM1X	Inquire*

15 µm ARION®
all dimensions in mm

Phase	50 × 21.2	100 × 21.2	150 × 21.2	250 × 21.2	ARION® Guard Cartridges
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*
Phenyl-Butyl	–	–	–	ARI-5735-QM2Y	Inquire*
Si	ARI-5739-QG2Y	ARI-5739-QI2Y	ARI-5739-QK2Y	ARI-5739-QM2Y	Inquire*

15 µm ARION®
all dimensions in mm

Phase	50 × 30	100 × 30	150 × 30	250 × 30	ARION® Guard Cartridges
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*
Si	ARI-5739-QG3X	ARI-5739-QI3X	ARI-5739-QK3X	ARI-5739-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.

Ordering information

Preparative columns

15 µm ARION®
all dimensions in mm

Phase	250 × 50	ARION® Guard Cartridges
Plus C18	ARI-5720-QM5X	Inquire*

30 µm ARION®
all dimensions in mm

Phase	250 × 30	ARION® Guard Cartridges
Si	ARI-5739-RM3X	Inquire*

Semi-preparative column 250 × 10 mm

Preparative column 250 × 30 mm

Preparative column 250 × 21.2 mm

Preparative column 250 × 50 mm

ARION® BIO

ARION® BIO columns have been developed for the protein, polypeptide and peptide characterisation and purification. They are offered with C8, 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.

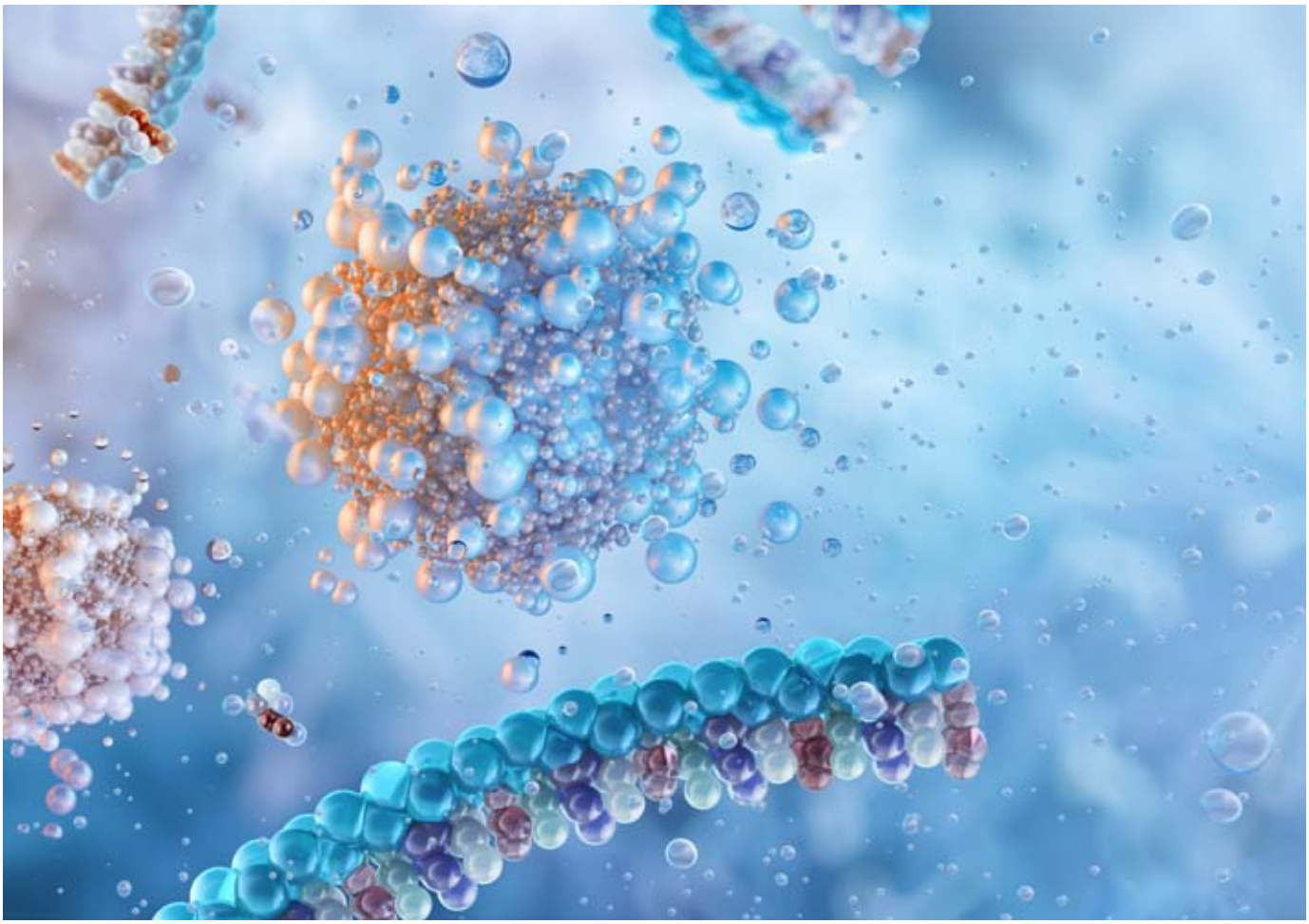
- Biomolecule separation up to 150 kDA.
- Pre-columns with corresponding media.
- Scale-up to 15 µm.

ARION® BIO silicagel

Particle size	15 µm	5 µm	3 µm
Metal content	<20 ppm	<20 ppm	<20 ppm
Temperature stability	60 °C*	60 °C*	60 °C*
Mean particle diameter	15.0 ± 1.5 µm	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 [m²/g]	Carbon load	pH stability	End-capping	100% aqueous mobile phase	USP code
C18-BIO	3, 5, 15	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
C8-BIO	3	200	110	n/a	1.5 to 7.5	Single-step	×	L7



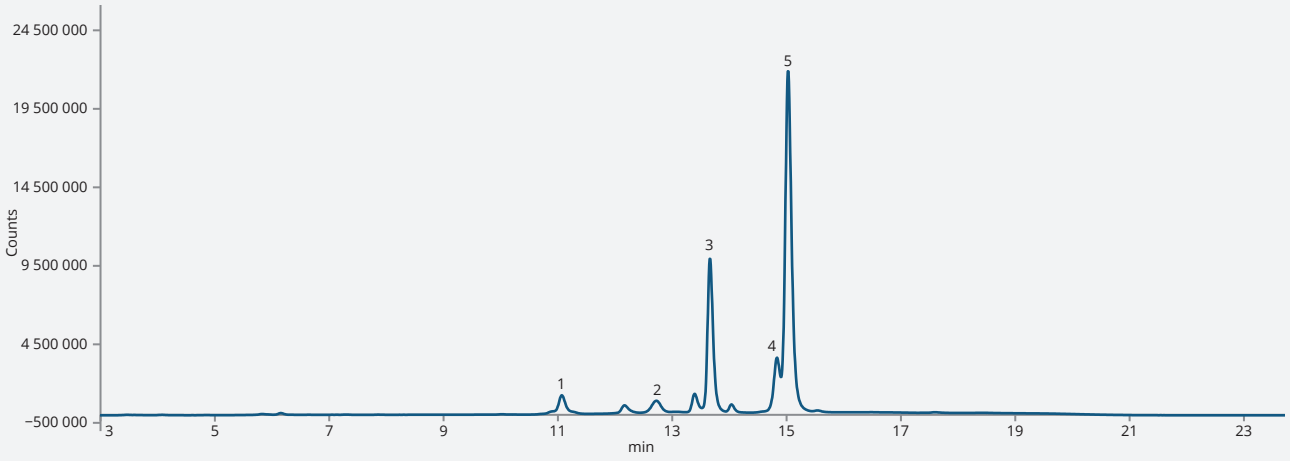
Lactoferrin in bovine milk

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 % H_2O+ 0.1 % TFA C: 5 % ACN + 95 % H_2O + 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. Lactoferrin** **3. α-La (α-Lactalbumin)** **4. β-LgB (β-Lactoglobulin B)** **5. β-LgA (β-Lactoglobulin A)**

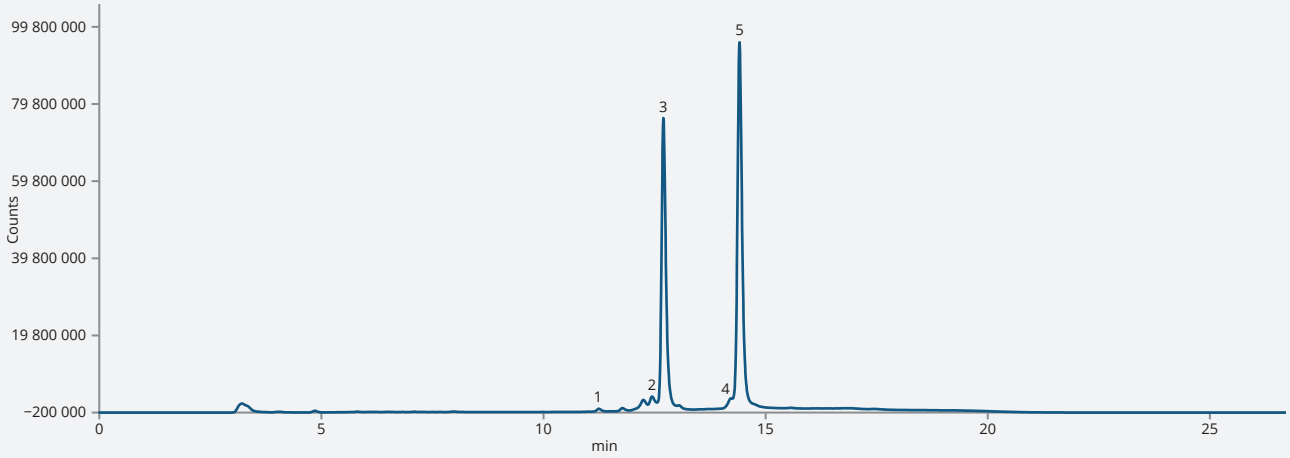
* The detection can be at UV @205 nm.

ARION® BIO

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 % H_20+ 0.1 % TFA C: 5 % ACN + 95 % H_20 + 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. Lactoferrin** **3. α-La (α-Lactalbumin)** **4. β-LagB (β-Lactoglobulin, BLG)** **5. β-LgA (β-Lactalbumin)**				

* The detection can be at UV @205 nm.

Ordering information

Peptides and oligopeptides columns

ARION® C18-BIO
all dimensions in mm

Phase	50 × 2.1	100 × 2.1	150 × 2.1	ARION® Guard Cartridges*
3 µm	ARI-5840-IG21	ARI-5840-II21	ARI-5840-IK21	–
5 µm	–	–	ARI-5840-LK21	AGS-5731-BD2

ARION® C18-BIO
all dimensions in mm

Phase	100 × 3.0	150 × 3.0	ARION® Guard Cartridges*
3 µm	On request	On request	–
5 µm	ARI-5840-LI30	ARI-5840-LK30	AGS-5731-BD2

ARION® C18-BIO
all dimensions in mm

Phase	100 × 4.6	150 × 4.6	250 × 4.6	ARION® Guard Cartridges*
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
15 µm	–	–	ARI-5840-QM46	–

ARION® C8-BIO
all dimensions in mm

Phase	150 × 4.6	ARION® Guard Cartridges*
3 µm	ARI-5954-IK46	–

Proteins and polypeptides

ARION® C4-BIO
all dimensions in mm

Phase	50 × 2.1	100 × 2.1	150 × 2.1	250 × 2.1	ARION® Guard Cartridges*
3 µm	On request	On request	ARI-5846-IK21	On request	–
5 µm	ARI-5846-LG21	ARI-5846-LI21	ARI-5846-LK21	ARI-5846-LM21	AGS-5731-BD2

ARION® C4-BIO
all dimensions in mm

Phase	50 × 3.0	ARION® Guard Cartridges*
3 µm	–	–
5 µm	ARI-5846-LG30	–

ARION® C4-BIO
all dimensions in mm

Phase	50 × 4.6	100 × 4.6	150 × 4.6	250 × 4.6	ARION® Guard Cartridges*
3 µm	–	–	ARI-5846-IK46	–	AGS-5731-BC4
5 µm	ARI-5846-LG46	ARI-5846-LI46	ARI-5846-LK46	ARI-5846-LM46	AGS-5731-BD4
15 µm	–	–	–	ARI-5846-QM46	–

Semi-preparative columns

ARION® C4-BIO
all dimensions in mm

Phase	150 × 10	250 × 10	ARION® Guard Cartridges*
5 µm	ARI-5846-LK1X	ARI-5846-LM1X	–

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

ARION® BIO

Ordering information

Preparative columns

ARION® C18-BIO
all dimensions in mm

Phase	150 × 10	250 × 10	250 × 21.2	150 × 30	ARION® Guard Cartridges*
5 µm	ARI-5840-LK1X	ARI-5840-LM1X	ARI-5840-LM2Y	ARI-5840-LK3X	–

ARION® C4-BIO
all dimensions in mm

Phase	150 × 10	250 × 10	250 × 21.2	150 × 30	ARION® Guard Cartridges*
5 µm	ARI-5846-LK1X	ARI-5846-LM1X	ARI-5846-LM2Y	ARI-5846-LK3X	–

CHROMSHELL®

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

- Ultrapure silica with low metal content.
- Maximum pressure 600 bar.
- Temperature stability up to 90 °C.

Metal content	<10 ppm
Temperature stability	90 °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 [m²/g]	Carbon load	pH stability	100% aqueous mobile phase	End-capping	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 Polar	2.6	85	130	6.5 %	1.5 to 7.0	✓	Mixed	L1

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

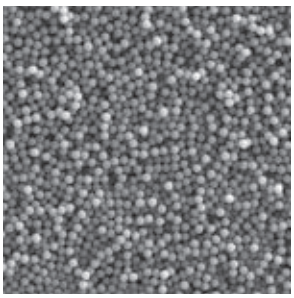
A polar end-capped developed for mid-polar and polar retention together with stability in the 100% aqueous mobile phase

pH Range	1.5 to 7.0
USP Code	L1

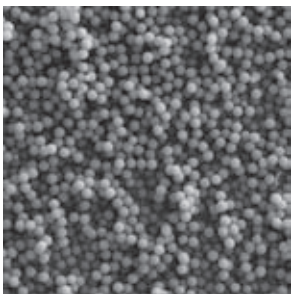
CHROMSHELL®

Up close

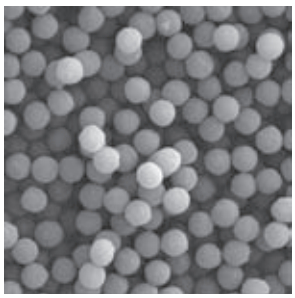
The 2.6-micron electron microscope field clearly shows the superlative quality of CHROMSHELL® particles.



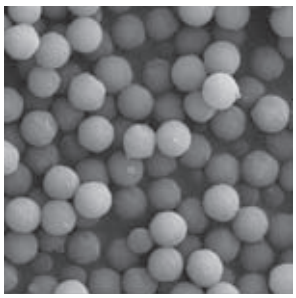
CHROMSHELL®
(100 × 100 µm)



Competitor K
(100 × 100 µm)



CHROMSHELL®
(30 × 30 µm)

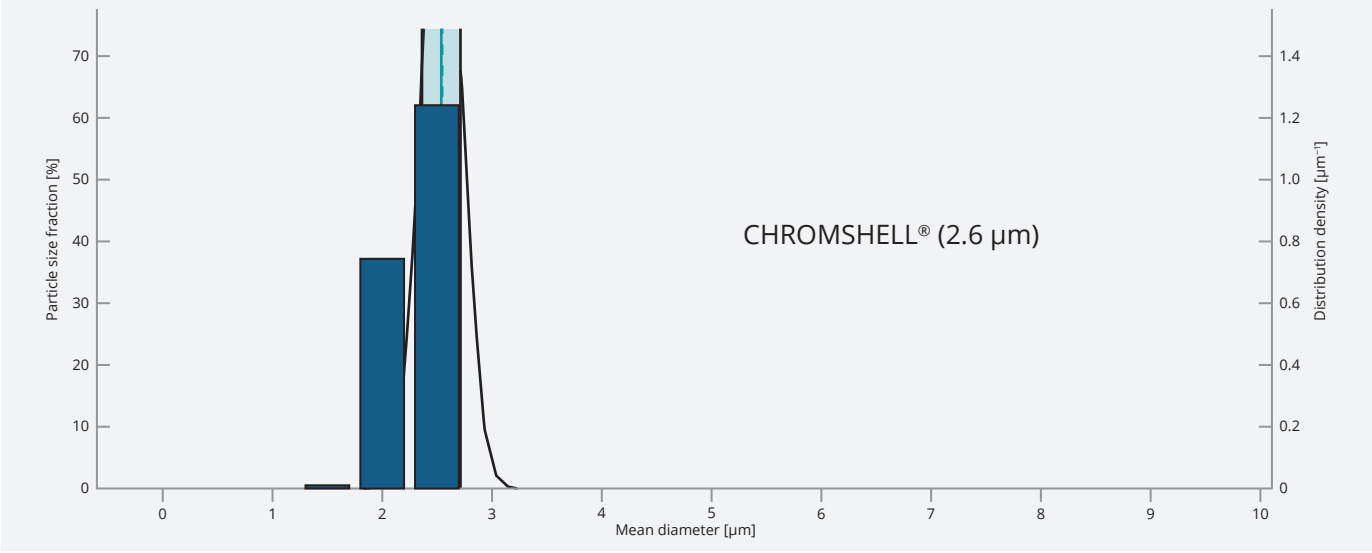


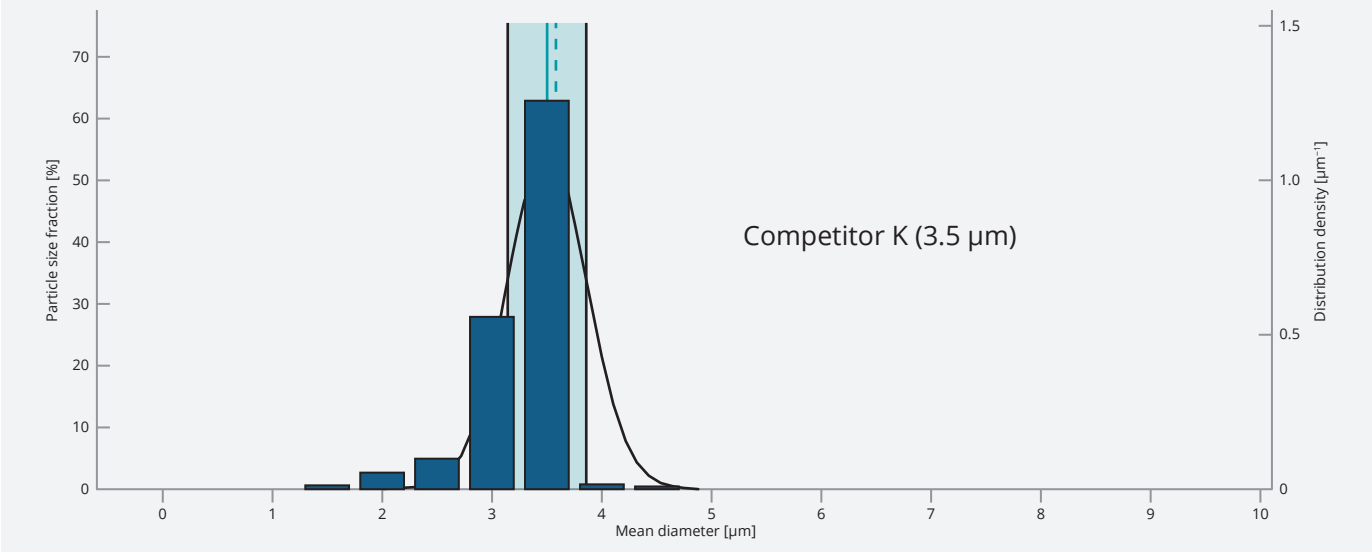
Competitor K
(30 × 30 µm)

The main particle characteristics:

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

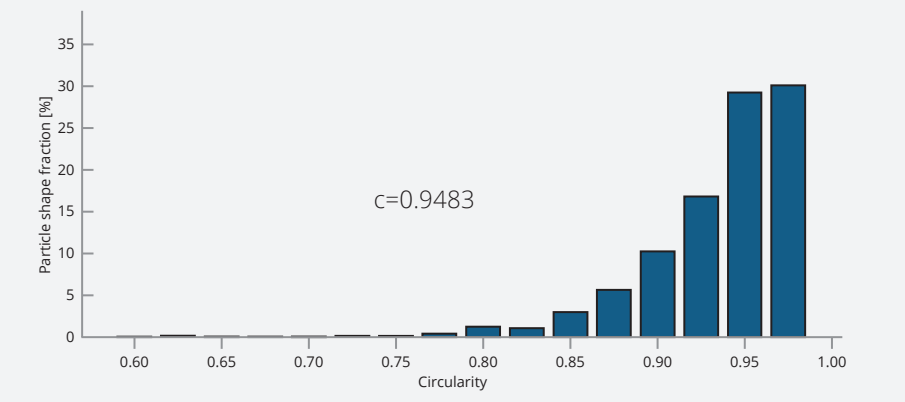
Particle size distribution



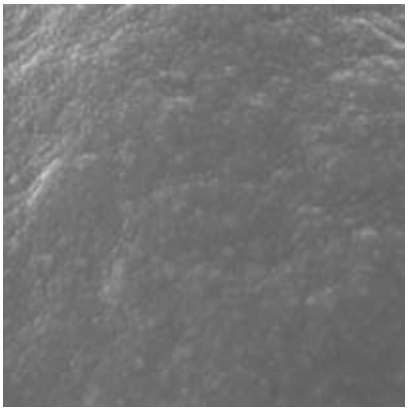


Circularity & surface smoothness

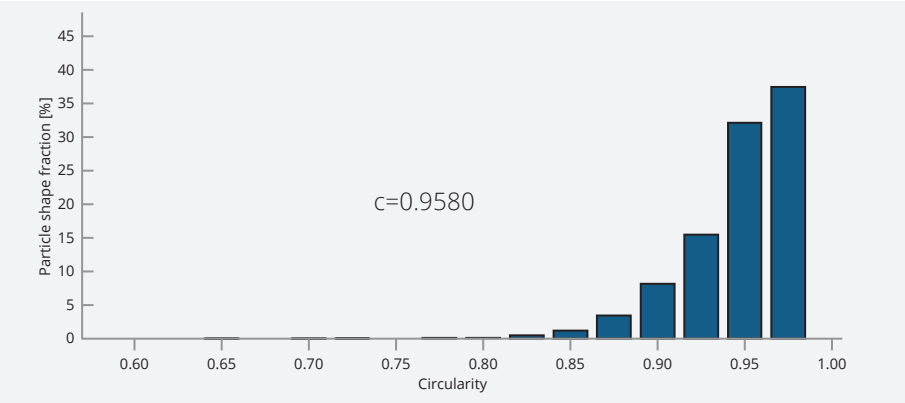
The core-shell particles were subjected to SEM analysis to determine circularity and surface smoothness.



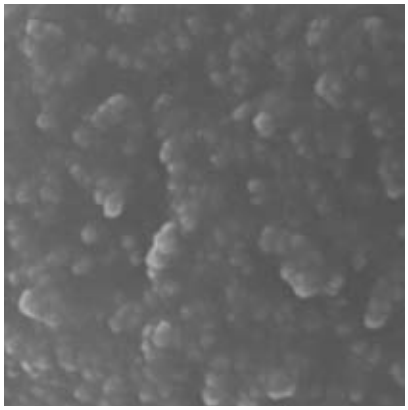
CHROMSHELL® (2.6 µm)



Detail view on pores



Competitor K (3.5 µm)



Detail view on pores up close

Chemicals of emerging concern (CECs) in river water

Chemical pollution causes enormous damage to the aquatic environment. The simultaneous determination of pollutants with different physico-chemical properties, such as pesticides, metabolites, personal care products, plastic-related chemicals, is always challenging. The application shows a sensitive LC/MS method for the fast determination of a diverse group of pollutants in river water.

Substance
Deisopropylatrazine
Hexazinon
Simazine
Atrazine
Terbuthylazine
Terbutryn
Prometryn
Metolachlor
Metazachlor
Diuron
Isoproturon
Chlorotoluron
Desethylterbuthylazine
Acetochlor
Tebuconazole
Propiconazole
Ametryn
Epoxiconazole
Cybutryne (Irgarol)
Alachlor
Chlorfenvinphos
Ethofumesate
Linuron
Pendimethalin

Substance
Fenthion
Dichlorvos
Quinoxyfen
Thiamethoxam
Imidacloprid
Clothianidin
Fenpropimorph
Carbendazim
Thiacloprid
Spiroxamine
Metamitron
Propazine
Thiophanate-methyl
(4-Chloro-2-methylphenoxy)acetic acid (MCPA)
Mecoprop (MCPP+MCPP-p)
2,4-Dichlorophenoxyacetic acid (2,4-D)
4-(4-Chloro-2-methylphenoxy)butanoic acid (MCPB)
Dichlorprop (2,4-DP)
Bentazone
2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)
Perfluorooctanesulfonic acid (PFOS)
Desethylatrazine (Desethyl-atrazine)
Methiocarb

Column	CHROMSHELL® C18 Plus, 2.6 µm		
Dimensions	50 mm × 2.1 mm		
Part number	CSH-5722-GG21		
Mobile phase	A: 5mM ammonium formate in water B: 5mM ammonium formate in MeOH		
Gradient elution	**Time [min]**	**A [%]**	**B [%]**
	0	100	0
	2	100	0
	7	0	100
	8	0	100
	8.1	100	0
	11	100	0
Flow rate	0.350 mL/min		
Temperature	40 °C		
Detection	MS/MS Low Mass		
Injection volume	100 µL		
Analytes	See MS/MS method		

Chemicals of emerging concern (CECs) in river water

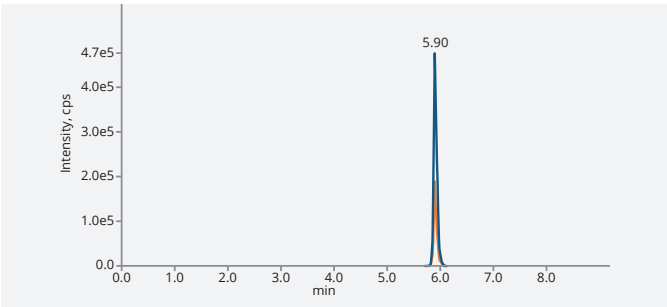
Validation parameters	LOD [µg/L]	LOQ [µg/L]
desethylatrazine	4.6	15.5
hexazinon	2.9	9.7
simazine	3.5	11.6
atrazine	2.1	7.1
terbuthylazine	3.8	12.6
terbutryn	3.5	11.7
prometryn	3.7	12.3
metolachlor	4.9	16.2
metazachlor	3	9.8
diuron	3.8	12.8
isoproturon	4	13.2
chlorotoluron	2.8	9.3
desethylterbuthylazine	6.3	21
acetochlor	4	13.4
tebuconazole	3.2	10.8
propiconazole	5	16.8
ametryn	3.4	11.4
epoxiconazole	2.7	8.9
cybutryne	3.9	12.8
alachlor	4.3	14.3
chlorfenvinphos	3	10
deisopropylatrazine	5.6	18.5
ethofumesate	2.7	8.9
linuron	4.7	15.6
pendimethalin	5.1	16.9
fenthion	2.3	7.6
dichlorvos	8.9	29.7
quinoxyfen	3	10.1
thiamethoxam	3.3	11
imidacloprid	3.3	11
clothianidin	5.8	19.3
fenpropimorph	3	9.9
carbendazim	4.5	15.1
thiacloprid	4.4	14.6
spiroxamine	3.6	12.1
metamitron	2.9	9.5
propazin	3.5	11.8
thiophanate-methyl	5.2	17.4
(4-chloro-2-methylphenoxy)acetic acid	5.1	16.8
mecoprop	6	20.1
2,4-dichlorophenoxyacetic acid	3.8	12.7
4-(4-chloro-2-methylphenoxy)butanoic acid	6	20.1
dichlorprop	6	20
bentazone	3	9.9
2,4,5-trichlorophenoxyacetic acid	3.4	11.2
methiocarb	4.9	16.4
perfluorooctanesulfonic acid	5.4	18.1

* The LOD and LOQ were calculated from real surface river water samples, not pure standards.

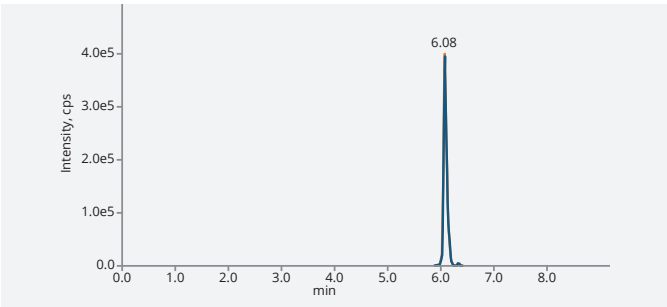
Chemicals of emerging concern (CECs) in river water

Internal standard are used:

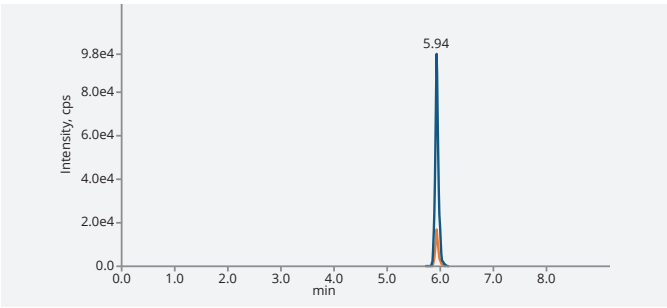
Bentazone D6 RT: 4.22	(−) Qualifier 244.9 > 132.0 [−38.0 V], Quantifier 244.9 > 181.0 [−30.0 V]
Isoproturon D6 RT: 6.35	(+) Qualifier 213.3 > 78.2 [27.0 V], Quantifier 213.3 > 52.2 [31.0 V]
Simazine D10 RT: 5.84	(+) Qualifier 212.1 > 137.1 [25.0 V], Quantifier 212.1 > 134.2 [25.0 V]



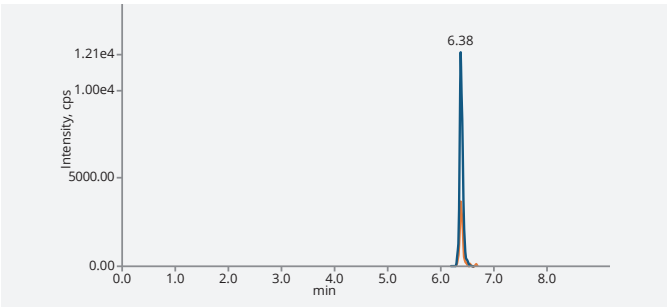
Mecoprop RT: 5.91
(−) Qualifier 213.0 > 141.0 [−18.0 V],
Quantifier 215.0 > 143.0 [−18.0 V]



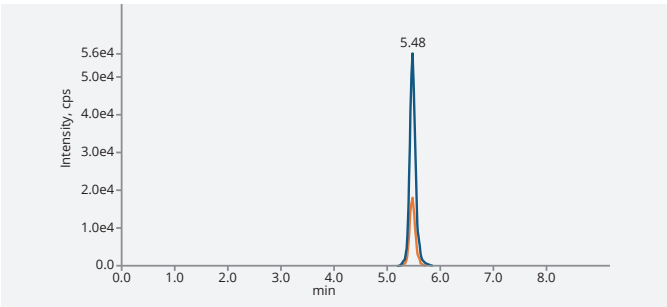
2,4,5-Trichlorophenoxyacetic acid RT: 6.07
(−) Qualifier 252.7 > 194.9 [−16.0 V],
Quantifier 254.7 > 196.8 [−16.0 V]



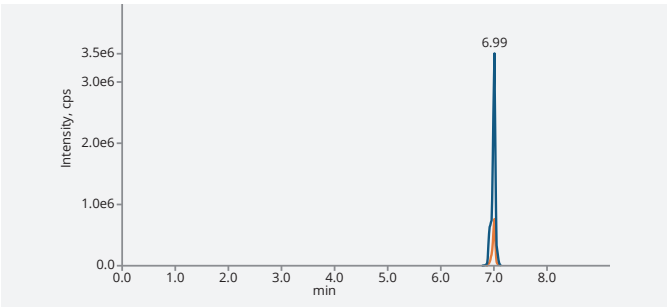
Dichlorprop RT: 5.92
(−) Qualifier 233.0 > 161.0 [−18.0 V],
Quantifier 233.0 > 125.0 [−32.0 V]



4-(4-Chloro-2-methylphenoxy)butanoic acid RT: 6.5
(−) Qualifier 227.0 > 141.0 [−12.0 V],
Quantifier 229.0 > 143.0 [−12.0 V]

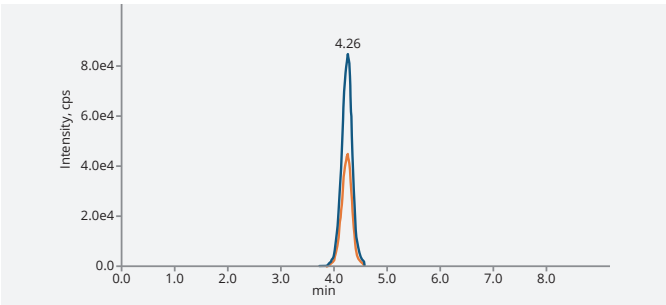


(4-Chloro-2-methylphenoxy)acetic acid RT: 5.48
(−) Qualifier 199.0 > 141.0 [−20.0 V],
Quantifier 201.0 > 143.0[−20.0 V]

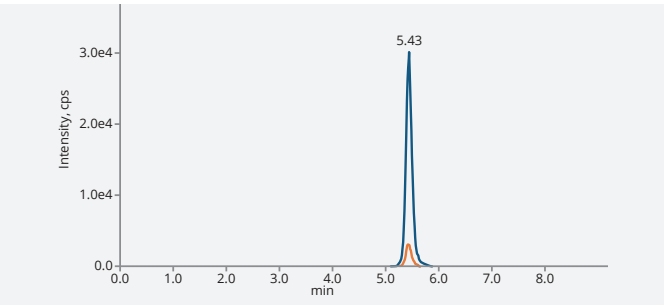


Perfluorooctanesulfonic acid RT: 7.0
(−) Qualifier 498.8 > 79.8 [−118.0 V],
Quantifier 498.8 > 98.8 [−98.0 V]

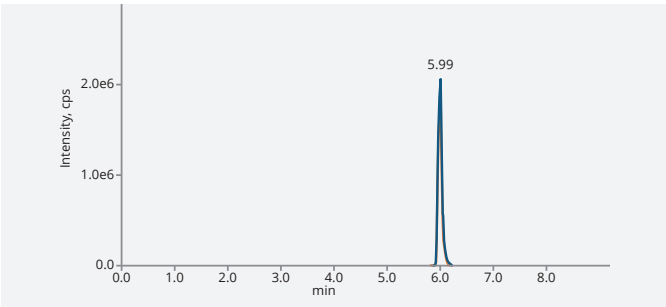
Chemicals of emerging concern (CECs) in river water



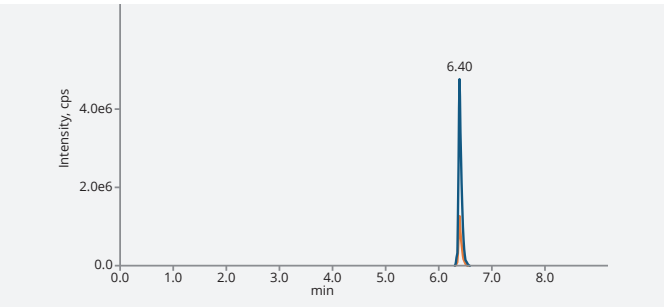
Bentazone RT: 4.22
(−) Qualifier 239.0 > 132.0 [−36.0 V],
Quantifier 239.0 > 197.0 [−30.0 V]



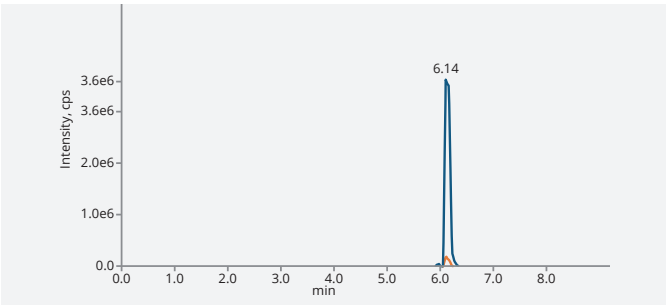
2,4-Dichlorophenoxyacetic acid RT: 5.44
(−) Qualifier 219.0 > 161.0 [−18.0 V],
Quantifier 219.0 > 125.0 [−36.0 V]



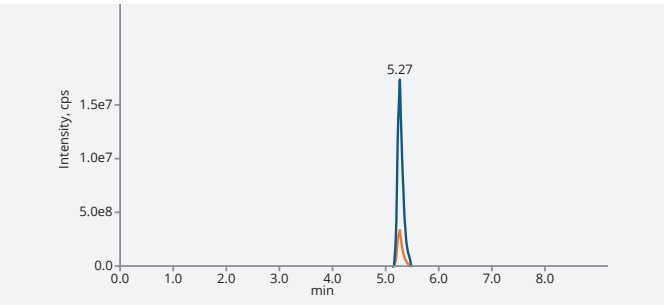
Simazine RT: 5.9
(+) Qualifier 202.1 > 132.1 [25.0 V],
Quantifier 202.1 > 124.3 [25.0 V]



Isoproturon RT: 6.35
(+) Qualifier 207.2 > 72.1 [29.0 V],
Quantifier 207.2 > 46.1 [31.0 V]

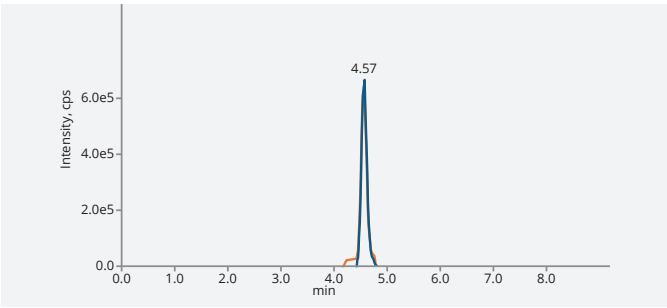


Desethylterbuthylazine RT: 6.1
(+) Qualifier 202.1 > 146.0 [23.0 V],
Quantifier 202.1 > 79.0 [50.0 V]

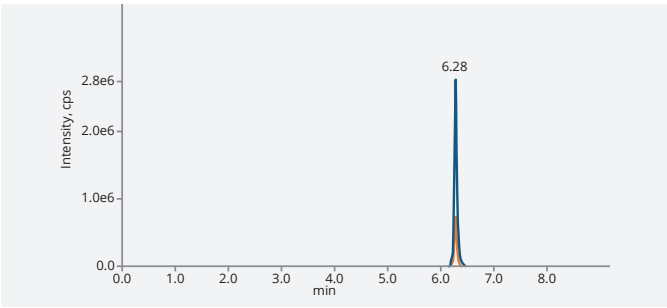


Carbendazim RT: 5.14
(+) Qualifier 192.2 > 160.2 [27.0 V],
Quantifier 192.2 > 132.1 [41.0 V]

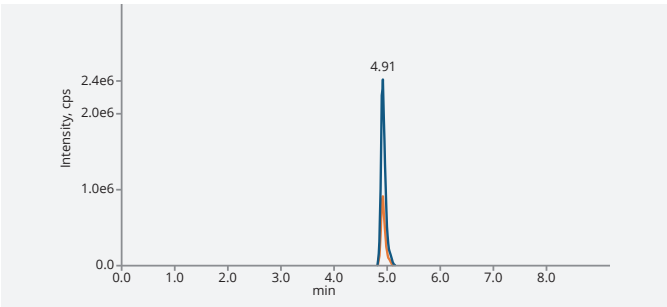
Chemicals of emerging concern (CECs) in river water



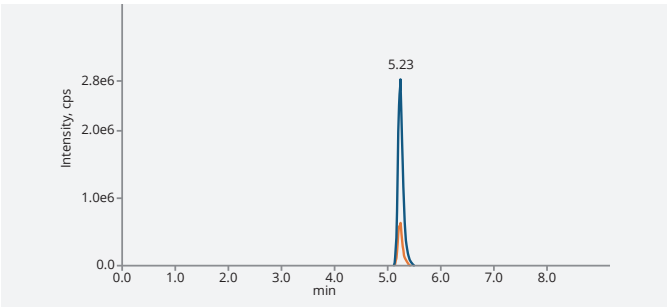
Deisopropylatrazine RT: 4.38
(+) Qualifier 174.1 > 104.1 [31.0 V],
Quantifier 174.1 > 96.1 [27.0 V]



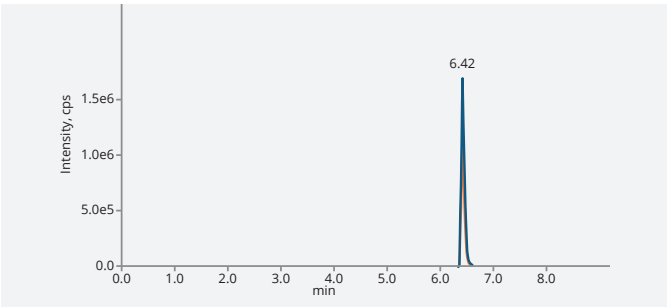
Chlorotoluron RT: 6.21
(+) Qualifier 213.1 > 72.2 [31.0 V],
Quantifier 213.1 > 46.2 [27.0 V]



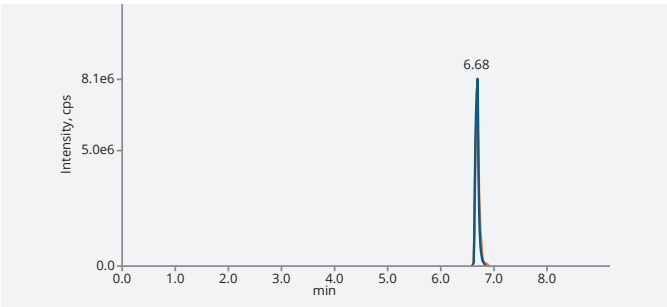
Metamitron RT: 4.8
(+) Qualifier 203.2 > 175.1 [23.0 V],
Quantifier 203.2 > 104.1 [33.0 V]



Desethylatrazine RT: 5.1
(+) Qualifier 188.1 > 146.2 [21.0 V],
Quantifier 188.1 > 104.1 [33.0 V]

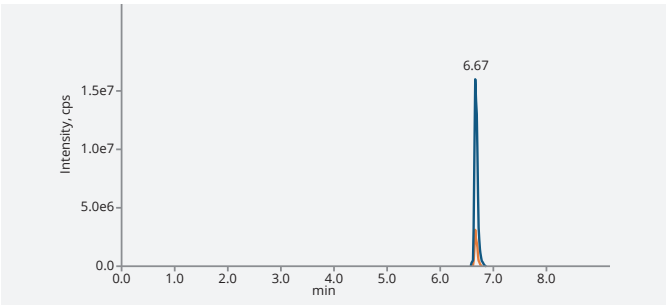


Diuron RT: 6.35
(+) Qualifier 233.1 > 72.0 [33.0 V],
Quantifier 235.1 > 72.1 [37.0 V]

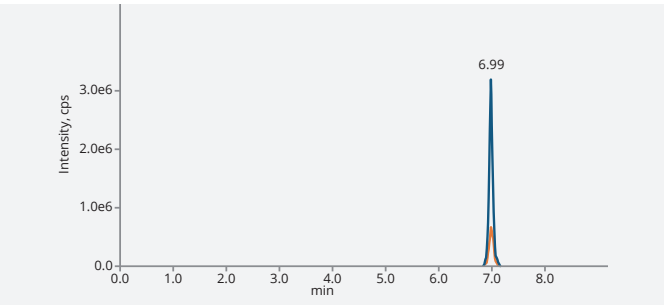


Propazin RT: 6.33
(+) Qualifier 230.1 > 188.0 [25.0 V],
Quantifier 230.1 > 146.0 [33.0 V]

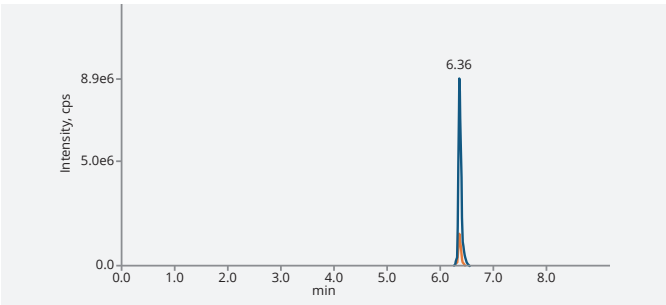
Chemicals of emerging concern (CECs) in river water



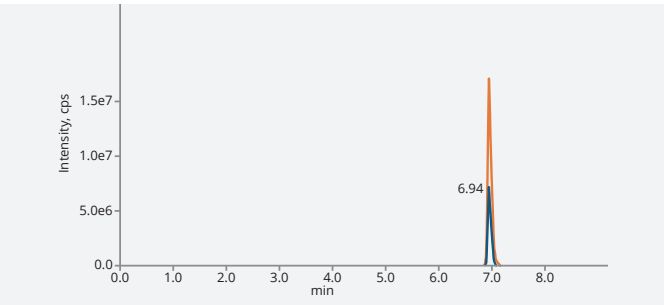
Ametryn RT: 6.63
(+) Qualifier 228.2 > 186.2 [23.0 V],
Quantifier 228.2 > 96.1 [33.0 V]



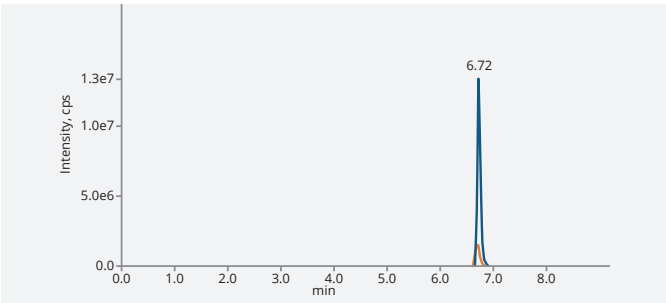
Acetochlor RT: 6.59
(+) Qualifier 224.1 > 148.1 [27.0 V],
Quantifier 270.0 > 224.0 [27.0 V]



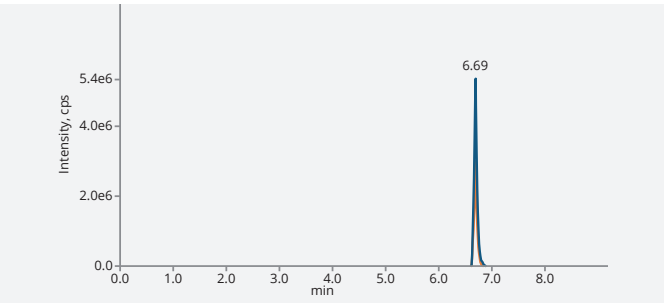
Atrazine RT: 6.31
(+) Qualifier 216.1 > 174.0 [23.0 V],
Quantifier 216.1 > 104.1 [39.0 V]



Prometryn RT: 6.9
(+) Qualifier 242.2 > 200.1 [19.0 V],
Quantifier 242.2 > 158.1 [35.0 V]

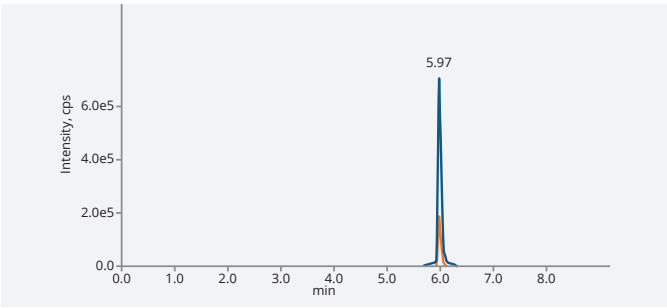


Terbuthylazine RT: 6.7
(+) Qualifier 230.1 > 174.1 [23.0 V],
Quantifier 230.1 > 104.1 [41.0 V]

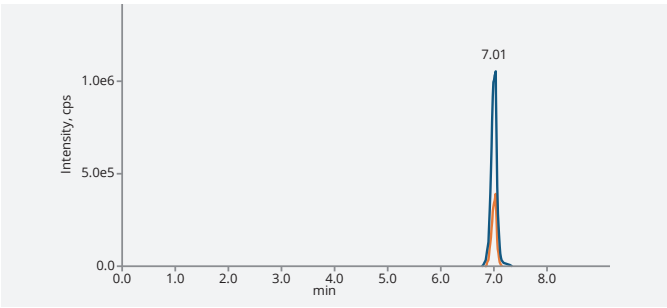


Methiocarb RT: 6.63
(+) Qualifier 226.1 > 169.2 [13.0 V],
Quantifier 226.1 > 121.1 [23.0 V]

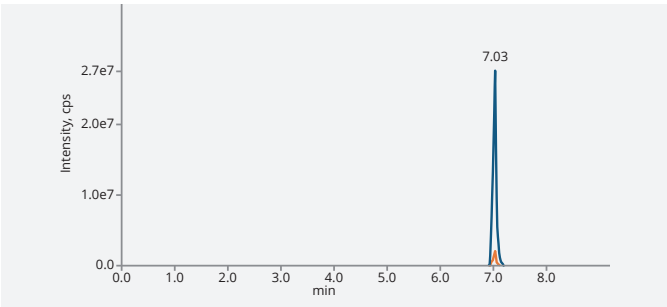
Chemicals of emerging concern (CECs) in river water



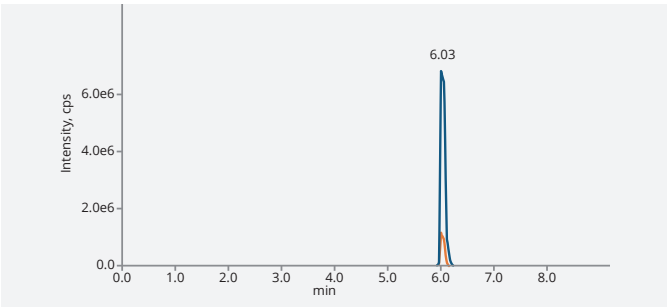
Dichlorvos RT: 5.88
(+) Qualifier 220.9 > 109.1 [25.0 V],
Quantifier 220.9 > 127.2 [23.0 V]



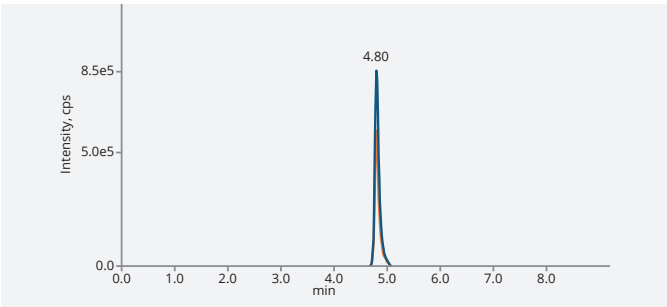
Alachlor RT: 7.0
(+) Qualifier 270.1 > 238.2 [17.0 V],
Quantifier 270.1 > 162.2 [28.0 V]



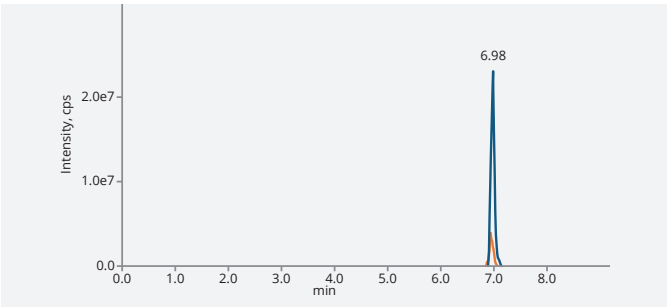
Cybutryne RT: 6.98
(+) Qualifier 254.2 > 198.2 [23.0 V],
Quantifier 254.2 > 83.2 [39.0 V]



Hexazinon RT: 5.94
(+) Qualifier 253.2 > 171.2 [27.0 V],
Quantifier 253.2 > 85.1 [44.0 V]

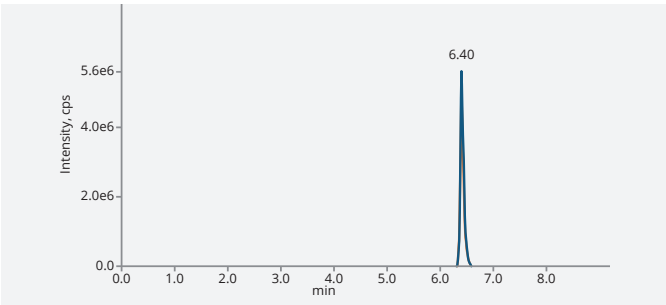


Clothianidin RT: 4.7
(+) Qualifier 250.0 > 169.1 [17.0 V],
Quantifier 250.0 > 132.0 [21.0 V]

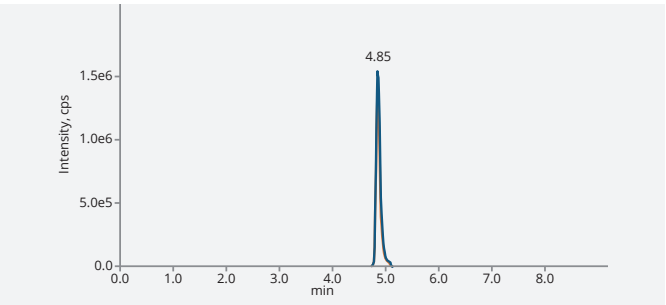


Terbutryn RT: 6.91
(+) Qualifier 242.2 > 186.1 [23.0 V],
Quantifier 242.2 > 68.1 [57.0 V]

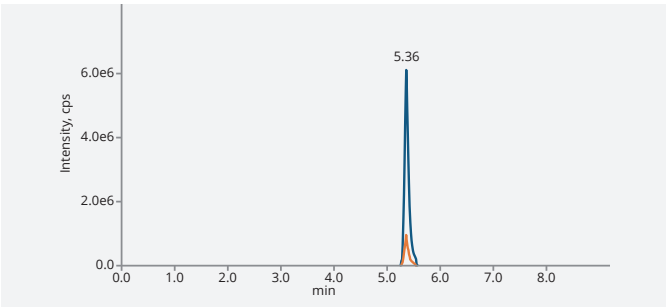
Chemicals of emerging concern (CECs) in river water



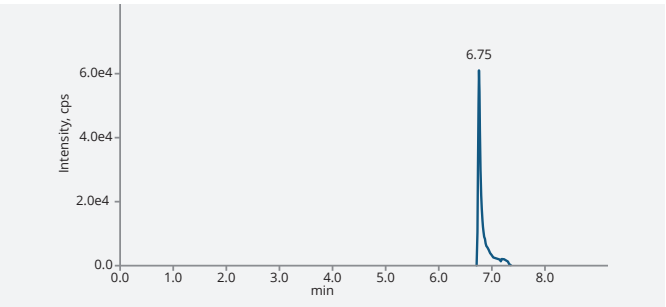
Metazachlor RT: 6.35
(+) Qualifier 278.2 > 134.2 [27.0 V],
Quantifier 278.2 > 210.2 [17.0 V]



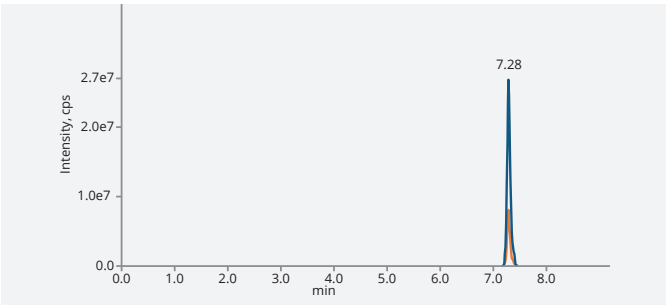
Imidacloprid RT: 4.62
(+) Qualifier 256.2 > 209.0 [23.0 V],
Quantifier 256.2 > 175.2 [23.0 V]



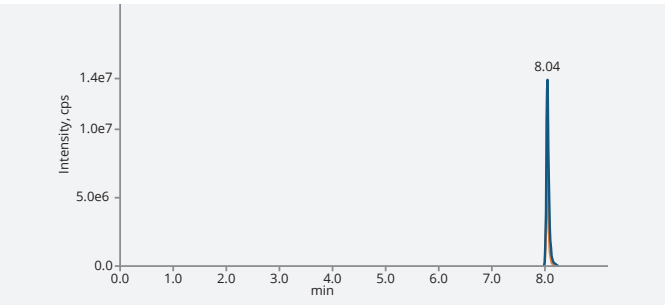
Thiacloprid RT: 5.22
(+) Qualifier 253.1 > 126.1 [29.0 V],
Quantifier 253.1 > 99.1 [57.0 V]



Linuron RT: 6.6
(+) Qualifier 249.1 > 160.0 [23.0 V],
Quantifier 249.1 > 182.1 [21.0 V]

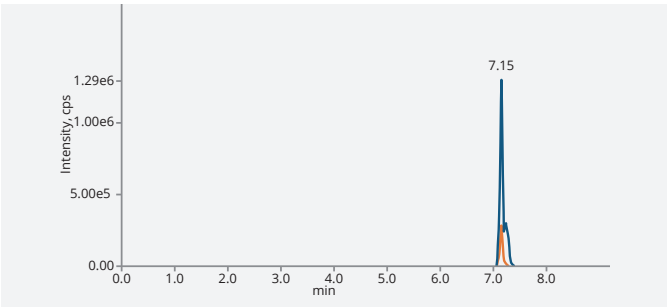


Spiroxamine RT: 7.1
(+) Qualifier 298.4 > 144.2 [27.0 V],
Quantifier 298.4 > 100.2 [43.0 V]

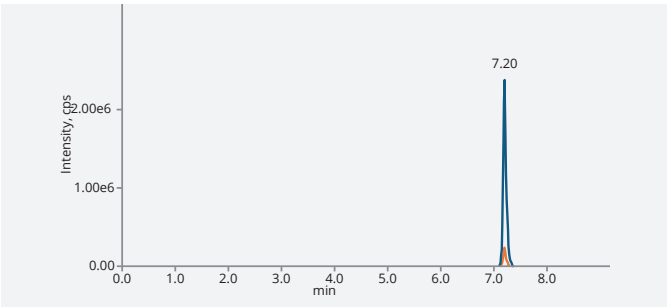


Fenpropimorph RT: 7.97
(+) Qualifier 304.0 > 147.0 [39.0 V],
Quantifier 304.0 > 117.0 [71.0 V]

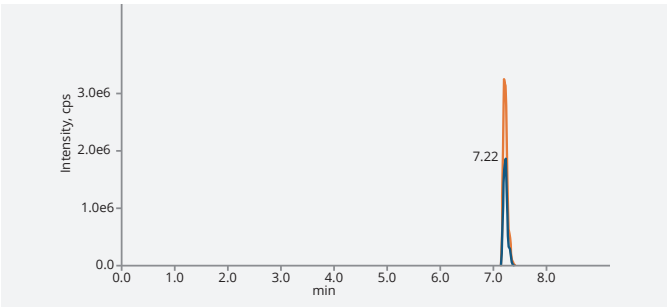
Chemicals of emerging concern (CECs) in river water



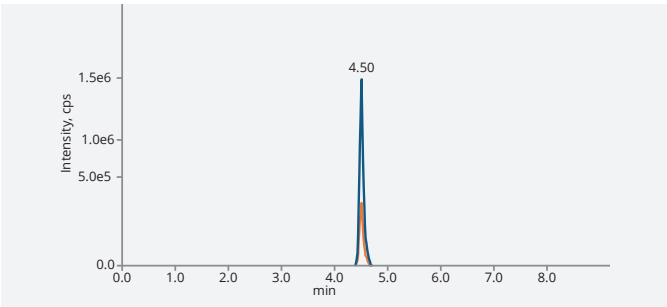
Tebuconazole RT: 7.1
(+) Qualifier 308.0 > 70.0 [39.0 V],
Quantifier 308.0 > 125.0 [47.0 V]



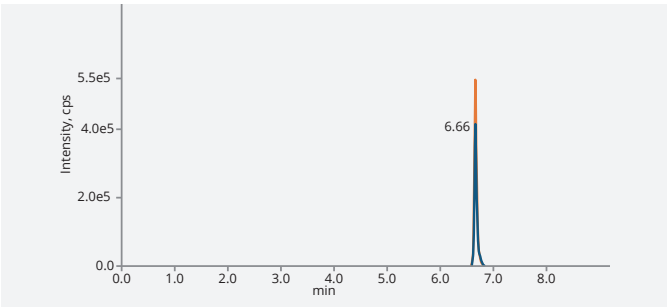
Propiconazole RT: 7.15
(+) Qualifier 342.1 > 159.1 [43.0 V],
Quantifier 342.1 > 69.1 [33.0 V]



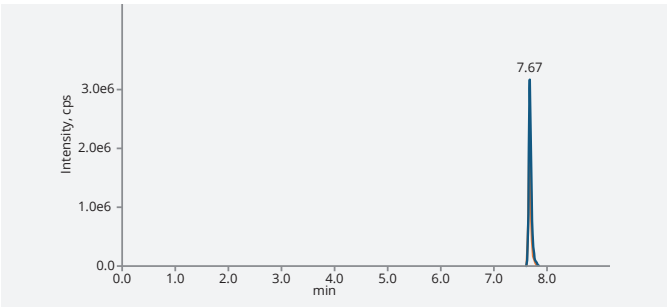
Chlorfenvinphos RT: 7.18
(+) Qualifier 358.9 > 99.0 [39.0 V],
Quantifier 358.9 > 155.1 [17.0 V]



Thiamethoxam RT: 4.34
(+) Qualifier 292.0 > 211.0 [17.0 V],
Quantifier 292.0 > 181.0 [31.0 V]

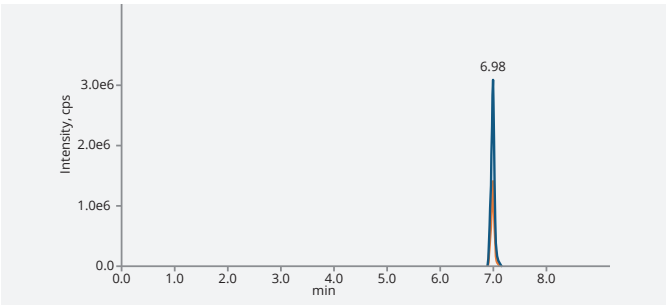


Ethofumesate RT: 6.62
(+) Qualifier 304.0 > 121.0 [27.0 V],
Quantifier 304.0 > 161.0 [31.0 V]

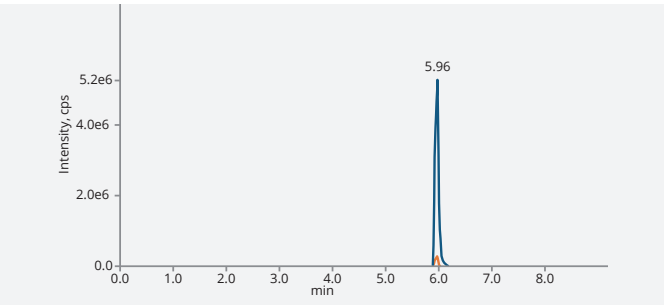


Quinoxyfen RT: 7.61
(+) Qualifier 308.0 > 197.0 [43.0 V],
Quantifier 308.0 > 162.0 [57.0 V]

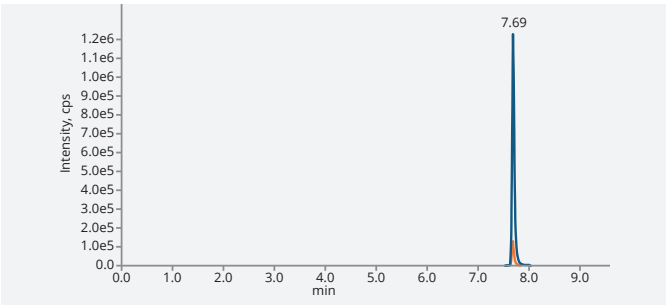
Chemicals of emerging concern (CECs) in river water



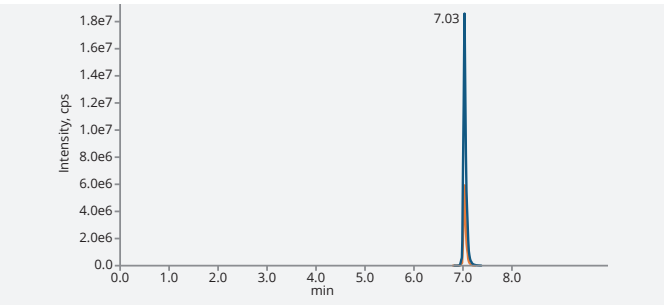
Epoxiconazole RT: 6.9
(+) Qualifier 330.0 > 121.0 [27.0 V],
Quantifier 330.0 > 101.0 [63.0 V]



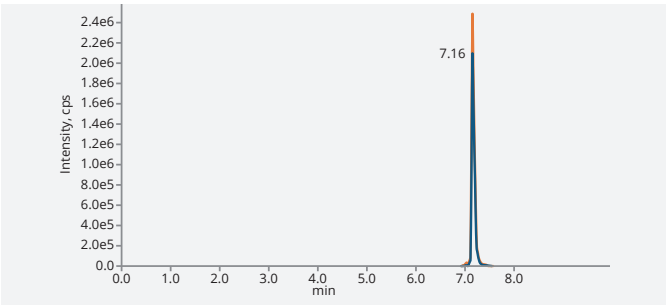
Thiophanate-methyl RT: 5.84
(+) Qualifier 343.0 > 151.0 [25.0 V],
Quantifier 343.0 > 192.0 [21.0 V]



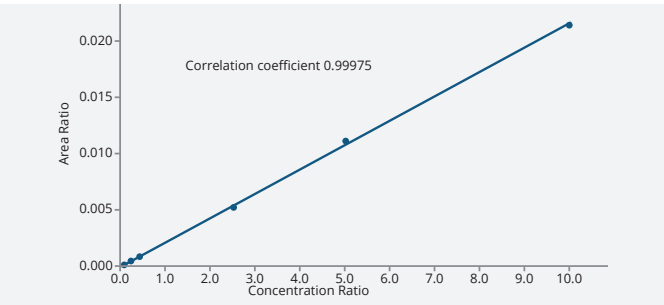
Pendimethalin RT: 7.65
(+) Qualifier 282.2 > 212.1 [15.0 V],
Quantifier 282.2 > 194.2 [21.0 V]



Metolachlor RT: 7.0
(+) Qualifier 284.2 > 252.2 [21.0 V],
Quantifier 284.2 > 176.2 [33.0 V]



Fenthion RT: 7.1
(+) Qualifier 278.9 > 169.0 [25.0 V],
Quantifier 278.9 > 246.9 [19.0 V]



Example of calibration curve for
4-(4-Chloro-2-methylphenoxy)butanoic acid (MCPB)

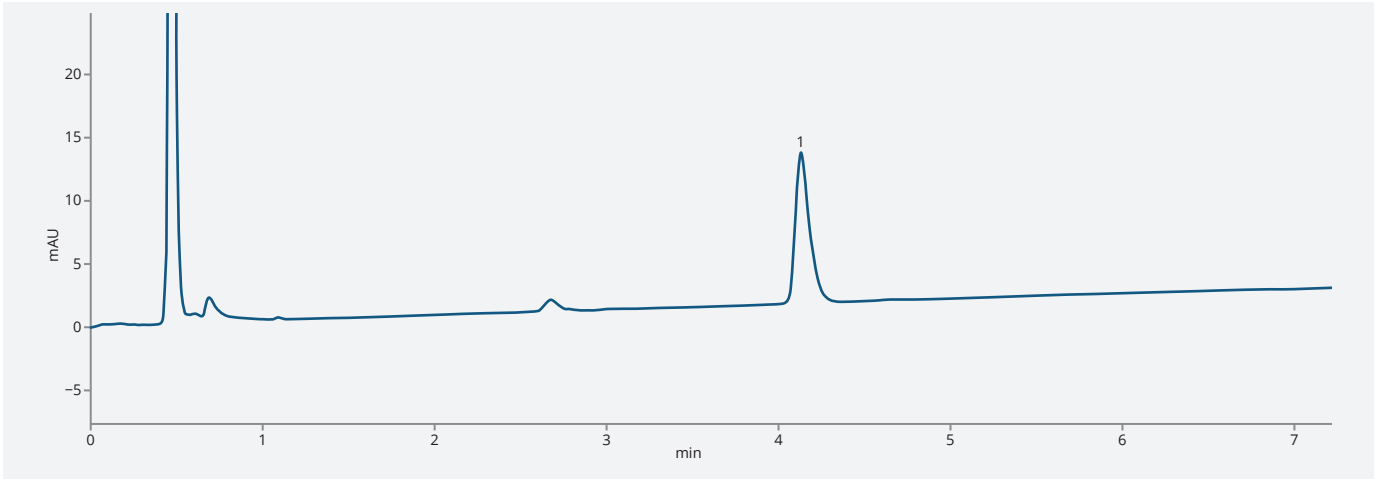
Author of this application: Ohře river basin, state enterprise.

Povodí Ohře

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**

Ordering information

2.6 µm CHROMSHELL®
all dimensions in mm

Phase	25 × 2.1	30 × 2.1	50 × 2.1	75 × 2.1	100 × 2.1	150 × 2.1
C18 Plus	CSH-5722-G521	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 Polar	–	CSH-5751-GD21	CSH-5751-GG21	CSH-5751-GH21	CSH-5751-GI21	CSH-5751-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
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 Polar	CSH-5751-GD30	CSH-5751-GG30	CSH-5751-GH30	CSH-5751-GI30	CSH-5751-GK30

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	CSH-5722-GM46
C18-XB	CSH-5749-GG46	CSH-5749-GH46	CSH-5749-GI46	CSH-5749-GK46	CSH-5749-GM46
C18 Polar	CSH-5751-GG46	CSH-5751-GH46	CSH-5751-GI46	CSH-5751-GK46	On request

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 87.

Protection can be perfectly ensured by installing a pre-column filter holder with a 0.2 µm or 0.5 µm 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

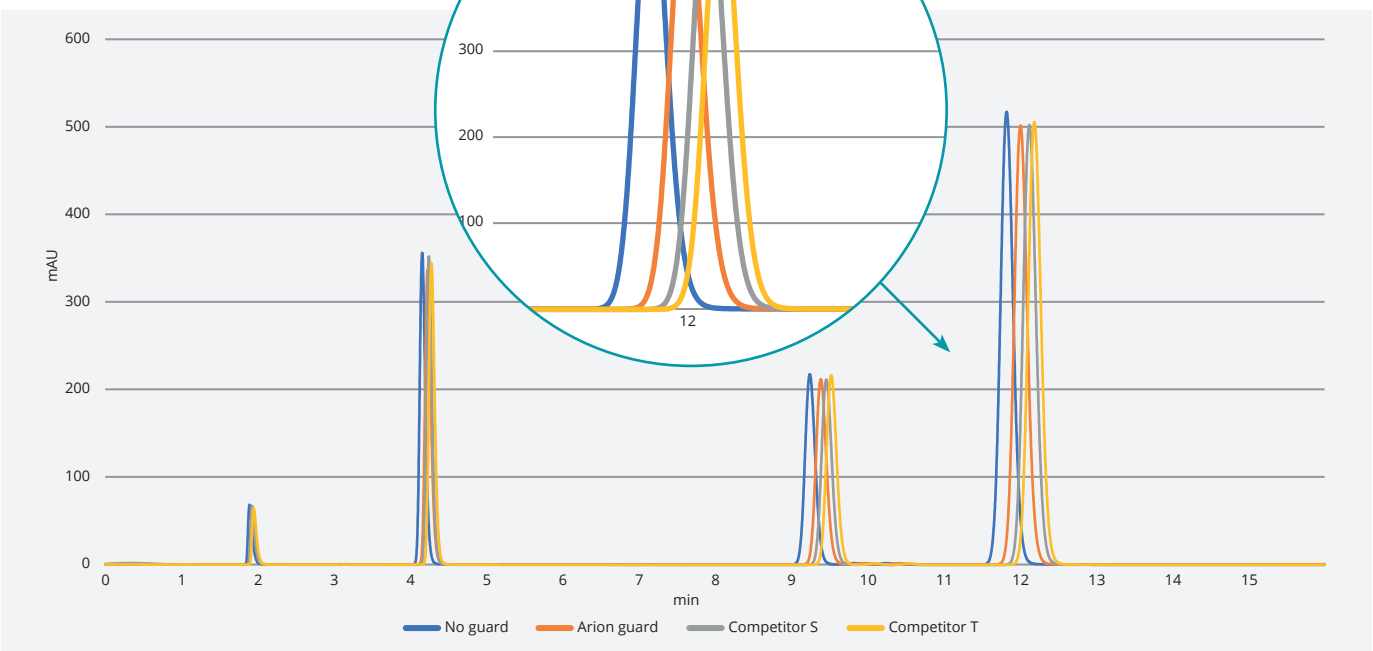
Guard column system

The ARION® Guard System (AGS) is a universal guard system, which can be connected to almost any analytical 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.

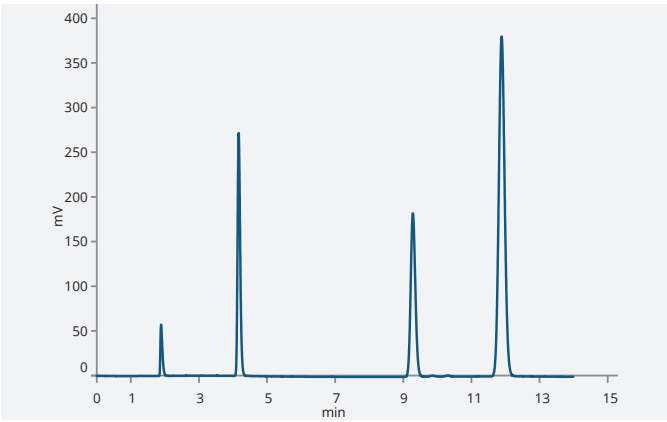
AGS system holder

Comparison of guard systems from various manufacturers

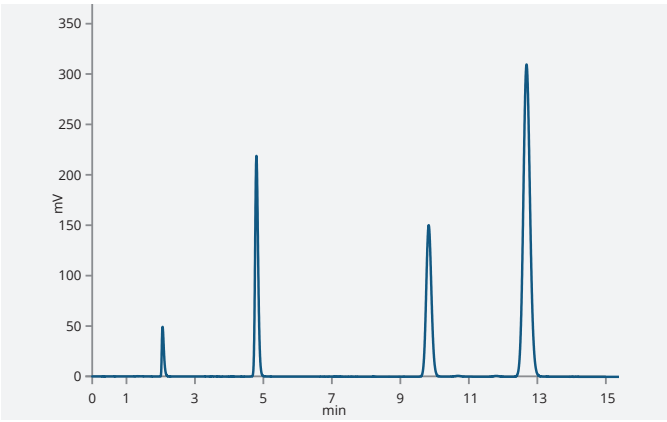


COLUMN PROTECTION

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.

ARION® Guard exploded view

Guard System for analytical columns

Material	Pore size [Å]	pH Stability	Column ID 2.1–3.0 5.0 × 2.1 mm  Package of 3 pcs	Column ID 3.0–4.6 5.0 × 4.0 mm  Package of 3 pcs	100% aqueous mobile phase
RP 1.7 µm	100	1 to 10	AGS-5731-RA2	–	×
RP 2.2 µm	100	1 to 10	AGS-5731-RB2	–	✓
RP 3.0 µm	100	1 to 10	AGS-5731-RC2	AGS-5731-RC4	✓
RP 5.0 µm	100	1 to 10	AGS-5731-RD2	AGS-5731-RD4	✓
RP C18 3.0 µm	100	2 to 9	–	AGS-5790-RC4	×
RP C18 5.0 µm	100	2 to 9	–	AGS-5790-RD4	×
C18-Hybrid 3.0 µm	150	1 to 12	–	AGS-5790-XC4	✓
C18-Hybrid 5.0 µm	150	1 to 12	–	AGS-5790-XD4	✓
HILIC 2.2 µm	100	1.5 to 7	AGS-5731-HB2	–	OM/W*
HILIC 3.0 µm	100	1.5 to 7	AGS-5731-HC2	AGS-5731-HC4	OM/W*
HILIC 5.0 µm	100	1.5 to 7	AGS-5731-HD2	AGS-5731-HD4	OM/W*
NP 2.2 µm	100	n/a	AGS-5731-NB2	–	n/a
NP 3.0 µm	100	n/a	AGS-5731-NC2	AGS-5731-NC4	n/a
NP 5.0 µm	100	n/a	AGS-5731-ND2	AGS-5731-ND4	n/a
NH2 2.2 µm	120	2 to 6.5	AGS-5731-CB2	–	✓
NH2 3.0 µm	120	2 to 6.5	AGS-5731-CC2	AGS-5731-CC4	✓
NH2 5.0 µm	120	2 to 6.5	AGS-5731-CD2	AGS-5731-CD4	✓
CN 3.0 µm	120	2 to 7	AGS-5731-DC2	AGS-5731-DC4	×
CN 5.0 µm	120	2 to 7	AGS-5731-DD2	AGS.5731-DD4	×
BIO RP 3.0 µm	300	1.5 to 7	AGS-5731-BC2	AGS-5731-BC4	×
BIO RP 5.0 µm	300	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 [bar]	10 pcs
PEEK	<400*	AGS-5731-Y00
Stainless Steel, Type 316	<689	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

COLUMN PROTECTION

Guard system for preparative columns

Preparative guard column system (PGS) is intended to use with 10 mm, 21.2 mm and 30 mm ID preparative HPLC columns.

Preparative Guard System Holders

ID	Description	Part number
10 mm	ARION® Preparative 10 mm Guard System, Holder only for ID 10 mm	PGS-5856-001
21.2 mm	ARION® Preparative 10 mm Guard System, Holder only for ID 21.2 mm	PGS-5856-000
30 mm	ARION® Preparative 10 mm Guard System, Holder only for ID 30 mm	PGS-5856-00Q

Preparative Guard System cartridges

5 µm AGS
all dimensions in mm

Phase	10 × 10	10 × 21.2	10 × 30
C18	PGS-5856-UD8	PGS-5856-UD9	PGS-5856-UDC
C18 Polar	On request	PGS-5856-WD9	PGS-5856-WDC
C8	On request	PGS-5856-TD9	On request
Pheny-butyl	On request	On request	On request
Biphenyl	On request	PGS-5856-LD9	On request
Si	On request	PGS-5856-VD9	PGS-5856-VDC

Preparative Guard System cartridges

10 µm AGS
all dimensions in mm

Phase	10 × 10	10 × 21.2	10 × 30
C18	PGS-5856-UF8	PGS-5856-UF9	PGS-5856-UFC
C18 Polar	PGS-5856-WF8	PGS-5856-WF9	PGS-5856-WFC
C8	On request	On request	On request
Pheny-butyl	PGS-5856-PF8	PGS-5856-PF9	On request
Biphenyl	On request	On request	On request
Si	On request	On request	PGS-5856-VFC

PGS holder
p/n PGS-5856-000

Preparative Guard System cartridges

15 µm AGS
all dimensions in mm

Phase	10 × 10	10 × 21.2	10 × 30
C18	PGS-5856-UG8	PGS-5856-UG9	On request
C18 Polar	PGS-5856-WG8	PGS-5856-WG9	On request
C8	On request	On request	On request
Pheny-butyl	PGS-5856-PG8	PGS-5856-PG9	On request
Biphenyl	On request	On request	On request
Si	On request	On request	On request

Preparative guard system cartridge

FLASH CHROMATOGRAPHY

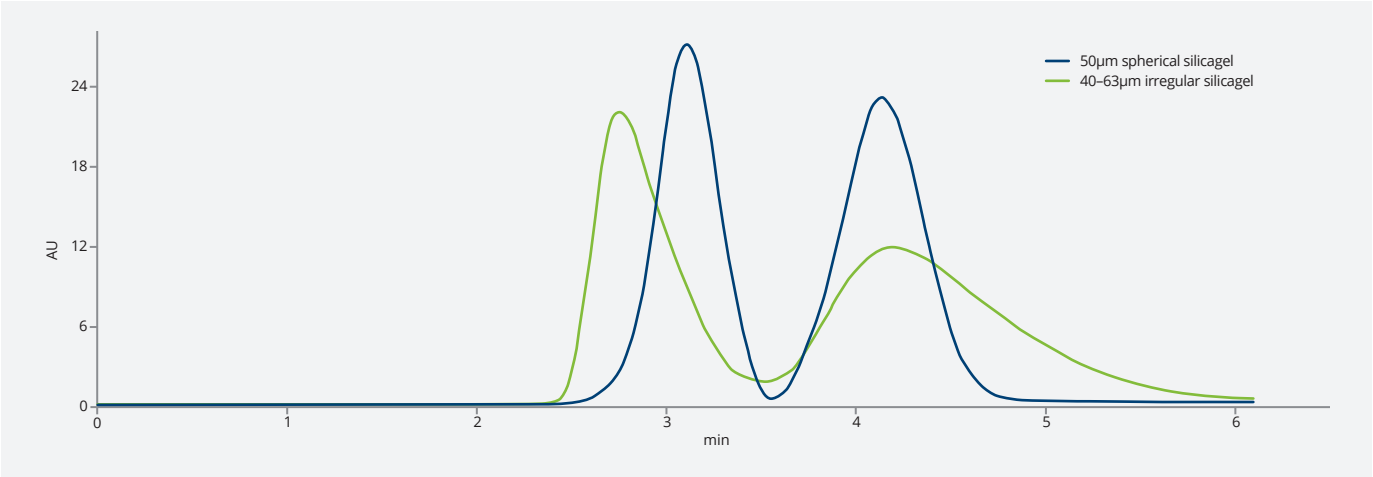
EasyFlash™ ChromLine

Flash columns

Chromservis has introduced Flash chromatography columns for high performance purifications. New EasyFlash™ columns offer high efficiency for a fast separation and isolation of impurities, reaction products and intermediates.

We offer wide range from 4 g up to 1600 g EasyFlash™ columns with various silicagel types – spherical and irregular.

Difference between spherical and irregular silicagel



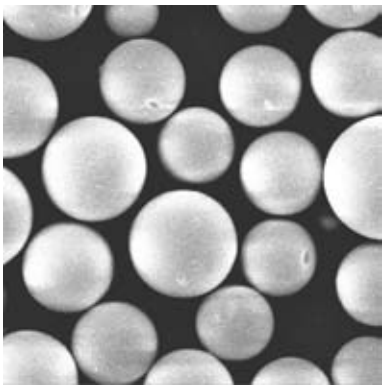
Benefits

- Higher efficiency – better separation of impurities
- Saves a lot of time
- Lower solvent consumption
- Lower influence of water content
- Man-power savings, automation
- Compatibility with virtually any Flash chromatograph (Luer/Luer Lock connection)

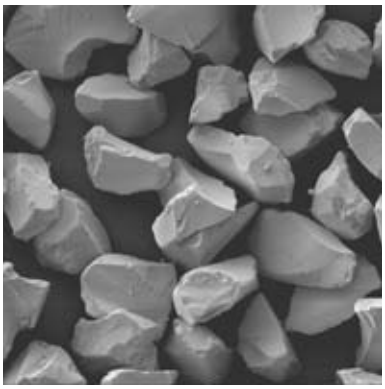
FLASH CHROMATOGRAPHY

EasyFlash™ columns specification

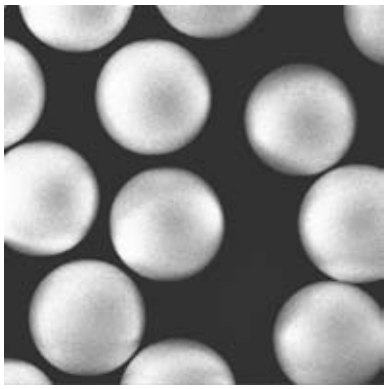
Size [g]	CV [mL]	Typical Flow rate [mL/min]	Length [mL]	ID [mm]	Max. pressure [bar]
4	5	5	68	12	22
12	19	15	84	21	22
25	32	15	133	21	22
40	48	25	135	27	20
80	102	35	205	31	20
120	153	45	224	36	20
220	269	130	153	60	20
330	405	130	226	60	20
800	1078	220	341	78	7
1600	2170	380	385	104	7



EasyFLash™ 25µ spherical silicagel



EasyFlash™ irregular silicagel



EasyFlash™ SAX polymer

Ordering Information

EasyFlash™ Silica IR

Size [g]	50 µm	Qty
4	FLC-5933-AD1	40 pcs
12	FLC-5933-AD2	30 pcs
25	FLC-5933-AD3	25 pcs
40	FLC-5933-AD4	20 pcs
80	FLC-5933-AD5	10 pcs
120	FLC-5933-AD6	8 pcs
220	FLC-5933-AD7	4 pcs
330	FLC-5933-AD8	4 pcs
800	FLC-5933-AD9	1 pc
1600	FLC-5933-ADA	1 pc

EasyFlash™ Silica 68

Size [g]	50 µm	Qty	25 µm	Qty	15 µm	Qty
4	FLC-5935-AD1	40 pcs	FLC-5935-AB1*	40 pcs	FLC-5935-AA1	20 pcs
12	FLC-5935-AD2*	30 pcs	FLC-5935-AB2*	30 pcs	FLC-5935-AA2	20 pcs
25	FLC-5935-AD3	25 pcs	FLC-5935-AB3*	25 pcs	FLC-5935-AA3	12 pcs
40	FLC-5935-AD4	20 pcs	FLC-5935-AB4*	20 pcs	FLC-5935-AA4	12 pcs
80	FLC-5935-AD5	10 pcs	FLC-5935-AB5*	10 pcs	FLC-5935-AA5	4 pcs
120	FLC-5935-AD6	8 pcs	FLC-5935-AB6*	8 pcs	FLC-5935-AA6	4 pcs
220	FLC-5935-AD7	4 pcs	FLC-5935-AB7	4 pcs	FLC-5935-AA7	2 pcs
330	FLC-5935-AD8	4 pcs	FLC-5935-AB8	4 pcs	FLC-5935-AA8	2 pcs
800	FLC-5935-AD9	1 pc	FLC-5935-AB9	1 pc	n/a	–
1600	FLC-5935-ADA	1 pc	FLC-5935-ABA	1 pc	n/a	–

EasyFlash™ Silica 50

Size [g]	50 µm	Qty	30 µm	Qty	15 µm	Qty
4	FLC-5934-AD1	40 pcs	FLC-5934-AC1	40 pcs	FLC-5934-AA1	20 pcs
12	FLC-5934-AD2	30 pcs	FLC-5934-AC2	30 pcs	FLC-5934-AA2	20 pcs
25	FLC-5934-AD3	25 pcs	FLC-5934-AC3	25 pcs	FLC-5934-AA3	12 pcs
40	FLC-5934-AD4	20 pcs	FLC-5934-AC4*	20 pcs	FLC-5934-AA4	12 pcs
80	FLC-5934-AD5	10 pcs	FLC-5934-AC5	10 pcs	FLC-5934-AA5	4 pcs
120	FLC-5934-AD6	8 pcs	FLC-5934-AC6	8 pcs	FLC-5934-AA6	4 pcs
220	FLC-5934-AD7	4 pcs	FLC-5934-AC7	4 pcs	FLC-5934-AA7	2 pcs
330	FLC-5934-AD8	4 pcs	FLC-5934-AC8	4 pcs	FLC-5934-AA8	2 pcs
800	FLC-5934-AD9	1 pc	FLC-5934-AC9	1 pc	n/a	–
1600	FLC-5934-ADA	1 pc	FLC-5934-ACA	1 pc	n/a	–

* Flash columns are available in bulk package

FLASH CHROMATOGRAPHY

Ordering Information

EasyFlash™ Alumina Basic

Size [g]	32/63 µm	Qty
4	FLC-5936-AE1	8 pcs
12	FLC-5936-AE2	4 pcs
25	FLC-5936-AE3	4 pcs
40	FLC-5936-AE4	4 pcs
80	FLC-5936-AE5	2 pcs
120	FLC-5936-AE6	2 pcs
220	FLC-5936-AE7	2 pcs
330	FLC-5936-AE8	1 pc
800	FLC-5936-AE9	1 pc
1600	FLC-5936-AEA	1 pc

EasyFlash™ Alumina Neutral

Size [g]	32/63 µm	Qty
4	FLC-5937-AE1	8 pcs
12	FLC-5937-AE2	4 pcs
25	FLC-5937-AE3	4 pcs
40	FLC-5937-AE4	4 pcs
80	FLC-5937-AE5	2 pcs
120	FLC-5937-AE6	2 pcs
220	FLC-5937-AE7	2 pcs
330	FLC-5937-AE8	1 pc
800	FLC-5937-AE9	1 pc
1600	FLC-5937-AEA	1 pc

EasyFlash™ NH2

Size [g]	50 µm	Qty	30 µm	Qty	15 µm	Qty
4	FLC-5950-AD1	4 pcs	FLC-5950-AC1	4 pcs	FLC-5950-AA1	4 pcs
12	FLC-5950-AD2	2 pcs	FLC-5950-AC2	2 pcs	FLC-5950-AA2	2 pcs
25	FLC-5950-AD3	1 pc	FLC-5950-AC3	1 pc	FLC-5950-AA3	1 pc
40	FLC-5950-AD4	1 pc	FLC-5950-AC4	1 pc	FLC-5950-AA4	1 pc
80	FLC-5950-AD5	1 pc	FLC-5950-AC5	1 pc	FLC-5950-AA5	1 pc
120	FLC-5950-AD6	1 pc	FLC-5950-AC6	1 pc	FLC-5950-AA6	1 pc
220	FLC-5950-AD7	1 pc	FLC-5950-AC7	1 pc	FLC-5950-AA7	1 pc
330	FLC-5950-AD8	1 pc	FLC-5950-AC8	1 pc	FLC-5950-AA8	1 pc
800	FLC-5950-AD9	1 pc	FLC-5950-AC9	1 pc	n/a	–
1600	FLC-5950-ADA	1 pc	FLC-5950-ACA	1 pc	n/a	–

EasyFlash™ C18 High Performance

Size [g]	50 µm	Qty	30 µm	Qty	15 µm	Qty
4	FLC-5940-AD1	4 pcs	FLC-5940-AC1	4 pcs	FLC-5940-AA1	4 pcs
12	FLC-5940-AD2	2 pcs	FLC-5940-AC2	2 pcs	FLC-5940-AA2	2 pcs
25	FLC-5940-AD3	1 pc	FLC-5940-AC3	1 pc	FLC-5940-AA3	1 pc
40	FLC-5940-AD4	1 pc	FLC-5940-AC4	1 pc	FLC-5940-AA4	1 pc
80	FLC-5940-AD5	1 pc	FLC-5940-AC5	1 pc	FLC-5940-AA5	1 pc
120	FLC-5940-AD6	1 pc	FLC-5940-AC6	1 pc	FLC-5940-AA6	1 pc
220	FLC-5940-AD7	1 pc	FLC-5940-AC7	1 pc	FLC-5940-AA7	1 pc
330	FLC-5940-AD8	1 pc	FLC-5940-AC8	1 pc	FLC-5940-AA8	1 pc
800	FLC-5940-AD9	1 pc	FLC-5940-AC9	1 pc	n/a	–
1600	FLC-5940-ADA	1 pc	FLC-5940-ACA	1 pc	n/a	–

Ordering Information

EasyFlash™ C18-AQ

Size [g]	30 µm	Qty	15 µm	Qty
4	FLC-5941-AC1	4 pcs	FLC-5941-AA1	4 pcs
12	FLC-5941-AC2	2 pcs	FLC-5941-AA2	2 pcs
25	FLC-5941-AC3	1 pc	FLC-5941-AA3	1 pc
40	FLC-5941-AC4	1 pc	FLC-5941-AA4	1 pc
80	FLC-5941-AC5	1 pc	FLC-5941-AA5	1 pc
120	FLC-5941-AC6	1 pc	FLC-5941-AA6	1 pc
220	FLC-5941-AC7	1 pc	FLC-5941-AA7	1 pc
330	FLC-5941-AC8	1 pc	FLC-5941-AA8	1 pc
800	FLC-5941-AC9	1 pc	n/a	–
1600	FLC-5941-ACA	1 pc	n/a	–

EasyFlash™ SAX

Size [g]	50 µm	Qty
4	FLC-5952-AD1	4 pcs
12	FLC-5952-AD2	2 pcs
25	FLC-5952-AD3	1 pc
40	FLC-5952-AD4	1 pc
80	FLC-5952-AD5	1 pc
120	FLC-5952-AD6	1 pc
220	FLC-5952-AD7	1 pc
330	FLC-5952-AD8	1 pc
800	FLC-5952-AD9	1 pc
1600	FLC-5952-ADA	1 pc

EasyFlash™ SCX

Size [g]	50 µm	Qty
4	FLC-5953-AD1	4 pcs
12	FLC-5953-AD2	2 pcs
25	FLC-5953-AD3	1 pc
40	FLC-5953-AD4	1 pc
80	FLC-5953-AD5	1 pc
120	FLC-5953-AD6	1 pc
220	FLC-5953-AD7	1 pc
330	FLC-5953-AD8	1 pc
800	FLC-5953-AD9	1 pc
1600	FLC-5953-ADA	1 pc

EasyFlash™ Diol

Size [g]	50 µm	Qty	30 µm	Qty	15 µm	Qty
4	FLC-5949-AD1	4 pcs	FLC-5949-AC1	4 pcs	FLC-5949-AA1	4 pcs
12	FLC-5949-AD2	2 pcs	FLC-5949-AC2	2 pcs	FLC-5949-AA2	2 pcs
25	FLC-5949-AD3	1 pc	FLC-5949-AC3	1 pc	FLC-5949-AA3	1 pc
40	FLC-5949-AD4	1 pc	FLC-5949-AC4	1 pc	FLC-5949-AA4	1 pc
80	FLC-5949-AD5	1 pc	FLC-5949-AC5	1 pc	FLC-5949-AA5	1 pc
120	FLC-5949-AD6	1 pc	FLC-5949-AC6	1 pc	FLC-5949-AA6	1 pc
220	FLC-5949-AD7	1 pc	FLC-5949-AC7	1 pc	FLC-5949-AA7	1 pc
330	FLC-5949-AD8	1 pc	FLC-5949-AC8	1 pc	FLC-5949-AA8	1 pc
800	FLC-5949-AD9	1 pc	FLC-5949-AC9	1 pc	n/a	–
1600	FLC-5949-ADA	1 pc	FLC-5949-ACA	1 pc	n/a	–

EasyFlash™ column

FLASH CHROMATOGRAPHY

Ordering information

EasyFlash™ Phenyl-Butyl

Size [g]	15 µm	Qty
4	FLC-6113-AA1	4 pcs
12	FLC-6113-AA2	2 pcs
25	FLC-6113-AA3	1 pc
40	FLC-6113-AA4	1 pc
80	FLC-6113-AA5	1 pc
120	FLC-6113-AA6	1 pc
220	FLC-6113-AA7	1 pc
330	FLC-6113-AA8	1 pc

Purification of PAHs and nitro-PAHs

Abstract

This application presents reliable purification of PAHs and nitro-PAHS prior their analytical determination. The flash chromatography method offers not only clean-up step, but also pre-concentration to enable easier GC/MS analysis. It also simplifies the sample preparation process to avoid manual SPE or GPC.

Introduction

Polycyclic aromatic hydrocarbons (PAHs), frequently alongside nitro-PAHs, are a key class of organic contaminants routinely measured in atmospheric pollution monitoring programs and pilot studies. Both compound groups represent a significant risk for human health. Many of them have been confirmed to have carcinogenic and/or mutagenic effects.

Purity table

Sample	Concentration	Fraction	Purity
Biphenyl	100 µg/mL	2.14	100%
3-Nitrobiphenyl	100 µg/mL	2.2-2.4	100%
Purified mixture	100 µg/mL (each)	2.17+2.18	99.99%
		2.22	99.91%

Purification conditions

Column	EasyFlash™ Phenyl-Butyl, 15 µm
Dimensions	4 g (2 columns in series)
Part number	FLC-6113-AA1
Mobile phase	Hexane 100%, isocratic
Flow rate	1.0 mL/min
Temperature	ambient
Detection	UV@251 nm
Flash chromatograph	PuriFlash 5.250 (Advion Interchim Scientific)

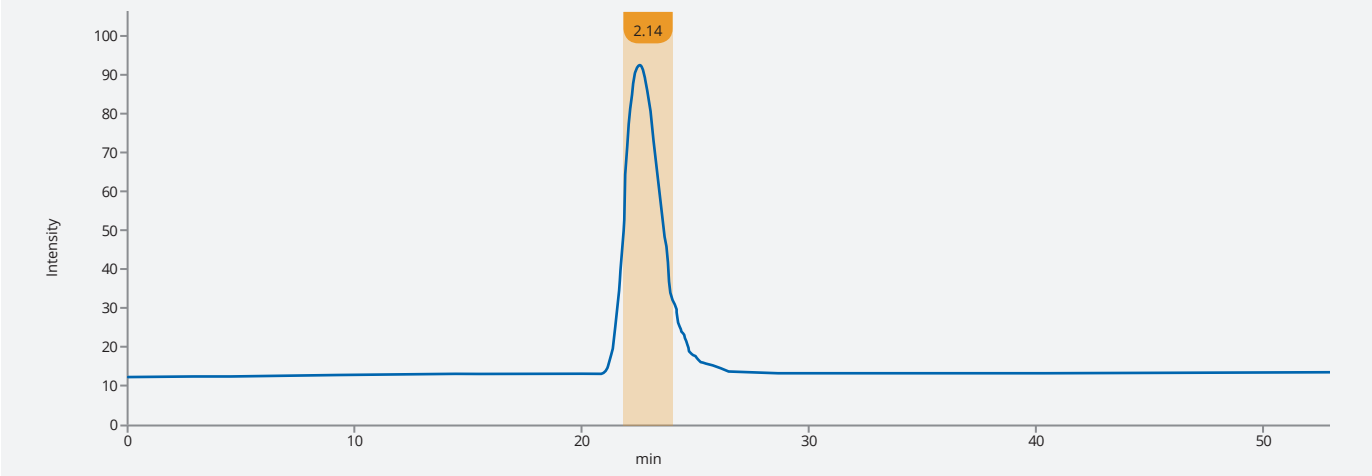
Analytical method

Column	ASTRA® Phenyl-Hexyl-HE, 5 µm
Dimensions	250 × 4.6 mm
Part number	AST-5891-LM46
Mobile phase	Hexane 100%, isocratic
Flow rate	1 mL/min
Temperature	25 °C
Detection	DAD@ 220 nm, 254 nm
HPLC system	Nexera XS Series (Shimadzu)
Analytes	**1. Biphenyl** **2. 3-Nitrobiphenyl**

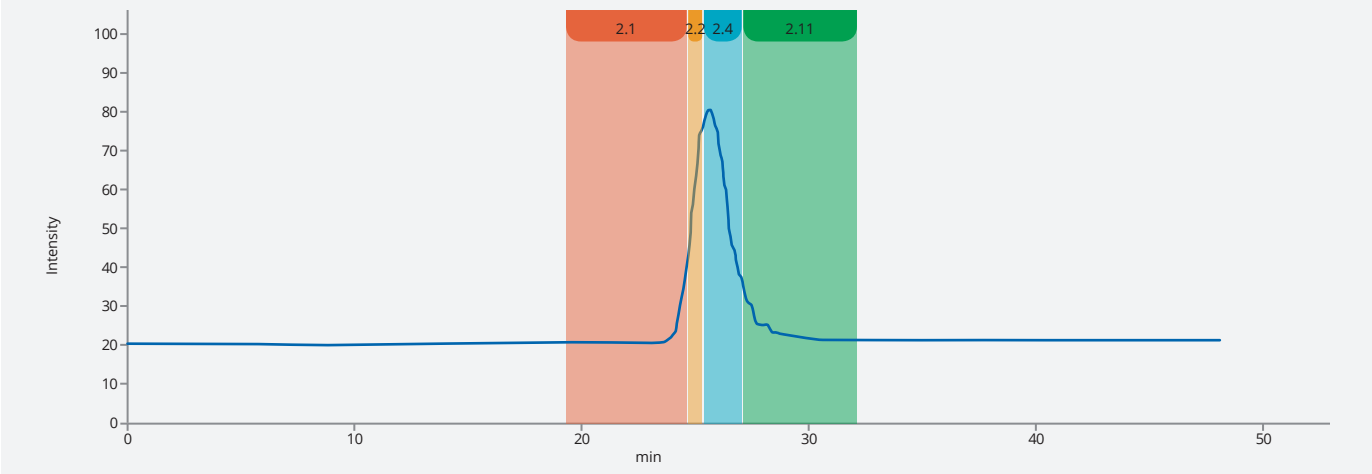
FLASH HROMATOGRAPHY

Purification of PAHs and nitro-PAHs

Purification chromatogram of Biphenyl (concentration 100 µg/mL, RT 22.3 min)

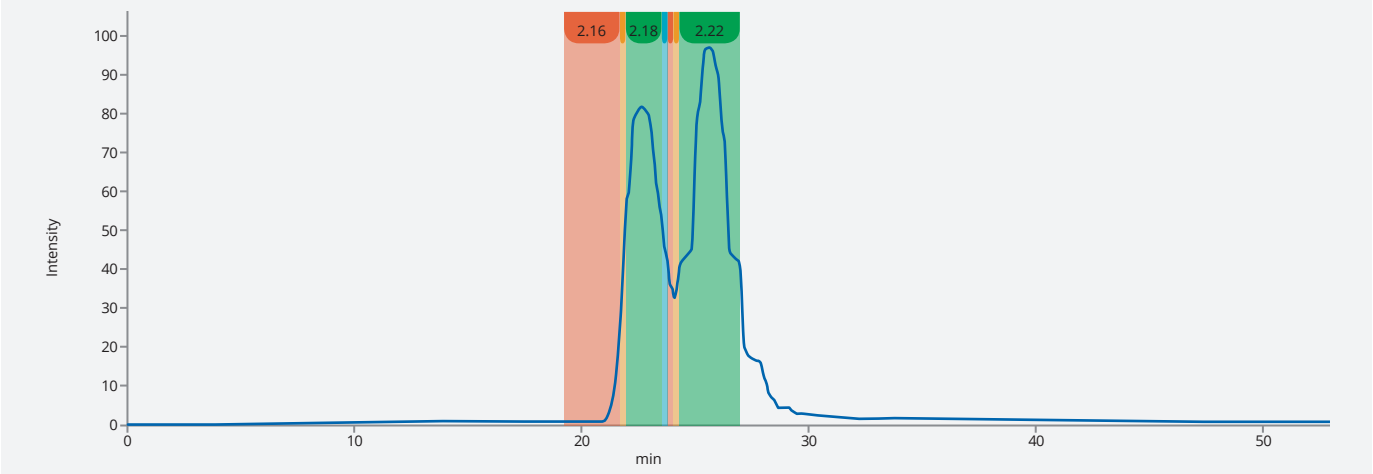


Purification chromatogram of 3-Nitrobiphenyl (concentration 100 µg/mL, RT 25.4 min)

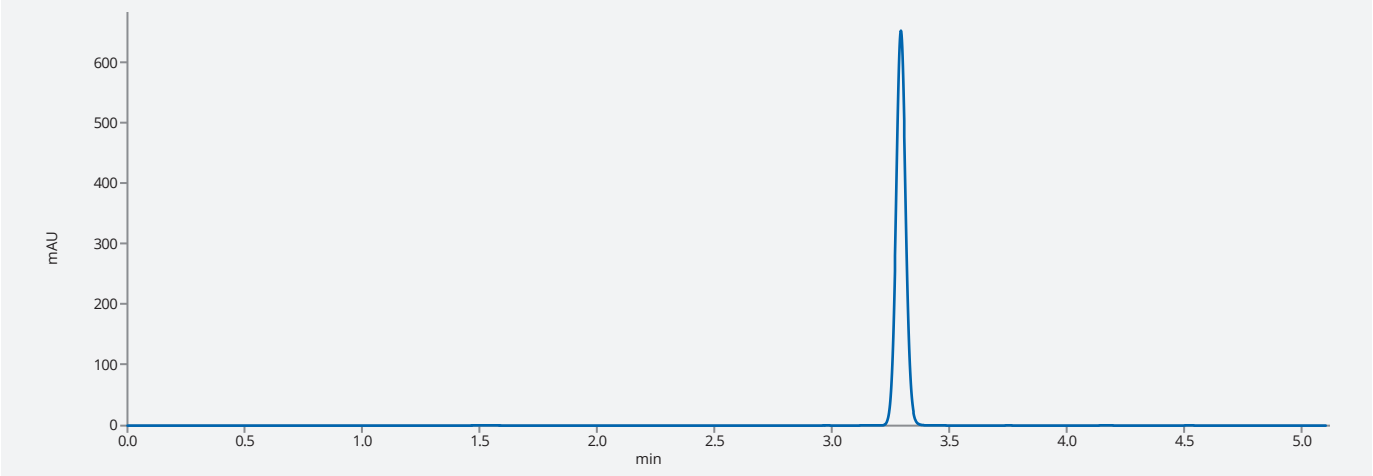


Purification of PAHs and nitro-PAHs

Purification of mixture (Biphenyl and 3-Nitrobiphenyl)



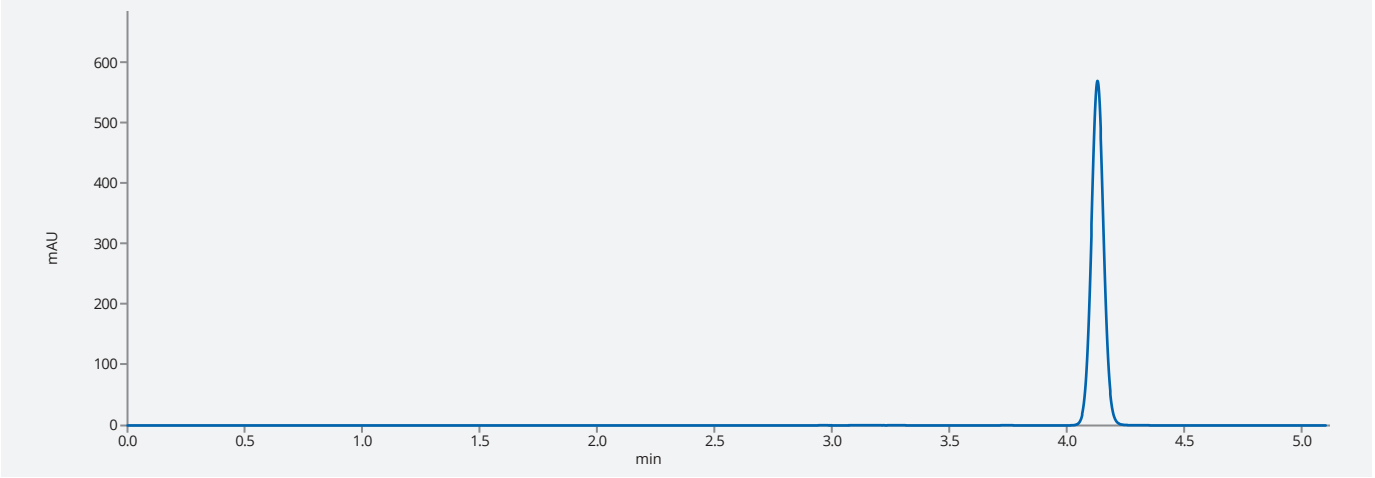
Fraction purity analysis (fraction 2.14)



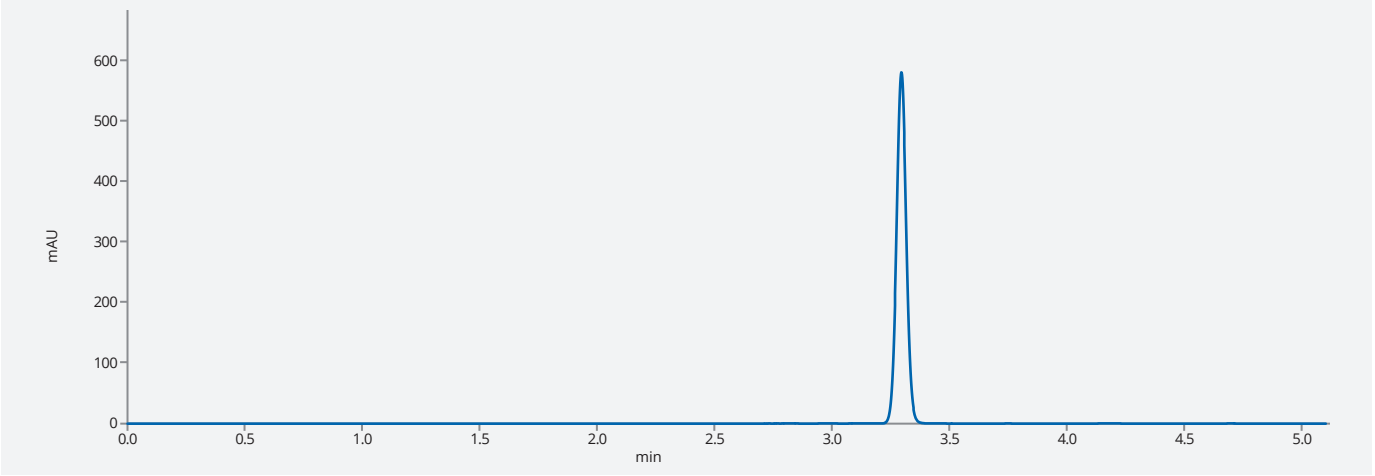
FLASH HROMATOGRAPHY

Purification of PAHs and nitro-PAHs

Fraction purity analysis (fractions 2.2+2.4)



Fraction purity analysis (fraction 2.18)

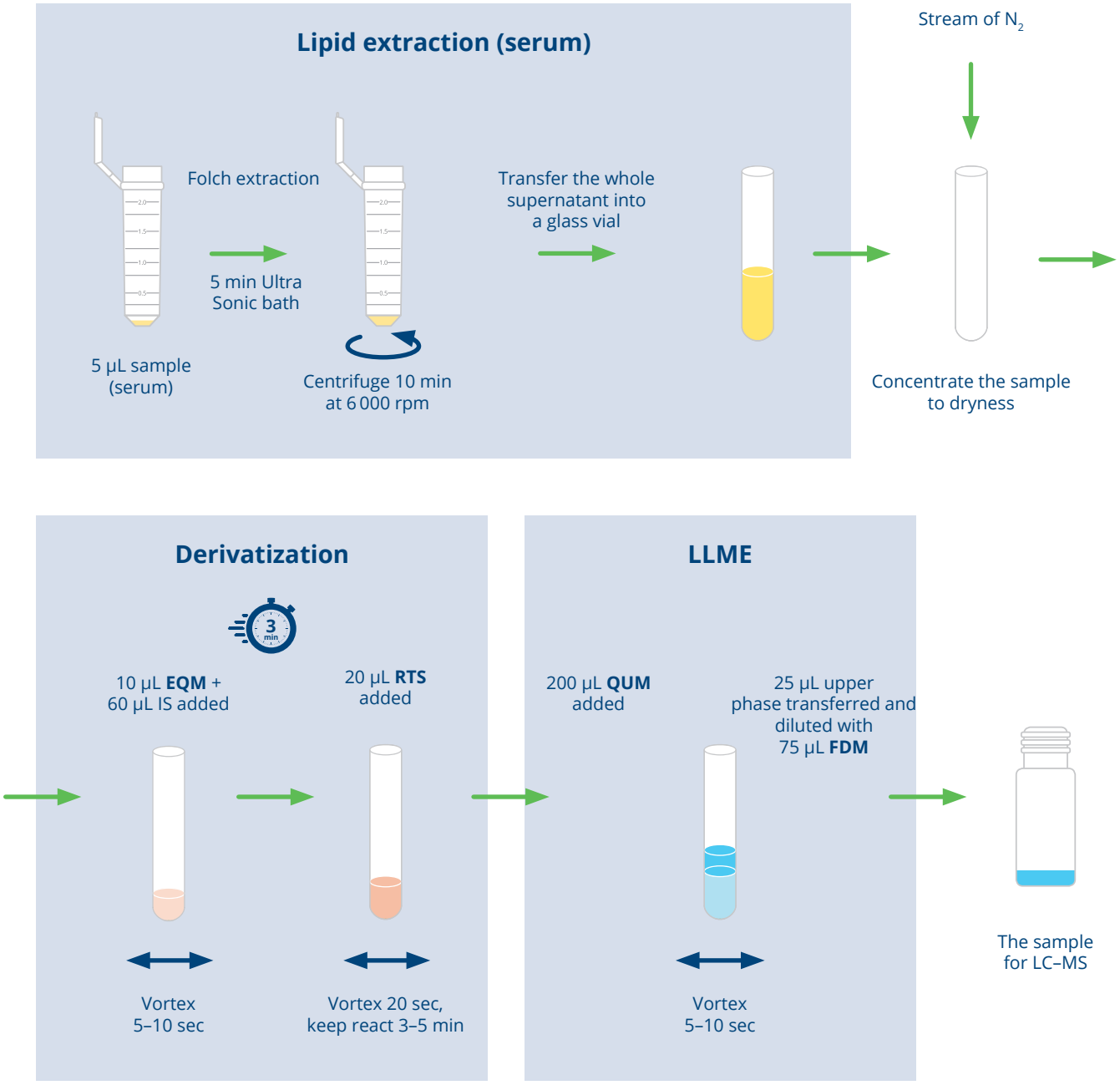


LipoEasy™ kit – Coming soon

Analysis of fatty acid (FA) profiles in a wide range of samples, from serum to fish oil supplements, has traditionally been performed by GC. The LipoEasy™ kit enables LC/MS analysis of both lipid-bound and total fatty acids and includes all components required for sample preparation. Compared with GC, LC/MS offers shorter analysis times, while analysis of lipid-bound fatty acids requires particularly simple and rapid sample preparation.

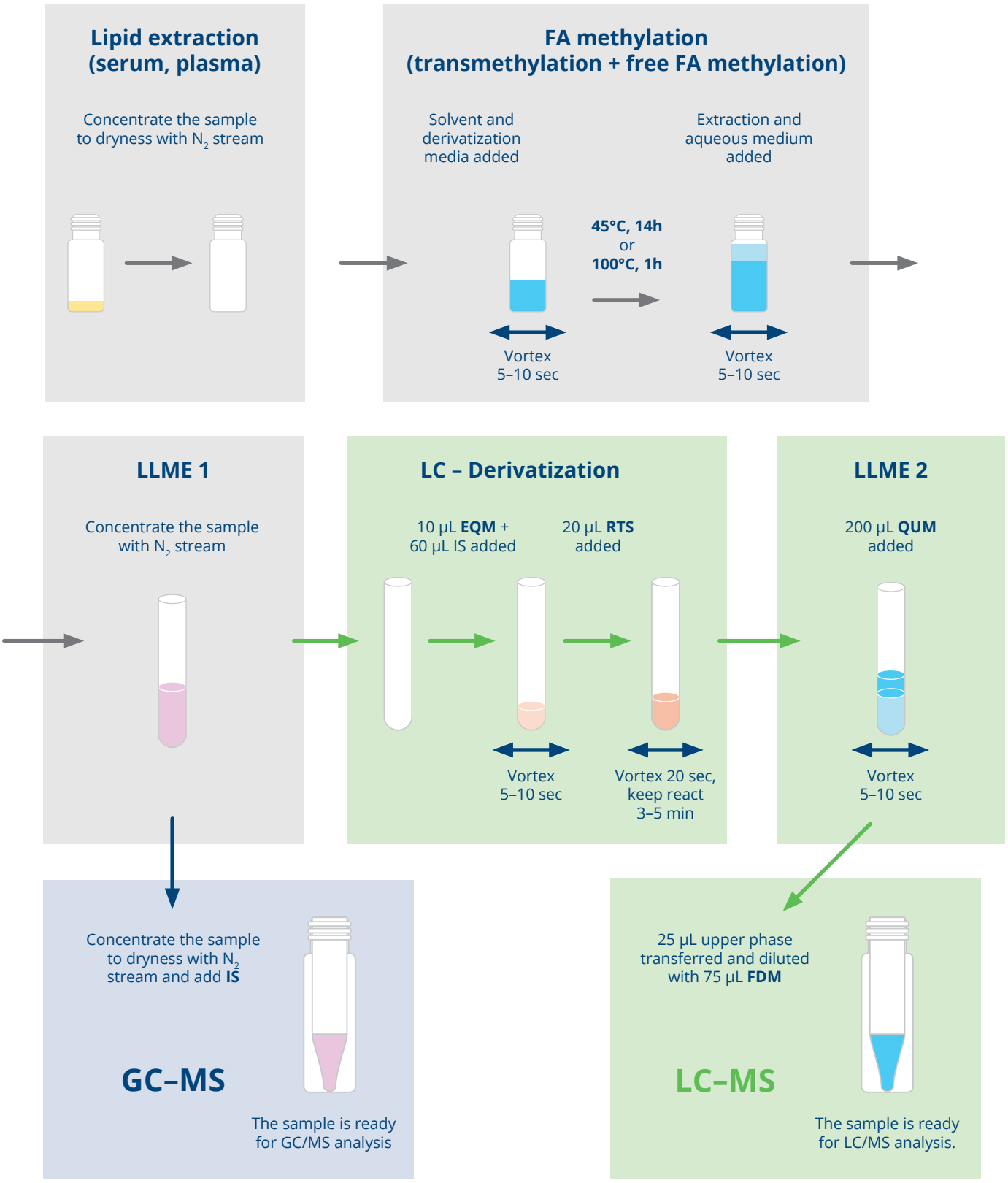
- Lipid bound or total fatty acids **LC/MS** analysis, GC/MS for total fatty acids
- Shorter analysis time (12 min. using LC/MS)
- **Simple and fast** sample preparation (6 min/sample)
- **Non-toxic** chemical used
- **Stable derivatives** – repeated measurements possible

LC/MS for lipidic ester bound FA sample preparation protocol



DIAGNOSTIC KITS

LC/MS and GC/MS for total FA sample preparation protocol



Note: List of fatty acids will be available at the LipoEasy™ kit launch.
LLME stands for Liquid-Liquid Micro-Extraction

MetAmino® kit

MetAmino® kits offer an easy sample preparation method for your LC/MS or GC/MS analysis. MetAmino® kits include derivatization reagents and all clean-up accessories to prepare your sample for injection. They eliminate time consuming sample preparation procedures.

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

- **80+** amino acids, polyamines, biogen amines and coenzymes.
- **Easy** sample preparation.
- **Fast** analysis including sample preparation within 25 minutes.
- Unique clean-up step.
- **High** accuracy and precision thanks to 17 isotopically labelled compounds.
- **Open** – possible extension to other analytes.

DIAGNOSTIC KITS

LC/MS kit

No.	Analyte name	Synonym	RT [min]	$[M+H]^+$	MRM MS/MS transitions* Precursor	Quantifier (CE)	Qualifier (CE)	$[M-H]^+$
1	Cotinine	Syringe standard	1.15	177.1024	177.1	80 (28)	98 (24)	n/a
2	Putrescine	PUT	1.40	189.1599	189.2	72.1 (16)	115.9 (12)	n/a
3	Cadaverine	CAD	1.48	203.1755	203.2	86 (20)	69.2 (28)	n/a
4	Homoserine	HSER	1.67	202.1074	202.1	146 (4)	102 (8)	n/a
5	Pyroglutamic acid	pGLU	1.86	186.1125	186.1	84 (20)	130 (8)	n/a
6	*Arginine*	ARG	3.35	331.2341	331.2	70.1 (48)	115.9 (32)	n/a
7	**Arginine ($^{13}C_6$, $^{15}N_4$)**	**IS**	**3.35**	**341.2423**	**341.2**	**75.1 (56)**	**122.2 (24)**	n/a
8	*Glutamine*	GLN	4.12	303.1916	303.2	186 (12)	84 (44)	n/a
9	Anserine	ANS	4.20	397.2447	397.2	109.1 (52)	226.2 (28)	n/a
10	*Citrulline*	CIT	4.20	332.2181	332.2	70.2 (36)	215 (16)	n/a
11	Methionine sulfoxide	MET-SO	4.29	322.1683	322.2	248 (12)	100 (32)	n/a
12	Methionine sulfone	MET-SO2	4.30	338.1632	338.2	238 (12)	182 (16)	n/a
13	*5-Hydroxylysine*	HLY	4.40	345.2021	345.2	82 (48)	128.1 (28)	n/a
14	*1-Methylhistidine*	1MHIS	4.52	326.2075	326.2	124 (36)	224 (20)	n/a
15	*3-Methylhistidine*	3MHIS	4.55	326.2075	326.2	270.1 (24)	95.7 (52)	n/a
16	*Prolylhydroxyproline*	PHP	4.71	385.2333	385.2	170.1 (16)	114 (36), 70.2 (56)	n/a
17	*Serine*	SER	4.73	262.1649	262.2	106 (16)	60.1 (40)	n/a
18	**Serine ($^{13}C_3$, ^{15}N)**	**IS**	**4.73**	**266.172**	**266.2**	**110.1 (12)**	**63.1 (28)**	n/a
19	*Asparagine**	ASN	4.78	271.1653	271.2	215.1 (0)	69.1 (24)	n/a
20	*4-Hydroxyproline*	HYP	5.23	288.1807	288.2	86.1 (32)	188 (12)	n/a
21	*Glycine*	GLY	5.23	232.1544	232.2	76 (12)	132 (4)	n/a
22	**Glycine ($^{13}C_2$, ^{15}N)**	**IS**	**5.23**	**235.1581**	**235.2**	**79 (16)**	**135.1 (4)**	n/a
23	N-Acetylaspartic acid	NAA	5.36	288.1807	288.2	88 (28)	144.1 (20), 158 (8)	n/a
24	*Glycylproline*	GPR	5.39	329.2072	329.2	70.1 (52)	172.1 (16), 115.9 (36)	n/a
25	*Threonine*	THR	5.45	276.1811	276.2	74.2 (28)	176.1 (12)	n/a
26	**Threonine ($^{13}C_4$, ^{15}N)**	**IS**	**5.45**	**281.191**	**281.2**	**78.2 (20)**	**181.1 (8)**	n/a
27	5-Aminolevulinic acid	5-ALA	5.63	288.1807	288.2	158 (8)	86.1 (32)	n/a
28	Ethanolamine	EAM	6.09	262.1649	262.2	88 (16)	144.1 (4)	n/a
29	*beta*-Alanine	3-ALA	6.22	246.1705	246.2	116 (12)	90 (12)	n/a
30	*Alanine*	ALA	6.25	246.1705	246.2	146 (8)	90 (16)	n/a
31	**Alanine ($^{13}C_3$, ^{15}N)**	**IS**	**6.25**	**250.1776**	**250.2**	**150.2 (8)**	**94 (12)**	n/a
32	Spermine		6.39	503.3804	503.4	102 (44)	229.2 (32)	n/a
33	Histamine	HTA	6.52	312.1919	312.2	212 (12)	95 (40), 112 (20)	n/a
34	Indoleacetic acid	IAA	6.65	232.1333	232.1	130 (24)	176 (8)	n/a
35	*gamma-Aminobutyric acid*	GABA	6.75	260.1857	260.2	87.1 (24)	86 (24)	n/a
36	*Sarcosine*	SAR	6.75	246.1701	246.2	146.1 (8)	90 (12)	n/a
37	4-Aminobenzoic acid	PABA	7.00	294.1701	294.2	134.1 (20)	91 (56)	n/a
38	*beta-Aminoisobutyric acid*	BAIBA	7.05	260.1857	260.2	130 (12)	112 (20)	n/a
39	*2-Aminobutyric acid*	ABA	7.35	260.1857	260.2	160.2 (8)	104 (12)	n/a
40	*Proline*	PRO	7.58	272.1862	272.2	70.1 (36)	172 (12)	n/a
41	**Proline ($^{13}C_5$, ^{15}N)**	**IS**	**7.58**	**278.2000**	**278.2**	**75.1 (56)**	**178.1 (8)**	n/a
42	*Methionine*	MET	7.65	306.1735	306.2	204 (8)	104 (20)	n/a
43	**Methionine ($^{13}C_5$, ^{15}N)**	**IS**	**7.64**	**312.1872**	**312.2**	**109.1 (20)**	**63.1 (48)**	n/a
44	*Thiaproline*	TPR	8.03	290.1422	290.1	88 (28)	134 (16), 190.1 (8)	n/a
45	Asparatame		8.15	451.2439	451.2	120 (48)	88 (44)	n/a
46	Serotonin	5-HT	8.22	377.2072	377.2	160 (32)	303.1 (8)	n/a
47	2,4-diaminobutyric acid	DABA	8.25	375.2490	375.2	201.3 (16)	245 (12)	n/a
48	*Valine*	VAL	8.30	274.2018	274.2	72 (32)	116 (12)	n/a
49	**Valine ($^{13}C_5$, ^{15}N)**	**IS**	**8.30**	**280.2151**	**280.2**	**77.1 (20)**	**121.1 (12)**	n/a
50	Norvaline	NVA	8.35	274.2018	274.2	72.1 (24)	174 (8)	n/a
51	Alanyl-lysine	ALA-LYS	8.36	474.3174	474.3	84.1 (60)	400.2 (12)	n/a
52	Carnosine	CAR	8.36	483.2814	483.3	110.1 (40)	212.1 (24)	n/a
53	*Ornithine*	ORN	8.45	389.2647	389.3	315.2 (8)	70.1 (60)	n/a
54	*Tryptophan*	TRP	8.45	361.2123	361.2	259 (12)	159 (28)	n/a
55	Ethionine	ETH	8.60	320.1890	320.2	218.1 (8)	75.1 (44)	n/a
56	*Histidine*	HIS	8.90	412.2443	412.2	110 (44)	312.1 (16)	n/a
57	**Histidine ($^{13}C_6$, $^{15}N_3$)**	**IS**	**8.90**	**421.2554**	**421.3**	**118.1 (48)**	**321.1 (16)**	n/a
58	*Lysine*	LYS	8.92	403.2808	403.3	329.1 (8)	84.1 (56)	n/a
59	**Lysine ($^{13}C_6$, $^{15}N_2$)**	**IS**	**8.92**	**411.2945**	**411.3**	**337-2 (8)**	**90.1 (60)**	n/a
60	*Phenylalanine*	PHE	9.04	322.2014	322.2	120 (36)	164 (16)	n/a

LC/MS kit

No.	Analyte name	Synonym	RT [min]	$[M+H]^+$	MRM MS/MS transitions* Precursor	Quantifier (CE)	Qualifier (CE)	$[M-H]^+$
61	**Phenylalanine ($^{13}C_9$, ^{15}N)**	**IS**	**9.04**	**332.2285**	**332.2**	**129.2 (40)**	**173.2 (8)**	n/a
62	*Leucine*	LEU	9.06	288.2170	288.2	86.1 (20)	188.2 (8), 130.1 (12)	n/a
63	**Leucine ($^{13}C_6$, ^{15}N)**	**IS**	**9.06**	**295.2341**	**295.2**	**92.1 (28)**	**195.2 (12), 136.1 (16)**	n/a
64	*Aspartic acid*	ASP	9.06	346.2225	346.2	88.1 (24)	159.9 (12)	n/a
65	**Aspartic acid ($^{13}C_4$, ^{15}N)**	**IS**	**9.06**	**351.2329**	**351.2**	**92.1 (32)**	**165.1 (12)**	n/a
66	Spermidine		9.11	446.3226	446.3	198.1 (28)	298.1 (12)	n/a
67	*Glutamic acid*	GLU	9.17	360.2382	360.2	186 (10)	286 (5)	n/a
68	**Glutamic acid ($^{13}C_5$, ^{15}N)**	**IS**	**9.17**	**366.2519**	**366.3**	**192.1 (12)**	**89.1 (48)**	n/a
69	*allo*-isoleucine	aILE	9.22	288.2169	288.2	130.1 (12)	86.1 (24)	n/a
70	*Isoleucine*	ILE	9.24	288.2170	288.2	130.1 (16)	86.1 (24)	n/a
71	**Isoleucine ($^{13}C_6$, ^{15}N)**	**IS**	**9.24**	**295.2341**	**295.2**	**136.1 (16)**	**92.2 (20)**	n/a
72	Norleucine	NLEU	9.40	288.2170	288.2	86.2 (24)	130.1 (12)	n/a
73	Pipecolic acid	PIP	9.45	286.2013	286.2	128.1 (12)	84.1 (40)	n/a
74	*2-Aminoadipic acid*	AAA	9.67	374.2538	374.3	98 (32)	172 (16)	n/a
75	Adrenaline	ADN	10.15	484.2541	484.3	166 (36)	466.2 (4)	n/a
76	Cysteine	CYS	10.16	378.1946	378.2	120.1 (32)	278 (12)	n/a
77	*2-Aminoheptane dioic acid*	APA	10.20	388.2695	388.3	112 (36)	186.1 (20)	n/a
78	Glutathione	GSH	10.27	620.3231	620.3	186.1 (28)	130.2 (44)	n/a
79	Dopamine	DAM	10.27	454.2435	454.2	196.1 (24)	152 (40)	n/a
80	Glutamyl-lysine	GLU-LYS	10.44	588.3855	588.4	84.1 (56)	128.1 (52), 157.9 (32)	n/a
81	Homocysteine	HCYS	10.48	392.2103	392.2	292.2 (12)	118.1 (16)	n/a
82	Diaminopimelic acid	DAP	10.54	503.3328	503.3	82.1 (60)	127.9 (48)	n/a
83	*Tyrosine*	TYR	10.61	438.2487	438.2	136 (44)	179.9 (28)	n/a
84	**Tyrosine ($^{13}C_9$, ^{15}N)**	**IS**	**10.61**	**448.2759**	**448.3**	**145.1 (44)**	**292.2 (12)**	n/a
85	*Cystathionine*	CTH	10.68	535.3049	535.3	201.9 (24)	88.1 (56)	n/a
86	*Cystine*	C-C	10.76	553.2613	553.3	276.1 (16)	219.9 (24)	n/a
87	**Cystine ($^{13}C_6$, $^{15}N_2$)**	**IS**	**10.76**	**561.2754**	**561.3**	**280.1 (16)**	**224 (24)**	n/a
88	Kynurenic acid	KYA	10.78	346.1649	346.2	246 (8)	144 (52), 190 (24)	n/a
89	Selenocystine	Se-C-C	11.12	649.1501	649.2	323.9 (20)	575 (12)	n/a
90	Kynurenine		11.17	465.2596	465.3	146 (44)	274.2 (12)	n/a
91	Homocystine	HC-CH	11.28	581.2926	581.3	290 (16)	190 (20)	n/a
92	3,4-dihydroxy-phenylalanine	DOPA	11.55	554.2961	554.3	152.1 (44)	454.1 (12)	n/a
Extension in July 2023								
93	S-Sulfocysteine**		2.61	358.0989	358.1	258.1 (8)	178 (16)	356.0843
94	Taurine**		1.03	226.0744	226.1	125.9 (8)	170 (4)	224.0598
95	Lanthionine	LTH	10.16	521.2891	521.3	99.9 (60)	188 (16)	n/a
Extension in February 2026								
96	Argininosuccinic acid	ASA	10.61	585.3494	585.3	511.2 (20)	70.1 (60)	n/a

Note: CE = Collision energy

Retention times may vary according to the instrument used. The order of analytes should stay the same.

**Fragmentation in ion source of QqQ Agilent 6495B*

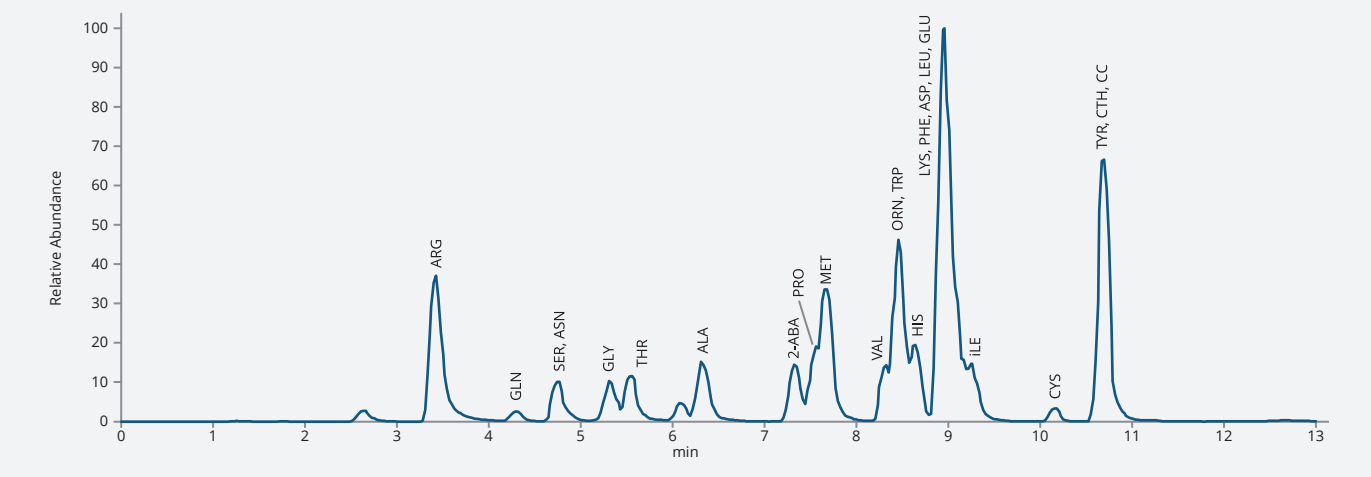
***The response of these analyte derivatives in positive ESI mode (PESI) is poor. Better response can be obtaioned in negative ESI mode (NESI).*

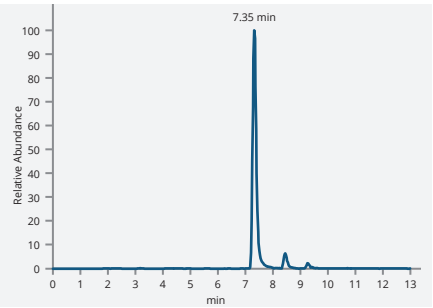
DIAGNOSTIC KITS

LC/MS separation

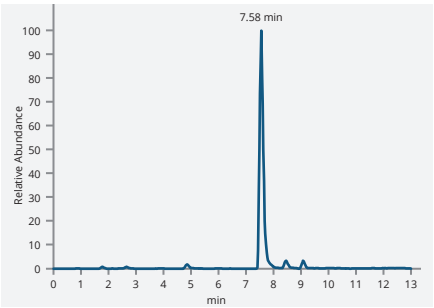
The chromatogram shown below displays TIC and some of the analyte's MRMs.

Chromatogram of 24 amino acids

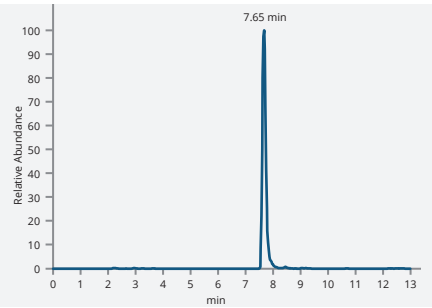




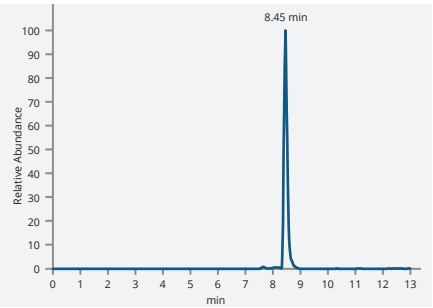
2-ABA (259.7–260.7)



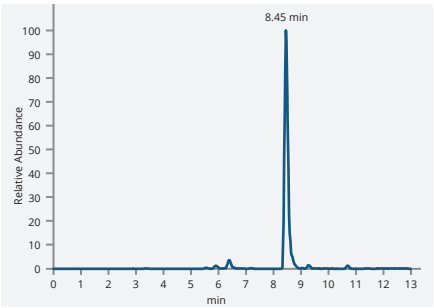
PRO (271.7–272.7)



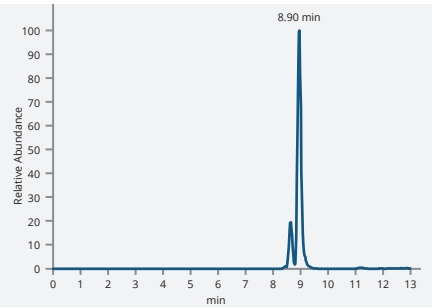
MET (305.7–306.7)



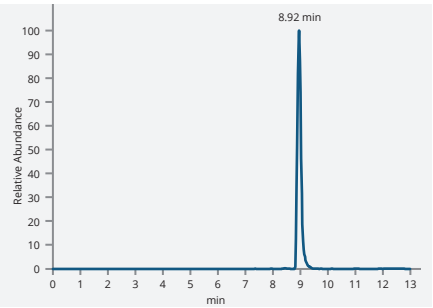
ORN (388.7–389.7)



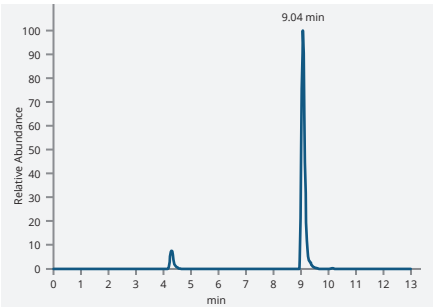
TRP (360.7–361.7)



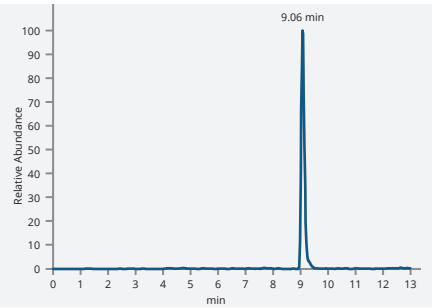
HIS (411.7–412.7)



LYS (420.7–403.7)

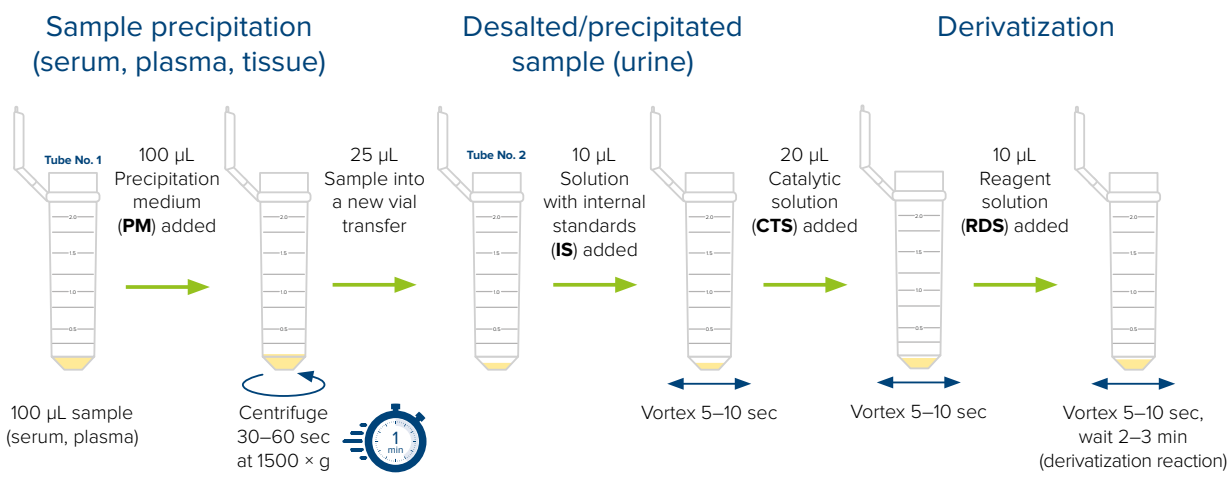


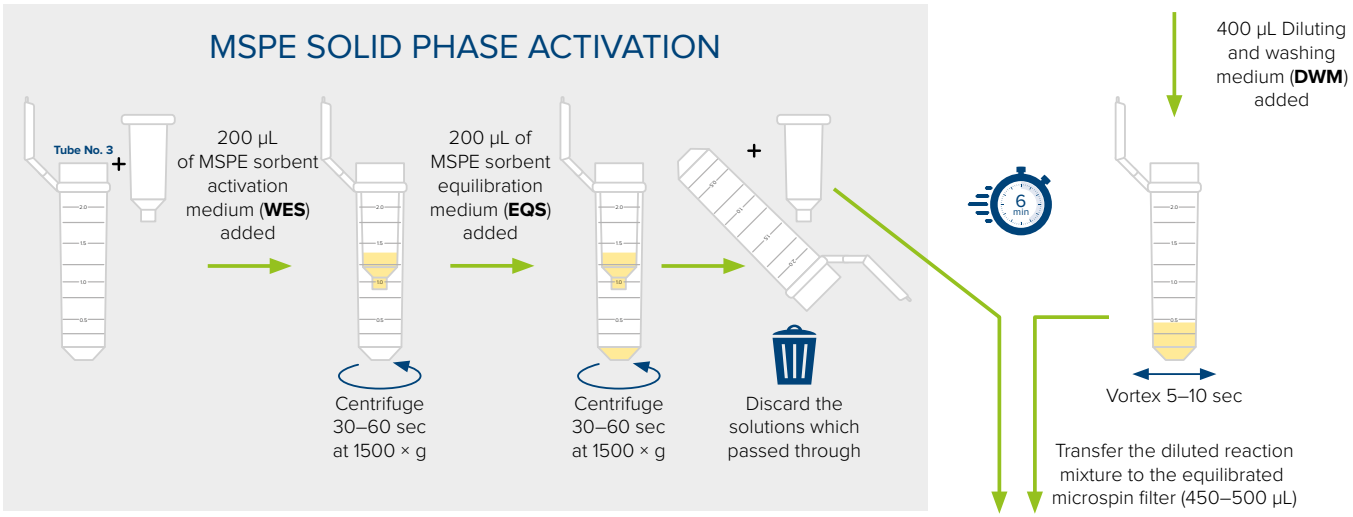
PHE (321.7–322.7)

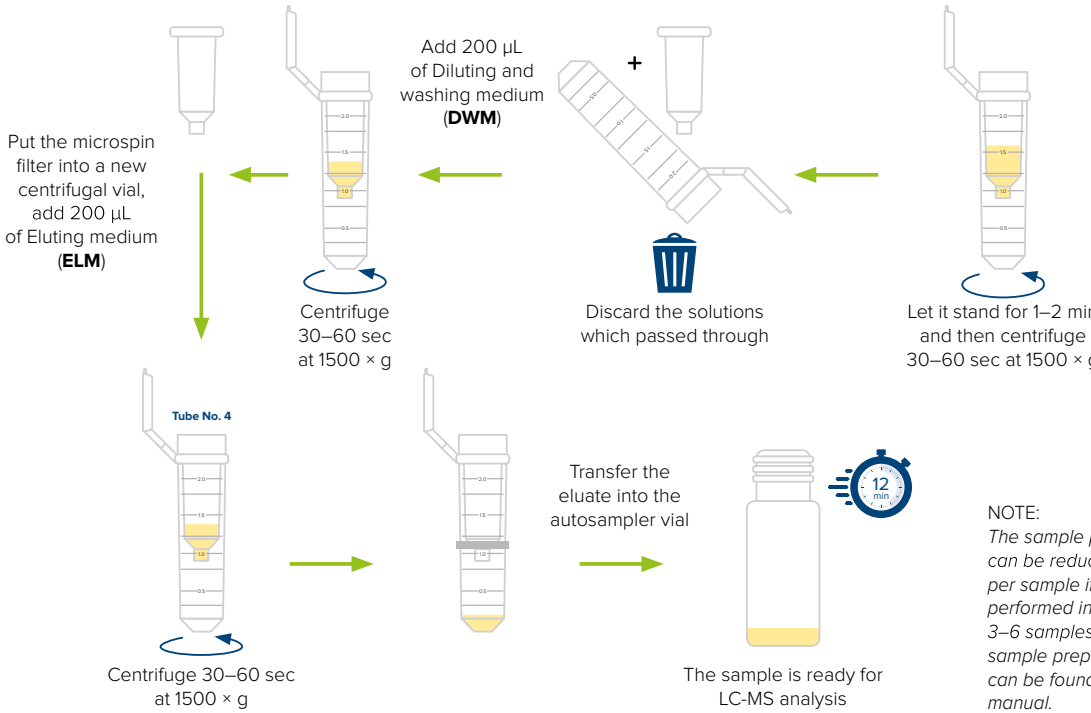


ASP (345.7–346.7)

LC/MS sample preparation protocol







NOTE:
The sample preparation time can be reduced to 6–8 minutes per sample if all steps are performed in parallel for 3–6 samples. The detailed sample preparation procedure can be found in the User manual.

DIAGNOSTIC KITS

GC/MS kit

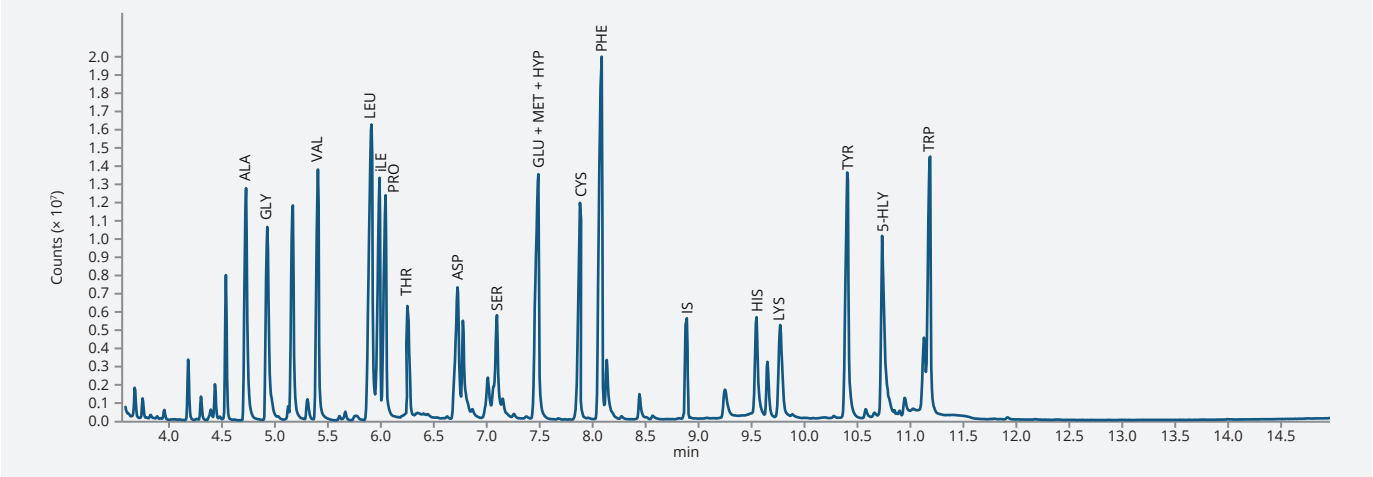
No.	Analyte		Quantification	RT	Mmi*	Diagnostic ions		
	name	Synonym		[min]		[m/z]	[m/z]	[m/z]
1	Sarcosine	SAR		4.62	497.0308	270	226	69
2	Alanine	ALA	✓	4.73	497.0308	270	70	69
3	N-Acetylglycine			4.92	299.0392	256	113	212
4	Glycine	GLY	✓	4.93	483.0151	256	212	56
5	3-Methylglutaric acid			4.97	510.0512	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	Norvaline	NVA		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	NAA		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	4-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**	**IS**		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)	DAP		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

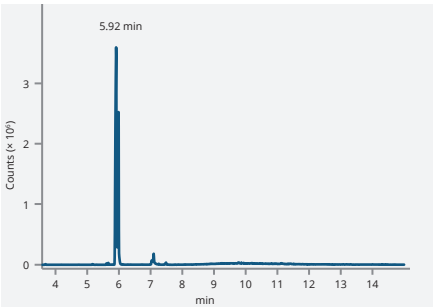
* Mmi = monoisotopic mass of the derivative of the relevant metabolite.

GC/MS separation

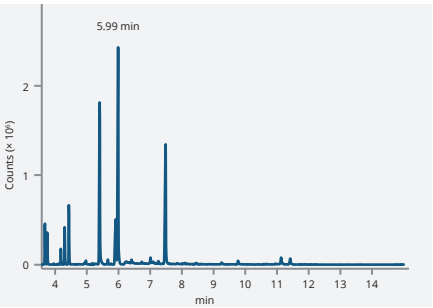
A typical chromatogram of the amino acid standard solution included in this kit.

Chromatogram of standard solution (above)

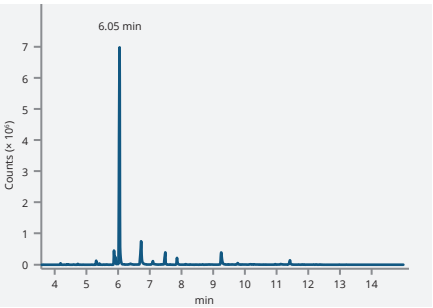




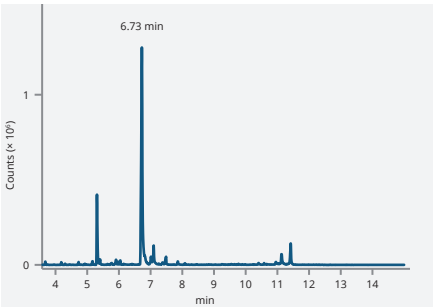
LEU (EIC 312)



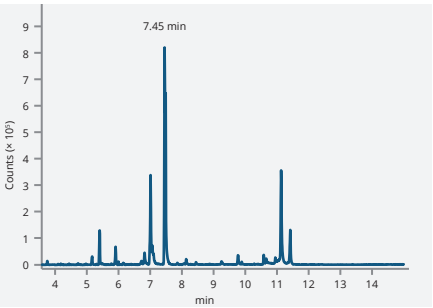
ILE (EIC 283)



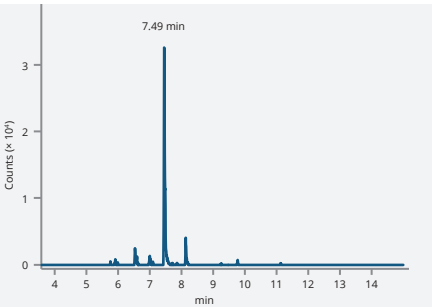
PRO (EIC 296)



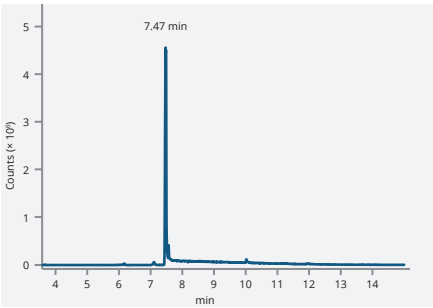
ASP (EIC 254)



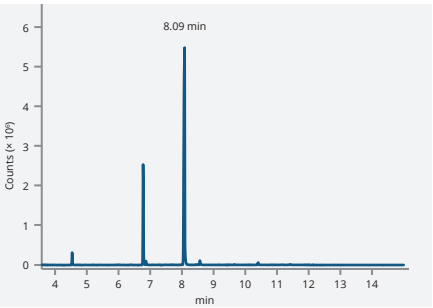
GLU (EIC 282)



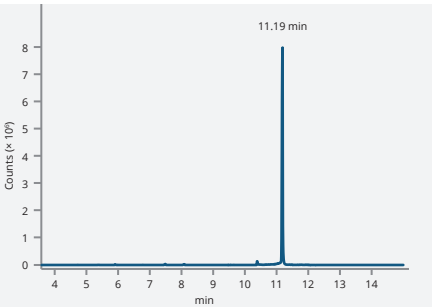
MET (EIC 538)



4-HYP (EIC 312)



PHE (EIC 91)



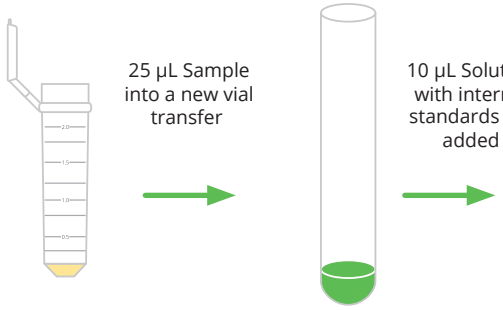
TRP (EIC 130)

DIAGNOSTIC KITS

GC/MS kit

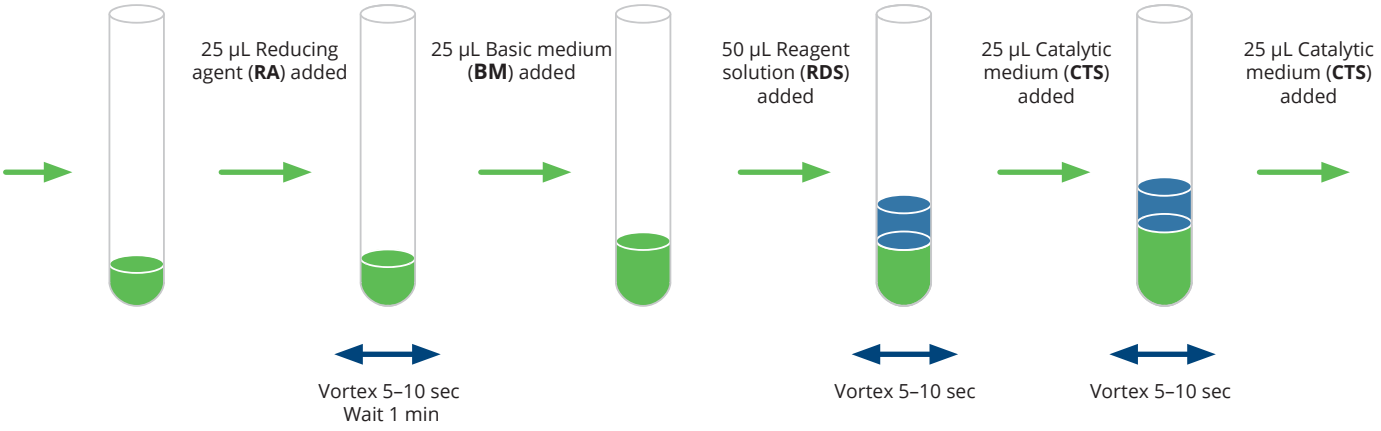
GC/MS Sample preparation protocol

Biological sample, (e.g. a biofluid serum, plasma)

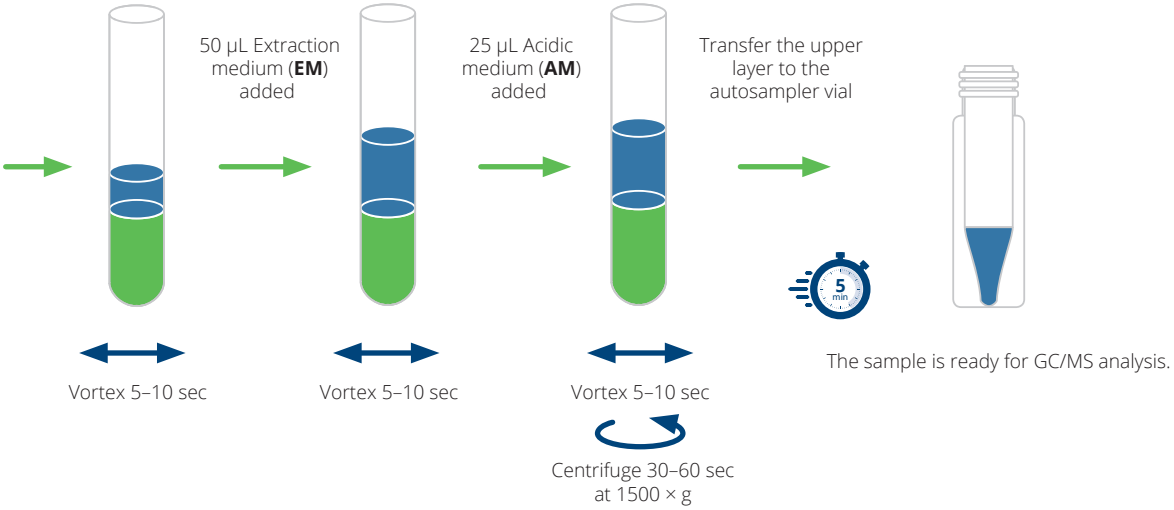


Note:
The sample preparation time can be reduced if all steps are performed in parallel. The detailed sample preparation procedure can be found in the User manual.

Derivatization step



Liquid–liquid extraction step



The sample is ready for GC/MS analysis.

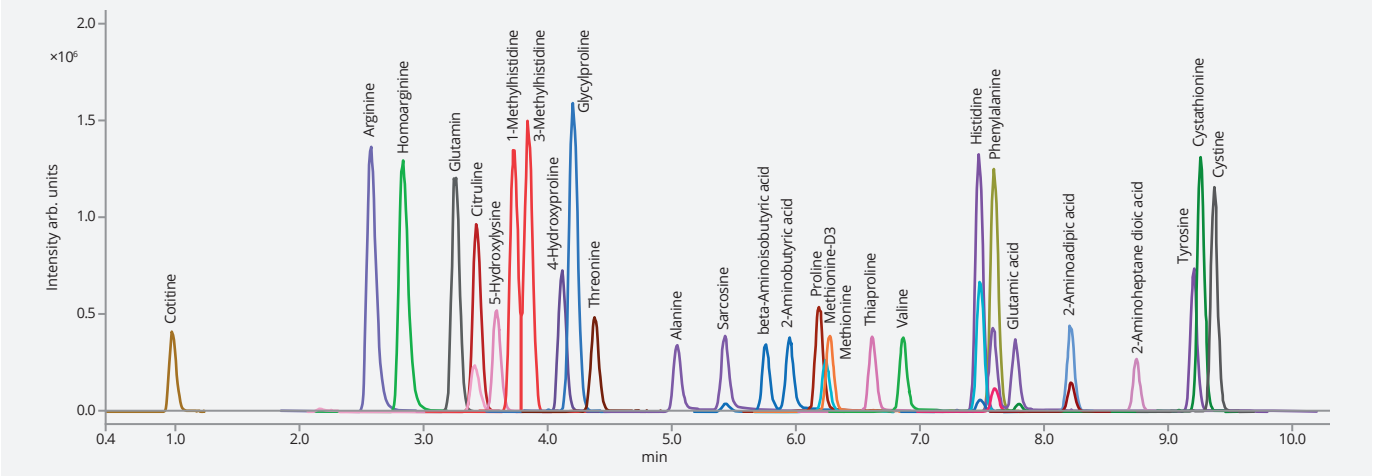
RESEARCH

Analysis of bee guts

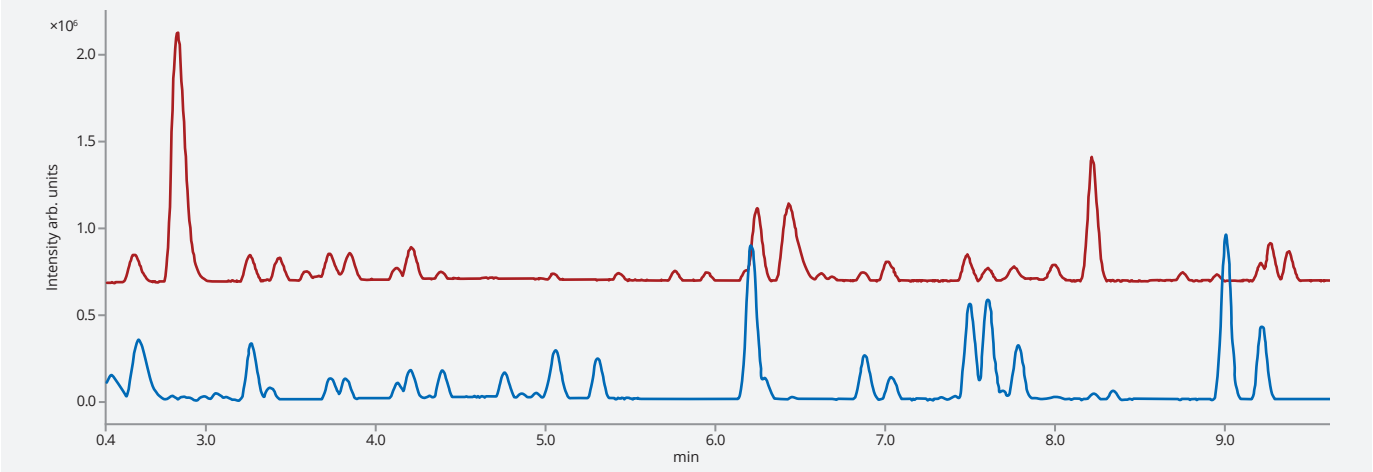
The sample preparation: According to the MetAmino kit protocol.

The chromatographic conditions: LC/MS method according to the MetAmino kit protocol.

Standard mixture – LC MetAmino® kit; mass extracted chromatogram; 5 nmol SD1 and SD2 according to the manual [1].



Comparison of calibration standard (top) with pooled QC sample (bottom)

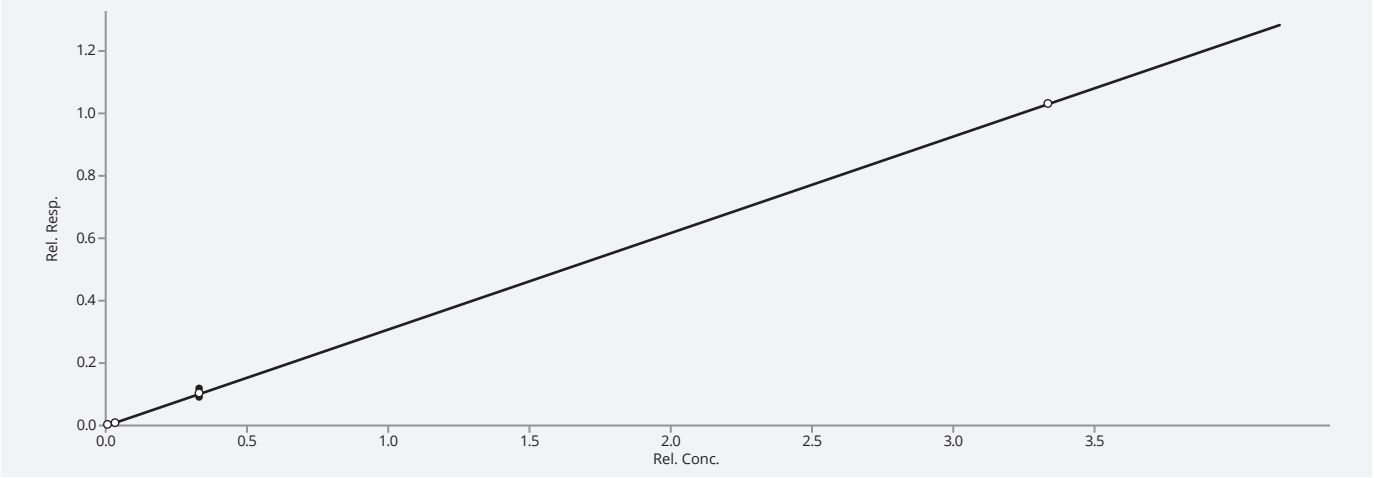


DIAGNOSTIC KITS

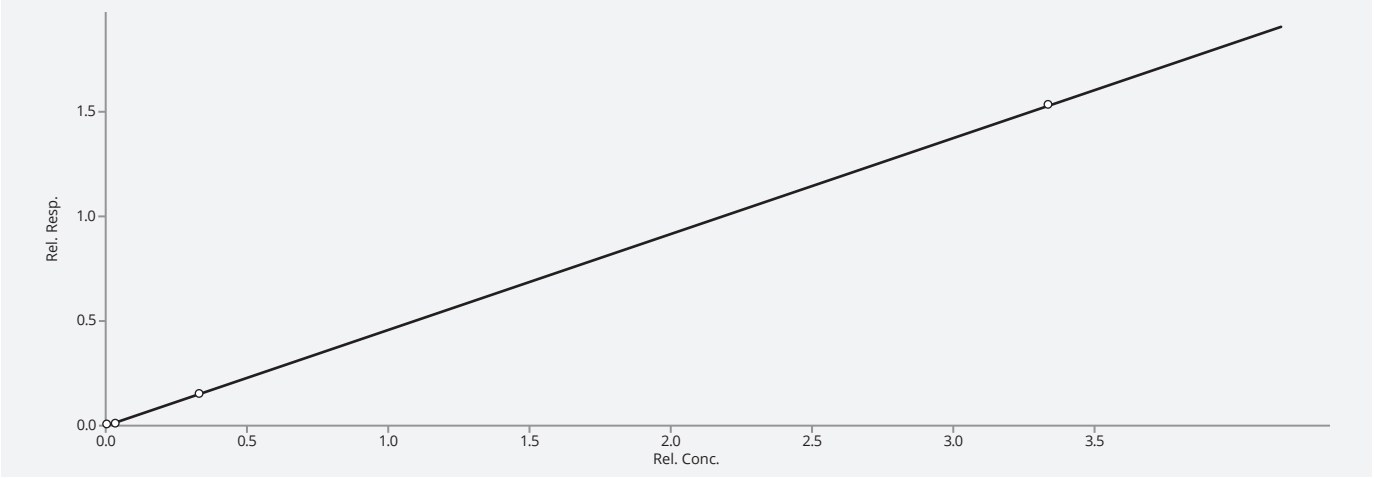
RESEARCH

Analysis of bee guts

Calibration of Isoleucine with Homophenylalanine ISTD



Calibration of Methionine with Methione-D3 ISTD



BRUKER

The application was developed on MS Bruker Impact II system (ESI+ on Apollo II ion source) equipped with Thermo UltiMate 3000 HPLC system.

Amino Acid Analysis in Fish Feed

Monitoring the concentration of amino acids in fish feed is critical to the health, growth and sustainability of aquaculture operations for several reasons. Firstly, fish feed should be rich in proteins, which are essential for fish growth and development. An optimal balance of amino acids ensures proper muscle development and overall growth [1]. Further, certain amino acids play a crucial role in maintaining and enhancing the fish's immune system, which helps them resist disease and reduce mortality rates. Monitoring ensures that fish feed contains all essential amino acids in the right proportions to avoid nutritional deficiencies that can lead to poor growth, deformities and increased susceptibility to disease.

Using our LC/MS MetAmino® kit, we tested samples of fish feed after protein hydrolysis. Here we show a comparison of the mass chromatograms of the standard mixture (Fig. 1) and an example of the tested fish feed samples after protein hydrolysis (Fig. 2). The sample preparation: Fish feed (50 mg) was placed in a test tube, 6M HCl (5 mL) was added and the test tube was sealed. The mixture was heated at 110 °C for 24 hours. After cooling, the mixture (50 µL) was diluted 5 times with 200 µL of deionized water. Further, 15 µL of such diluted mixture was taken for analysis. IS (10 µL) was added and the sample preparation protocol was continued with the addition of CTS and RDS according to the general protocol scheme [2].

The amino acid profile after hydrolysis corresponded to the protein used for the preparation of the fish feed.

References:

[1] Wei, Y.; Shen, H.; Xu, W.; Pan, Y.; Chen, J.; Zhang, W.; Mai, K. Replacement of dietary fishmeal by Antarctic krill meal on growth performance, intestinal morphology, body composition and organoleptic quality of large yellow croaker Larimichthys crocea; Aquaculture; 2019, 734281.

[2] Chromservis: https://www.chromservis.eu/en/metamino-kit-400139

BIOLOGY CENTRE CAS

This application was developed by the Biology Centre CAS, České Budějovice, The Czech Republic.

DIAGNOSTIC KITS

Amino Acid Analysis in Fish Feed

Fig. 1: Standard mixture – LC MetAmino® kit; mass extracted chromatogram; 5 nmol SD1 and SD2 according to the manual [2]

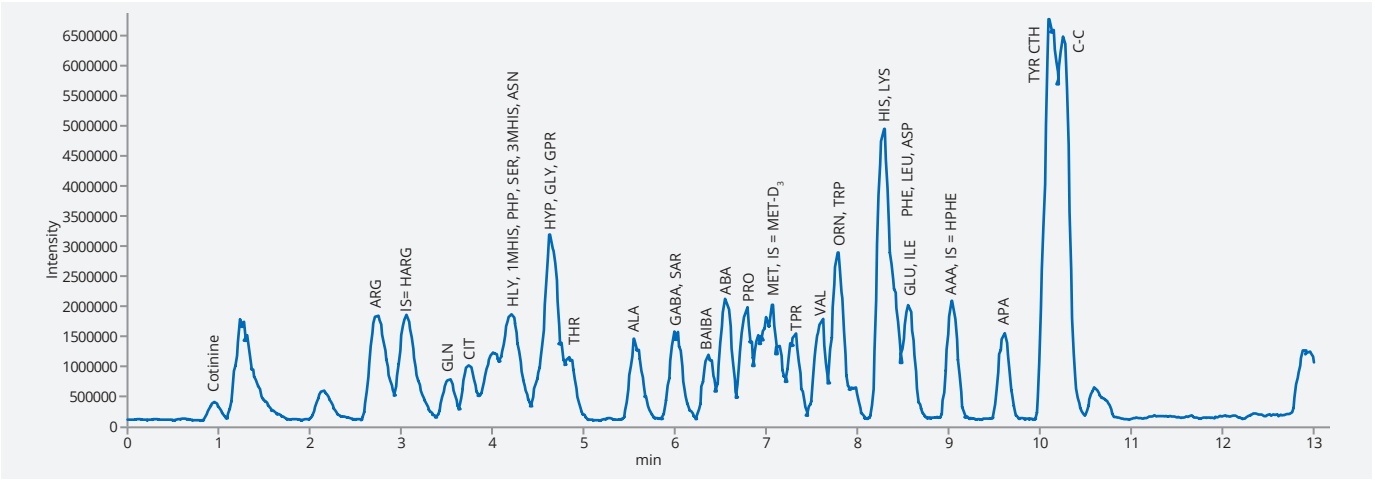
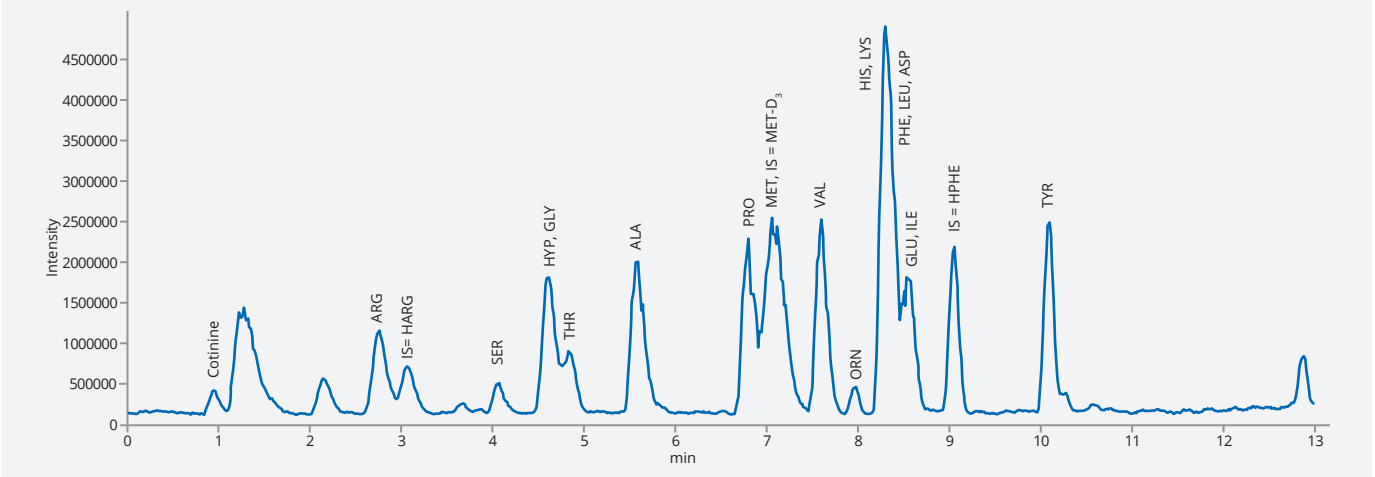


Fig. 2: Fish feed hydrolysate – LC MetAmino® kit; mass extracted chromatogram; (30 µg of sample after recalculation)



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 LC/MS reagents kit	MAK-5857-L002	100
MetAmino® sample preparation GC/MS reagents kit	MAK-5857-M002	100

SAMPLE PREPARATION

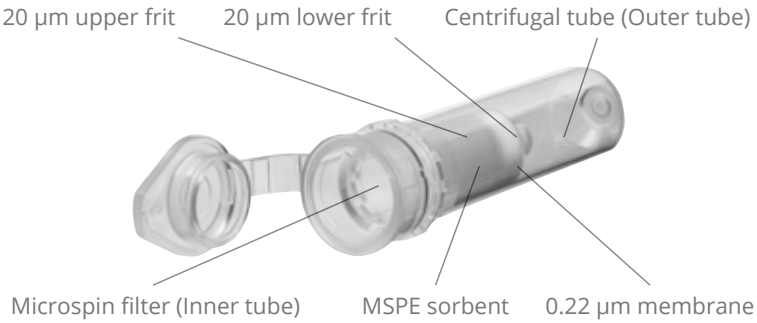
MSPE

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

Speed up your sample preparation

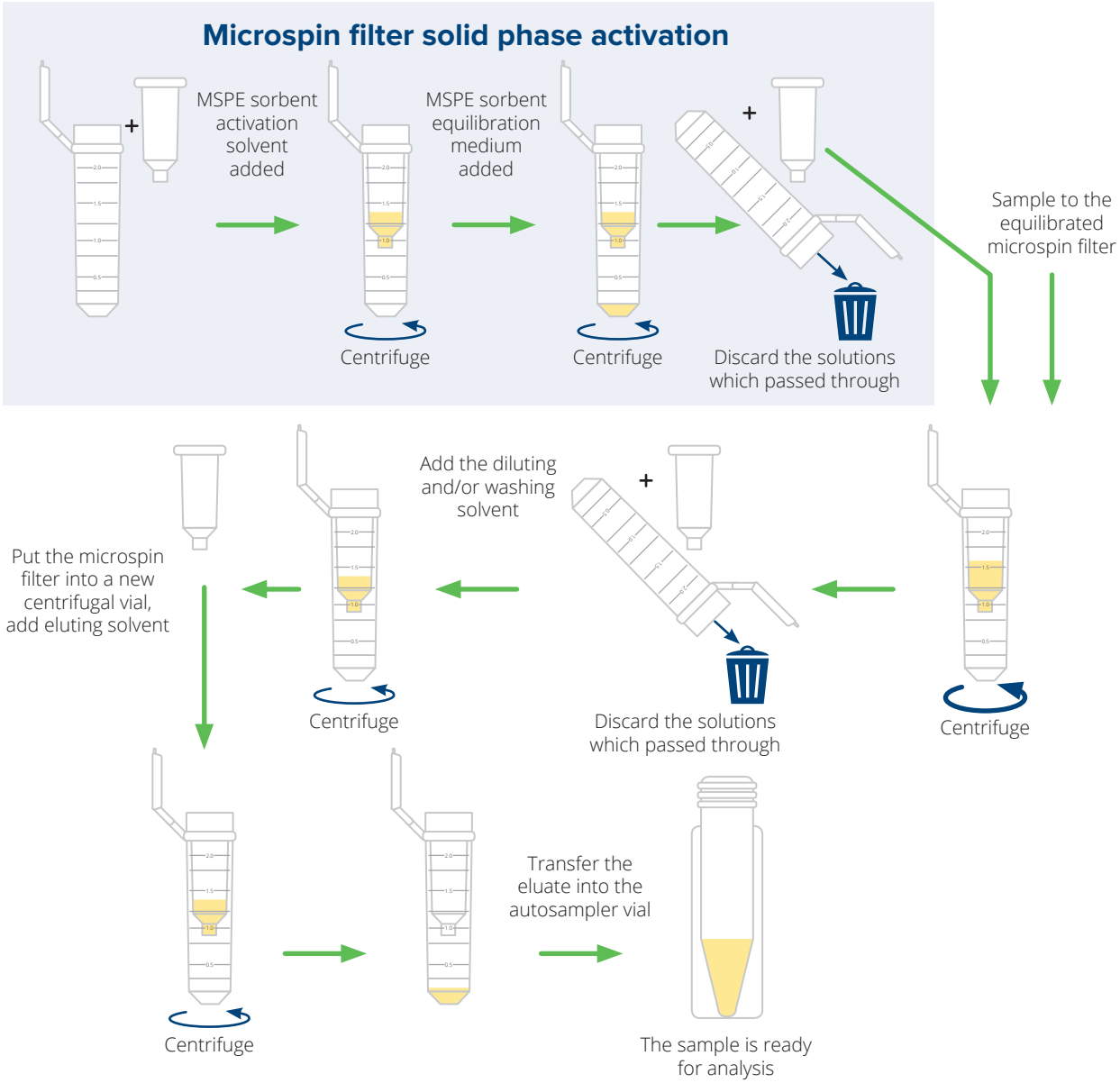
- Simple and fast sample preparation.
- 2 in 1 – micro-solid phase extraction and filtration in one step.
- SPE manifold replaced by use of centrifuge.

MSPE – unique technology



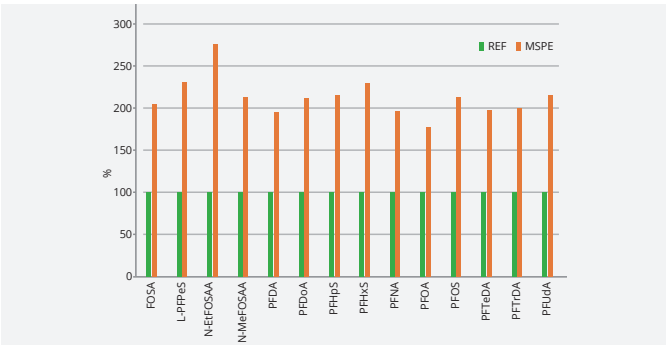
SAMPLE PREPARATION

General sample preparation workflow

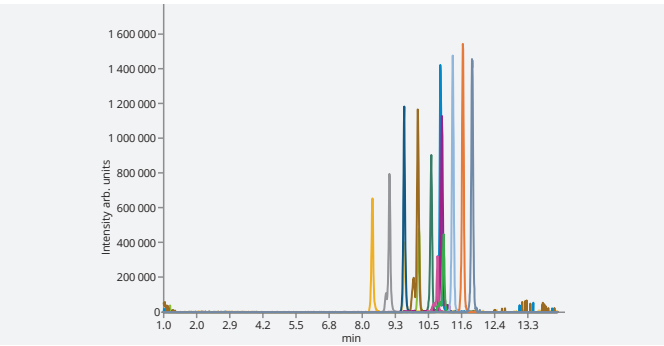


Note: The workflow may vary depending on your application.

Analysis of long-chain PFASs in biological sample matrix



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



Mixture of PFASs on ASTRA® column

MSPE Method

MSPE Column	Micro Spin SPEextra™ MSPE C18 column with 0.22 µm Nylon membrane, 15 mg (p/n MSP-5876-AA07)
Homogenization	TissueLyser II, Quiagen, Germany, 1800 min^{-1} for 10 min
Extraction	ACN + 0.1% FA
Centrifugation	Mini spin, Eppendorf, Germany; 4000 rpm for 2 min
Reconstitution	DDW + 0.1% FA
Dissolution	Ultrasonic bath 5 min
MSPE Activation	DDW + MeOH (50:50)
MSPE Equilibration	DDW + 0.1% FA
MSPE Extraction of analytes	500 µL of sample
MSPE Elution of analytes	200 µL ACN + 0.1% FA

We strongly recommend to use PFAS suitable vials and caps (e.g CHS silicone/PP septa and PP caps).

LC-HRMS Method

Column	ASTRA® C18-HE, 3 µm			
Dimensions	75 mm × 2.1 mm			
Part number	AST-5732-IH21			
Mobile phase	A: DDW + 10mM Ammonium Acetate B: Methanol + 10mM Ammonium Acetate			
Gradient elution	**Time [min]**	**A [%]**	**B [%]**	**Flow rate [µL/min]**
	0	90	10	350
	0.5	90	10	350
	6	40	60	350
	11	0	100	400
	14	0	100	400
	14.01	90	10	350
	16	90	10	350
Temperature	23 °C			
Injection volume	10 µL			
Detection	Full scan (resolving power 120 000, m/z 200), negative mode			

Substance	**1. L-PFPeS (perfluoropentanesulfonic acid)** **2. PFHxS (perfluorohexanesulfonic acid)** **3. PFOA (perfluorooctanoic acid)** **4. PFHpS (perfluoroheptanesulfonic acid)** **5. PFNA (perfluorononanoic acid)** **6. FOSA (perfluorooctanesulfonamide)** **7. PFOS (perfluorooctanesulfonic acid)** **8. PFDA (perfluorodecanoic acid)** **9. PFUdA (perfluoroundecanoic acid)** **10. N-MeFOSAA (2-(N-methylperfluorooctanesulfonamido) acetic acid)11. N-EtFOSAA (N-Ethyl-N-[(heptadecafluorooctyl)sulphonyl]glycine)** **12. PFDoA (perfluorododecanoic acid)** **13. PFTrDA (perfluorotridecanoic acid)** **14. PFTeDA (perfluorotetradecanoic acid)**

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

SAMPLE PREPARATION

Ordering information

C18 MSPE SPEextra™
all tubes 0.7 mL

Membrane	15 mg	30 mg	50 mg
Nylon	MSP-5876-AA07	MSP-5876-AB07	MSP-5876-AC07
PTFE hydrophilic	MSP-5876-DA07	MSP-5876-DB07	MSP-5876-DC07
PTFE hydrophobic	On request	MSP-5876-EB07	MSP-5876-EC07
PVDF	MSP-5876-BA07	MSP-5876-BB07	MSP-5876-BC07
MCE	MSP-5876-CA07	MSP-5876-CB07	MSP-5876-CC07

MSPE columns

C18-P MSPE SPEextra™
all tubes 0.7 mL

Membrane	15 mg	30 mg	50 mg
Nylon	MSP-5879-AA07	MSP-5879-AB07	On request
PTFE hydrophilic	On request	MSP-5879-DB07	MSP-5879-DC07
PTFE hydrophobic	On request	MSP-5879-EB07	MSP-5879-EC07
PVDF	MSP-5879-BA07	MSP-5879-BB07	MSP-5879-BC07
MCE	MSP-5879-CA07	MSP-5879-CB07	MSP-5879-CC07

HLB MSPE SPEextra™
all tubes 0.7 mL

Membrane	5 mg	10 mg	15 mg	30 mg
Nylon	MSP-5877-AD07	MSP-5877-AE07	MSP-5877-AA07	MSP-5877-AB07
PTFE hydrophilic	MSP-5877-DD07	MSP-5877-DE07	MSP-5877-DA07	On request
PTFE hydrophobic	MSP-5877-ED07	MSP-5877-EE07	On request	MSP-5877-EB07
PVDF	MSP-5877-BD07	MSP-5877-BE07	MSP-5877-BA07	MSP-5877-BB07
MCE	MSP-5877-CD07	MSP-5877-CE07	MSP-5877-CA07	MSP-5877-CB07

WAX MSPE SPEextra™
all tubes 0.7 mL

Membrane	15 mg	30 mg
Nylon	MSP-5957-AA07	MSP-5957-AB07
PTFE hydrophilic	MSP-5957-DA07	MSP-5957-DB07
PTFE hydrophobic	MSP-5957-EA07	MSP-5957-EB07
PVDF	MSP-5957-BA07	MSP-5957-BB07
MCE	MSP-5957-CA07	MSP-5957-CB07

SAX MSPE SPEextra™
all tubes 0.7 mL

Membrane	15 mg	30 mg
Nylon	MSP-5959-AA07	MSP-5959-AB07
PTFE hydrophilic	MSP-5959-DA07	On request
PTFE hydrophobic	On request	On request
PVDF	On request	On request
MCE	On request	On request

All MSPE columns are supplied in packs of 50 pcs.

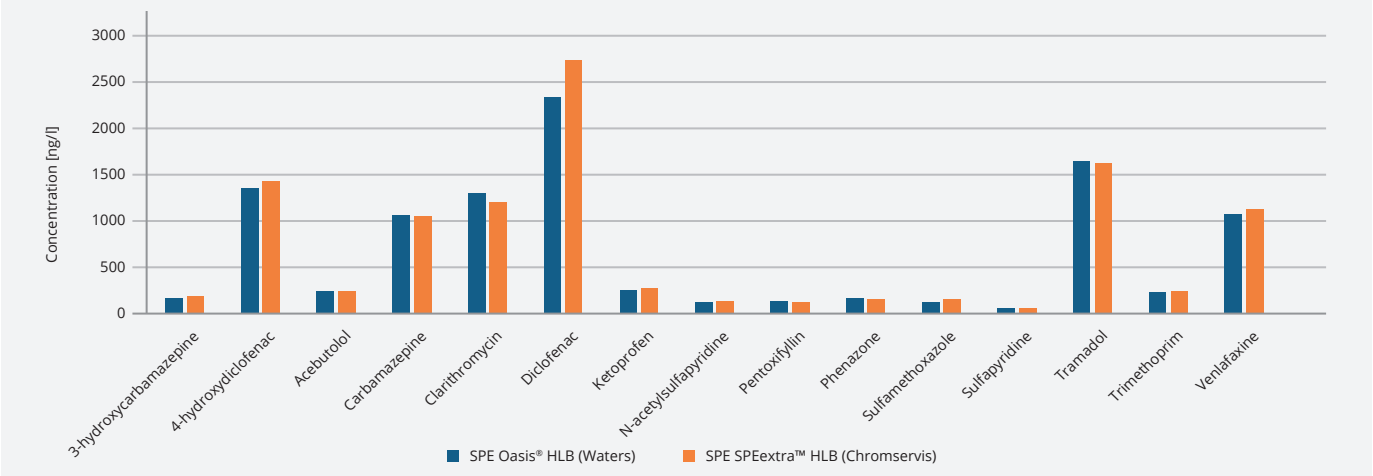
Accessories

Desription	Qty	Part number
Micro Spin SPEextra™, Outer tube only, 2 mL	50 pcs	MSP-0000-0T20
Frontier 5000 Series centrifuge, model FC5306	1 pc	30134156
Vortex Mini, Model VXMNFS, Fixed Speed, Orbit 4.9 mm	1 pc	30392110
Vortex-Genie2, e-V2, SI-0246	1 pc	83041410
Vortex Mini Model VXMNDG, Digital control, Orbit 4.9 mm	1 pc	30392124

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™ C18

Sorbent mass [mg]	Particle size [µm]	Volume [mL]	Part Number	Qty
50	50	1	SPE-5812-DH01	50 pcs
100	50	1	SPE-5812-DB01	100 pcs
100	50	3	SPE-5812-DB03	50 pcs
200	50	3	SPE-5812-DC03	50 pcs
200	50	6	SPE-5812-DC06	30 pcs
500	50	3	SPE-5812-DD03	50 pcs
500	50	3	SPE-5812-DD03-B	200 pcs
500	50	6	SPE-5812-DD06	30 pcs
500	50	6	SPE-5812-DD06-B	200 pcs

SPEextra™ C8

Sorbent mass [mg]	Particle size [µm]	Volume [mL]	Part Number	Qty
50	50	1	SPE-5813-DH01	50 pcs
100	50	1	SPE-5813-DB01	100 pcs
100	50	3	SPE-5813-DB03	50 pcs
200	50	3	SPE-5813-DC03	50 pcs
500	50	3	SPE-5813-DD03	50 pcs
500	50	6	SPE-5813-DD06	30 pcs

SPE columns

SAMPLE PREPARATION

SPE columns

SPEextra™ HLB Clinical

Sorbent mass [mg]	Particle size [µm]	Volume [mL]	Part Number	Qty
30	30	1	SPE-5804-AA01	50 pcs

SPEextra™ Phenyl

Sorbent mass [mg]	Particle size [µm]	Volume [mL]	Part Number	Qty
100	50	1	SPE-5961-DB01	100 pcs
100	50	3	SPE-5961-DB03	50 pcs
500	50	3	SPE-5961-DD03	50 pcs
200	50	6	SPE-5961-DC06	30 pcs
500	50	6	SPE-5961-DD06	30 pcs

SPEextra™ HLB Enviro

Sorbent mass [mg]	Particle size [µm]	Volume [mL]	Part Number	Qty
60	30	1	SPE-5804-AG01	50 pcs
60	60	1	SPE-5804-EG01	50 pcs
60	30	3	SPE-5804-AG03	50 pcs
60	60	3	SPE-5804-EG03	50 pcs
150	30	6	SPE-5804-AI06	30 pcs
150	60	6	SPE-5804-EI06	30 pcs
200	30	3	SPE-5804-AC03	50 pcs
200	30	6	SPE-5804-AC06	30 pcs
200	30	6	SPE-5804-AC06-B	200 pcs
200	60	3	SPE-5804-EC03	50 pcs
200	60	6	SPE-5804-EC06	30 pcs
500	30	6	SPE-5804-AD06	30 pcs
500	60	6	SPE-5804-ED06	30 pcs

SPEextra™ HCX

Sorbent mass [mg]	Particle size [µm]	Volume [mL]	Part Number	Qty
200	60	3	SPE-5841-EC03	50 pcs

SPEextra™ SAX

Sorbent mass [mg]	Particle size [µm]	Volume [mL]	Part Number	Qty
50	50	1	SPE-5814-DH01	50 pcs
100	50	1	SPE-5814-DB01	100 pcs
100	50	3	SPE-5814-DB03	50 pcs
200	50	3	SPE-5814-DC03	50 pcs
500	50	3	SPE-5814-DD03	50 pcs
1000	50	6	SPE-5814-DE06	30 pcs

SPEextra™ SCX

Sorbent mass [mg]	Particle size [µm]	Volume [mL]	Part Number	Qty
50	50	1	SPE-5815-DH01	50 pcs
100	50	1	SPE-5815-DB01	100 pcs
100	50	3	SPE-5815-DB03	50 pcs
200	50	3	SPE-5815-DC03	50 pcs
500	50	3	SPE-5815-DD03	50 pcs

SPE columns

SPEextra™ WAX

Sorbent mass [mg]	Particle size [µm]	Volume [mL]	Part Number	Qty
60	30	3	SPE-5956-AG03	50 pcs
100	30	6	SPE-5956-AB06	30 pcs
150	30	6	SPE-5956-AI06	30 pcs
200	30	6	SPE-5956-AC06	30 pcs
200	30	6	SPE-5956-AC06-B	200 pcs
500	30	6	SPE-5956-AD06	30 pcs

SPEextra™ Florisil® (pesticide grade)

Sorbent mass [mg]	Particle size [µm]	Volume [mL]	Part Number	Qty
1000	150/250	6	SPE-5805-NE06	30 pcs
1000	150/250	15	SPE-5805-NE15	20 pcs
500	150/250	3	SPE-5805-ND03	50 pcs

SPEextra™ Florisil® (ultra pure)

Sorbent mass [mg]	Particle size [µm]	Volume [mL]	Part Number	Qty
2000	150/250	15	SPE-5805-NF15	20 pcs

SPEextra™ Si

Sorbent Mass [mg]	Particle size [µm]	Volume [mL]	Part Number	Qty
500	50	3	SPE-5872-DD03	50 pcs
500	50	6	SPE-5872-DD06	30 pcs
1000	50	6	SPE-5872-DE06	30 pcs

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

PH. EUR. AND USP METHODS

Allowable method adjustments

Parameter	Isocratic Elution	Gradient Elution
pH	±0.2	±0.2
Buffer concentration	±10 %	±10 %
Mobile phase / Gradient volume	Solvent ratio up to the lesser of ±30 % relative or ±10 % absolute for minor components	Gradient segments adjusted according to the equation: $tG2 = tG_1 \times (F_1/F_2)\ [(L_2 \times dc_2 2) /(L_1 \times dc_1^2)]$
UV wavelenght	No changes allowed	No changes allowed
Column dimensions	L (length) / dp (particle diameter) = −25 % to +50 % Adjustments from totally porous (TPP) to superficially porous particles (SPP): $(t_R/W_h)^2$ = −25 % to +50 % The system suitability criteria are fulfilled, selectivity and elution order of the specified impurities are demonstrated to be equivalent.	L (length) / dp (particle diameter) = −25 % to +50 % Adjustments from totally porous (TPP) to superficially porous particles (SPP): $(t_R/W_h)^2$ = −25 % to +50 % The system suitability criteria are fulfilled, selectivity and elution order of the specified impurities are demonstrated to be equivalent.
Stationary phase	No change of the identity of the substituent; the other physicochemical characteristics of the stationary phase. A change from TPP to SPP is allowed provided the above-mentioned requirements are met.	No change of the identity of the substituent; the other physicochemical characteristics of the stationary phase. A change from TPP to SPP is allowed provided the above-mentioned requirements are met.
Internal diameter	In absence of a change in particle size and/or length, the internal diameter may be adjusted.	In absence of a change in particle size and/or length, the internal diameter may be adjusted.
Flow rate	Allowed if column efficiency does not reduce by > 20 % Adjustment according to the equation: $F_2 = F_1 \times [(dc_2^2 \times dp_1) / (dc_1^2 \times dp_2)]$	Adjustment according to the equation: $F_2 = F_1 \times [(dc_2^2 \times dp_1) / (dc_1^2 \times dp_2)]$
Injection volume	Allowed if system suitability, limit of detection and repeatability are within specified limits. Adjustment according to the equation: $V_{inj2} = V_{inj1}\ (L_2 dc_2^2) / (L_1 dc_1^2)]$	Allowed if system suitability, limit of detection and repeatability are within specified limits. Adjustment according to the equation: $V_{inj2} = V_{inj1}\ (L_2 dc_2^2) / (L_1 dc_1^2)]$
Column temperature	±10 °C	±5 °C
Dwell volume		The length of the isocratic step may be adapted. Adapted time points according to the equation: $t_c = t - [(D - D_0)/F]$

References

(1) United States Pharmacopeia (USP), General Chapter <621>

(2) European Pharmacopoeia (Ph. Eur.), Chapter 2.2.46

PH. EUR. AND USP METHODS

USP methods

USP Code	Description	Corresponding column
L1	Octadecyl silane chemically bonded to porous or nonporous silica particles or superficially porous particles or ceramic micro-particles, 1.5–10 µm in diameter, or a monolithic rod.	ARION® Plus C18 ARION® Polar C18 ARION® C18-BIO ASTRA® C18-AQ ASTRA® C18-BDS ASTRA® C18-HE ASTRA® C18-Hybrid CHROMSHELL® C18 Plus CHROMSHELL® C18-XB CHROMSHELL® C18 Polar
L3	Porous silica particles or superficially porous particles, 1.5–10 µm in diameter, or a monolithic rod.	ARION® HILIC Plus ARION® Si ASTRA® Si
L7	Octylsilane chemically bonded to totally porous or superficially porous silica particles 1.5–10 µm in diameter, or a monolithic rod.	ARION® C8 ARION® C8-BIO ASTRA® C8-HE ASTRA® C8-BDS
L8	An essentially monomolecular layer of aminopropylsilane chemically bonded to totally porous silica gel support, 1.5–10 µm in diameter, or a monolithic silica rod.	ARION® NH_2
L9	Irregular or spherical, totally porous silica gel having a chemically bonded, strongly acidic cation-exchange coating, 3 to 10 µm in diameter.	ARION® SCX
L10	Nitrile groups chemically bonded to porous silica particles or superficially porous particles, 1.5–10 µm in diameter, or a monolithic silica rod.	ARION® CN
L11	Phenyl groups chemically bonded to porous or superficially porous silica particles, 1.5–10 µm in diameter, or a monolithic silica rod.	ARION® Biphenyl ARION® Phenyl-Butyl ASTRA® Phenyl-Hexyl-HE
L14	Silica gel having a chemically bonded, strongly basic quaternary ammonium anion-exchange coating, 5–10 µm in diameter.	ARION® SAX
L17	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 6–12 µm in diameter.	ASTRA® Sugar H (S)
L19	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the calcium form, 5–15 µm in diameter.	ASTRA® Sugar Ca (S)
L20	Dihydropropane groups chemically bonded to porous silica particles, 1.5–10 µm in diameter, or a monolithic silica rod.	ASTRA® Diol
L26	Butyl silane chemically bonded to totally porous or superficially porous silica particles, 1.5 to 10 µm in diameter.	ARION® C4-BIO
L43	Pentafluorophenyl groups chemically bonded to porous or superficially porous silica particles by a propyl spacer, 1.5–10 µm in diameter.	ARION® PFP
L50	Multifunction resin with reversed-phase retention and strong anion-exchange functionalities. The resin consists of ethylvinylbenzene, 55 % cross-linked with divinylbenzene copolymer, 3–15 µm in diameter, and a surface area not less than 350 m^2 per g. Substrate is coated with quaternary ammonium functionalized latex particles consisting of styrene cross-linked with divinylbenzene.	ARION® SCX
L58	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the sodium form, about 6 to 30 µm in diameter.	ASTRA® Sugar Na (S)
L96	Alkyl chain, reversed-phase bonded totally or superficially porous silica designed to retain hydrophilic and other polar compounds when using highly aqueous mobile phases, including 100% aqueous, 1.5 µm to 10 µm.	ARION® Polar C18 ASTRA® C18-AQ

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