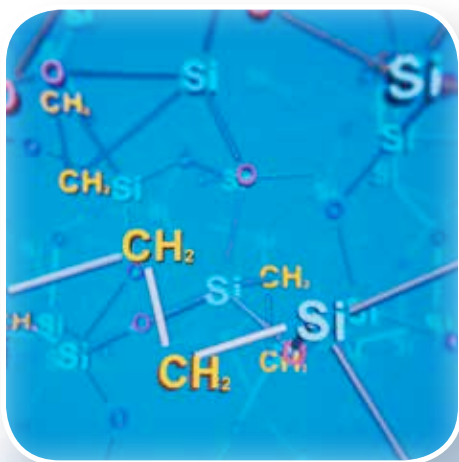
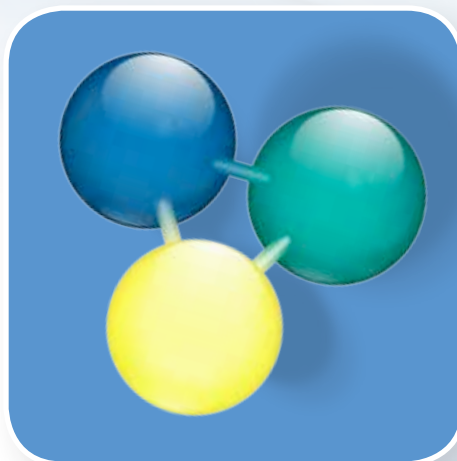


**INCREASED
TEMPERATURE
STABILITY!**

YMC
EUROPE GMBH
The Selectivity Company

Versatile hybrid silica based (U)HPLC columns

YMC-Triart



(U)HPLC
microLC
LC/MS

www.ymc.de

YMC-Triart

Chromatographers always seek to push the limits of HPLC columns to greater extremes to allow them to perform day-to-day with ever-changing pH, buffers and temperature ranges. The column for the laboratory of today must be suitable for harsh pH conditions in combination with high temperature ranges without sacrificing selectivity.

In order to meet these goals, YMC has developed a novel particle technology. The revolutionary production technique provides a silica-organic hybrid stationary phase, which provides an outstandingly narrow pore size and particle size distribution. This in turn, results in low back pressures and high loadability.



Industry Solution

Pharmaceutical
QA / QC
Drug Discovery
Isolation to Purification
Manufacturing



Life Science

Amino Acids
Peptides to Proteins / Antibodies
Oligonucleotides



Food & Beverages

Food Safety
QA / QC
Environmental

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Phase overview

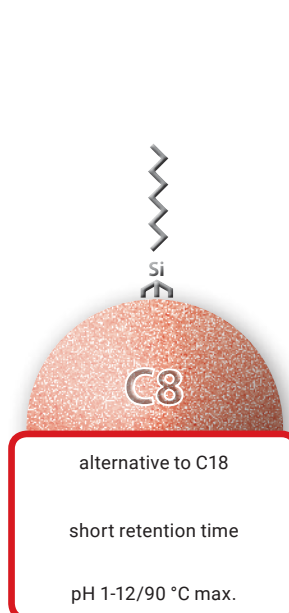
YMC-Triart C18



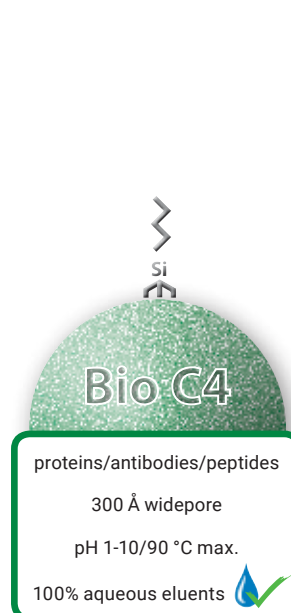
YMC-Triart C18 ExRS



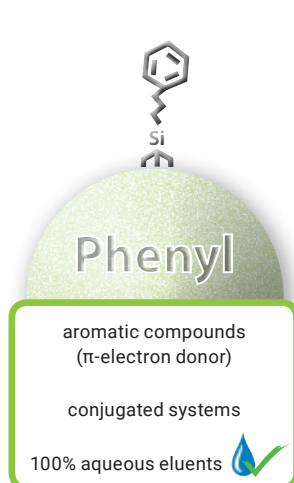
YMC-Triart C8



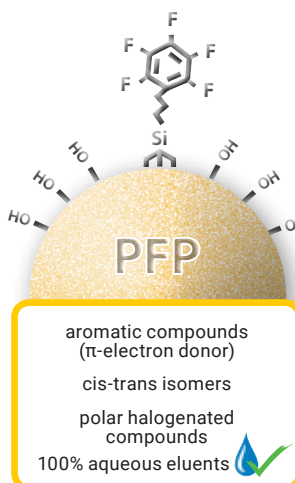
YMC-Triart Bio C4



YMC-Triart Phenyl



YMC-Triart PFP



YMC-Triart Diol-HILIC



In order to offer a convenient solution for method developers YMC is offering price attractive Method Development Kits with a selection of 3 different YMC-Triart (U)HPLC columns.

Specification

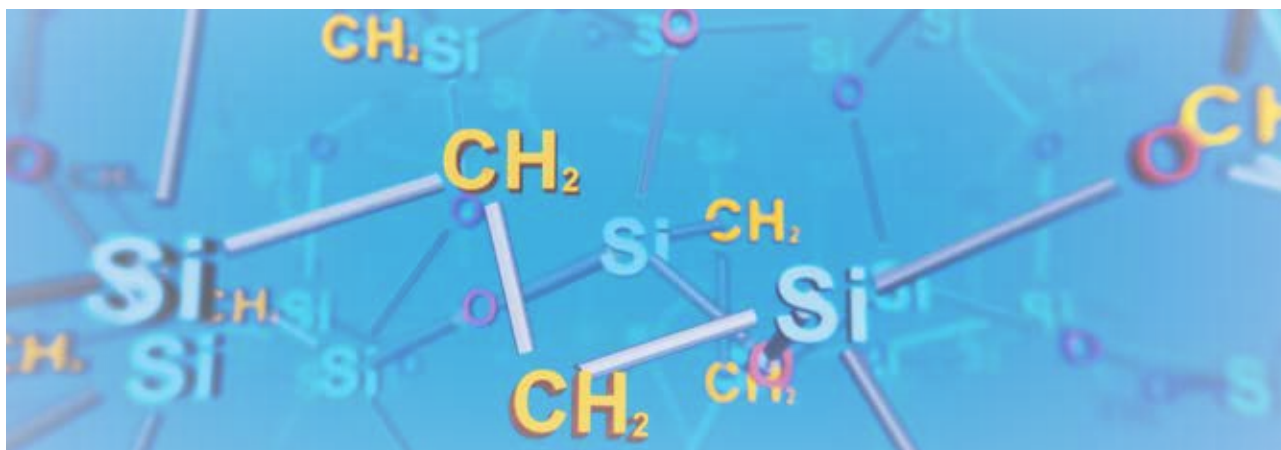
	YMC-Triart C18	YMC-Triart C18 ExRS	YMC-Triart C8	YMC-Triart Bio C4	YMC-Triart Phenyl	YMC-Triart PFP	YMC-Triart Diol-HILIC
Base	organic/inorganic silica						
Stationary phase	C18 (USP L1)	C18 (USP L1)	C8 (USP L7)	C4 (USP L26)	Phenyl (USP L11)	Pentafluorophenyl (USP L43)	Diol (USP L20)
Particle size	1.9, 3 and 5 µm						
Pore size	12 nm	8 nm	12 nm	30 nm	12 nm	12 nm	12 nm
Specific surface	360 m ² /g	430 m ² /g	360 m ² /g	—	360 m ² /g	360 m ² /g	360 m ² /g
Carbon content	20%	25%	17%	—	17%	15%	—
Bonding	trifunctional						
Endcapping	multi-stage	multi-stage	multi-stage	multi-stage	multi-stage	none	none
pH range	1 ~ 12	1 ~ 12	1 ~ 12	1 ~ 10	1 ~ 10	1 ~ 8	2 ~ 10
Temperature range	pH < 7: 90 °C pH > 7: 50 °C	pH < 7: 90 °C pH > 7: 50 °C	pH < 7: 90 °C pH > 7: 50 °C	pH < 7: 90 °C pH > 7: 50 °C	50 °C	50 °C	50 °C
Pressure limit	1.9 µm: 100 MPa (15,000 psi) 3/5 µm: 45 MPa (6,525 psi)*						
100% aqueous eluents	✓	✗	✗	✓	✓	✓	✓

* previous hardware, still available [20/25 MPa (3,000/3,750 psi)]

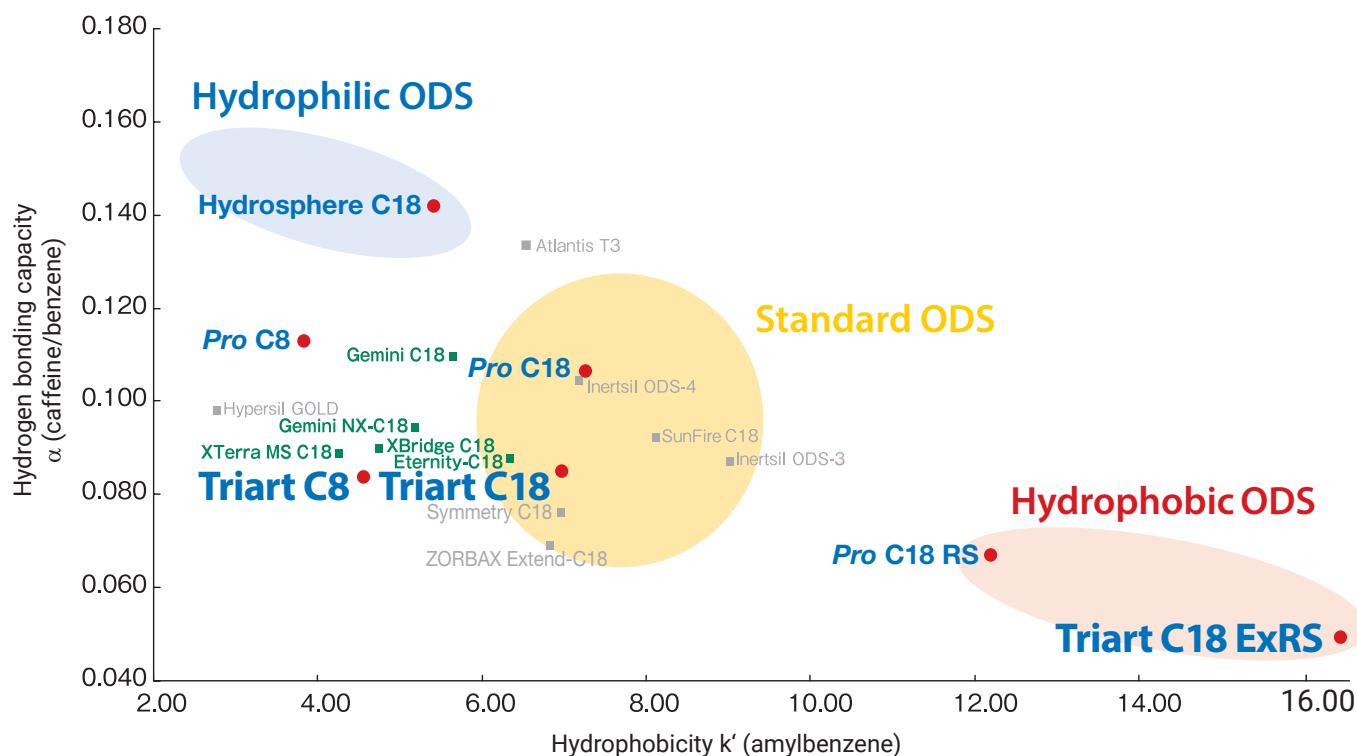
Particle technology

YMC-Triart is a versatile material prepared using tightly controlled particle formation technology which has been adapted from micro-reactor technology. This recently developed production process developed by YMC results in exceptionally narrow particle and pore size distributions.

With YMC-Triart, challenging pH and high temperature conditions are no longer a limitation to the day-to-day work in laboratories. Most importantly, due to its unique particle composition, a balanced hydrophobicity and silanol activity are achieved which makes YMC-Triart a "First Choice" column in method development.

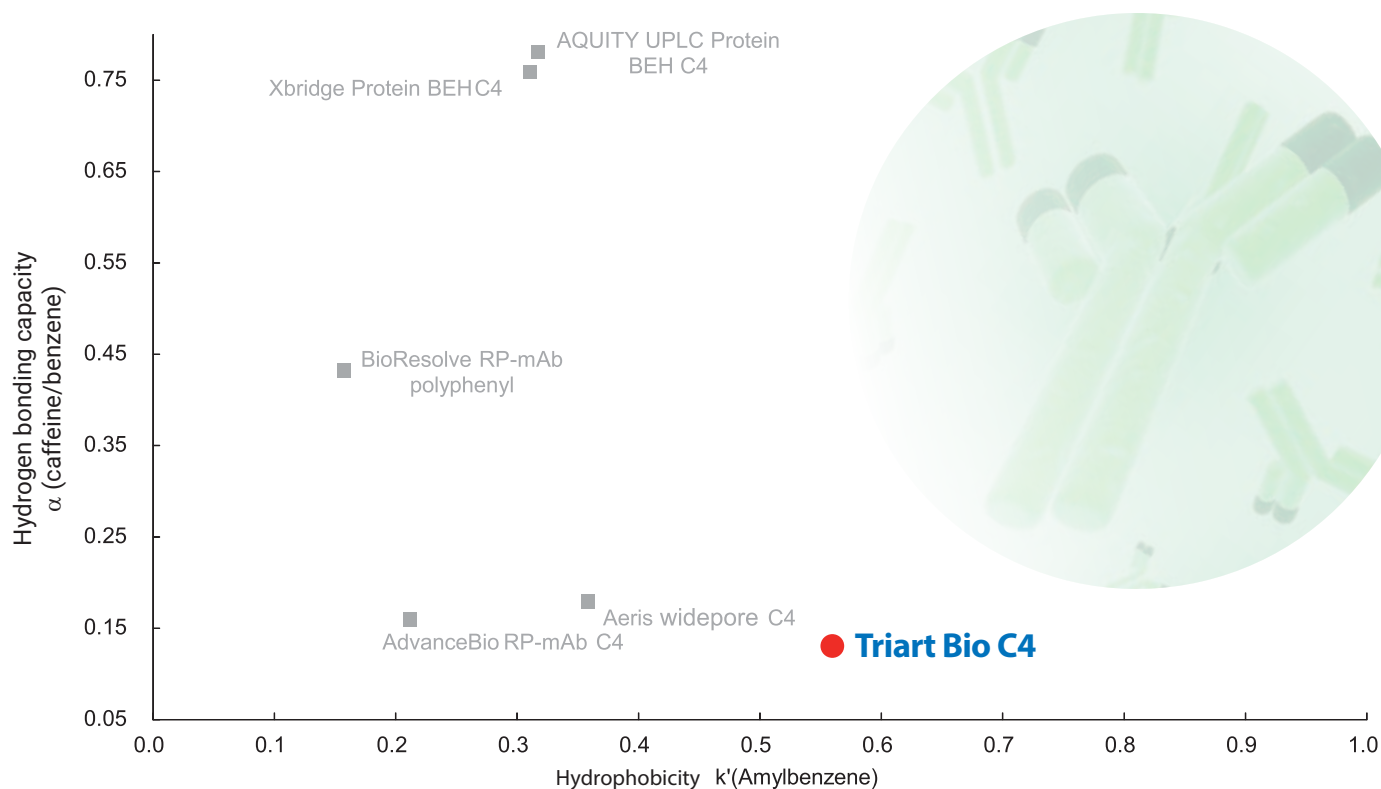


"First choice" column for method development



Conventional hybrid silica-based ODS columns tend to be less hydrophobic than silica-based columns. YMC-Triart C18 has a higher carbon load, giving it a hydrophobicity comparable to that of standard ODS

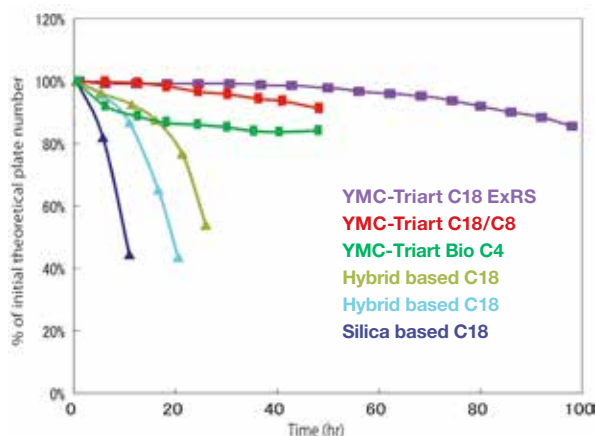
columns, thereby making it a "versatile first-choice" column for method development. On the other hand, YMC-Triart C18 ExRS has been designed to provide contrastingly different separation characteristics!



pH & temperature

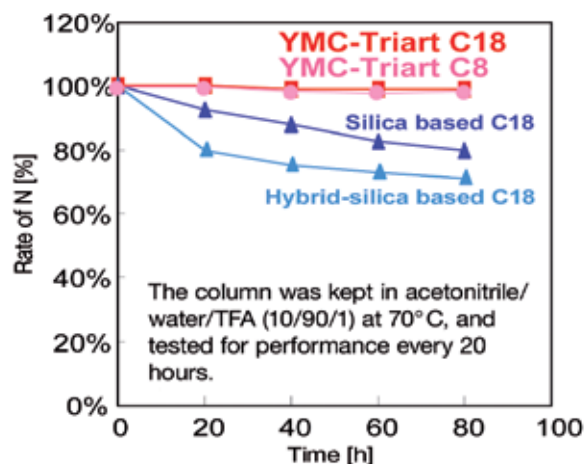
Versatile wide pH stability

Phosphate buffer (pH 11.5, 40 °C)*



Column: YMC-Triart (5 µm) 150 x 4.6 mm ID
 Part No.: TA12S05-1546WT
 Eluent: 50 mM K₂HPO₄-K₃PO₄ (pH 11.5) / methanol (90/10)
 Flow rate: 1.0 mL/min
 Temperature: 40 °C
 Sample: benzyl alcohol

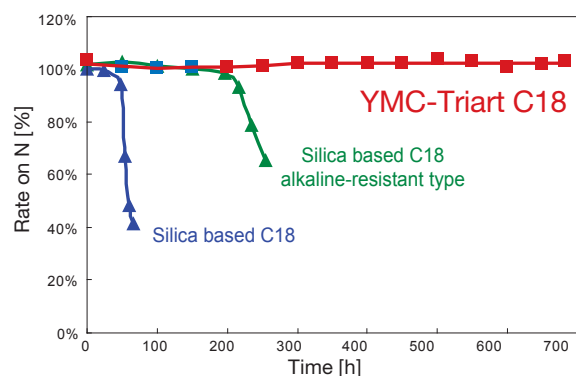
1% TFA (pH 1, 70 °C)*



Column: YMC-Triart C18 (5 µm) 50 x 2.0 mm ID
 Part No.: TA12S05-0502WT
 Eluent: acetonitrile / water (60/40)
 Flow rate: 0.2 mL/min
 Temperature: 37 °C
 Sample: butyl benzoate

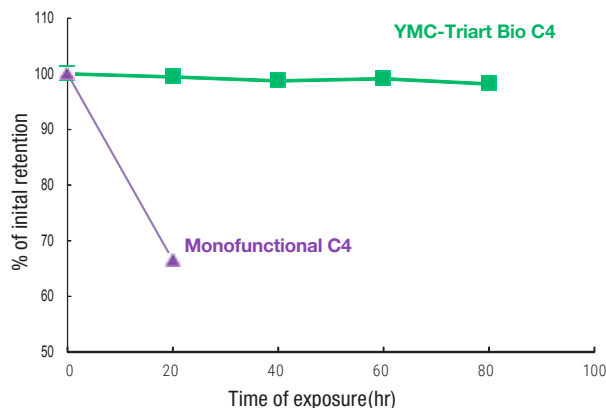
Stability at high temperature

pH 6.9, 70 °C*



Column: YMC-Triart C18 (5 µm) 50 x 2.0 mm ID
 Part No.: TA12S05-0502WT
 Eluent: 20 mM KH₂PO₄-K₂HPO₄ (pH 6.9) / acetonitrile (90/10)
 Flow rate: 0.2 mL/min
 Temperature: 70 °C
 Sample: phenol

pH 1, 90 °C*



Column: YMC-Triart Bio C4 Column (5 µm) 150 x 3.0 mm ID
 Part No.: TB30S05-1503PTH
 Eluent: acetonitrile/water (60/40)
 Flow rate: 0.4 mL/min
 Temperature: 37 °C
 Sample: butyl benzoate

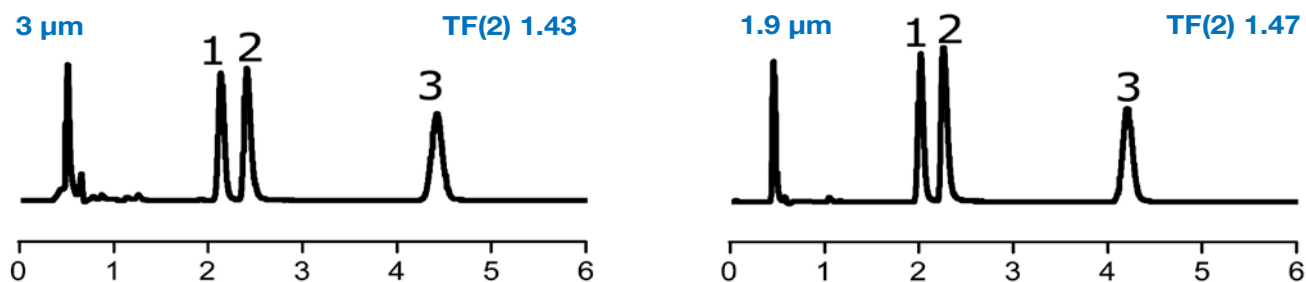
YMC-Triart phases show great chemical stability due to the highly developed hybrid-silica matrix. Even under high pH or high temperature conditions, the lifetime of YMC-Triart phases is more than 10 x greater than conventional reversed phase columns.

Transfer HPLC↔UHPLC

Secure your method transfer!*

Differences in selectivity, retention time, and also peak shapes between different particle sizes of commercially available C18 phases in the same brand (or an alternative as recommended by its manufacturer) have been observed.

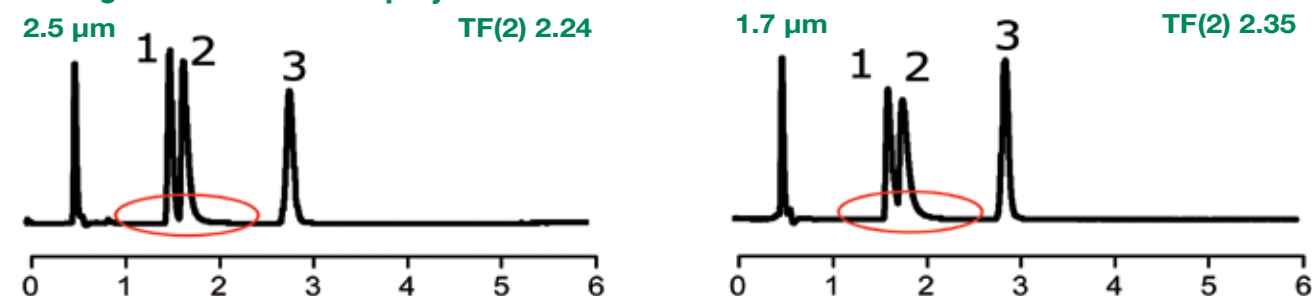
YMC-Triart C18



YMC has addressed this issue of method transfer. YMC-Triart columns show identical selectivity and excellent peak shapes for basic compounds for all 3.0 µm to 1.9 µm particle sizes. It allows predictable scale up from UHPLC to conventional HPLC and even to semi-preparative LC, and vice versa.

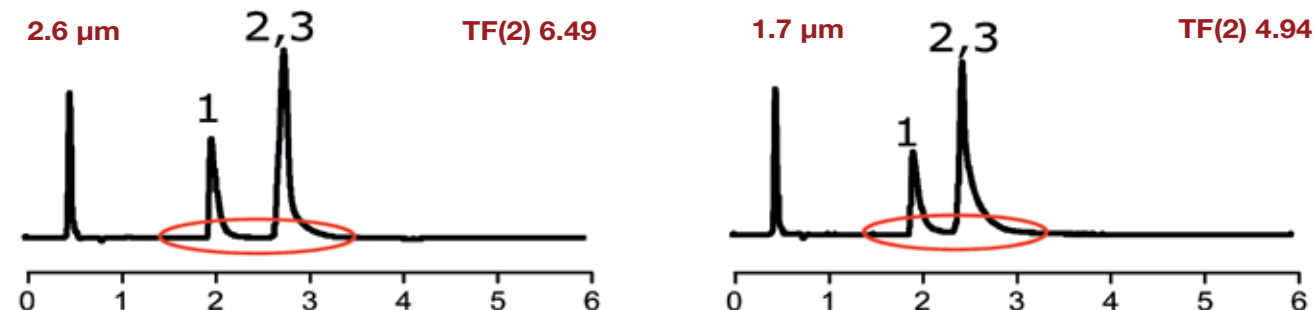
Case Studies**

X-Bridge BEH C18 and Acquity UPLC BEH C18



** These observations might not be representative for all applications.

Kinetex™ C18



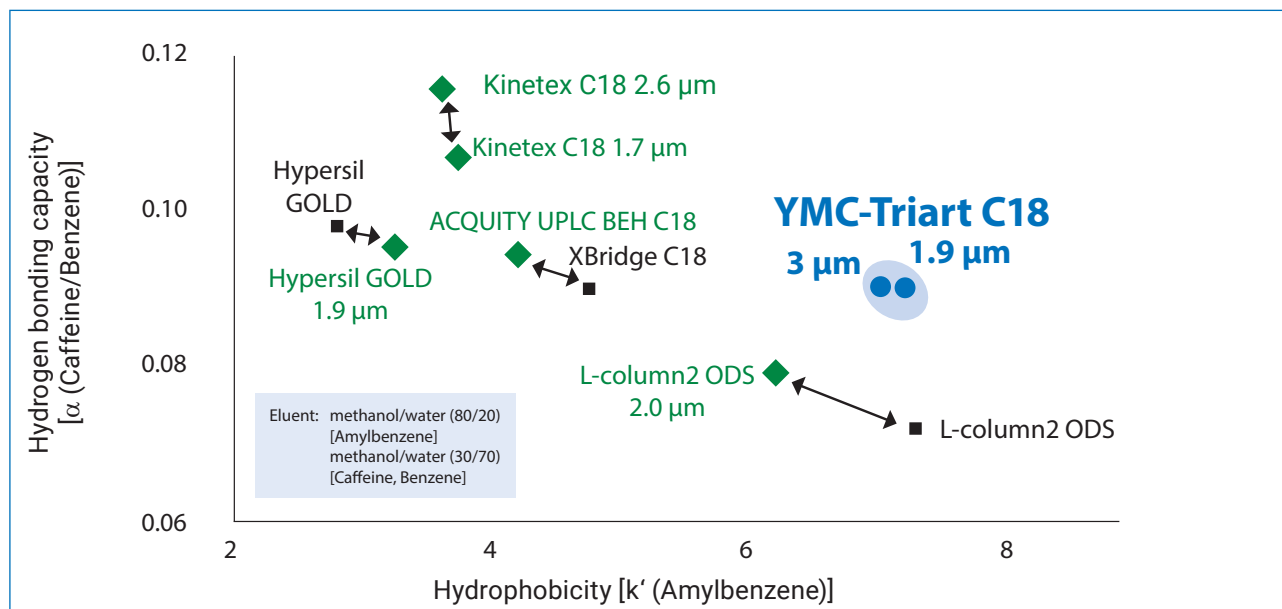
Kinetex™ C18 columns show significant peak tailing and have limited scalability due to lack of larger particle sizes.

Column: 50 x 2.0 mm ID or 2.1 mm ID
 Eluent: 20 mM KH₂PO₄-K₂HPO₄ (pH 6.9) / acetonitrile (65/35)
 Temperature: 40 °C
 Flow rate: 0.2 mL/min
 Detection: UV at 235 nm

1. Chlorpheniramine (basic)
 2. Dextromethorphan (basic)
 3. Propyl paraben (internal standard)

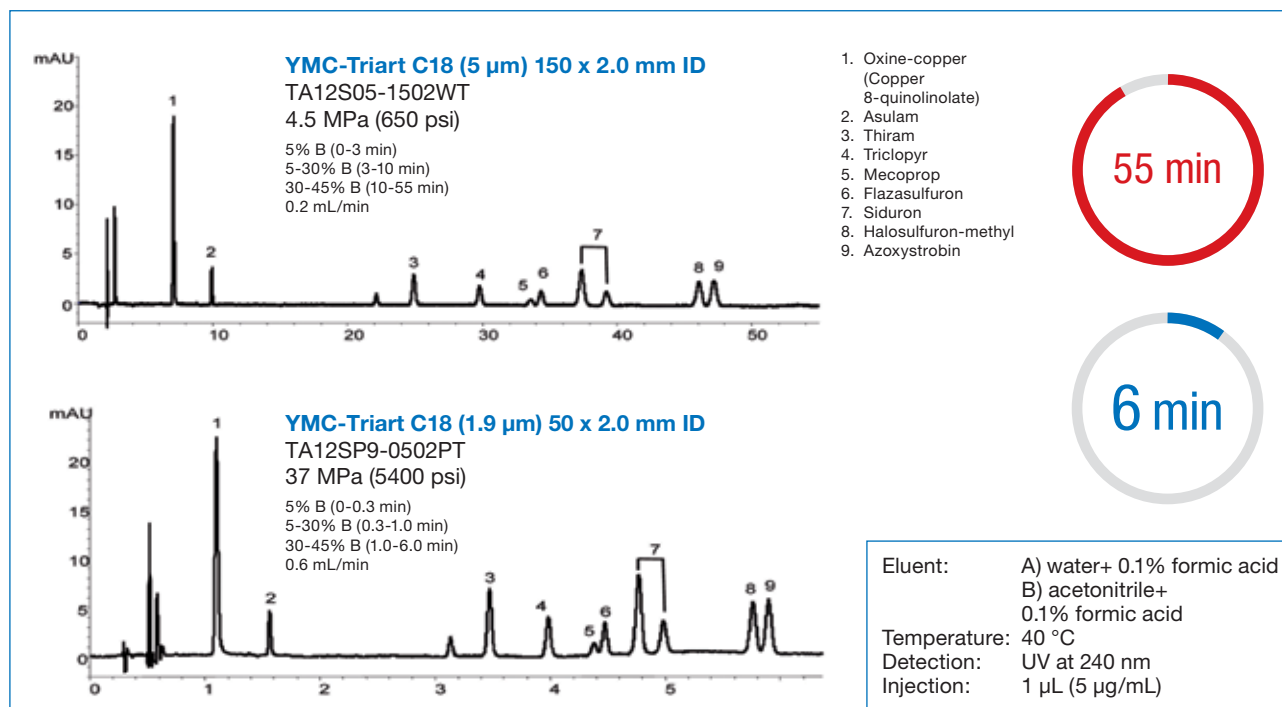
Transfer HPLC↔UHPLC

Evaluation of method transfer performance!*



With the introduction of UHPLC, sub-2-μm particles became necessary. Therefore smaller particles have been added to existing column lines. Consequently, sub-2-μm particles may exhibit differences in chromatographic performance. By introducing YMC-Triart, YMC provides matching chromatographic behaviour for all particles sizes!

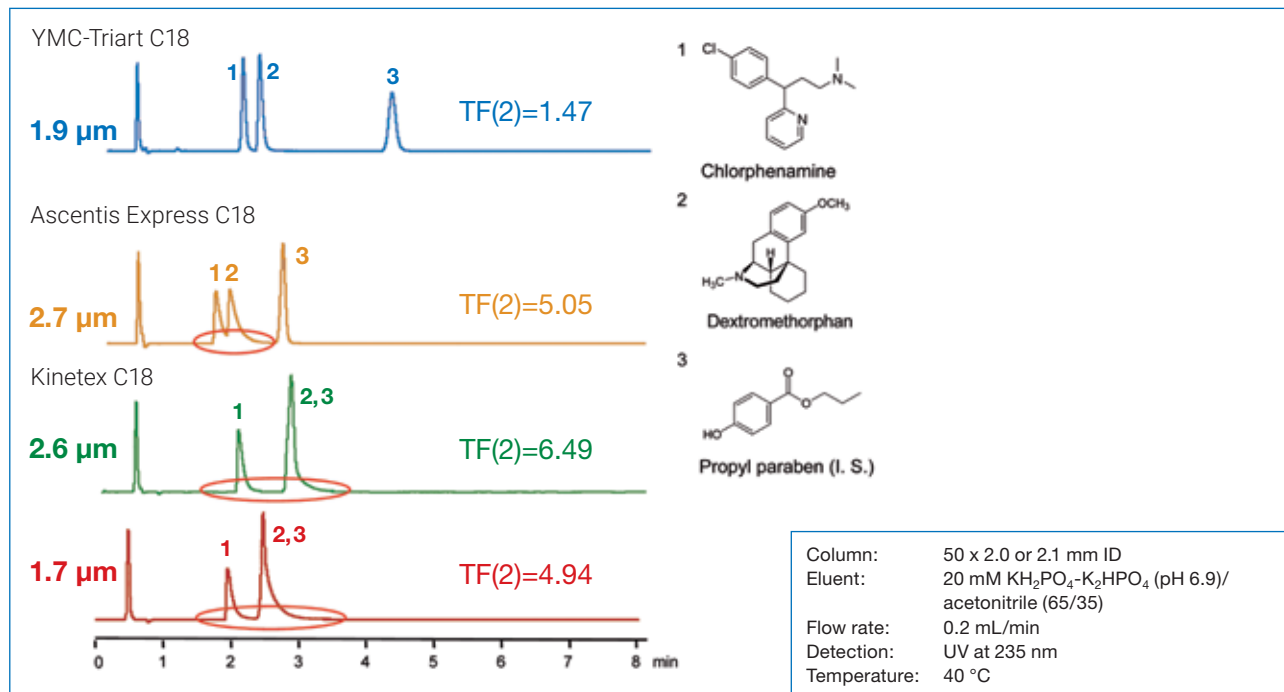
Method transfer HPLC↔UHPLC*



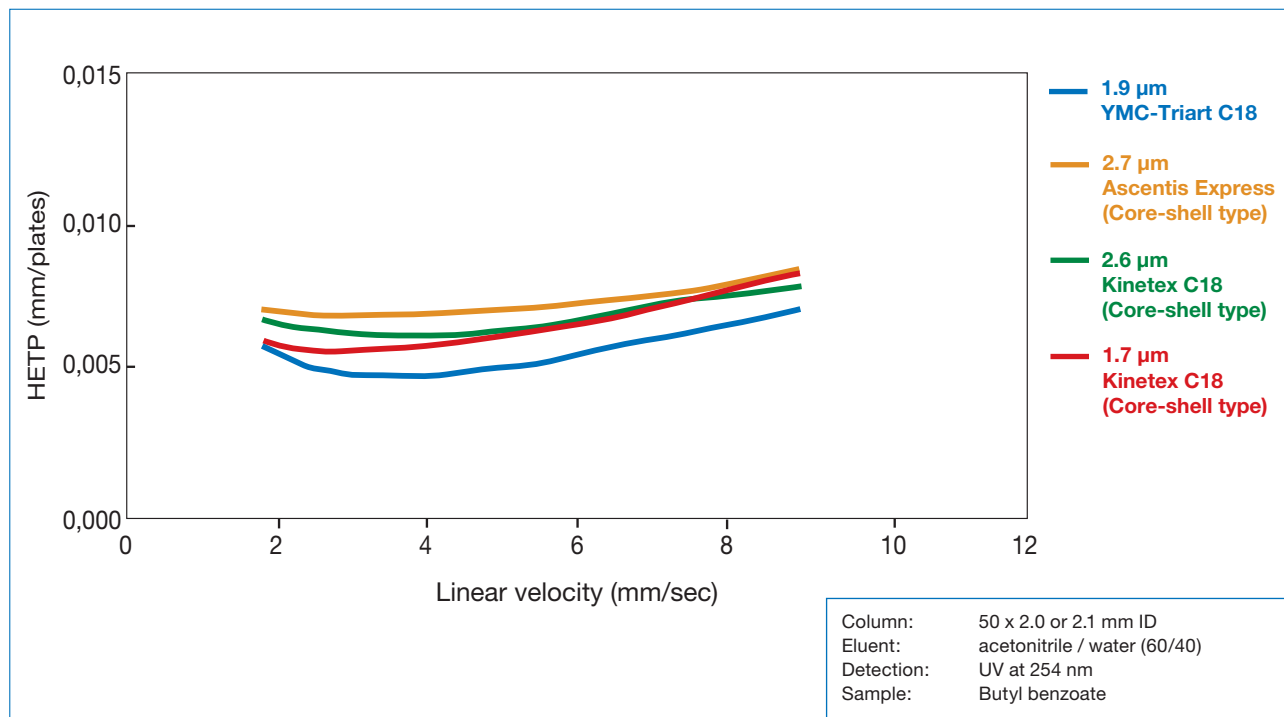
When transferring the 55 min HPLC method to UHPLC scale, the resolution remains the same although the separation time is reduced to only 6 min.

UHPLC

Higher resolution and good loadability*



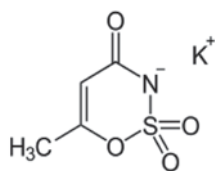
Lower HETP means higher resolution!*



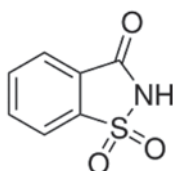
YMC-Triart C18 always shows the lowest HETP compared to the three Core-Shell products over the range of linear velocity applied.

UHPLC & MS

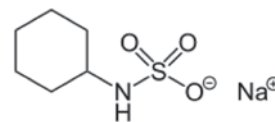
Determination of artificial sweeteners with LC-MS/MS*



Acesulfame (K salt)

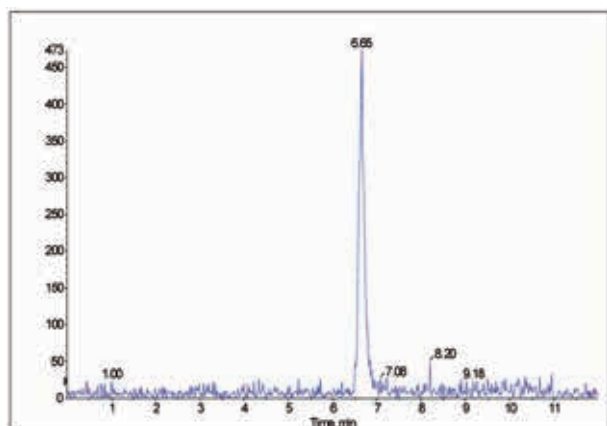


Saccharin

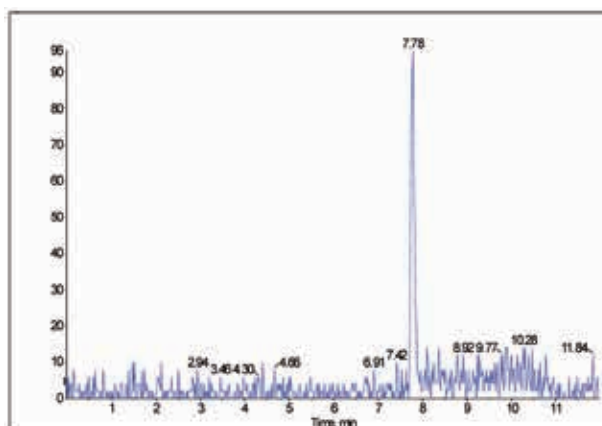


Cyclamate Na

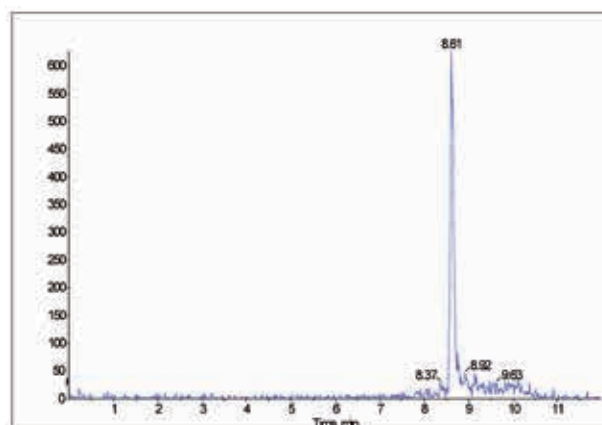
→ Non biological markers of wastewater entries in ground and surface water



Extracted Ion Chromatogram (XIC) of Acesulfame K, 0.1 µg/L



Extracted Ion Chromatogram (XIC) of Saccharin, 0.1 µg/L



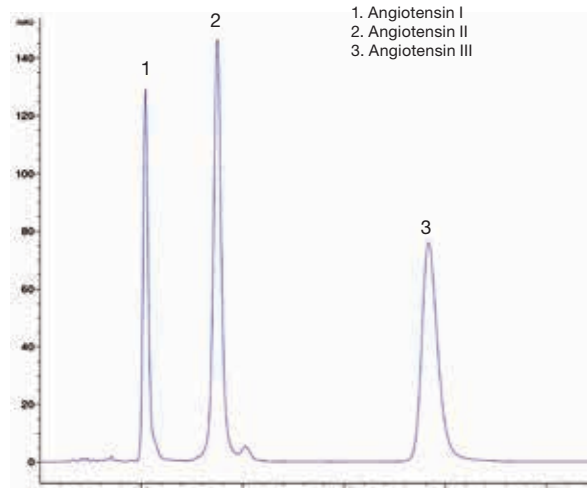
Extracted Ion Chromatogram (XIC) of Cyclamate Na, 0.1 µg/L

Column: YMC-Triart C18, (1.9 µm, 12 nm) 100 x 3.0 mm ID
 Part-No.: TA12SP9-1003PT
 LC-System: Agilent 1100 HPLC system and CTC Analytics
 HTC-Pal Autosampler
 MS/MS System: Applied Biosystems MDS Sciex API 4000,
 ESI negative
 Temperature: 35°C
 Flow: 0.3 mL/min
 Injection: 40 µL, direct injection
 Eluent: A: water (containing 10 mmol NH₄ formate)
 B: methanol (containing 10 mmol NH₄ formate)
 Gradient:

Time	0	6.0	6.1	12.0
% B	2	75	2	2

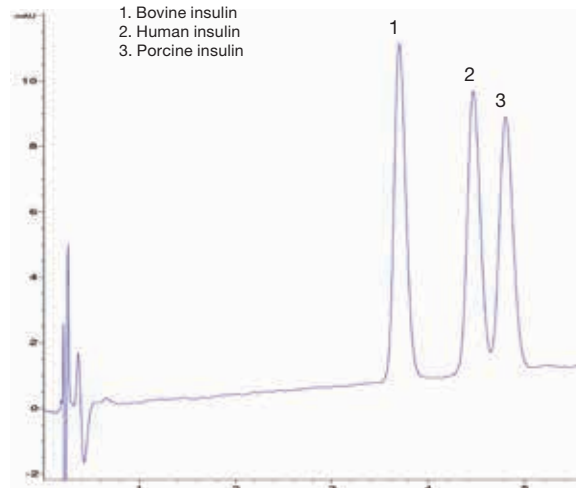
UHPLC

Angiotensin I, II and III



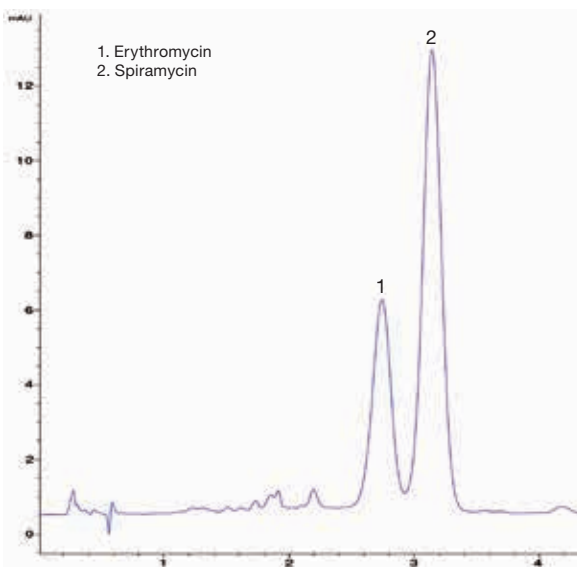
Column: YMC-Triart C18 (1.9 μ m, 12 nm) 50 x 2.0 mm ID
Part No.: TA12SP9-0502PT
Eluent: 20 mM KH_2PO_4 + K_2HPO_4 (pH 7.9) / acetonitrile (22/78)
Flow rate: 0.7 mL/min
Detection: UV at 220 nm
Pressure: 720 bar
Injection: 0.5 μ L
Temperature: 40 $^\circ\text{C}$

Insulin



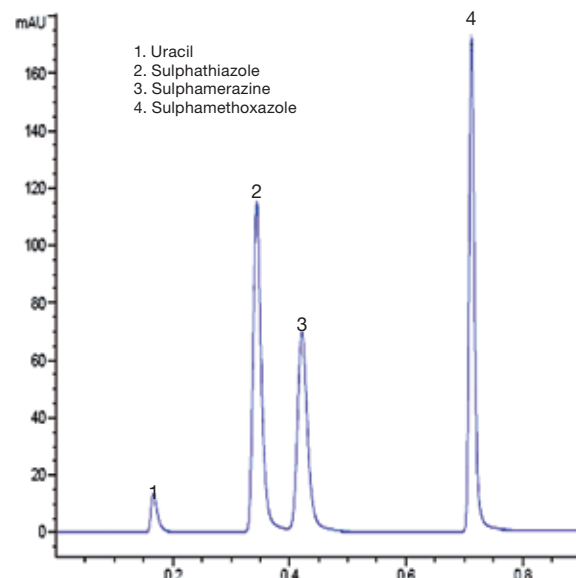
Column: YMC-Triart C18 (1.9 μ m, 12 nm) 50 x 2.0 mm ID
Part No.: TA12SP9-0502PT
Eluent: A) H_2O + 0.1% TFA
B) acetonitrile + 0.1% TFA
Gradient: 30% B (0 min); 30-32% B (0-5 min); 32% B (55 min)
Flow rate: 0.6 mL/min
Detection: UV at 220 nm
Pressure: 611 bar
Injection: 0.5 μ L
Temperature: 30 $^\circ\text{C}$

Macrolide antibiotics



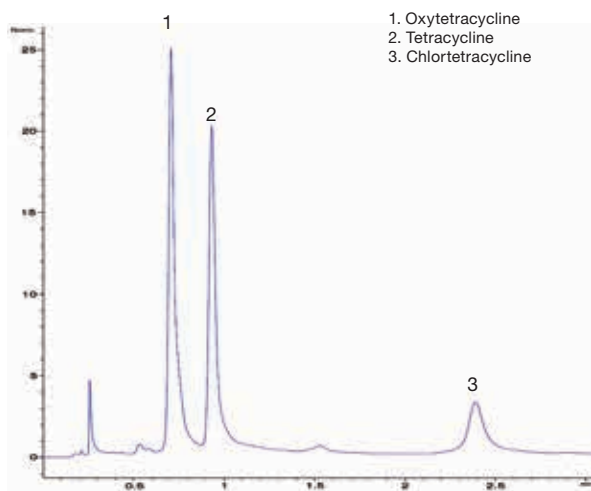
Column: YMC-Triart C18 (1.9 μ m, 12 nm) 50 x 2.0 mm ID
Part No.: TA12SP9-0502PT
Eluent: A) 20 mM K_2HPO_4 + 20 mM KH_2PO_4 (pH 7.9)
B) acetonitrile
Gradient: 60% B (0.5 min); 60-70% B (0.5-1.5 min); 70% B (3.5 min)
Flow rate: 0.45 mL/min
Detection: UV at 210 nm
Pressure: 520 bar
Injection: 1 μ L
Temperature: 50 $^\circ\text{C}$

Sulpha drugs



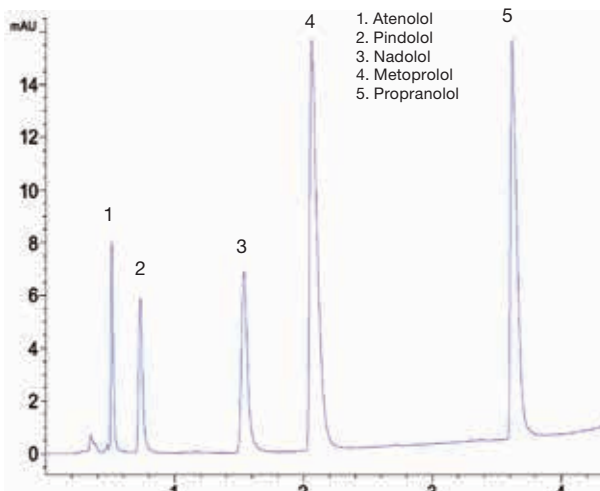
Column: YMC-Triart C18 (1.9 μ m, 12 nm) 50 x 2.0 mm ID
Part No.: TA12SP9-0502PT
Eluent: H_2O + formic acid (pH 2.5) / acetonitrile (75/25)
Flow rate: 0.75 mL/min
Detection: UV at 280 nm
Pressure: 740 bar
Injection: 0.5 μ L
Temperature: 50 $^\circ\text{C}$

Tetracycline antibiotics



Column: YMC-Triart C18 (1.9 μ m, 12 nm) 50 x 2.0 mm ID
Part No.: TA12SP9-0502PT
Eluent: 5 mM $\text{CH}_3\text{COONH}_4$ / acetonitrile (87/13)
Flow rate: 0.65 mL/min
Detection: UV at 280 nm
Pressure: 662 bar
Injection: 1 μ L
Temperature: 40 $^\circ\text{C}$

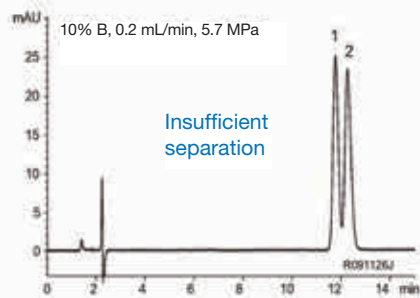
Betablockers



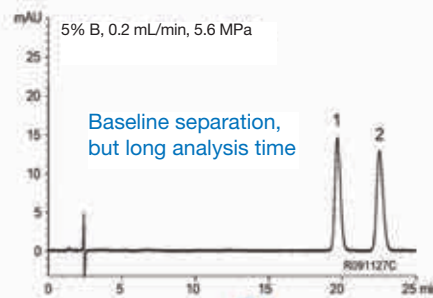
Column: YMC-Triart C18 (1.9 μ m, 12 nm) 50 x 2.0 mm ID
Part No.: TA12SP9-0502PT
Eluent: A) 20 mM $\text{CH}_3\text{COONH}_4$ + ammonia (pH 9.0)
B) acetonitrile
Gradient: 25% B (1.0 min); 75% B (1-6 min)
Flow rate: 0.35 mL/min
Detection: UV at 254 nm
Pressure: 450 bar
Injection: 1 μ L
Temperature: 40 $^\circ\text{C}$

Fast LC for conventional HPLC*

YMC-Triart C18 (5 μ m) 150 x 2.0 mm ID

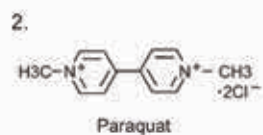
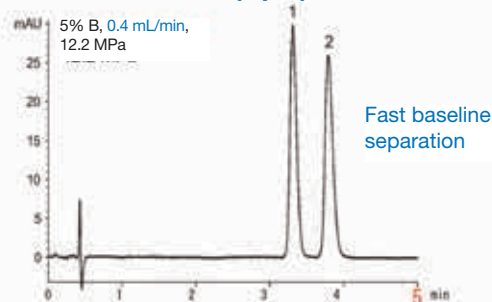


optimisation



Down scaling

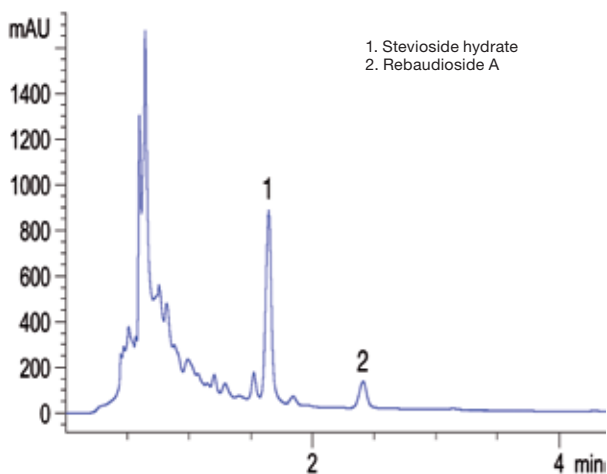
YMC-Triart C18 (3 μ m) 50 x 2.0 mm ID



Eluent: A) water / HFBA* (100/0.1)
B) acetonitrile / HFBA* (100/0.1)
Temperature: 37 $^\circ\text{C}$
Detection: UV at 290 nm
Injection: 1 μ L (0.1 mg/mL)
*heptafluorobutyric acid

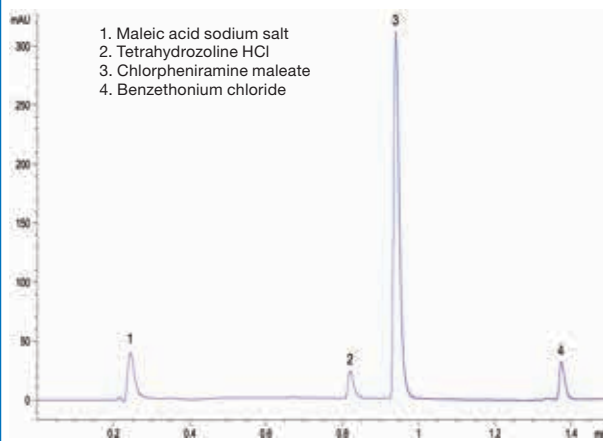
UHPLC

Stevia leaves



Column: YMC-Triart Diol-HILIC (1.9 μ m, 12 nm) 100 x 3.0 mm ID
 Part No.: TDH12SP9-1003PT
 Eluent: acetonitrile / water (85/15)
 Flow rate: 1 mL/min
 Detection: UV at 200 nm
 Injection: 2 μ L
 Temperature: 30 $^{\circ}$ C

Nasal spray

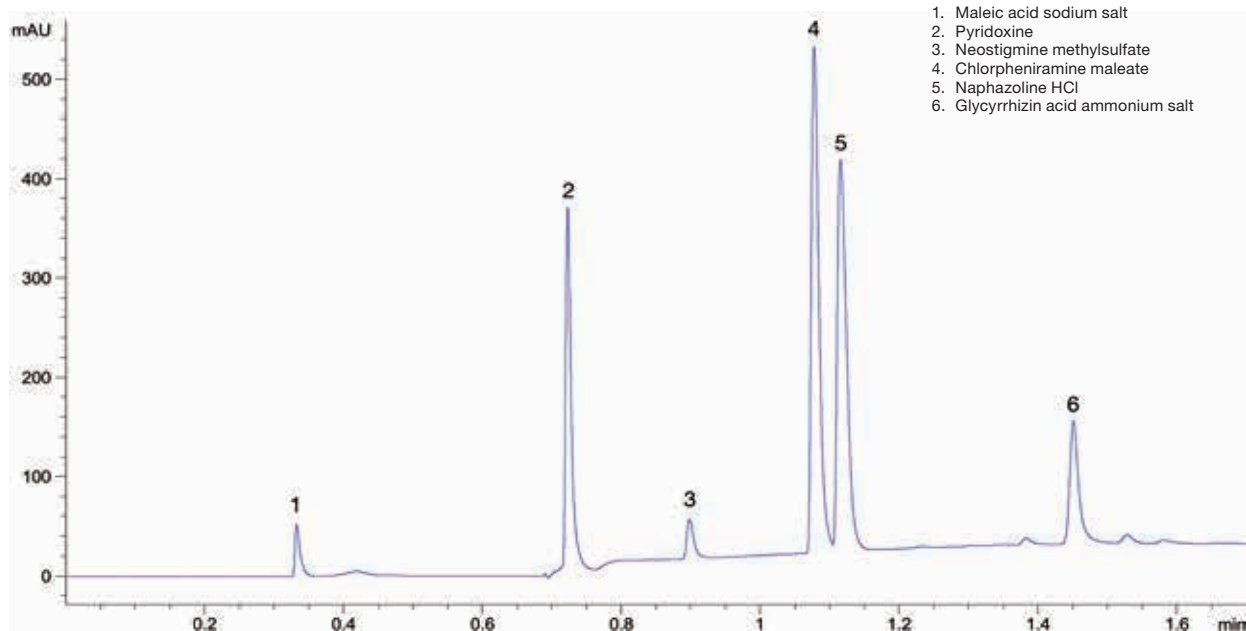


Column: YMC-Triart C18 (1.9 μ m, 12 nm) 50 x 2.0 mm ID
 Part No.: TA12SP9-0502PT
 Eluent: A) water + 0.05% TFA / B) methanol (50/50)
 Gradient:

min	A	B
0	80	20
0.5	10	90
1.2	0	100

 Flow rate: 0.6 mL/min
 Detection: UV at 260 nm
 Injection: 0.2 μ L
 Temperature: 40 $^{\circ}$ C

Eye drop formulation

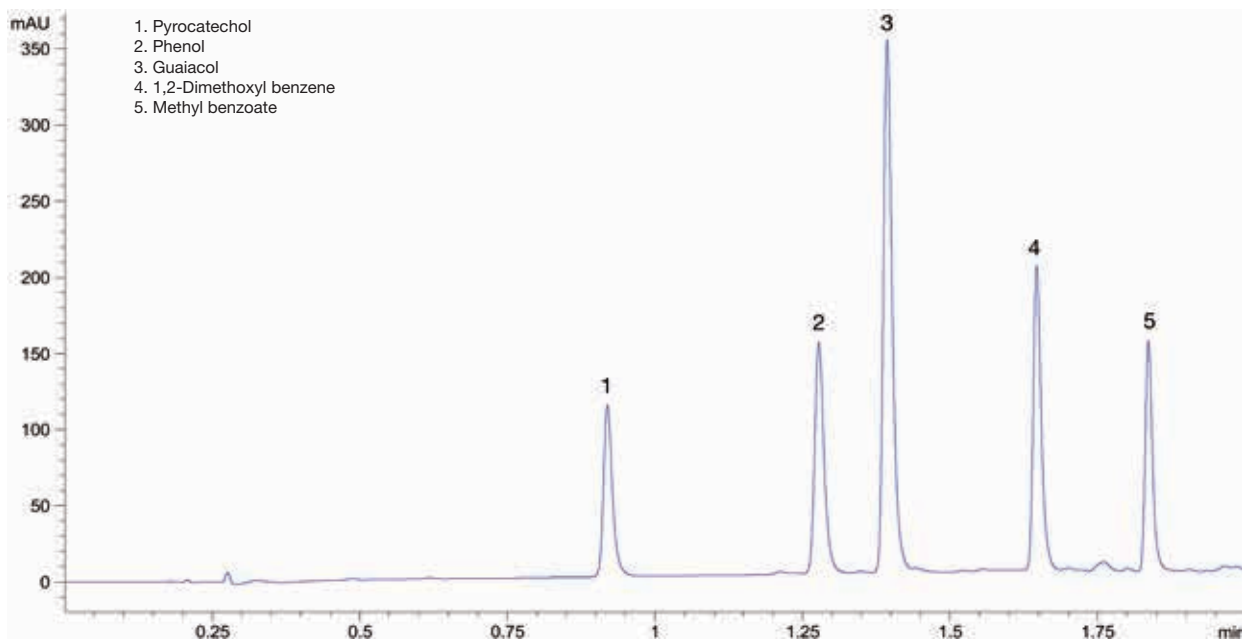


Column: YMC-Triart C18 (1.9 μ m, 12 nm) 50 x 2.0 mm ID
 Part No.: TA12SP9-0502PT
 Eluent: A) water + 0.05% TFA
 B) acetonitrile
 Flow rate: 0.6 mL/min
 Detection: UV at 265 nm
 Injection: 0.5 μ L
 Temperature: 40 $^{\circ}$ C

Gradient:

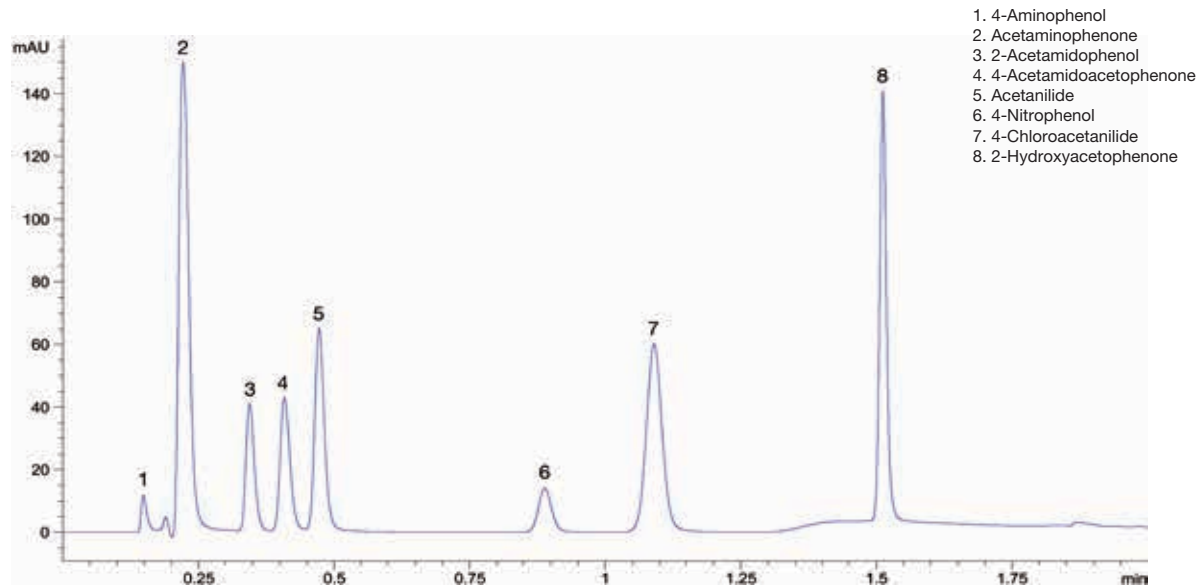
min	A	B
0	100	0
1	50	50
1.5	50	50
1.7	10	90

Guaiacol and impurities



Column: YMC-Triart C18 (1.9 μ m, 12 nm) 50 x 2.0 mm ID
Part No.: TA12SP9-0502PT
Eluent: water / acetonitrile (50/50)
Flow rate: 0.7 mL/min
Detection: UV at 254 nm
Injection: 0.5 μ L
Temperature: 40 $^{\circ}$ C

Paracetamol

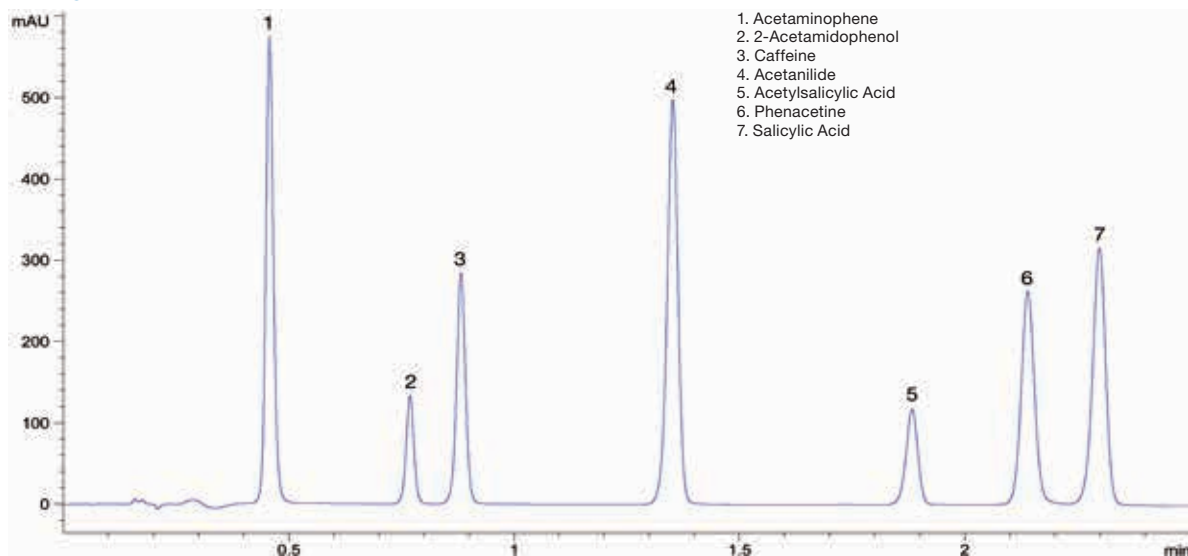


Column: YMC-Triart C18 (1.9 μ m, 12 nm) 50 x 2.0 mm ID
Part No.: TA12SP9-0502PT
Eluent: A) water + formic acid (pH 2.5) / B) acetonitrile
Flow rate: 0.7 mL/min
Detection: UV at 254 nm
Injection: 0.5 μ L
Temperature: 40 $^{\circ}$ C

Gradient:	min	A	B
	0	70	30
	1	70	30
	1.5	20	80
	2	20	80

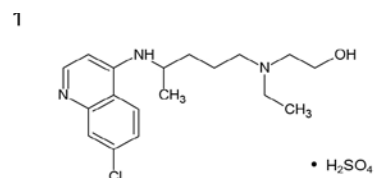
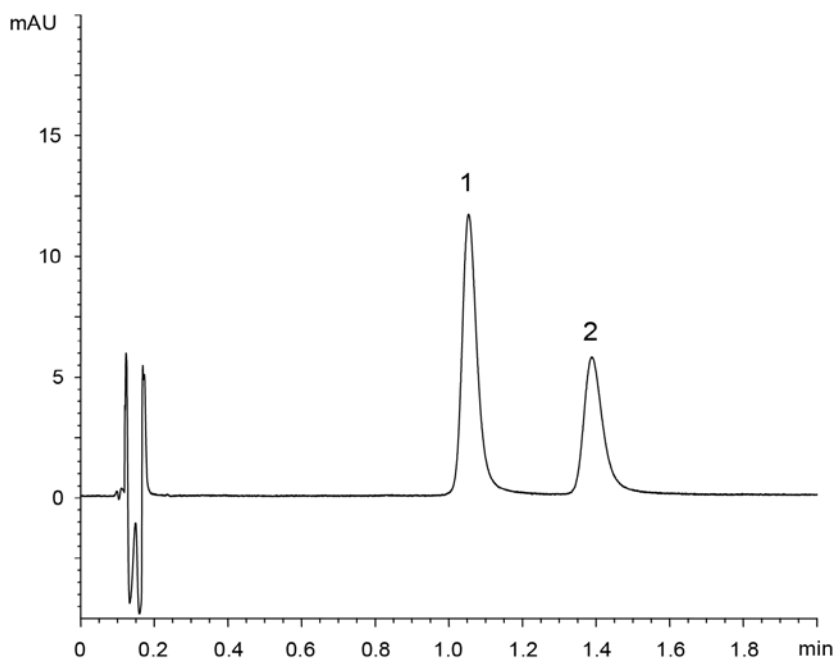
UHPLC

7 Analgesics

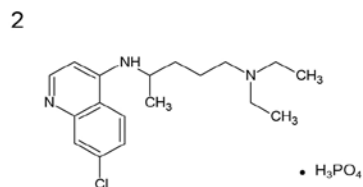


Column: YMC-Triart C18 (1.9 μ m, 12 nm) 50 x 2.0 mm ID
Part No.: TA12SP9-0502PT
Eluent: water + formic acid (pH 2.5) / acetonitrile (50/50)
Flow rate: 0.8 mL/min
Detection: UV at 240 nm
Injection: 1 μ L
Temperature: 40 $^{\circ}$ C

Hydroxychloroquine and chloroquine



Hydroxychloroquine sulfate

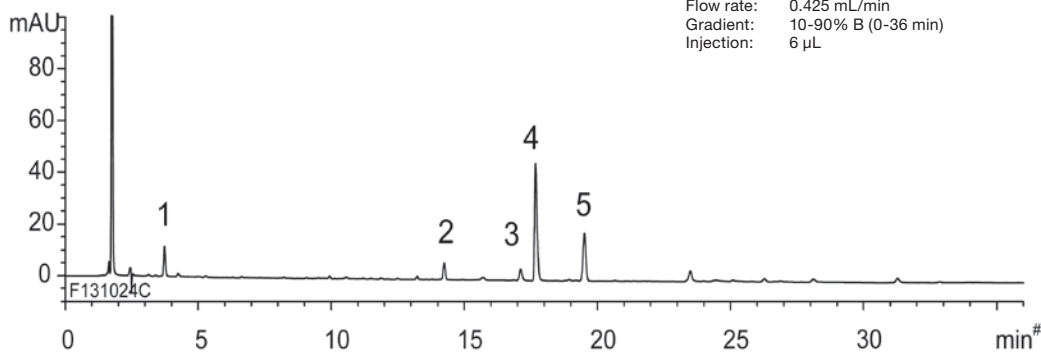


Chloroquine phosphate

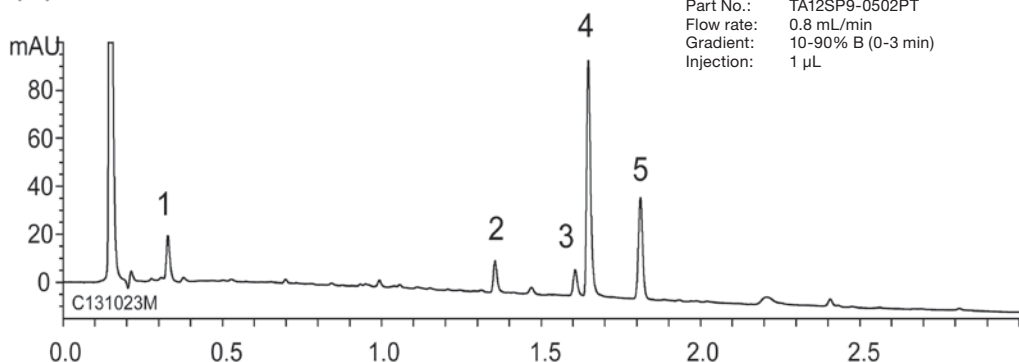
Column: YMC-Triart C18 (1.9 μ m, 12 nm) 50 x 2.0 mm ID
Part No.: TA12SP9-0502PT
Eluent: 20 mM HCOOH-HCOONH_4 (pH 4.3) / acetonitrile (90/10)
Flow rate: 1.0 mL/min
Detection: UV at 254 nm
Injection: 2 μ L (10 μ g/mL)
Temperature: 25 $^{\circ}$ C

Duloxetine and its degradation products*

(A) HPLC method



(B) UHPLC method

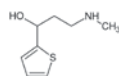


35 min

11x faster

3 min

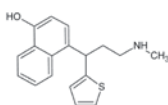
1.



Amino alcohol

(3-Methylamino-1-thiophen-2-yl-propan-1-ol)

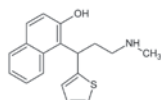
2.



Para isomer

(4-(3-Methylamino-1-thiophen-2-yl-propyl)-naphthalen-1-ol)

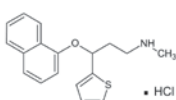
3.



Ortho isomer

(2-(3-Methylamino-1-thiophen-2-yl-propyl)-naphthalen-1-ol)

4.



Duloxetine hydrochloride

5.



α -Naphthol

Eluent: A) 10 mM $\text{CH}_3\text{COONH}_4$ (pH 6.0)

B) acetonitrile

Detection: UV at 230 nm

Temperature: 30 $^\circ\text{C}$

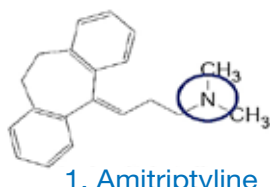
Sample: Oxidative degradation products of duloxetine hydrochloride*

* Sample preparation was performed as described by Veera Reddy. Arava et al. Der Pharma Chemica, 2012 4 (4): 1735-1741

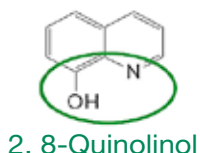
Pharmaceuticals – YMC-Triart C18 ExRS

High hydrophobicity & high steric recognition ability*

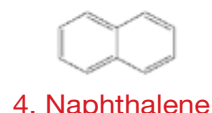
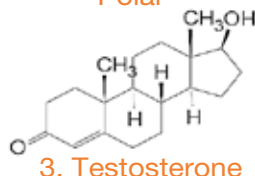
Basic Compound



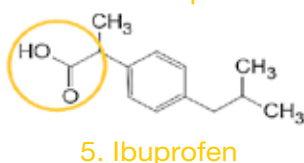
Coordination Compound



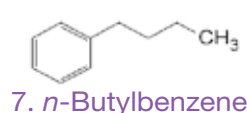
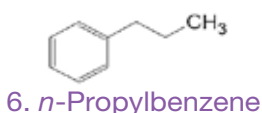
Neutral Compounds
Polar π - π interaction



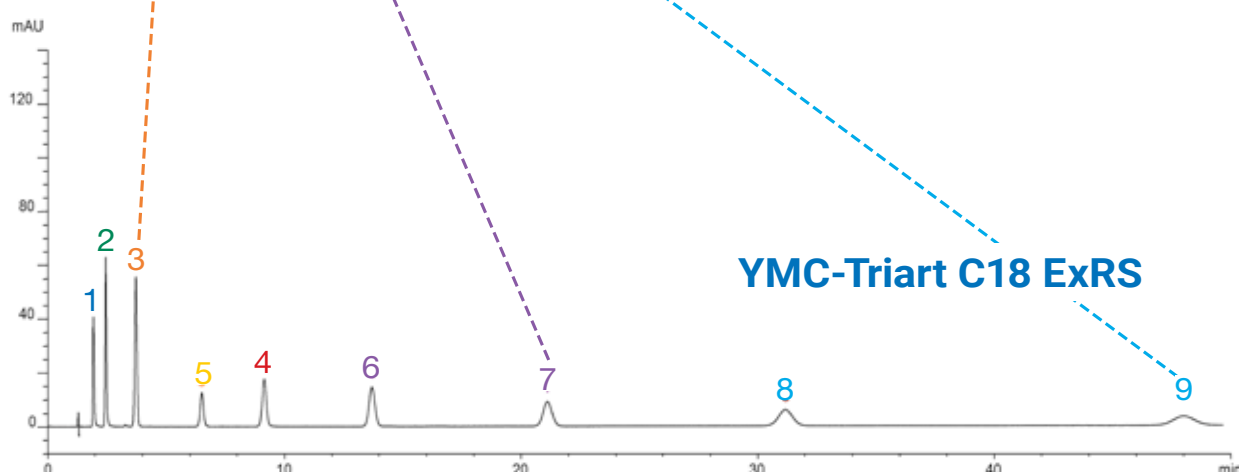
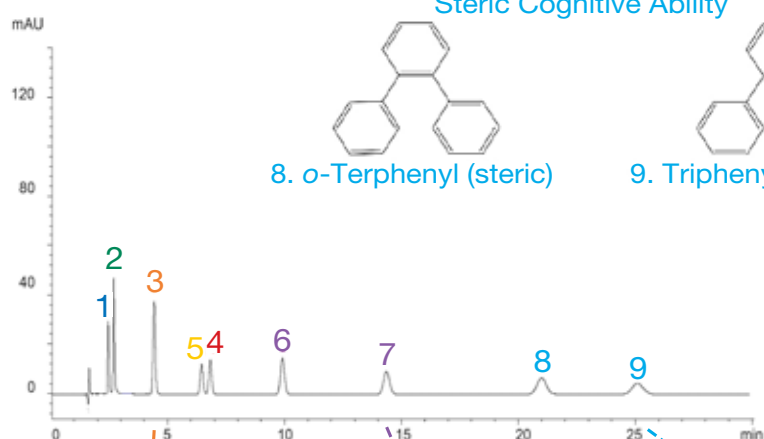
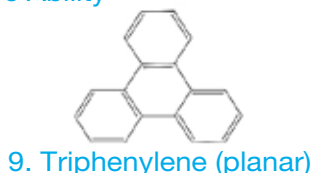
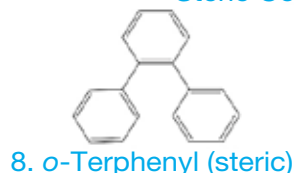
Acidic Compound



Hydrophobic



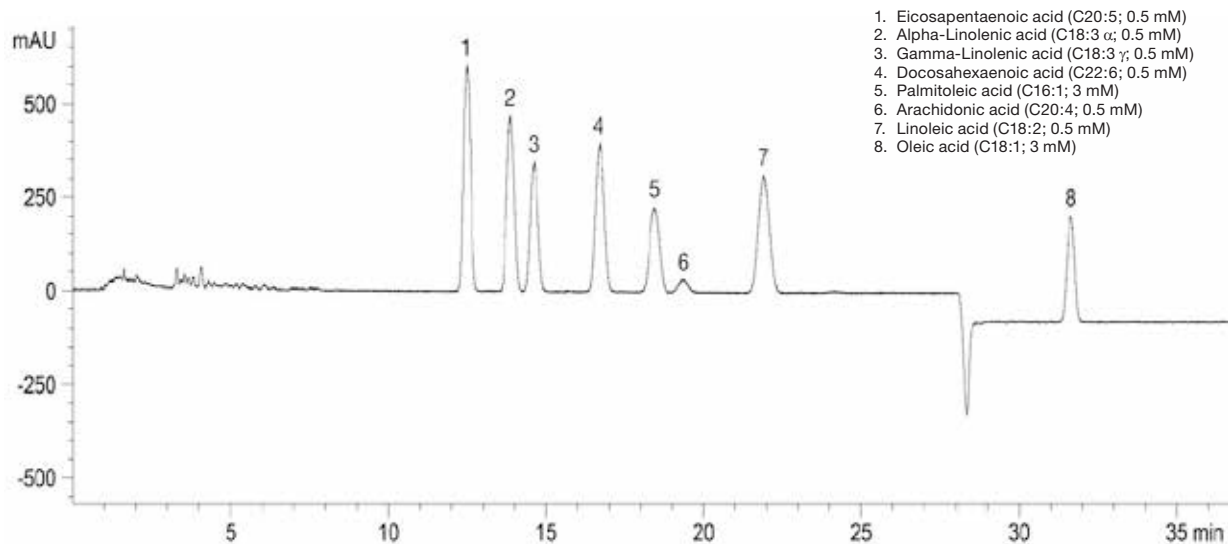
Steric Cognitive Ability



Column: 5 μ m, 150 x 3.0 ID
Part No.: TA12S05-1503PTH / TAR08S05-1503PTH
Eluent: 20 mM HCOOH-HCOONH₄ (pH 4.3) / acetonitrile (90/10)
Flow rate: 1.0 mL/min
Detection: UV at 254 nm
Injection: 2 μ L (10 μ g/mL)
Temperature: 25 °C

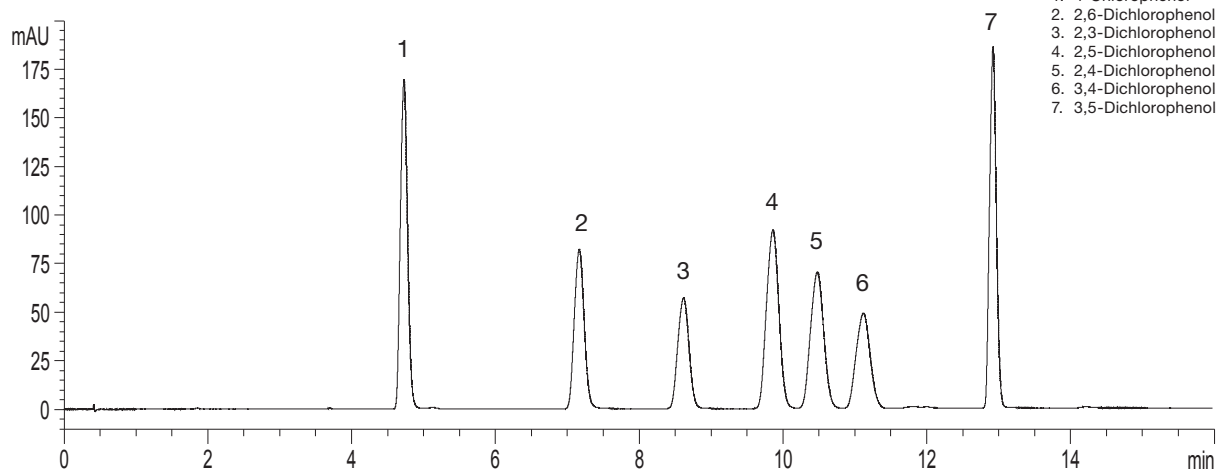
Pharmaceuticals – YMC-Triart C18 ExRS

Omega fatty acid isomers



Column: YMC-Triart C18 ExRS (3 μ m, 8 nm) 150 x 4.6 mm ID
 Part No.: TAR08S03-1546PTH
 Eluent: A) H_2O + 0.5 % H_3CCOOH
 B) ACN + 0.5 % H_3CCOOH
 Gradient: 76.5-78.5% B (0-2 min), 78.5% B (2-27 min), 78.5-90% B (27-27.1 min), 90% B (27.1-55 min)
 Flow rate: 1 mL/min
 Temperature: 35 $^{\circ}\text{C}$
 Detection: UV at 254 nm
 Injection: 20 μ L

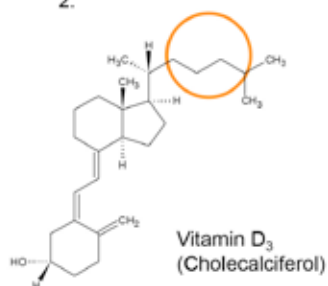
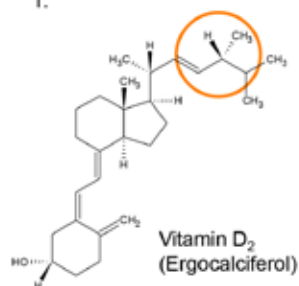
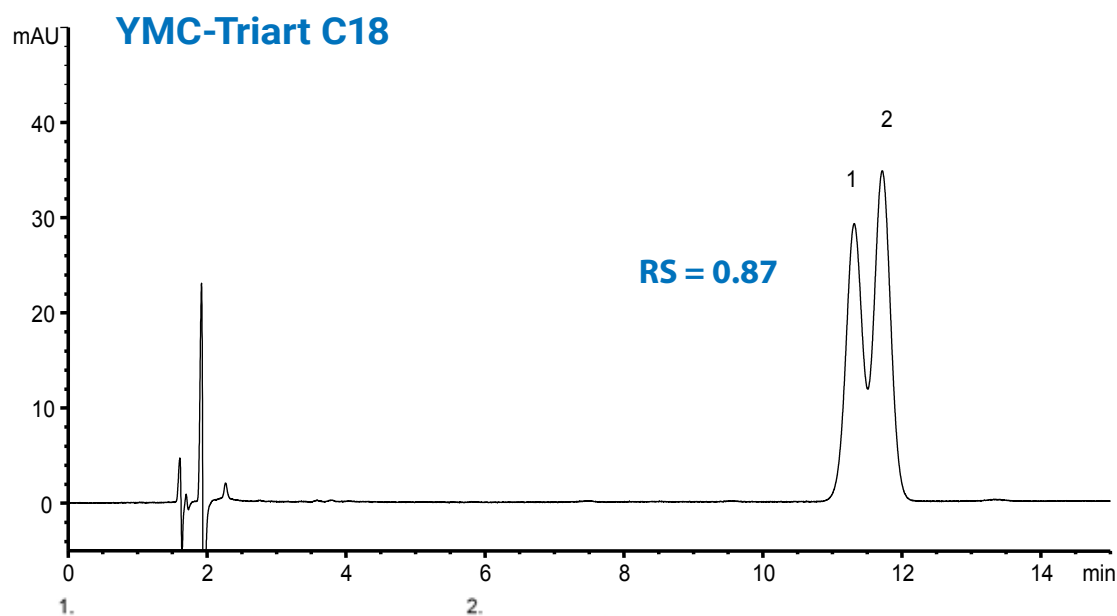
Outstanding steric selectivity for chlorophenols



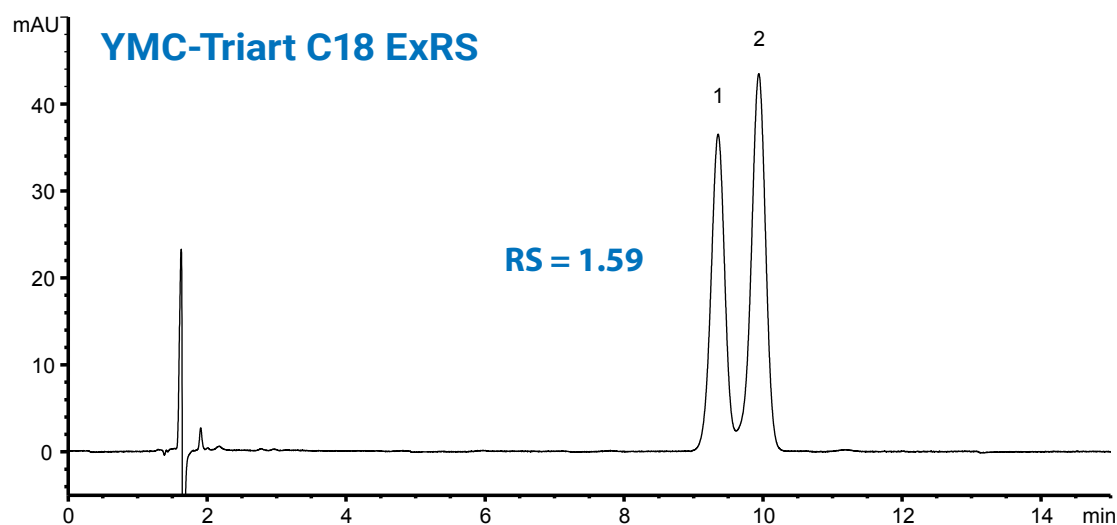
Column: YMC-Triart C18 ExRS (1.9 μ m, 8 nm) 75 x 3.0 mm ID
 Part No.: TAR08SP9-L503PT
 Eluent: A) water + 0.1% HCOOH B) methanol + 0.1% HCOOH
 Gradient: 44-50% B (0-8.1 min), 50-51.5% B (8.1-11 min), 51.5-65% B (11-11.1 min), 65% B (11.1-20 min)
 Flow rate: 0.7 mL/min
 Detection: UV at 280 nm
 Injection: 1 μ L (0.7 mg/mL)
 Temperature: 40 $^{\circ}\text{C}$

Pharmaceuticals – YMC-Triart C18 ExRS

Structural analogs*



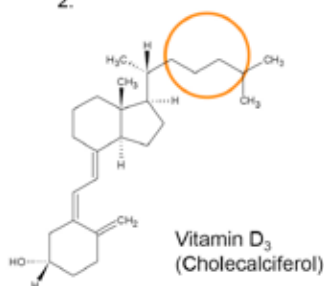
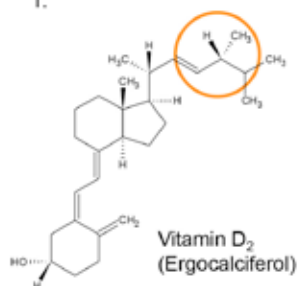
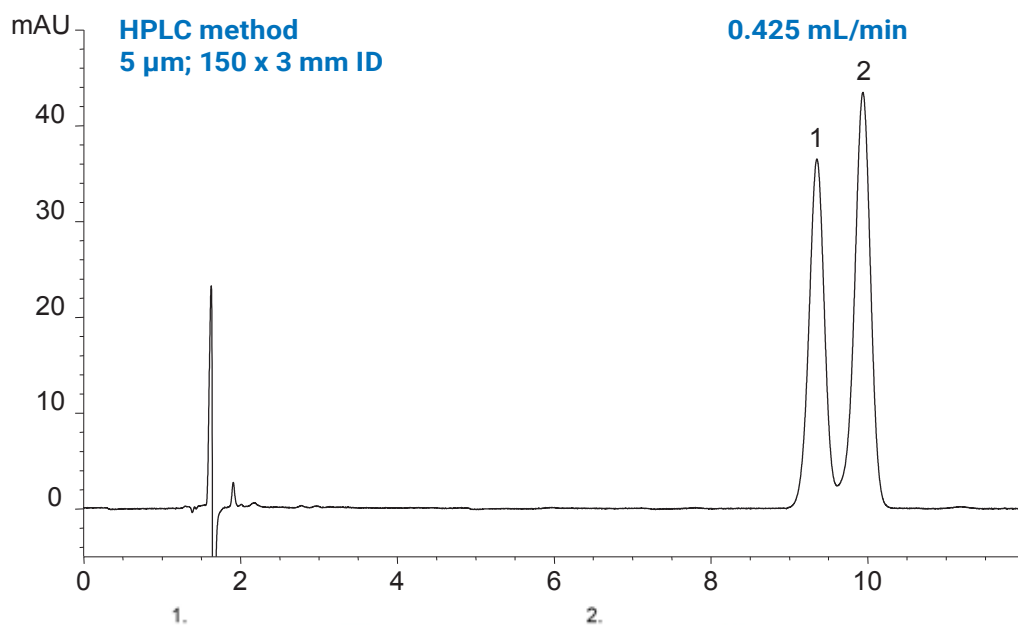
Higher Resolution



Column: 5 μ m, 150 x 3.0 mm ID
Part No.: TA12S05-1503PTH / TAR08S03-1503PTH
Eluent: THF / acetonitrile (10/90)
Flow rate: 0.425 mL/min
Detection: UV at 265 nm
Injection: 4.25 μ L (10 μ g/mL)
Temperature: 30 $^{\circ}$ C

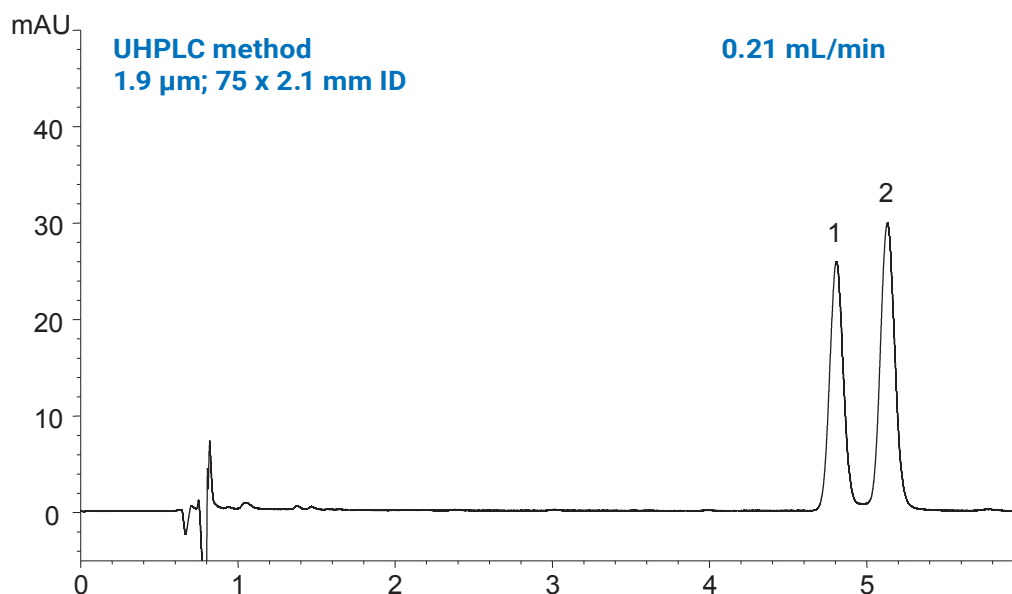
Pharmaceuticals – YMC-Triart C18 ExRS

Easy transfer HPLC ↔ UHPLC



12 min

-50%

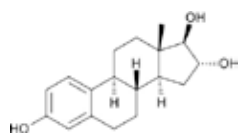


6 min

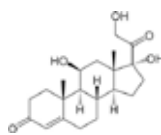
Part No.: TAR08S03-1503PTH/TAR08SP9-L5Q1PT
 Eluent: THF / acetonitrile (10/90)
 Detection: UV at 265 nm
 Temperature: 30 °C

Pharmaceuticals – YMC-Triart Phenyl

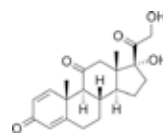
Excellent alternative to C18 phases for steroids



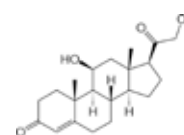
1. Estriol



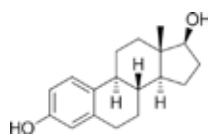
2. Cortisol / Hydrocortison



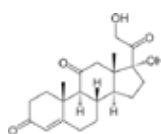
3. Prednisone



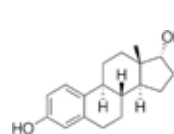
4. Corticosterone



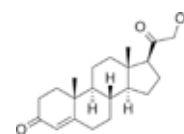
5. Beta-Estradiol



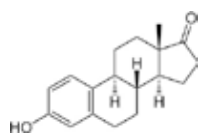
6. Cortisone / Cortison acetate



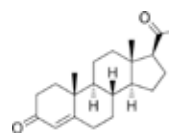
7. Alpha-Estradiol



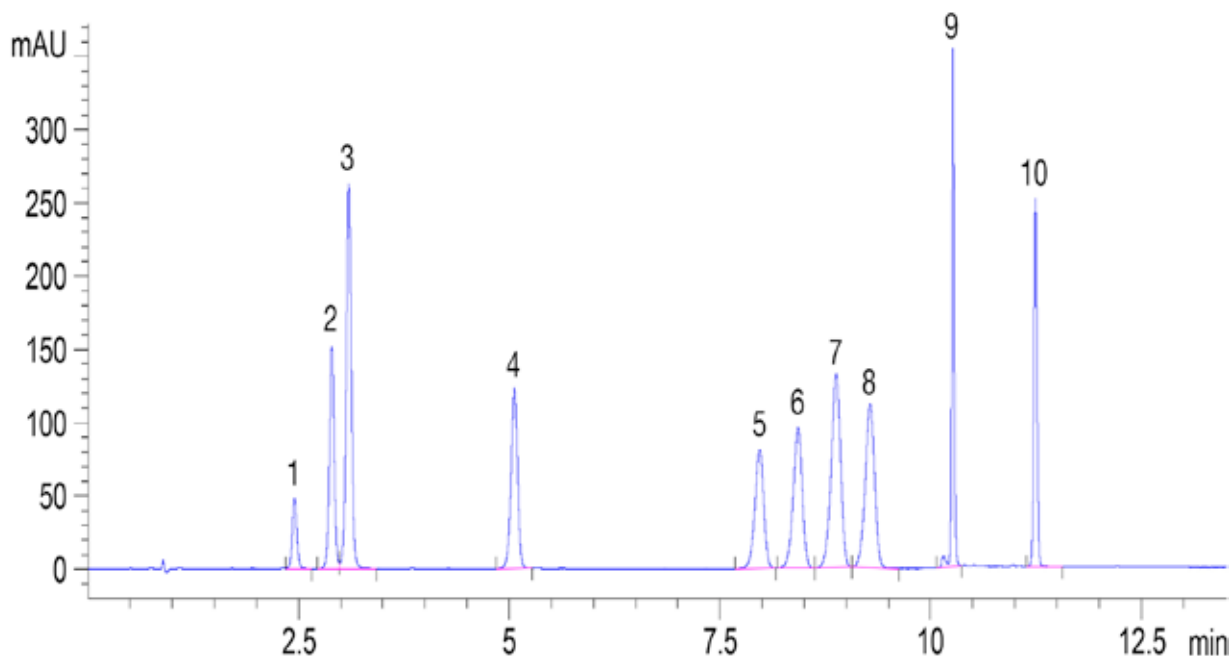
8. 21-Hydroxyprogesterone



9. Estrone



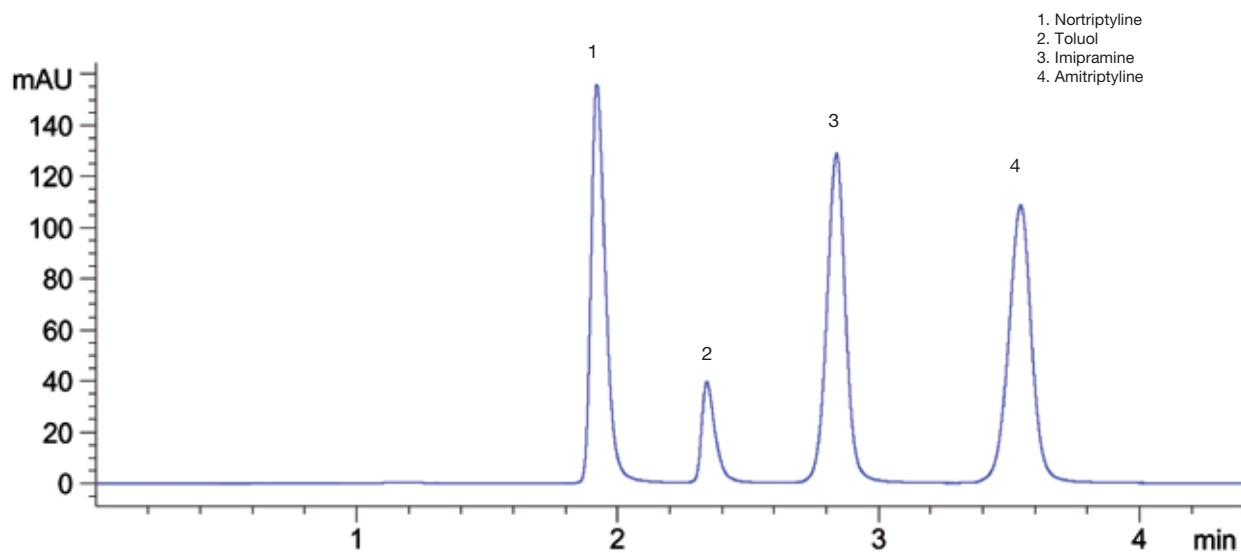
10. Progesterone



Column: YMC-Triart Phenyl (1.9 μ m, 12 nm) 100 x 2.0 mm ID
 Part No.: TPH12SP9-1002PT
 Eluent: A) water B) acetonitrile
 Gradient: 29-35% B (0-9 min), 35-60% B (9-9.1 min), 60% B (9.1-13.5 min)
 Flow rate: 0.3 mL/min
 Detection: UV at 220 nm
 Injection: 0.5 μ L
 Temperature: 48 $^{\circ}$ C

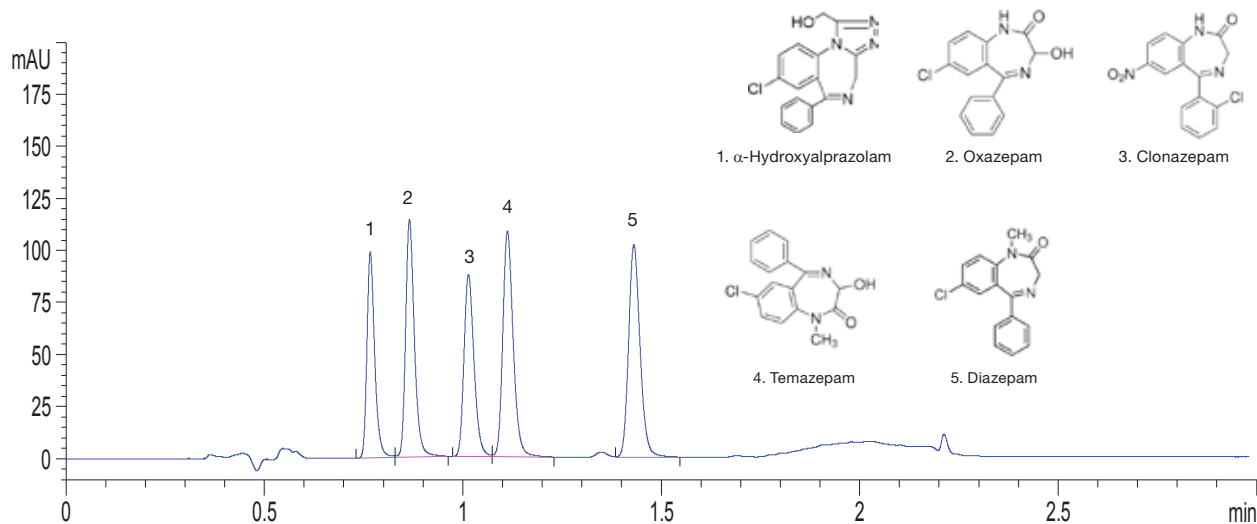
Pharmaceuticals – YMC-Triart Phenyl

Antidepressants



Column: YMC-Triart Phenyl (1.9 μ m, 12 mm) 100 x 2.0 mm ID
Part No.: TPH12SP9-1002PT
Eluent: methanol / 25 mM KH_2PO_4 (pH 6.0) (65/35)
Flow rate: 0.4 mL/min
Detection: UV at 254 nm
Injection: 2 μ L
Temperature: 25 $^\circ\text{C}$

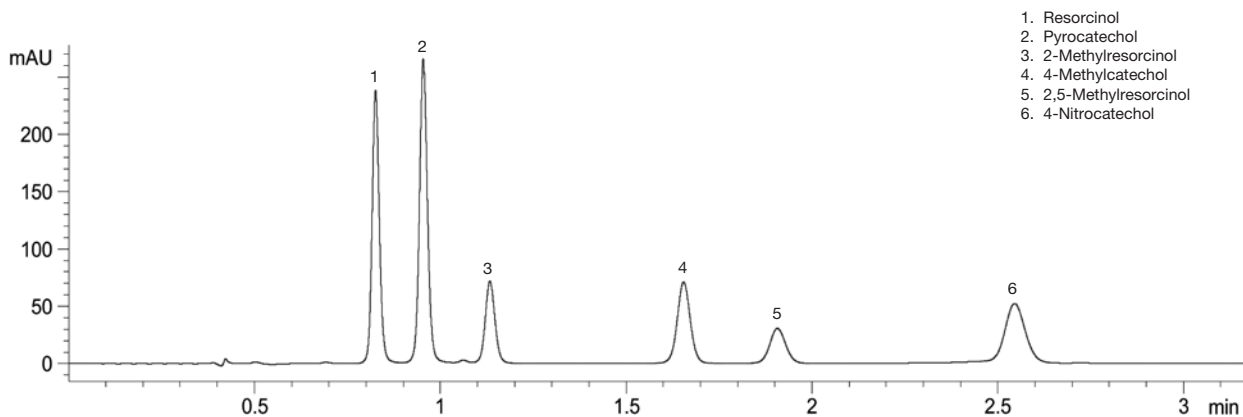
UHPLC separation of different benzodiazepines



Column: YMC-Triart Phenyl (1.9 μ m, 12 mm) 100 x 2.0 mm ID
Part No.: TPH12SP9-1002PT
Eluent: A) water B) acetonitrile
Gradient: 52-54% B (0-1.1 min), 54-95% B (1.1-1.2 min), 95% B (1.2-3 min)
Flow rate: 0.5 mL/min
Detection: UV at 254 nm
Injection: 2 μ L (0.02 mg/mL)
Temperature: 35 $^\circ\text{C}$

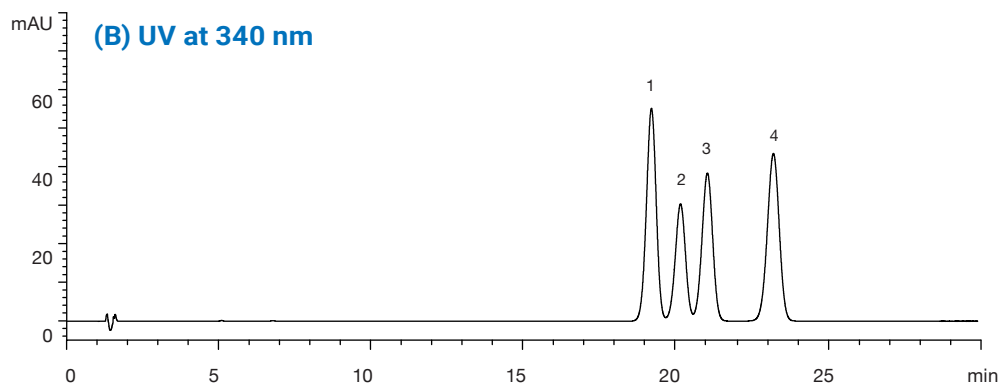
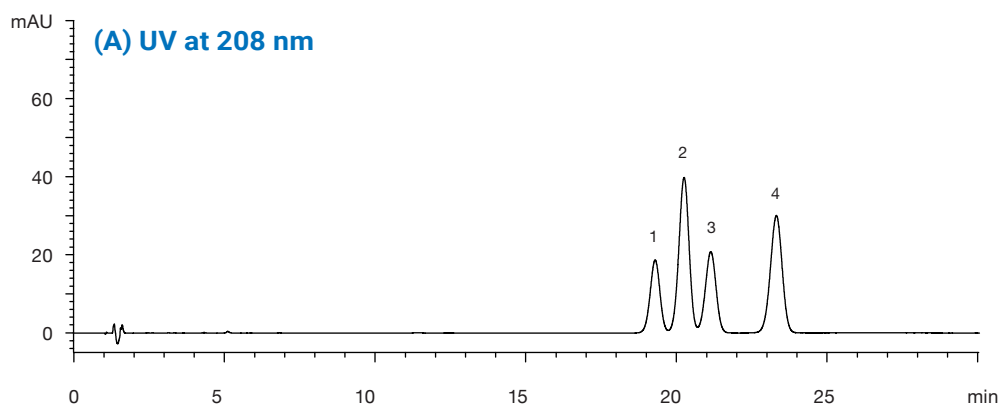
Pharmaceuticals – YMC-Triart PFP

Resorcinol



Column: YMC-Triart PFP (1.9 μ m, 12 mm) 100 x 2.0 mm ID
Part No.: TPF12SP9-1002PT
Eluent: water + 0.1% formic acid / acetonitrile + 0.1% formic acid (85/15)
Flow rate: 0.8 mL/min
Detection: UV at 270 nm
Injection: 0.5 μ L
Temperature: 25 $^{\circ}$ C

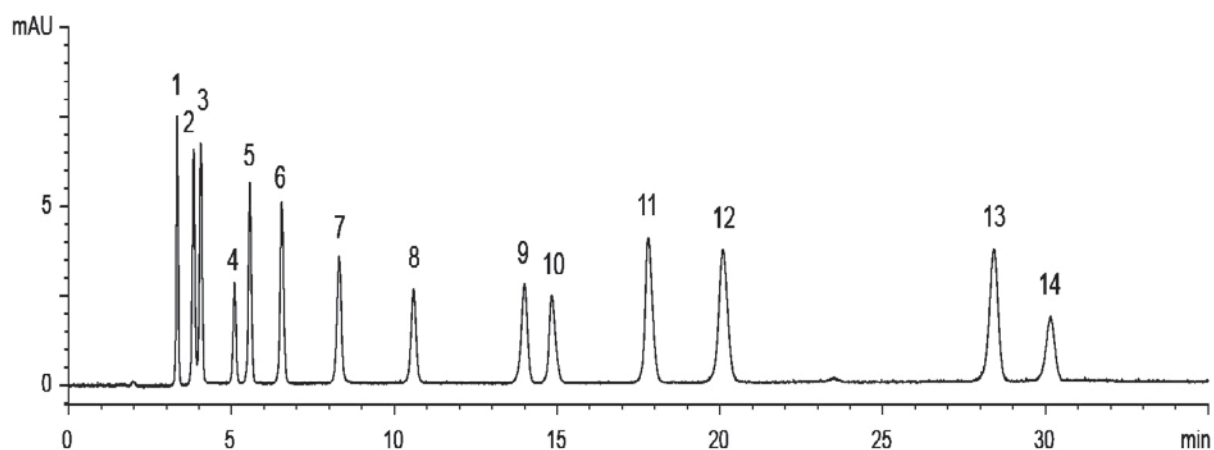
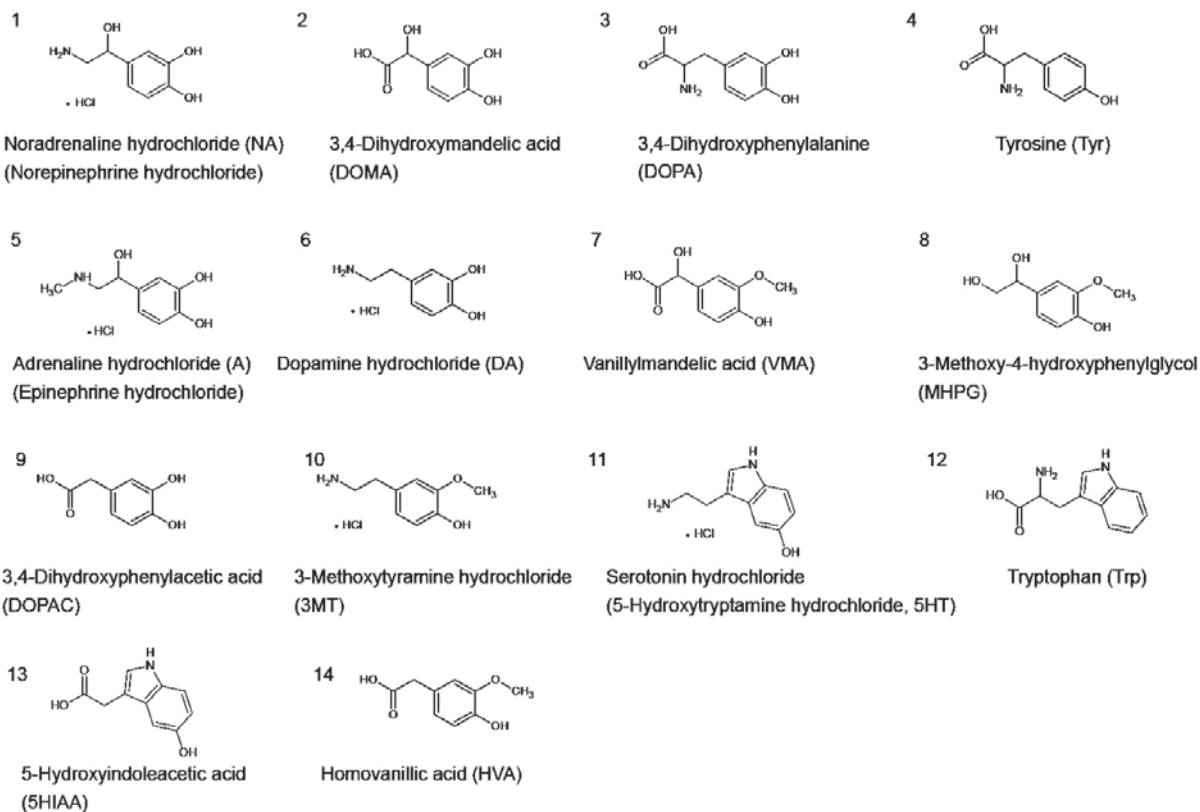
Piperine and its isomers*



Column: YMC-Triart PFP (5 μ m, 12 nm) 150 x 3.0 mm ID
Part No.: TPF12S05-1503PTH
Eluent: 0.1% HCOOH / acetonitrile (60/40)
Flow rate: 0.425 mL/min
Injection: 4.25 μ L
Temperature: 25 $^{\circ}$ C

Pharmaceuticals – YMC-Triart PFP

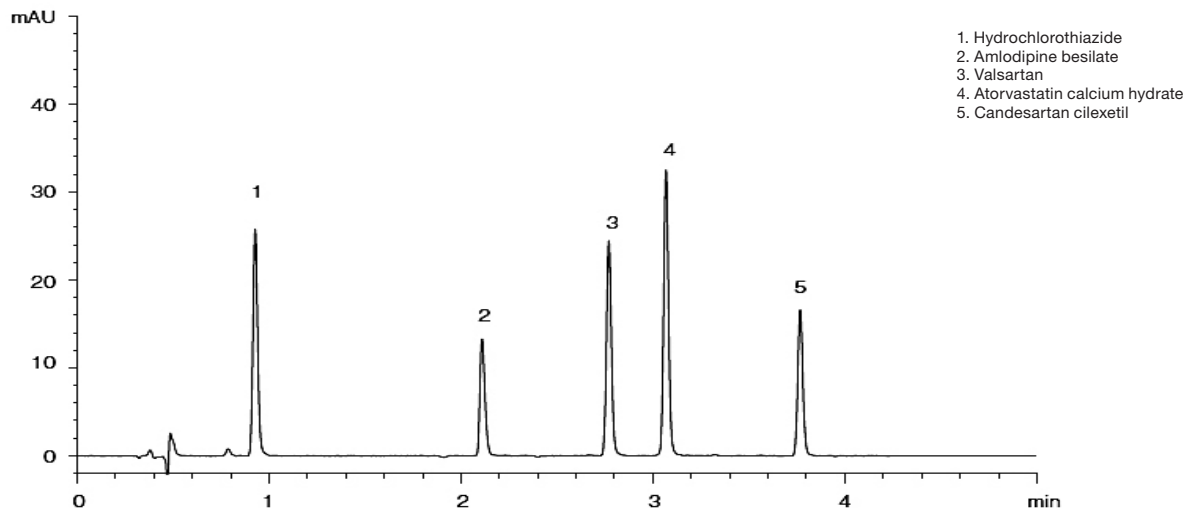
Catecholamines, serotonin, and their precursors and metabolites*



Column: YMC-Triart PFP (3 μ m, 12 nm) 150 x 3.0 mm ID
 Part-No.: TPF12S03-1503WT
 Eluent: A) 10 mM formic acid
 B) methanol containing 10 mM formic acid
 Gradient: 0-20% B (0-30 min), 20% B (30-35 min)
 Flow rate: 0.425 mL/min
 Detection: UV at 280 nm
 Injection: 4 μ L (5 μ g/mL)
 Temperature: 25 $^{\circ}$ C

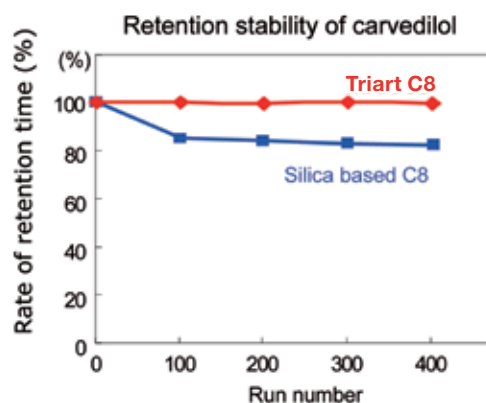
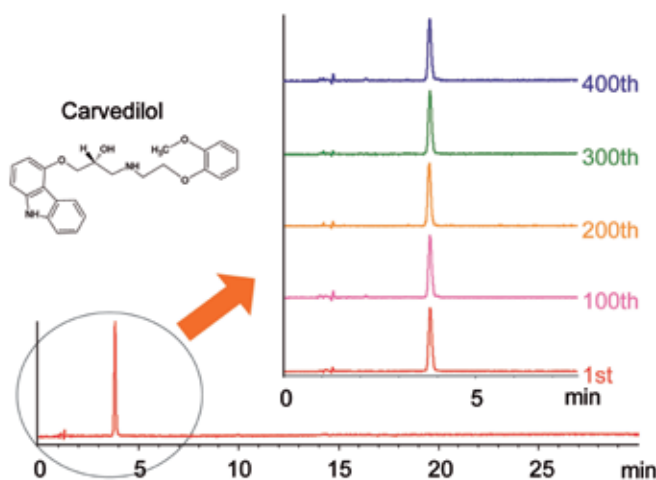
Pharmaceuticals – YMC-Triart C8

Basic drugs*



Column: YMC-Triart C8 (3 μ m, 12 nm), 50 x 2.0 mm ID
Part No.: TO12S03-0502WT
Eluent: A) water / formic acid (100/0.1)
B) acetonitrile / formic acid (100/0.1)
Gradient: 10-90% B (0-5 min), 90% B (5-7 min)
Flow rate: 0.4 mL/min
Temperature: 30 °C
Detection: UV at 254 nm
Injection: 2 μ L (10-20 μ g/mL)

Sequential analysis of Carvedilol*

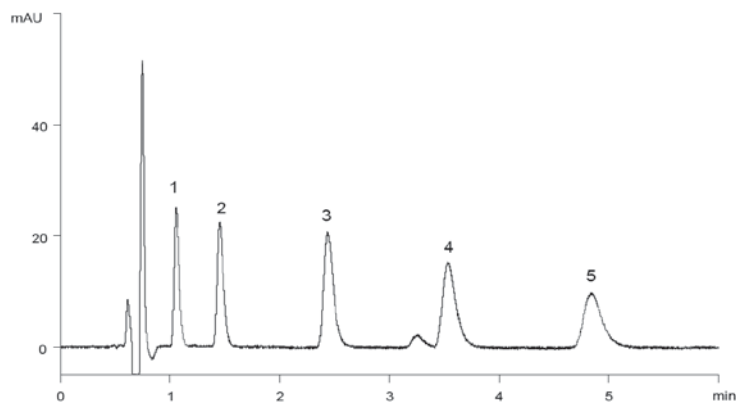


Column: YMC-Triart C8 (5 μ m, 12nm) 150 x 2.0 mm ID
Part No.: TO12S05-1502WT
Eluent: phosphate buffer (pH 2.0)* / acetonitrile (65/35)
*Dissolve 2.72 g of KH_2PO_4 in 900 mL water, adjust pH 2.0 with H_3PO_4 and add water to make 1000 mL
Flow rate: 0.28 mL/min (adjust the flow rate so that the retention time of carvedilol is about 4 min)
Temperature: 55 °C
Detection: UV at 240 nm

No change in retention time is observed even under a high pH and at an elevated temperature.

Pharmaceuticals

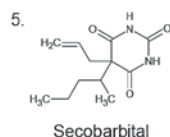
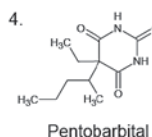
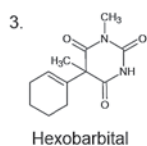
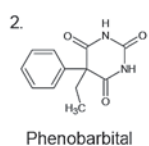
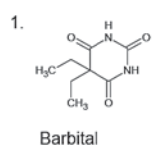
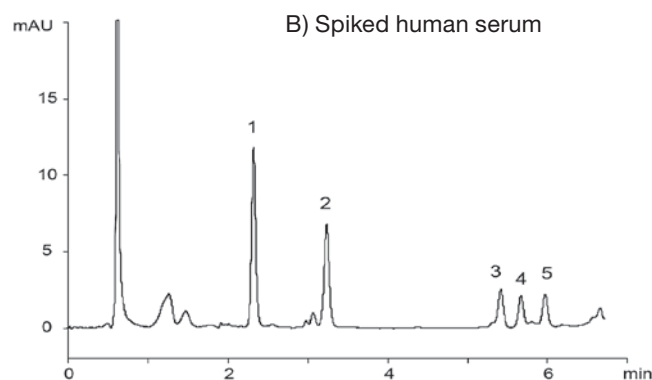
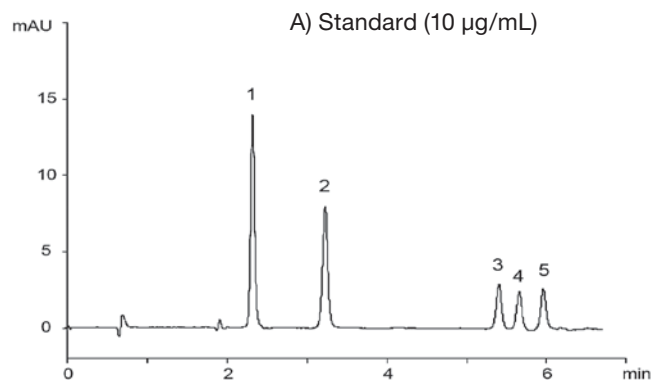
Separation of alkaloids*



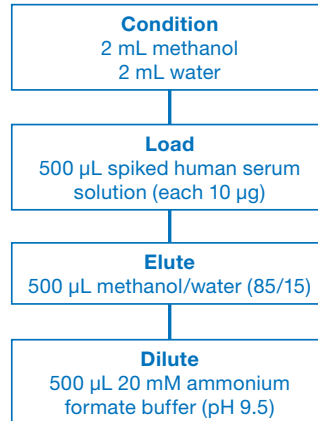
1. Scopolamine
2. Atropine
3. Cinchonine
4. Quinine
5. Dihydroquinine

Column: YMC-Triart C18 (5 μ m, 12 nm)
 50 x 2.0 mm ID
 Part No.: TA12S05-0502WT
 Eluent: 20 mM $\text{CH}_3\text{COOH}-\text{CH}_3\text{COONH}_4$
 (pH 4.9) / acetonitrile (80/20)
 Flow rate: 0.2 mL/min
 Temperature: 40 $^\circ\text{C}$
 Detection: UV at 220 nm
 Injection: 1 μ L (0.02-0.1 mg/mL)

Barbiturates in human serum*



Solid-phase extraction method YMC Dispo SPE C18 100 mg/1mL

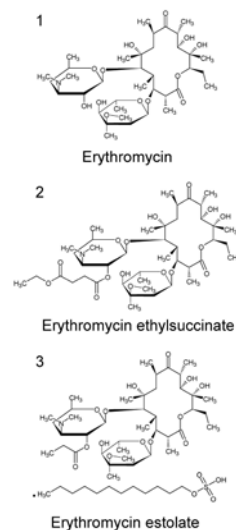
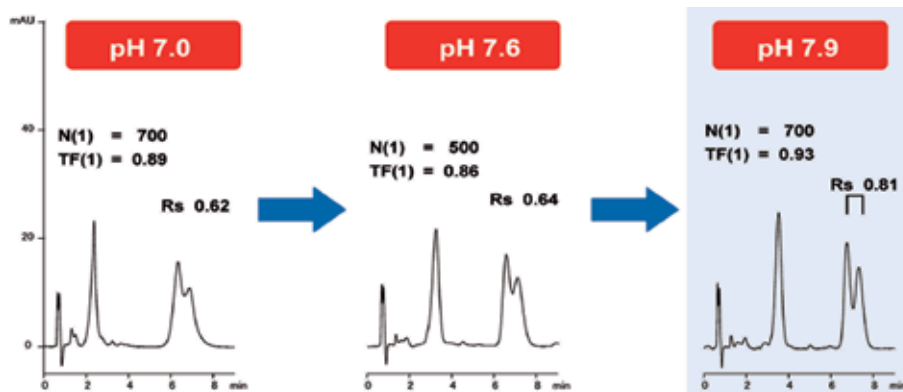


Column: YMC-Triart C18 (5 μ m, 12 nm)
 50 x 2.0 mm ID
 Part No.: TA12S05-0502WT
 Eluent: A) 20 mM $\text{HCOONH}_4-\text{NH}_3$ (pH 9.5)
 B) methanol
 Gradient: 0-90% B (0-7 min)
 Flow rate: 0.2 mL/min
 Temperature: 25 $^\circ\text{C}$
 Detection: UV at 240 nm
 Injection: 1 μ L

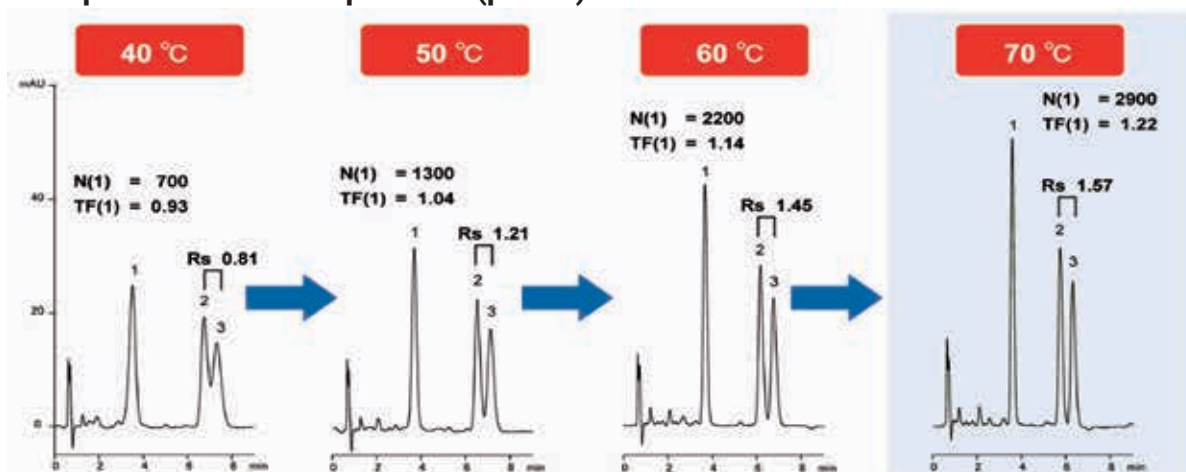
Pharmaceuticals

Erythromycin at elevated pH and temperature*

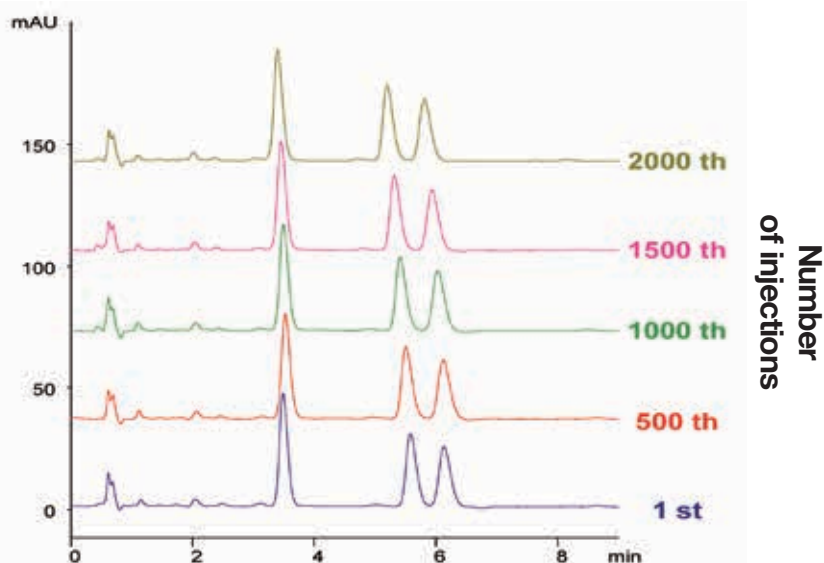
1. Optimisation of pH



2. Optimisation of temperature (pH 7.9)



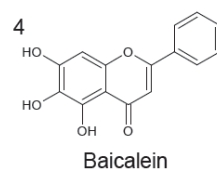
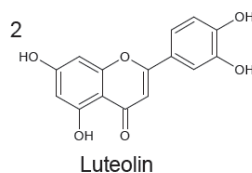
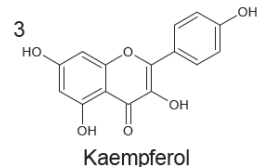
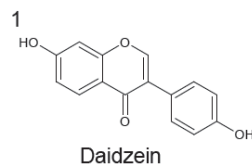
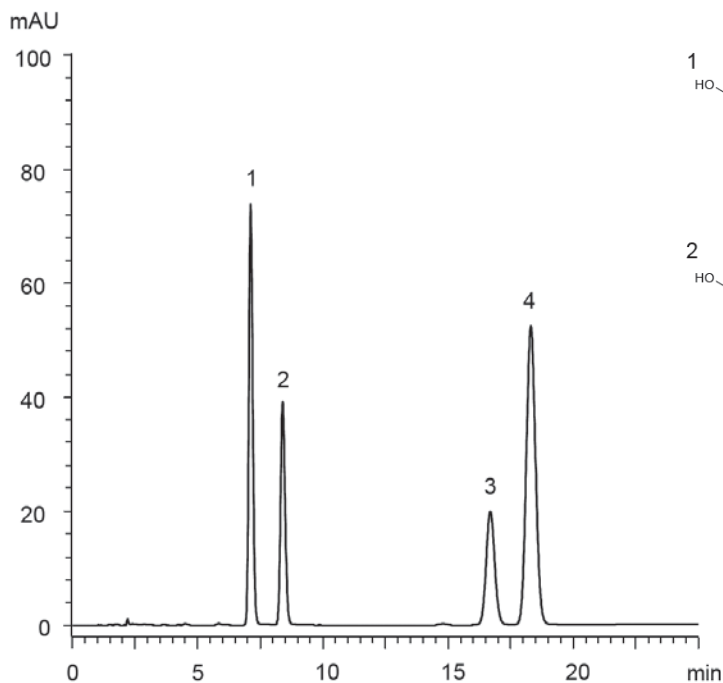
3. Stability test: pH 7.9, 70 °C



Column: YMC-Triart C18 (3 μ m, 12 nm)
 50 x 2.0 mm ID
 Part No.: TA12S03-0502WT
 Eluent: 20 mM KH_2PO_4 - K_2HPO_4 / acetonitrile / methanol (40/45/15)
 Flow rate: 0.2 mL/min
 Detection: UV at 210 nm

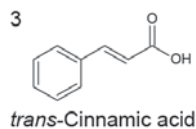
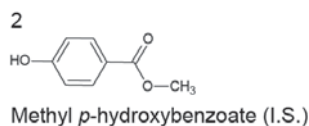
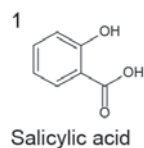
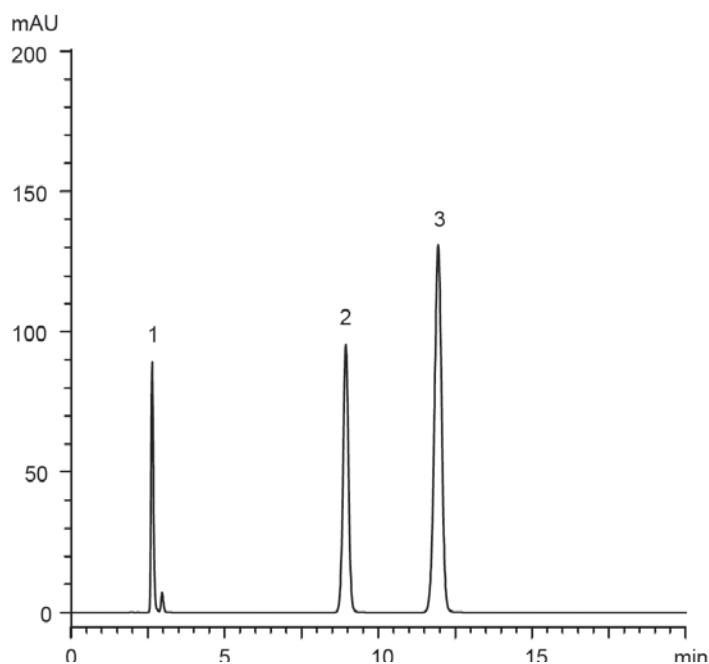
Pharmaceuticals

Separation of flavonoids*



Column: YMC-Triart C18 (5 μ m, 12 nm) 150 x 3.0 mm ID
 Part No.: TA12S05-1503WT
 Eluent: acetonitrile / 10 mM H_3PO_4 (30/70)
 Flow rate: 0.425 mL/min
 Temperature: 37 $^\circ\text{C}$
 Detection: UV at 280 nm
 Injection: 2 μL (50 $\mu\text{g}/\text{mL}$)

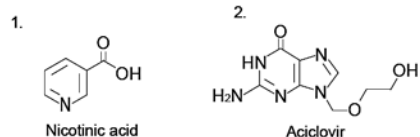
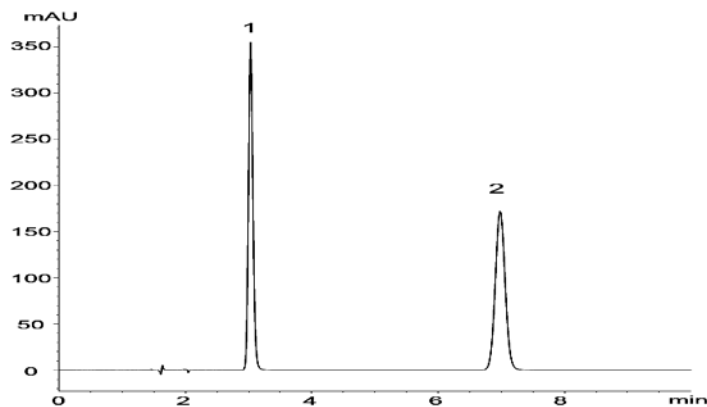
Separation of aromatic carboxylic acids*



Column: YMC-Triart C18 (5 μ m, 12 nm) 150 x 3.0 mm ID
 Part No.: TA12S05-1503WT
 Eluent: 10 mM $\text{CH}_3\text{COOH}-\text{CH}_3\text{COONH}_4$ (pH 4.2) / acetonitrile (75/25)
 Flow rate: 0.425 mL/min
 Temperature: 40 $^\circ\text{C}$
 Detection: UV at 254 nm
 Injection: 4 μL (0.02 ~ 0.3 mg/mL)

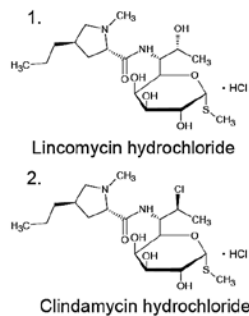
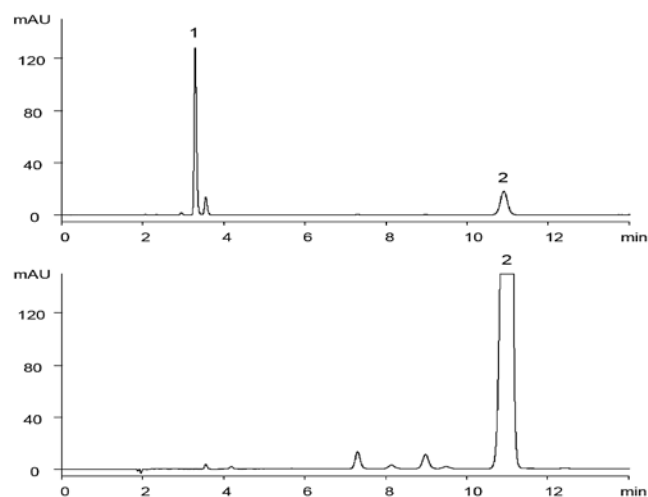
Pharmaceuticals

Aciclovir syrup and injection*



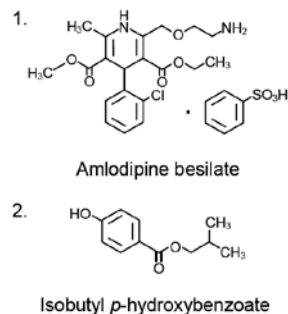
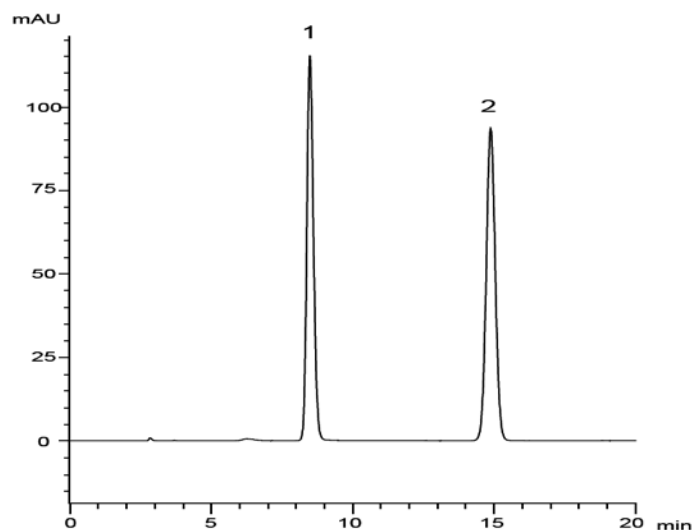
Column: YMC-Triart C18 (5 μ m, 12 nm) 150 x 4.6 mm ID
 Part No.: TA12S05-1546WT
 Eluent: phosphate buffer* / methanol (95/5)
 *Dissolve 1.45 g of H_3PO_4 and 25 mL of 1 mol/l CH_3COOH in water to make 900 mL $\rightarrow$ adjust pH 2.5 by 1 mol/l NaOH $\rightarrow$ add water to make 1000 mL
 Flow rate: 1.0 mL/min
 Temperature: 25 $^{\circ}$ C
 Detection: UV at 254 nm
 Injection: 20 μ L (0.05 mg/mL, 0.032 mg/mL)

Clindamycin hydrochloride*

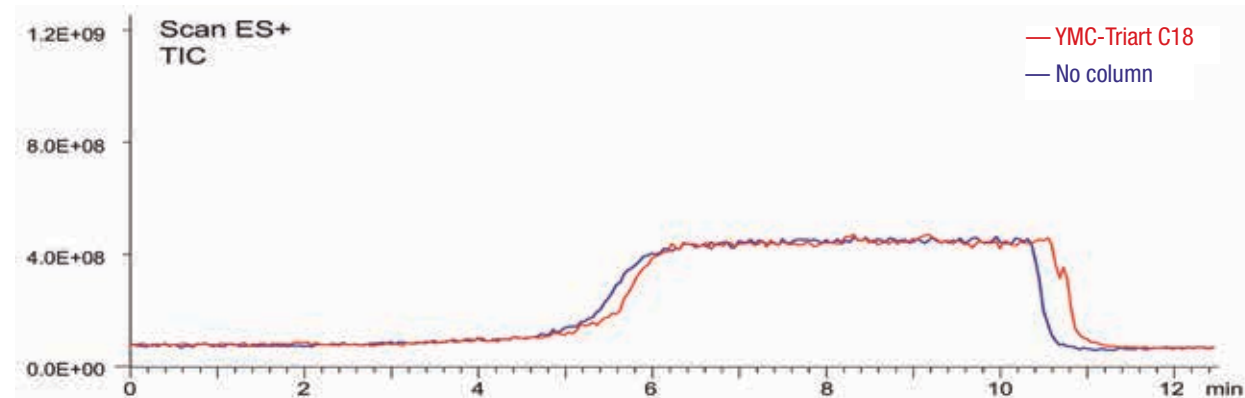


Column: YMC-Triart C18 (5 μ m, 12 nm) 250 x 4.6 mm ID
 Part No.: TA12S05-2546WT
 Eluent: 50 mM KH_2PO_4 (pH 7.5 adjusted by 8 M KOH) / acetonitrile (55/45)
 Flow rate: 1.0 mL/min
 Temperature: 25 $^{\circ}$ C
 Detection: UV at 210 nm
 Injection: 10 μ L

Analysis of amlodipine besilate*



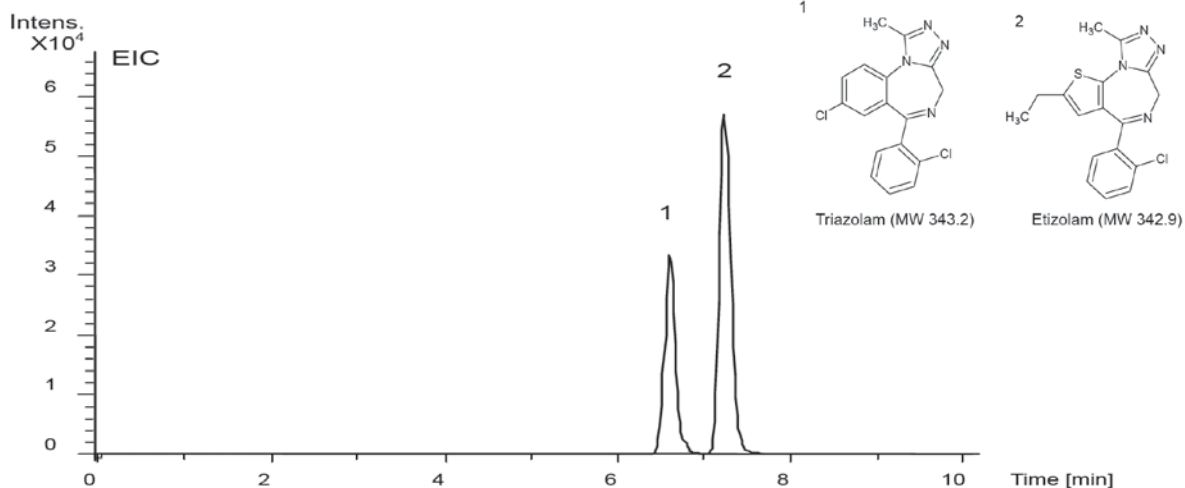
LC / MS compatibility



Column: 5 μ m, 50 x 2.0 mm ID
 Part-No.: TA12S05-0502WT
 Eluent: A) water + 0.1% formic acid
 B) acetonitrile + 0.1% formic acid
 Gradient: 5% B (0-1 min), 5-100% B (1-5 min),
 100% B (5-10 min), 100-5% B (10-10.1 min),
 5% B (10.1-12.5 min)
 Flow rate: 0.4 mL/min
 Temperature: 40 °C
 Detection: ESI positive, TIC (Mass Range: 50-1000)

Column bleeding, caused by the fragments of stationary phase, is the main reason for background noise and restrictions on detection limits. No bleed is observed in the test of total ion current (TIC) measured by LC/MS with blank or with YMC-Triart C18. So in terms of the signal/noise ratio (S/N ratio), YMC-Triart C18 can be expected to not only reduce the background noise but to also increase the sensitivity of the analysis.

LC / MS analysis of benzodiazepine derivatives

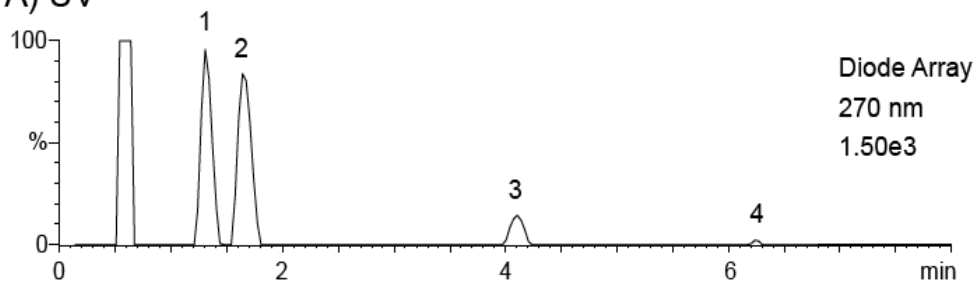


Column: YMC-Triart C18 (5 μ m, 12 nm) 50 x 2.0 mm ID
 Part-No.: TA12S05-0502WT
 Eluent: A) 10 mM formic acid
 B) acetonitrile
 Gradient: 25-50% B (0-10 min)
 Flow rate: 0.2 mL/min
 Temperature: 40 °C
 Detection: Bruker Daltonics microTOF, ESI,
 positive mode
 Injection: 5 μ L (100 ng/mL)

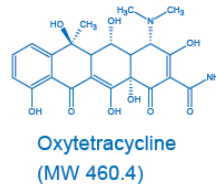
LC / MS

LC/MS analysis of tetracycline antibiotics*

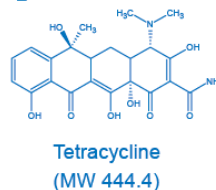
A) UV



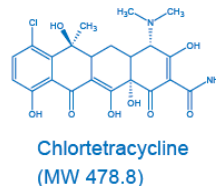
1



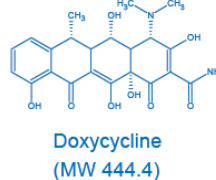
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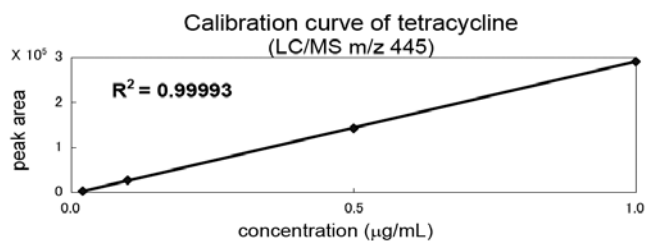
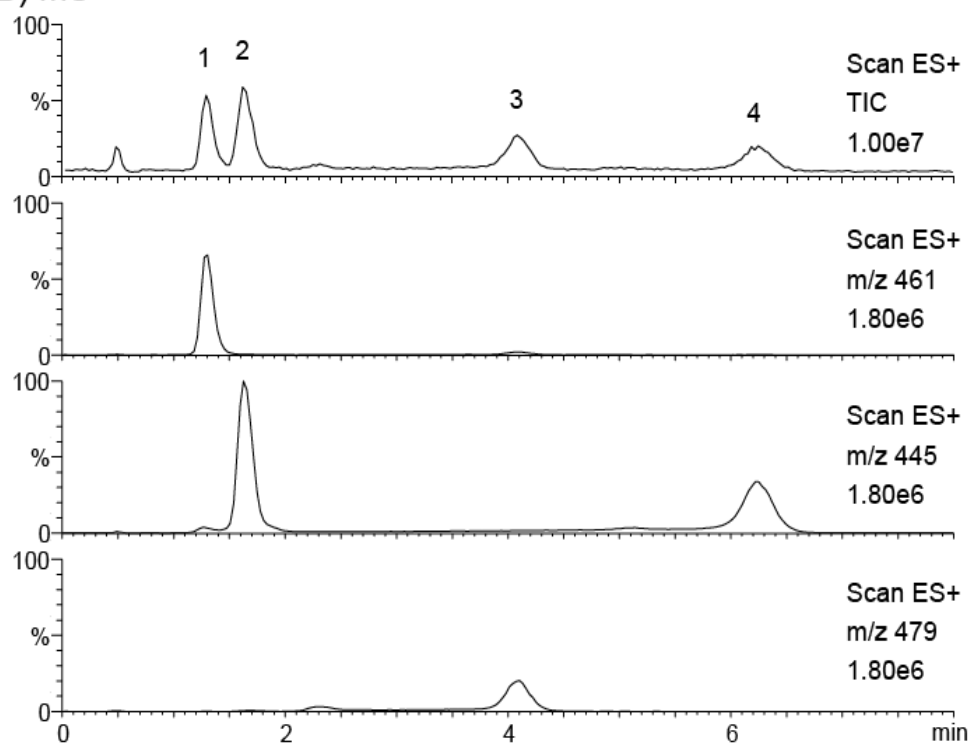
3



4

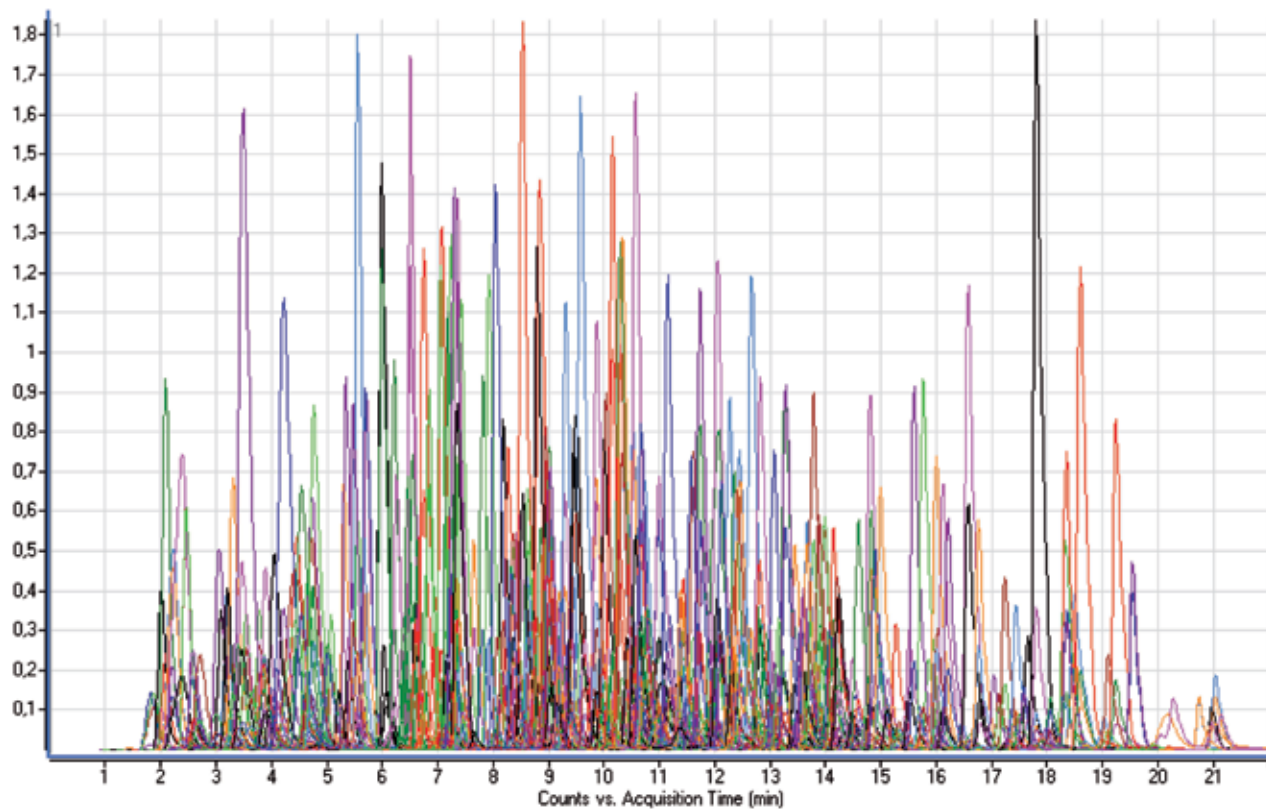


B) MS



Column: YMC-Triart C18 (5 µm, 12 nm) 50 x 2.0 mm ID
Part No.: TA12S05-0502WT
Eluent: acetonitrile / water / formic acid (15/85/0.1)
Flow rate: 0.4 mL/min
Temperature: 40 °C
Detection: A) UV at 270 nm
B) ESI positive-mode
Injection: 10 µL (1 µg/mL)

Analysis of 360 pesticides in a single run

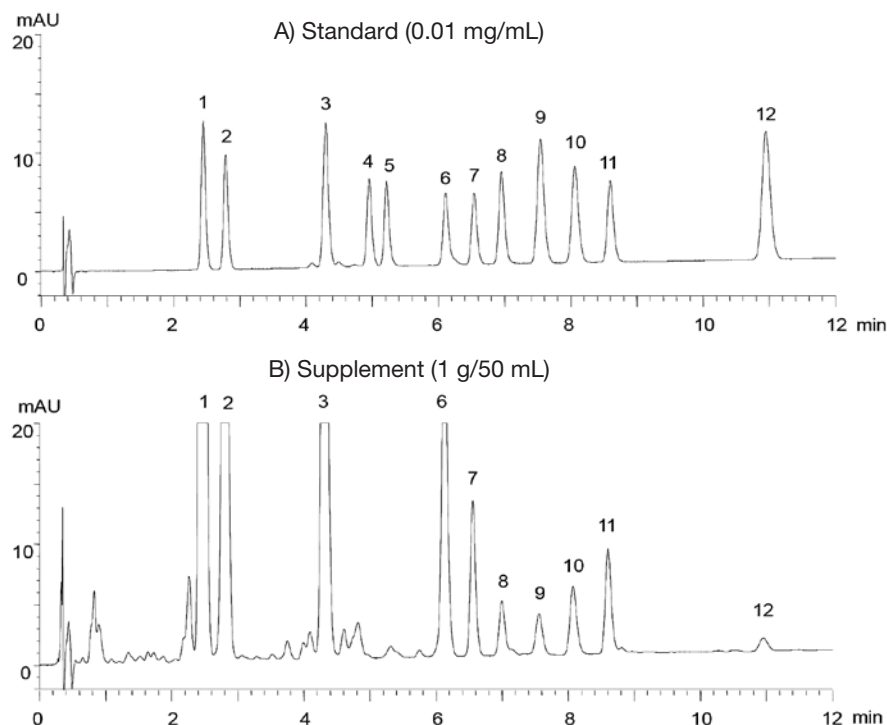


Column: YMC-Triart C18 (3 μ m, 12nm) 100 x 2.0 mm ID
 Part No.: TA12S03-1002WT
 Eluent: A) 5 mM ammonium formate / water
 B) 5 mM ammonium formate / methanol
 Gradient: 0 min: 30% B, 0.1 min: 50% B, 18 min: 100% B,
 21 min: 100% B, 21.01 min: 30% B, 29 min: 30% B
 Total run time: 30 min
 Flow rate: 0.25 mL/min
 Temperature: 45 °C
 Injection: 5 μ L
 Sample: 100 ng/mL pesticide mix in acetonitrile

Application data by courtesy of: József László
 WIREC, WESSLING International Research and Educational Centre Nonprofit Co. (Hungary)

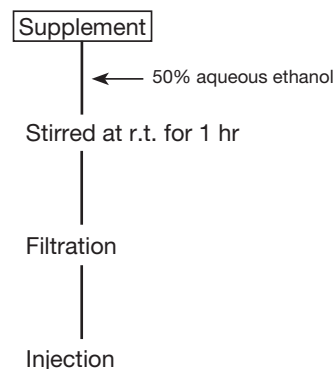
Food

Soy isoflavones in supplement*



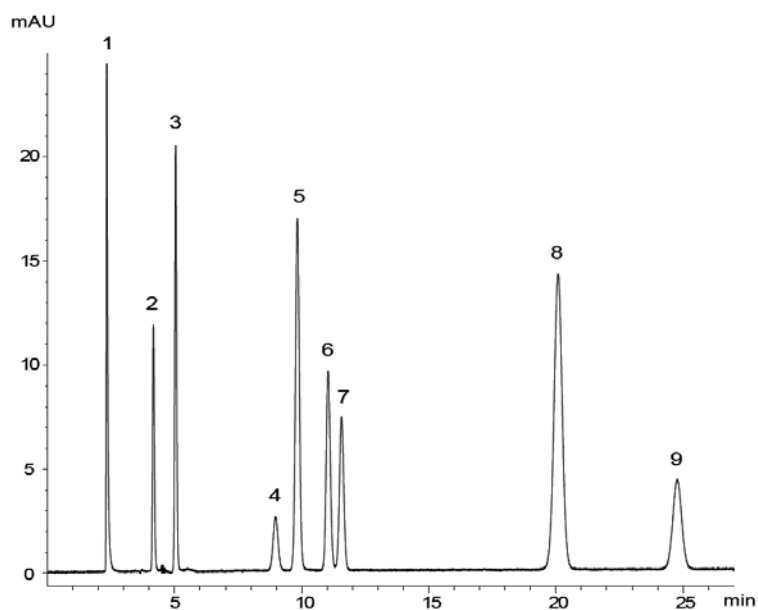
1. Daidzin
2. Glycitin
3. Genistin
4. 6"-O-Malonyldaidzin
5. 6"-O-Malonylglycitin
6. 6"-O-Acetyldaidzin
7. 6"-O-Acetylglycitin
8. 6"-O-Malonylgenistin
9. Daidzein
10. Glycitein
11. 6"-O-Acetylgenistin
12. Genistein

Sample preparation method



Column: YMC-Triart C18 (3 μ m, 12 nm)
 50 x 2.0 mm ID
 Part No.: TA12S03-0502WT
 Eluent: A) acetonitrile / water / HCOOH (10/90/0.1)
 B) acetonitrile / water / HCOOH (60/40/0.1)
 Gradient: 5-40% B (0-12 min)
 Flow rate: 0.4 mL/min
 Temperature: 25 °C
 Detection: UV at 254 nm
 Injection: 2 μ L

Separation of water-soluble vitamins*



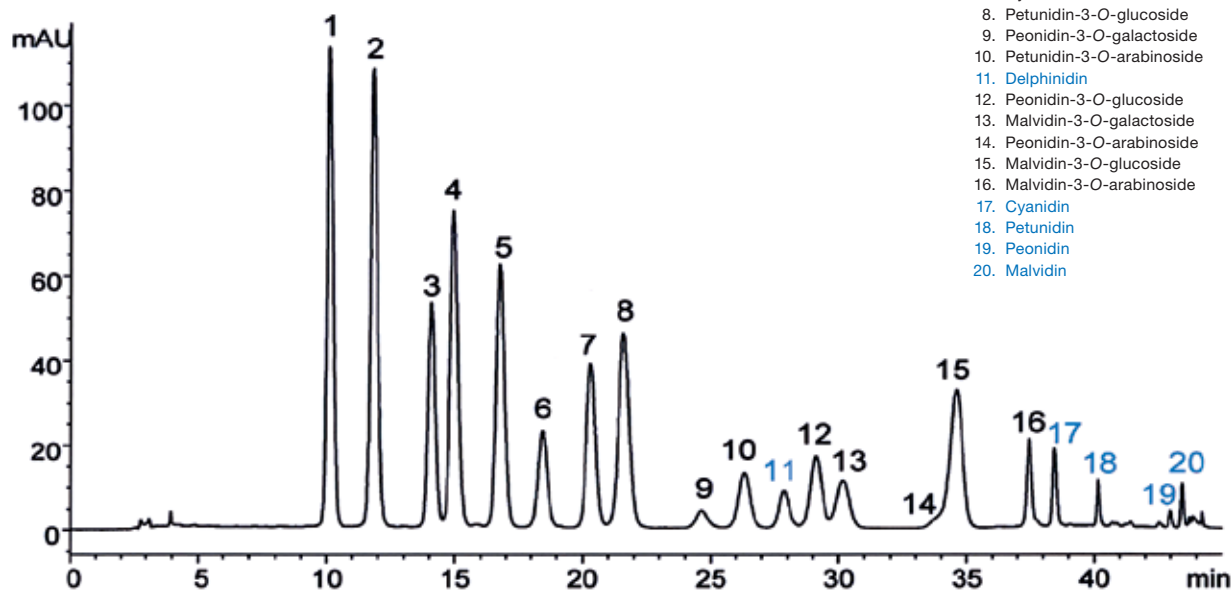
1. Thiamine HCl (Vitamin B₁)
2. Pyridoxine HCl (Vitamin B₆)
3. Nicotinamide
4. Cyanocobalamin (Vitamin B₁₂)
5. L-Ascorbic acid 2-glucoside
6. L-Ascorbic acid (Vitamin C)
7. Erythorbic acid
8. Riboflavin (Vitamin B₂)
9. Nicotinic acid (Vitamin B₃)

Column: YMC-Triart C18 (5 μ m, 12 nm) 250 x 4.6 mm ID
 Part No.: TA12S05-2546WT
 Eluent: phosphate buffer* / acetonitrile (90/10)
 * Dissolve 1.4 g KH₂PO₄ in 800 mL water
 → add 26 mL 10% TBA-OH
 → adjust pH 5.2 by 20% H₃PO₄
 → add water to make 1000 mL
 Flow rate: 0.8 mL/min
 Temperature: 40 °C
 Detection: UV at 260 nm
 Injection: 10 μ L (5 μ g/mL)

Analysis of anthocyanins and anthocyanidins

Anthocyanins: Indicated in black

Anthocyanidins: Indicated in blue

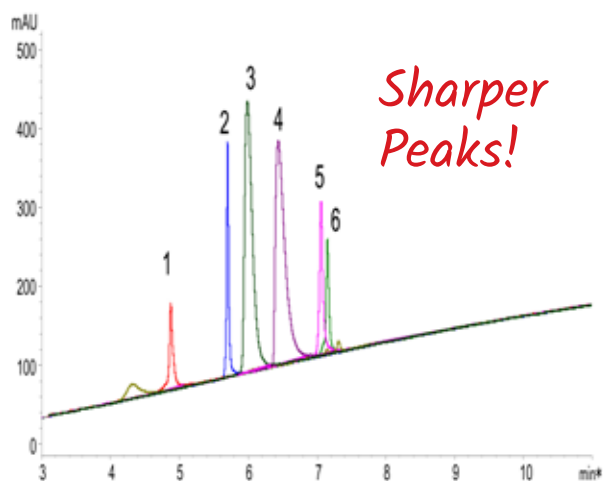


Column: YMC-Triart C18 (5 μ m, 12 nm) 250 x 4.6 mm ID
 Part No.: TA12S05-2546WT
 Eluent: A) water / formic acid (90/10)
 B) acetonitrile / methanol / water / formic acid (22.5/22.5/40/10)
 Gradient: 20-28% B (0-30 min),
 28-70% B (30-40 min),
 100% B (40-45 min)
 Flow rate: 1.0 mL/min
 Temperature: 25 $^{\circ}$ C
 Detection: UV/VIS at 535 nm
 Sample: commercial bilberry powder
 (1.25 mg/mL)

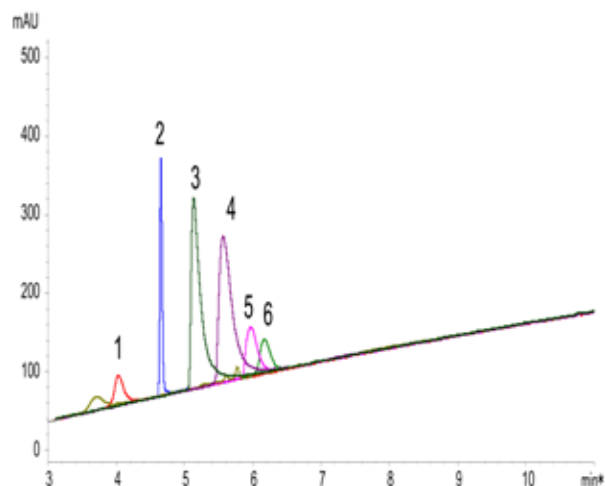
Life Science – Proteins

High sensitivity and sharp peaks under LC/MS compatible conditions*

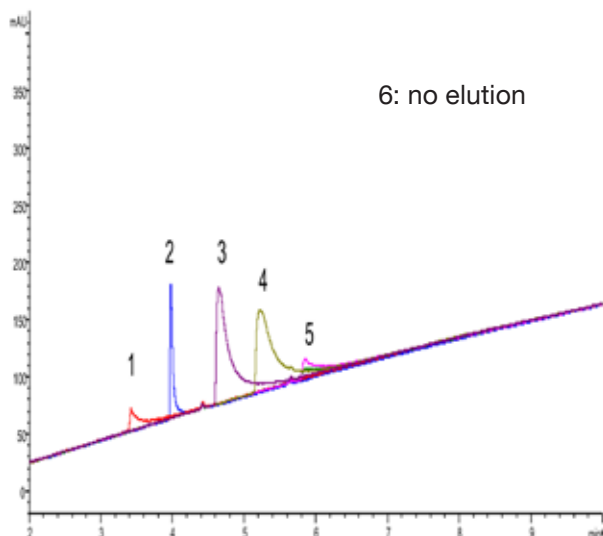
YMC-Triart Bio C4 (3 μ m, 30 nm)



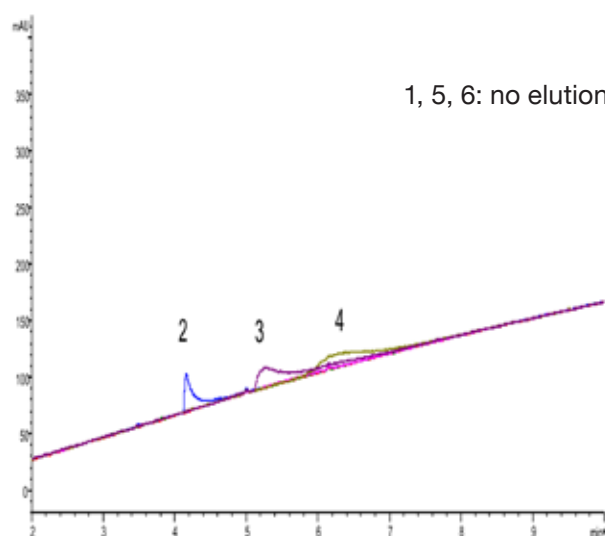
XBridge Protein BEH C4 (3.5 μ m, 30 nm)



AdvanceBio RP-mAb C4 (3.5 μ m, 45 nm)



Aeris widepore C4 (3.6 μ m, 20 nm)



Column: 150 x 3.0 mm ID
Eluent: A) water/formic acid (100/0.1)
B) acetonitrile/formic acid (100/0.1)
Gradient: 10-95%B (0-15 min)
Temperature: 40 °C
Detection: UV at 220 nm

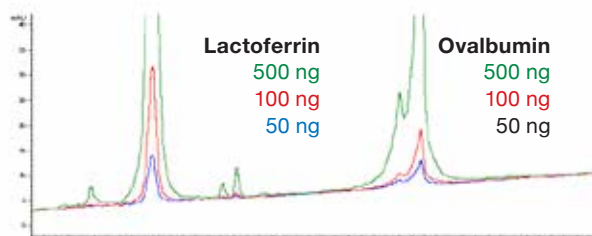
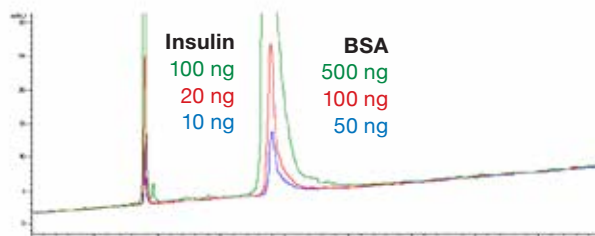
Sample:
1. Cytochrome-C (Horse heart)
2. Insulin (Bovine pancreas)
3. Transferrin (Human)
4. BSA
5. β -Lactoglobulin (Bovine)
6. α -Chymotrypsinogen A (Bovine pancreas)

YMC-Triart Bio C4 shows better peak shape and recovery with a mobile phase containing formic acid, which is commonly used for LC/MS analysis. Therefore, YMC-Triart Bio C4 is ideal for highly sensitive analysis of proteins.

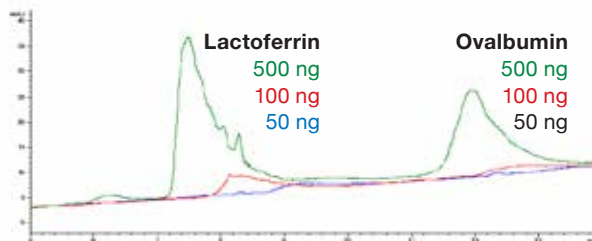
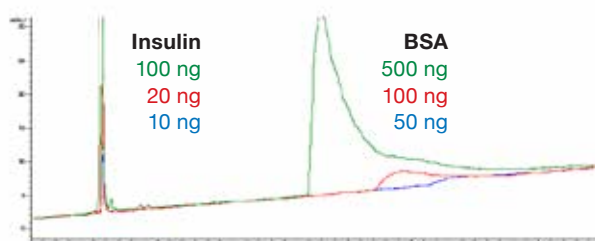
Life Science – Proteins

Ideal for Microanalysis*

YMC-Triart Bio C4 (1.9 μ m, 30 nm)



Aeris widepore C4 (3.6 μ m, 20 nm)

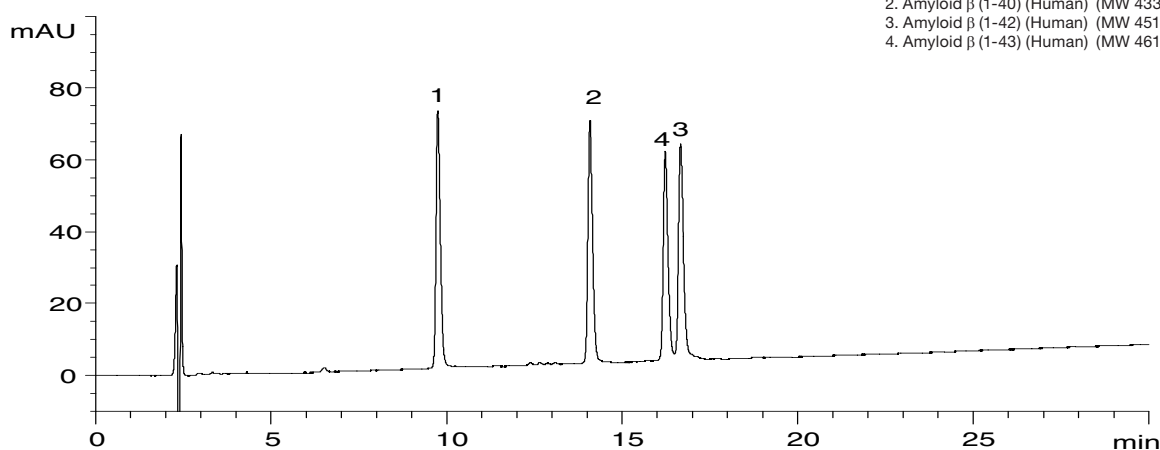


Column: 150 x 2.1 mm ID
Eluent: A) water/TFA (100/0.05)
B) acetonitrile/TFA (100/0.05)
Gradient: 25-60%B (0-15 min), 90%(15-20 min), 25%(20-35 min)

Detection: UV at 220 nm
Temperature: 40 °C

No adsorption was observed on YMC-Triart Bio C4 even at a low loading amount. This feature is beneficial for microanalysis of proteins.

Amyloid β -proteins



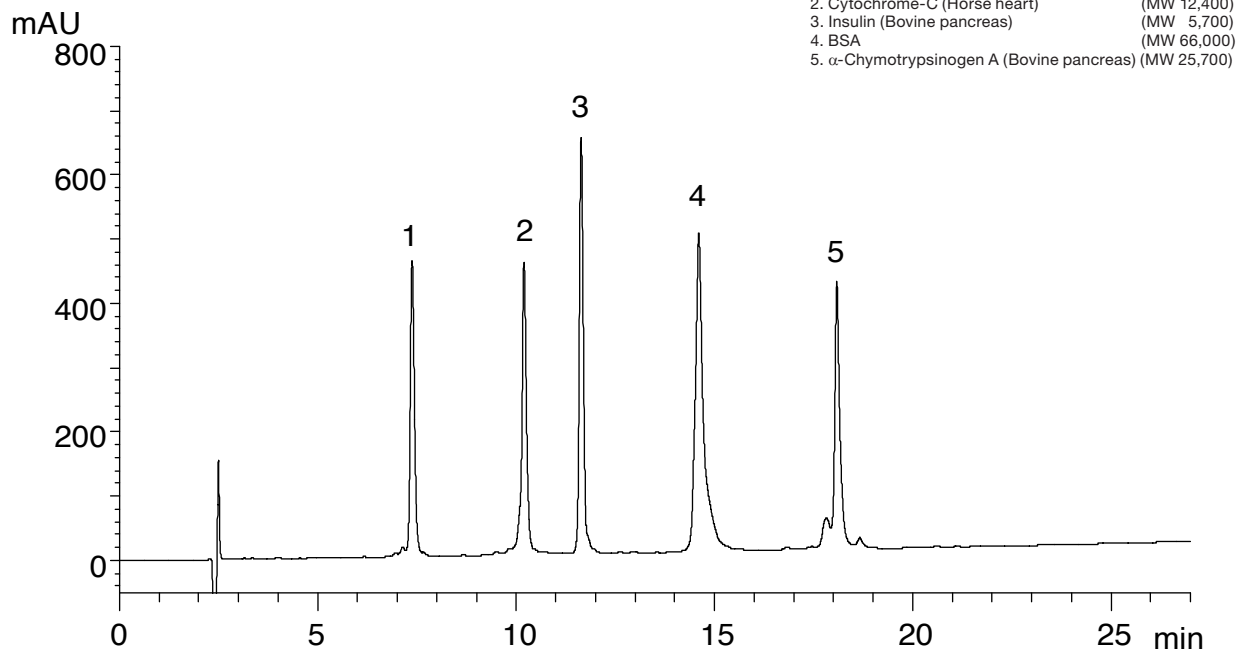
Amyloid β (1-43) : Asp-Ala-Glu-Phe-Arg-His-Asp-Ser-Gly-Tyr-Glu-Val-His-His-Gln-Lys-Leu-Val-Phe-Phe-Ala-Glu-Asp-Val-Gly-Ser-Asn-Lys-Gly-Ala-Ile-Ile-Gly-Leu-Met-Val-Gly-Gly-Val-Val-Ile-Ala-Thr

Column: YMC-Triart Bio C4 (3 μ m, 30 nm) 150 x 3.0 mm ID
Part No.: TB30S03-1503PTH
Eluent: A) water/TFA (100/0.1)
B) acetonitrile/TFA (100/0.1)
Gradient: 25-40%B (0-30 min), 90%B (30-40 min)

Flow rate: 0.4 mL/min
Temperature: 70 °C
Detection: UV at 220 nm
Injection: 4 μ L (each 0.1 mg/mL)

Life Science – Proteins

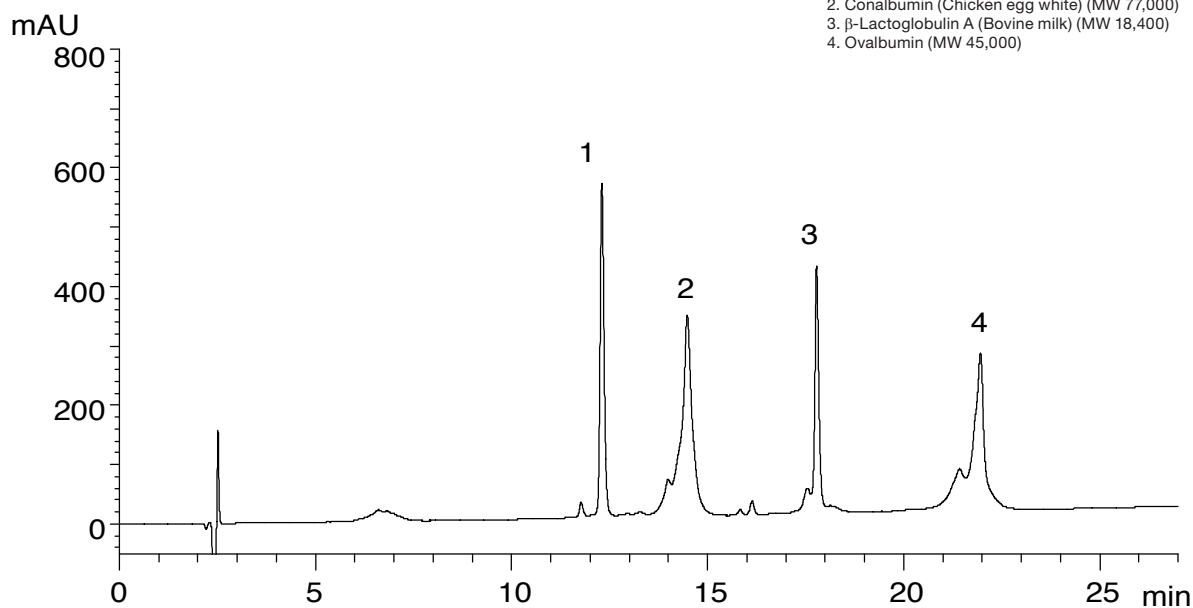
Proteins (MW 5,700 ~ 66,000)



Column: YMC-Triart Bio C4 (5 μm, 30 nm) 150 x 3.0 mm ID
 Part No.: TB30S03-1503PTH
 Eluent: A) water/TFA (100/0.1)
 B) acetonitrile/TFA (100/0.1)
 Gradient: 20-60%B (0-27 min), 90%B (27-35 min)

Flow rate: 0.4 mL/min
 Temperature: 70 °C
 Detection: UV at 220 nm
 Injection: 10 μL (0.25 ~ 0.50 mg/mL)

Proteins (MW 14,300 ~ 77,000)



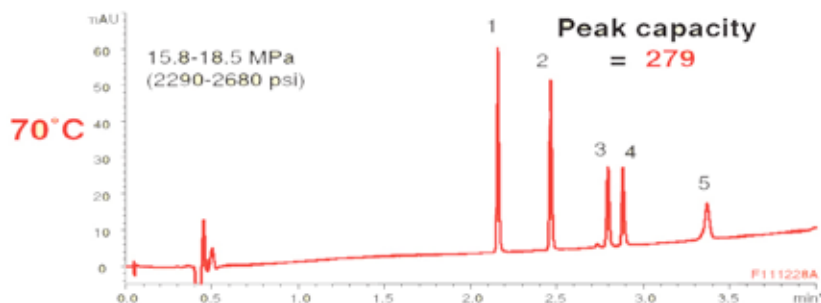
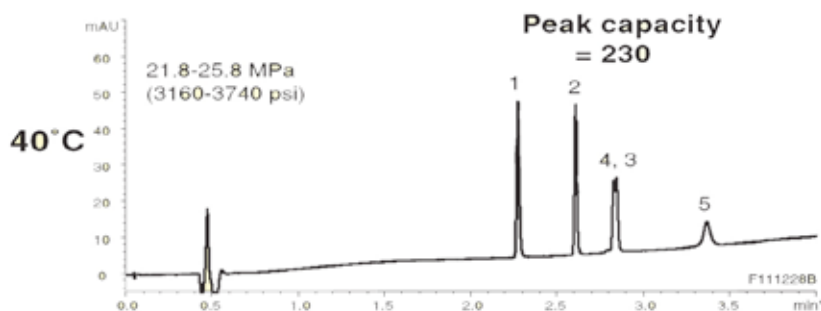
Column: YMC-Triart Bio C4 (5 μm, 30 nm) 150 x 3.0 mm ID
 Part No.: TB30S03-1503PTH
 Eluent: A) water/TFA (100/0.1)
 B) acetonitrile/TFA (100/0.1)
 Gradient: 20-60%B (0-27 min), 90%B (27-35 min)

Flow rate: 0.4 mL/min
 Temperature: 70 °C
 Detection: UV at 220 nm
 Injection: 10 μL (0.25 ~ 0.50 mg/mL)

Life Science – Proteins

Highly efficient RP-HPLC separation of proteins and peptides using high temperature*

Mixture A (MW 500–18,400)



Analytes	MW	Peak width 1/2 (min)	
		40 °C	70 °C

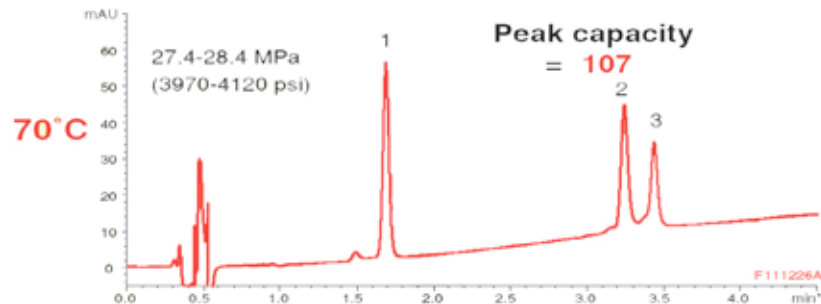
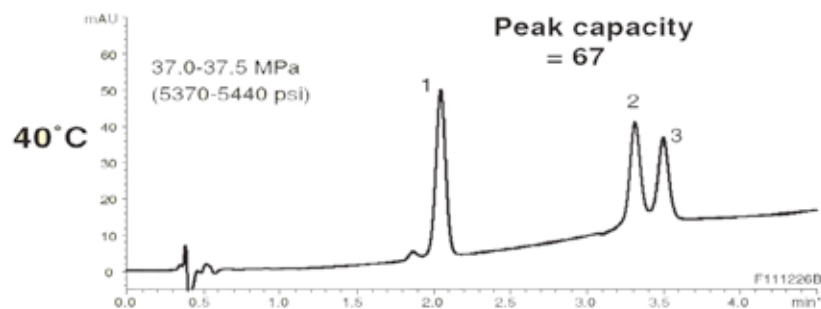
Mixture A

1. Oxytocin	1,007	0.017	0.014
2. Leu-Enkephalin	556	0.015	0.015
3. β -Endorphin	3,465	—	0.016
4. Insulin	5,733	—	0.015
5. β -Lactoglobulin A	18,400	0.043	0.030

Mixture B

1. Lysozyme	14,300	0.069	0.044
2. α -Chymotrypsinogen	25,700	0.080	0.049
3. β -Lactoglobulin A	18,400	0.080	0.048

Mixture B (MW 14,300–25,700)



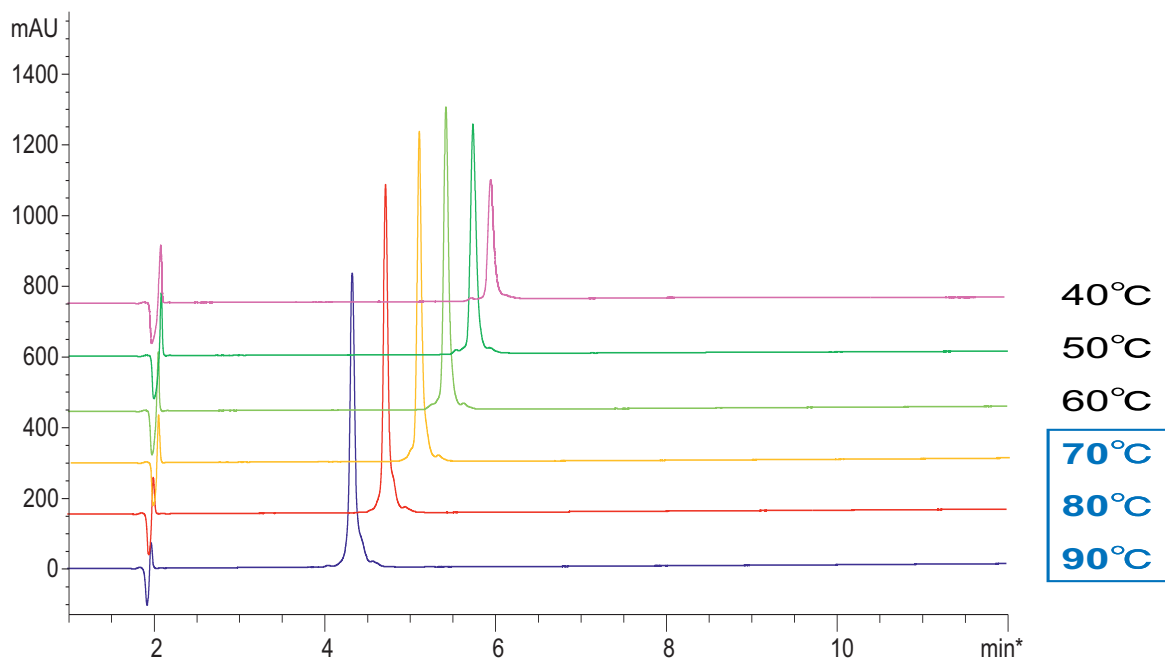
Column: YMC-Triart C18 (1.9 μ m, 12 nm) 50 x 2.0 mm ID
 Part-No.: TA12SP9-0502WT
 Eluent: A) water / TFA (100/0.1)
 B) acetonitrile / TFA (100/0.1) - mixture A
 B) acetonitrile / 2-propanol / TFA (50/50/0.1) - mixture B
 Gradient: 10-80% B (0-5 min) - mixture A
 30-60% B (0-5 min) - mixture B

Flow rate: 0.4 mL/min
 Detection: UV at 220 nm
 Injection: 1 μ L (50 μ g/mL) - condition A
 1 μ L (250 μ g/mL) - condition B
 System: Agilent 1200SL

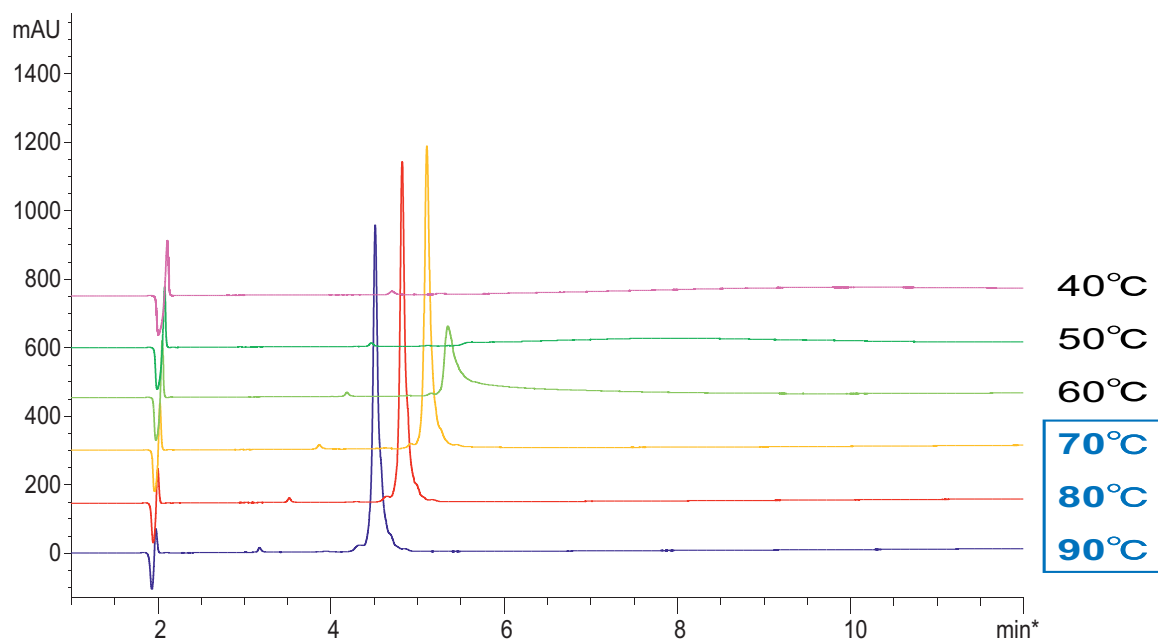
PC (peak capacity) = 1 + (gradient time / peak width*)
 *peak width = $2W_{0.5h}$ average

Life Science – Antibodies

Adalimumab (MW: ca. 148 kDa)*



Bevacizumab (MW: ca. 148 kDa)*

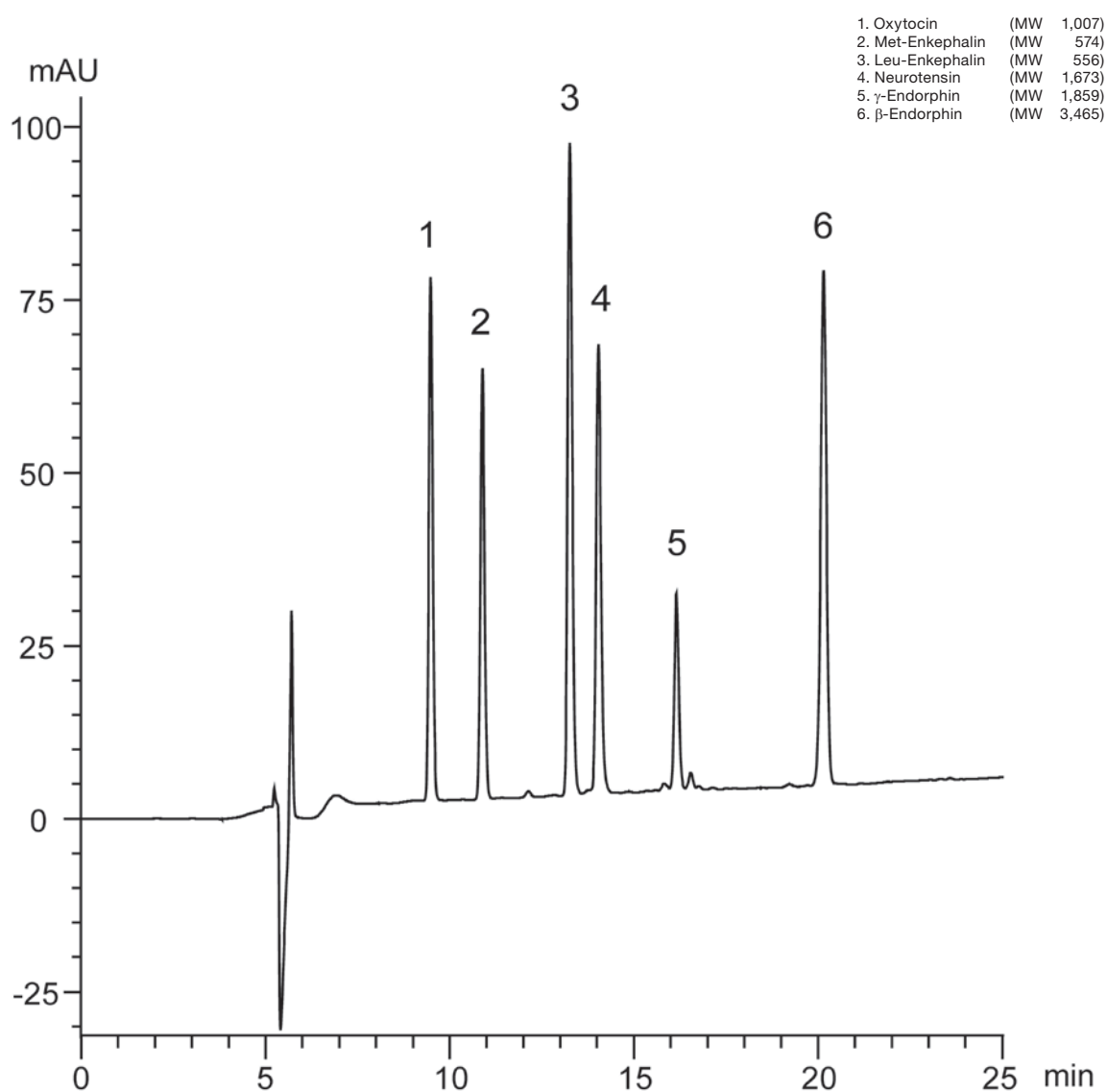


Column: YMC-Triart Bio C4 (3 μ m, 30 nm) 150 x 3.0 mm ID
 Part No.: TB30S03-1503PTH
 Eluent: A) water/TFA (100/0.1)
 B) acetonitrile/TFA (100/0.1)
 Gradient: Time [min] Eluent B [%]
 0 30
 15 60
 30 90

Flow rate: 0.4 mL/min
 Temperature: 25 °C
 Detection: UV at 220 nm
 Injection: 4 μ L (0.5 mg/mL)

Life Science – Peptides

Peptides (MW 556 - 3,465)*

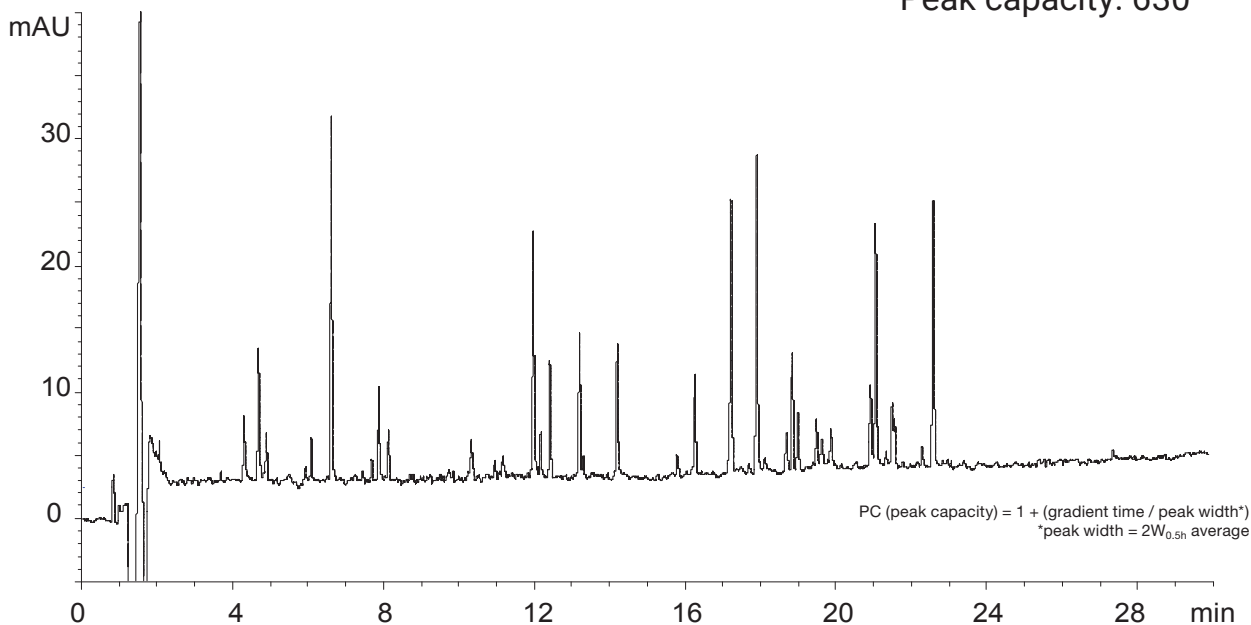


Column: YMC-Triart C18 (5 μ m, 12 nm) 150 x 2.0 mm ID
 Part No.: TA12S05-1502WT
 Eluent: A) water + 0.1% TFA
 B) acetonitrile + 0.1% TFA
 Gradient: 20-45% B (0-25 min)
 Flow rate: 0.2 mL/min
 Temperature: 37 °C
 Detection: UV at 220 nm
 Injection: 2 mL (0.075 ~ 0.25 mg/mL)

Life Science – Peptides / Amino Acids

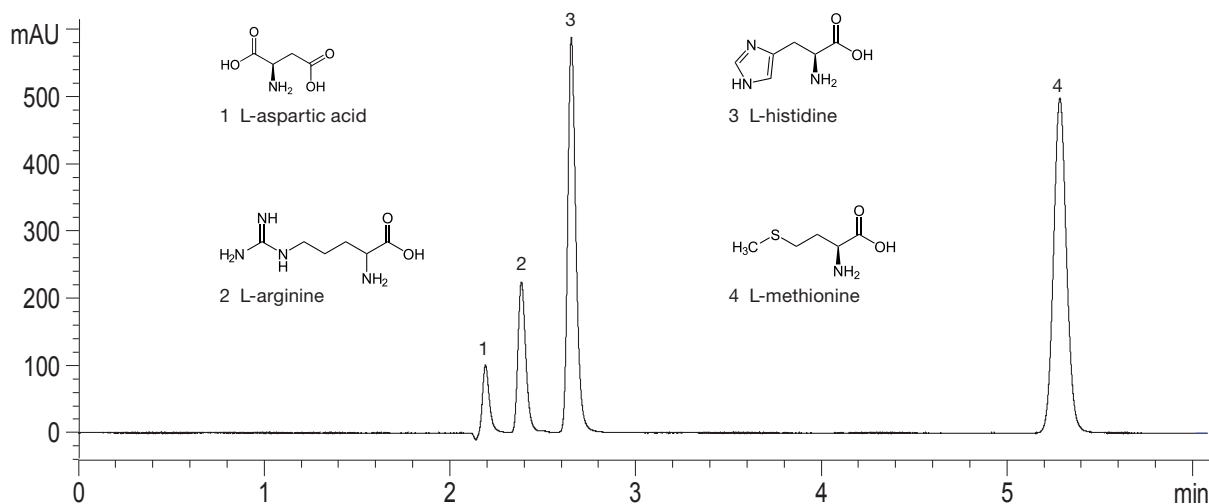
Peptide mapping*

Peak capacity: 630



Column: YMC-Triart C18 (1.9 μ m, 12 nm) 200 x 2.0 mm ID (Two coupled 100 x 2.0 mm ID)
 Part No.: TA12SP9-1002PT (2x)
 Eluent: A) water/TFA (100/0.1)
 B) acetonitrile/TFA (100/0.08)
 Gradient: 5-40%B (0-30 min)
 Flow rate: 0.4 mL/min
 Temperature: 70 °C
 Detection: UV at 220 nm
 Injection: 20 μ L
 Sample: Tryptic digest of Bovine Hemoglobin (2.5 nmol/mL)
 Pressure: 58.1-61.6 MPa (8,430-8,930 psi)

Amino acids with 100% aqueous phase



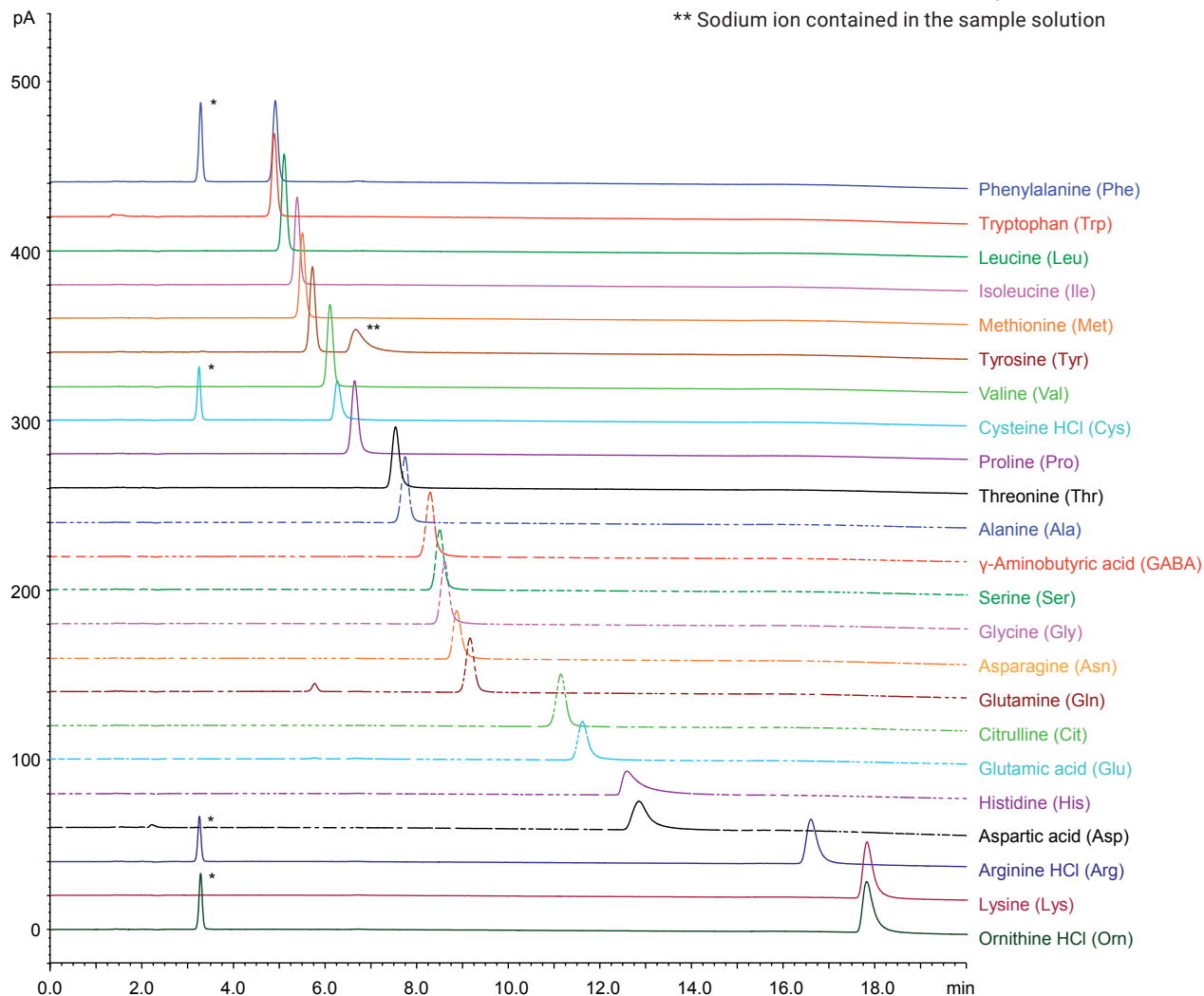
Column: YMC-Triart C18 (1.9 μ m, 12 nm) 150 x 3.0 mm ID
 Part No.: TA12SP9-1503PT
 Eluent: 40 mM K_2HPO_4 (pH 7.0)
 Flow rate: 0.3 mL/min
 Temperature: 20 °C
 Detection: UV at 210 nm
 Injection: 2 μ L (1 mg/mL)

Life Science – Amino Acids

Free amino acids in HILIC mode*

* Chloride ion contained in the sample solution

** Sodium ion contained in the sample solution



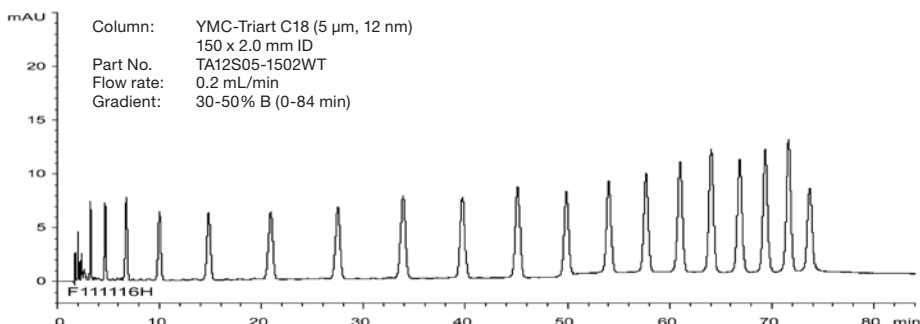
Column: YMC-Triart Diol-HILIC (5 μ m, 12 nm) 150 x 4.6 mm ID
 Part No.: TDH12S05-1546PTH
 Eluent: A) 100 mM HCOOH-HCOONH₄ (pH 3.6)
 B) acetonitrile
 Gradient: 83-80%B (0-12 min), 80-68%B (12-20 min)
 Flow rate: 1.0 mL/min
 Temperature: 40 °C
 Detection: Corona® CAD® (Charged Aerosol Detector)
 Injection: 10 μ L (0.1 mg/mL)

Corona and CAD are trademarks of Thermo Fisher Scientific.

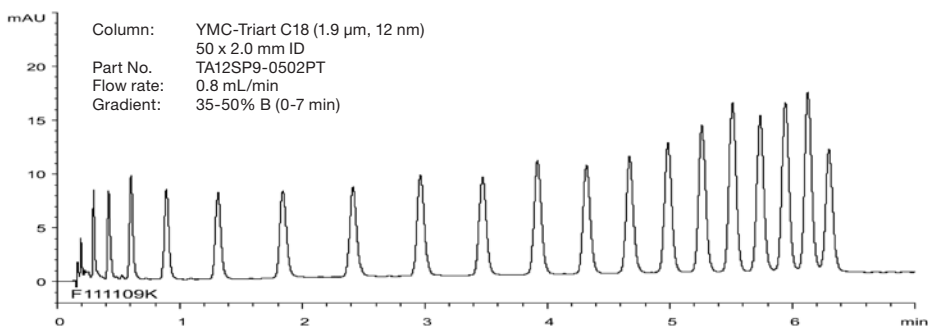
Life Science – Oligonucleotides

Oligonucleotides d(T)2-20 method transfer from HPLC to UHPLC*

Conventional LC method

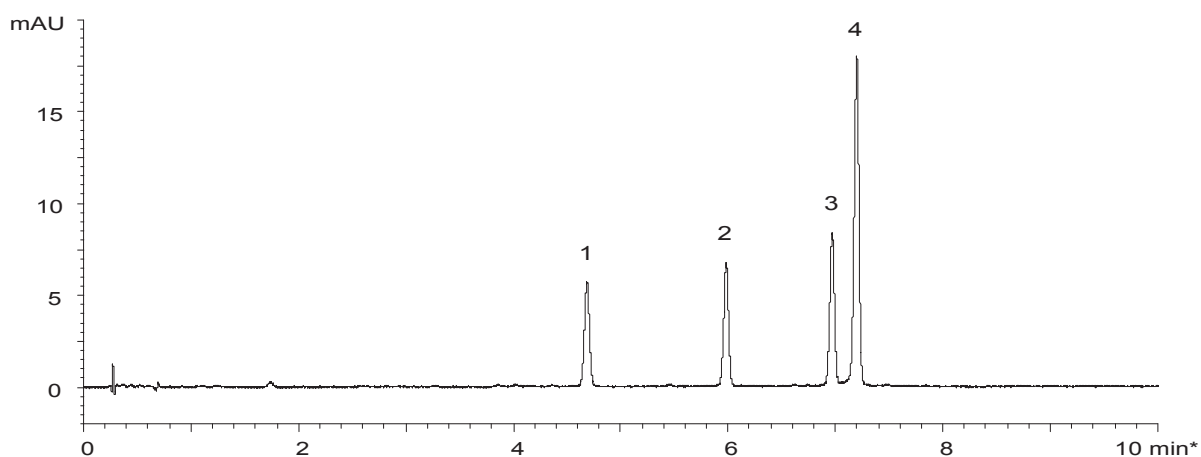


UHPLC method



Eluent: A) 10 mM di-n-butylamine-acetic acid (pH 6.0)
B) methanol
Detection: UV at 269 nm
Injection: 1 µL (5 nmol/mL)
Temperature: 37 °C

Synthetic oligonucleotides



1. 5'-CAC UGA AUA CCA AU-3' (14mer)

2. 5'-UCA CAC UGA AUA CCA AU-3' (17mer)

3. 5'-UCA UCA CAC UGA AUA CCA AU-3' (20mer)

4. 5'-GUC AUC ACA CUG AAU ACC AAU-3' (21mer)

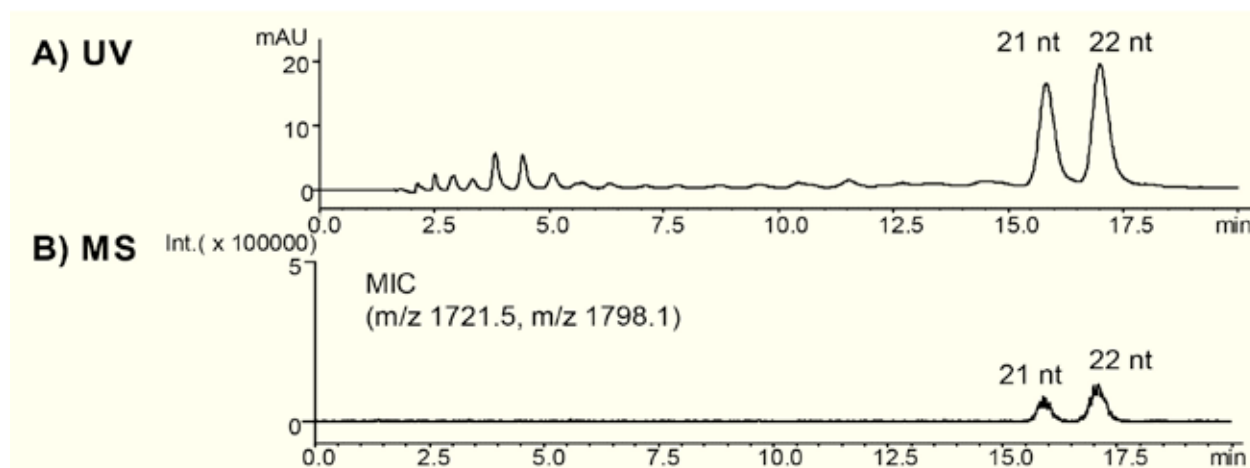
Column: YMC-Triart C18 (1.9 µm, 12 nm) 50 x 2.1 mm ID
Eluent: A) 200 mM HFIP*-8 mM triethylamine
B) methanol
Gradient: 10-20%B (0-10 min)
*hexafluoroisopropanol

Flow rate: 0.42 mL/min
Temperature: 65 °C
Detection: UV at 260 nm
Injection: 1 µL (2-4 nmol/mL)

Courtesy of M. Yamada, SHIMADZU CORPORATION

Life Science – Oligonucleotides

LC/MS analysis of miRNA



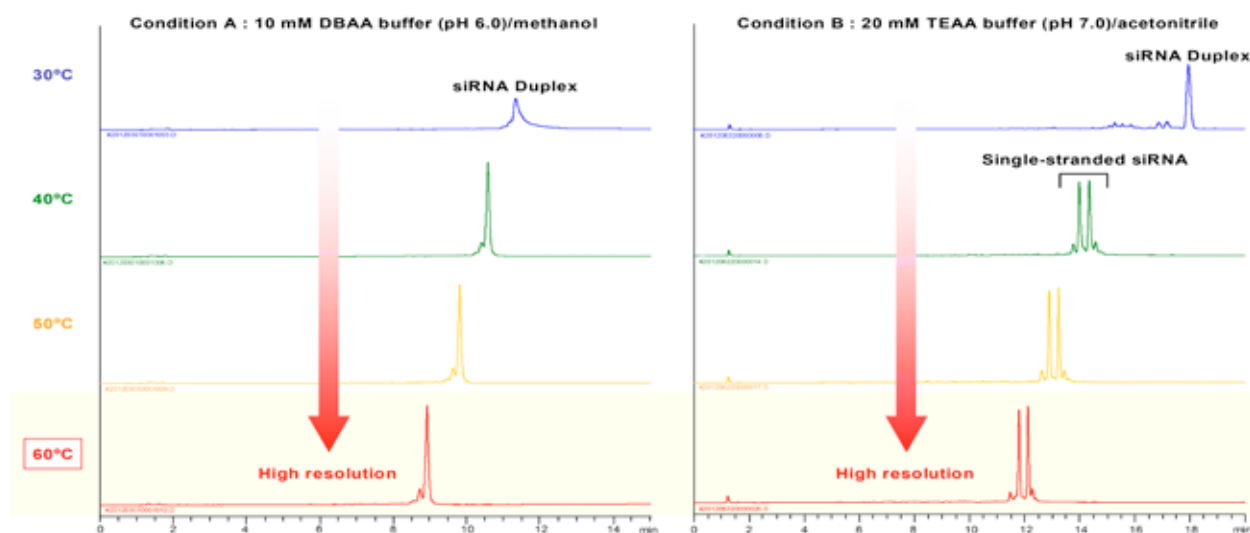
5'-pUGG AGU GUG ACA AUG GUG UUG-3' (21 nt, MW 6890.1)
 5'-pUGG AGU GUG ACA AUG GUG UUG U-3' (22 nt, MW 7196.3)

Column: YMC-Triart C18 (3 μ m, 12 nm), 150 x 2.0 mm ID
 Part No.: TA12S03-1502WT
 Eluent: A) 10 mM di-n-butylamine-acetic acid (pH 7.5)
 B) 10 mM di-n-butylamine-acetic acid (pH 7.5)/acetonitrile (50/50)
 Gradient: 62-72%B (0-20 min)
 Flow rate: 0.2 mL/min

Temperature: 30°C
 Detection: A) UV at 260 nm
 B) ESI-negative mode
 Injection: 4 μ L (5 nmol/mL)
 System: LC) Shimadzu Prominence
 MS) Shimadzu LCMS2020

Courtesy of M. Yamada, SHIMADZU CORPORATION

Effect of mobile phase and column temperature on separation of siRNA duplex*



Crude synthetic siRNA duplex (19 bp):

5'-CGU ACG CGG AAU ACU UCG AdTdT-3'
 3'-dTdTGCA UGC GCC UUA UGA AGC U-5'

Column: YMC-Triart C18 (1.9 μ m, 12 nm) 100 x 2.0 mm ID
 Part No.: TA12SP9-1002PT
 Flow rate: 0.2 mL/min
 Detection: UV at 269 nm
 Injection: 1 μ L (5 nmol/mL)
 System: Agilent 1290

Condition A Eluent: A) 10 mM di-n-butylamine-acetic acid (pH 6.0)
 B) methanol
 Gradient: 35-60%B (0-15 min)
Condition B Eluent: A) 20 mM triethylamine-acetic acid (pH 7.0)
 B) acetonitrile
 Gradient: 5-12%B (0-20 min)

YMC-Triart "AQ" | YMC-Triart C18

General

The use of 100% water eluent has been a challenge in HPLC analysis for decades. Even today, many C18 materials suffer from unacceptable short lifetime, because the C18 chains collapse and this reduces the separation performance drastically. As a pioneer in this field, YMC has offered a product as early as the 80's, which presents a synonym for stability under aqueous conditions: **YMC-Pack ODS-AQ**.

"AQ"-type phases are particularly suitable for the separation of polar substances, metabolites, pesticides, degradation products, peptides and protein digests.

2000

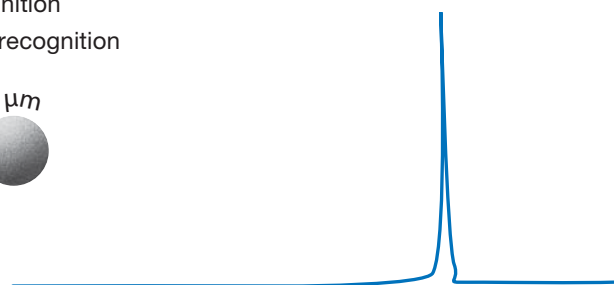
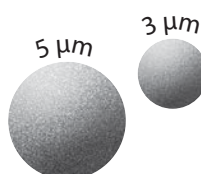


1985



YMC-Pack ODS-AQ

- "hydrophilic" C18
- balanced surface chemistry
- polar recognition
- metabolite recognition

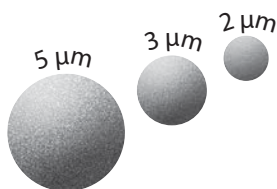


2013

Hydrosphere C18

A new, ultrapure silica base was introduced whilst adapting the surface chemistry to maintain the "AQ"-type properties.

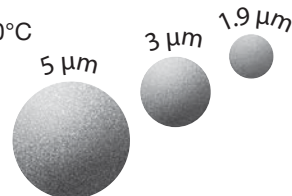
- "hydrophilic" C18 surface for enhanced polar recognition
- stable when used with 100% aqueous eluent
- no need for ion pair reagents
- addition of 2 μm particle size for Fast-LC (YMC-Pack UltraHT)



YMC-Triart "AQ" = YMC-Triart C18

The latest YMC technology platform consists of a "hybrid-style" substrate with enhanced stability against

- pH 1-12
- temp. up to 90°C
- 100% H₂O



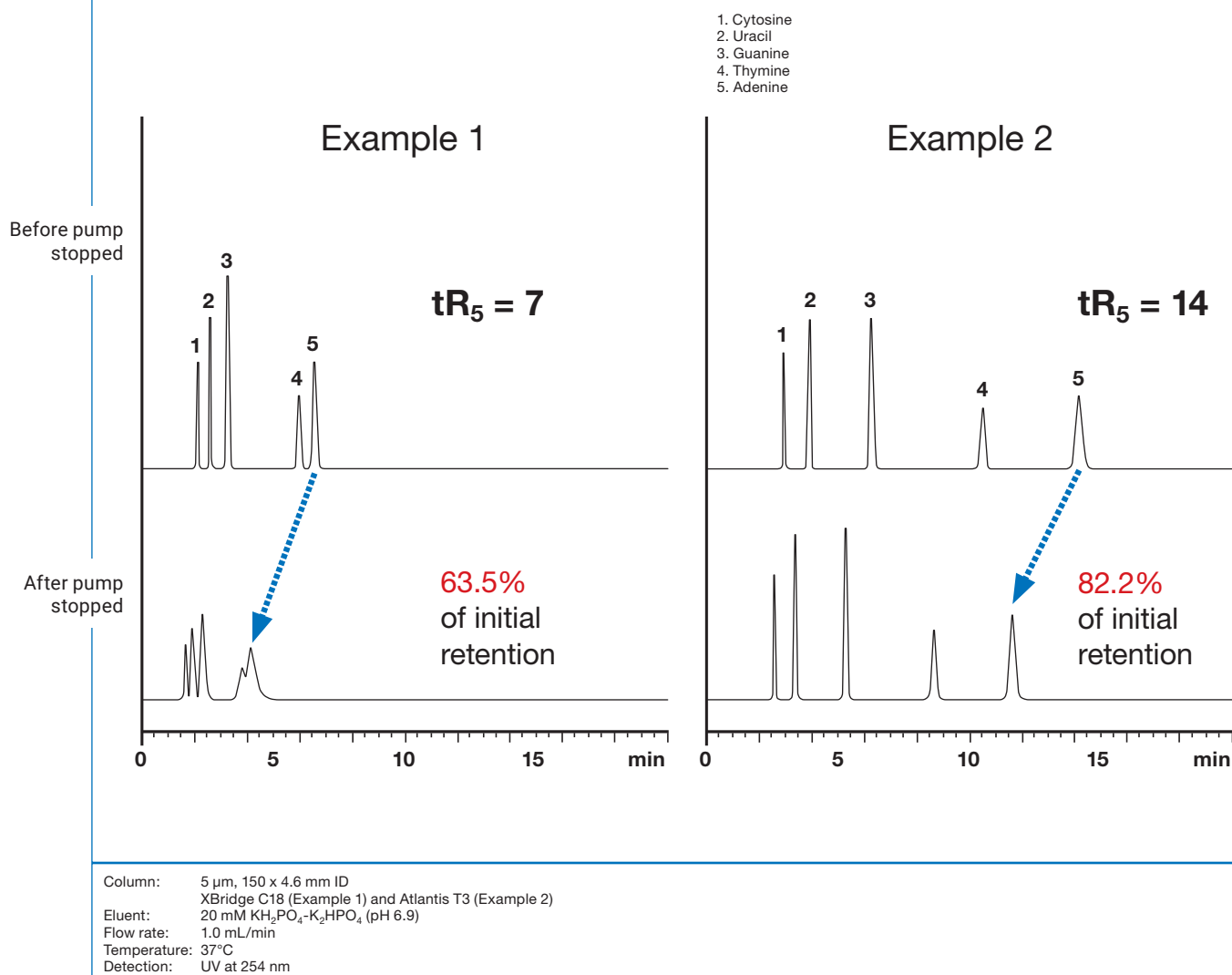
Therefore, YMC-Triart provides freedom in method development, robustness and enhanced column life-times for reproducible results, day-after-day, year-after-year.

YMC-Triart is fully scalable within (U)HPLC↔HPLC with its 1.9 – 3 – 5 micron particle sizes in order to facilitate lab-to-lab method transfer.

YMC-Triart "AQ" | YMC-Triart C18

Problem with conventional C18 columns

Aqueous conditions deteriorate column performance*



Why?

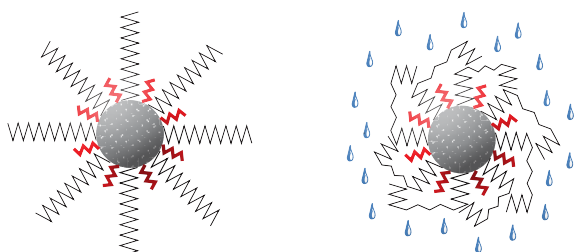


Image of C18 surface hydration

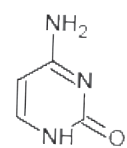
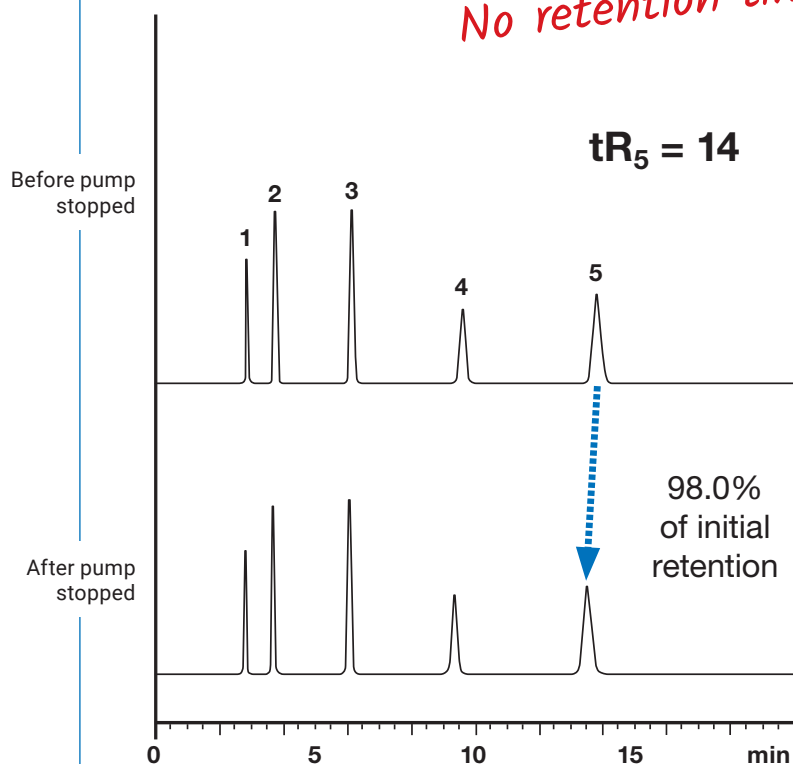
The columns used for applications involving 100% aqueous buffers provide shorter retention times after the flow was stopped between analyses. This behaviour is caused by poor hydration of the phase. Polar compounds cannot easily distribute between the mobile phase and the stationary phase.

YMC-Triart "AQ" | YMC-Triart C18

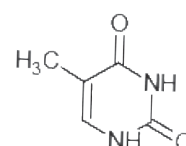
Solution with YMC-Triart C18

Reproducible stable performance!*

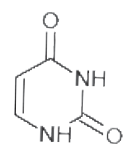
No retention time changes!



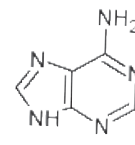
1. Cytosine



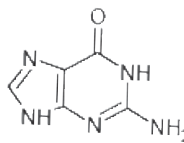
4. Thymine



2. Uracil



5. Adenine



3. Guanine

Column: YMC-Triart C18 (5 μ m, 12 nm) 150 x 4.6 mm ID
 Part No.: TA12S05-1546WT
 Eluent: 20 mM KH_2PO_4 - K_2HPO_4 (pH 6.9)
 Flow rate: 1.0 mL/min
 Temperature: 37°C
 Detection: UV at 254 nm

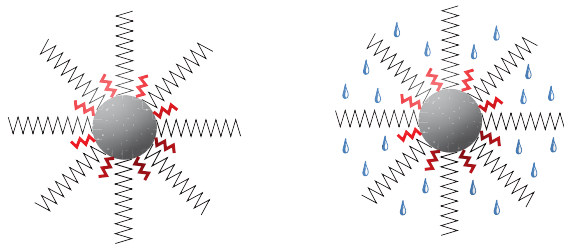


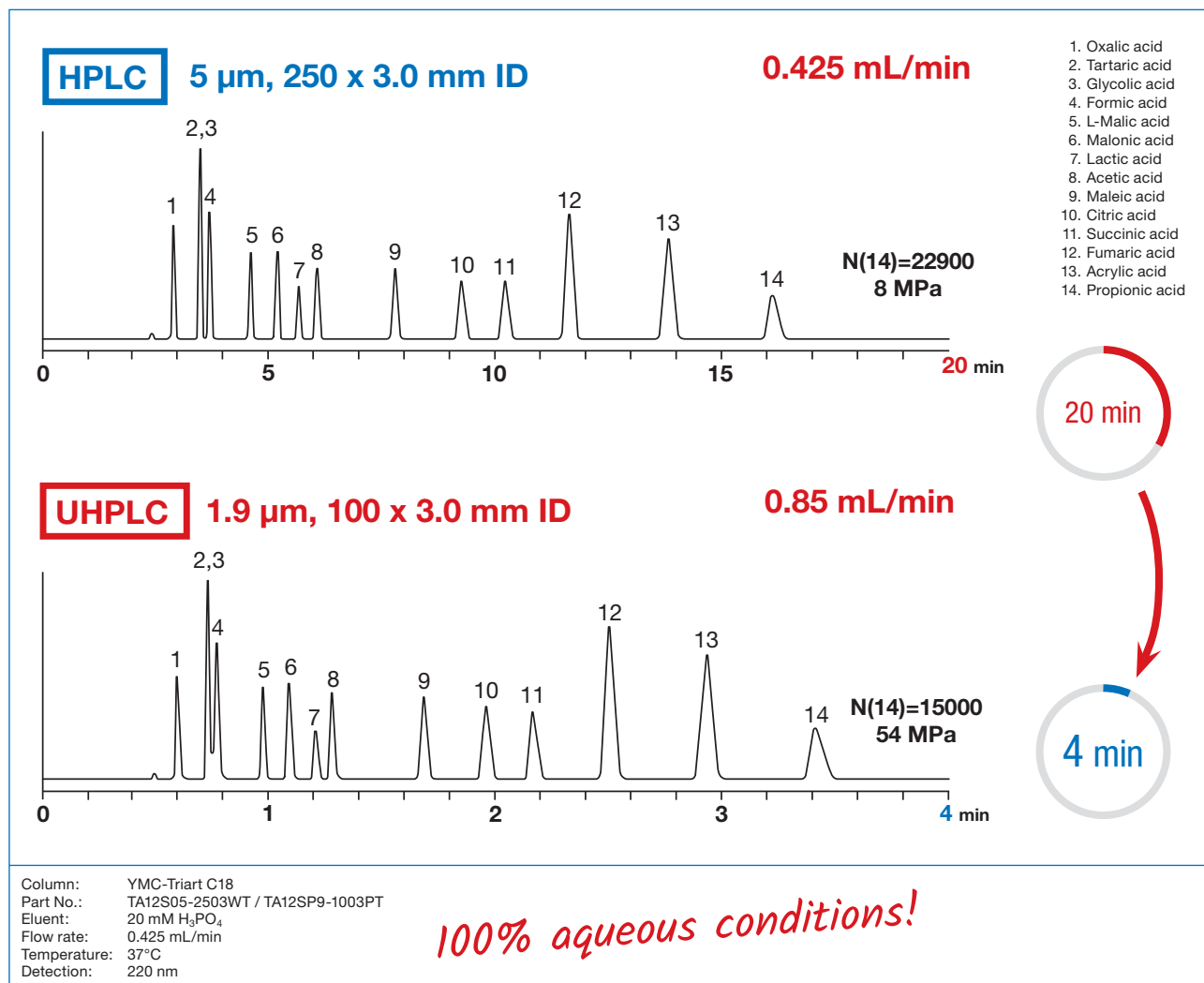
Image of C18 surface hydration

When YMC-Triart C18 columns are used for applications involving 100% aqueous buffers, the retention times are unchanged after the flow was stopped between analyses.

This is due to the improved hydration of the phase. Polar compounds can easily distribute between the mobile phase and the stationary phase.

YMC-Triart "AQ" | YMC-Triart C18

From the inventors of AQ-columns: YMC-Triart C18 "validated" for AQ-conditions!*



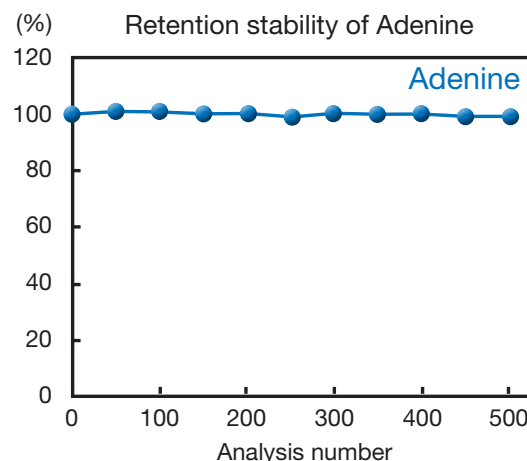
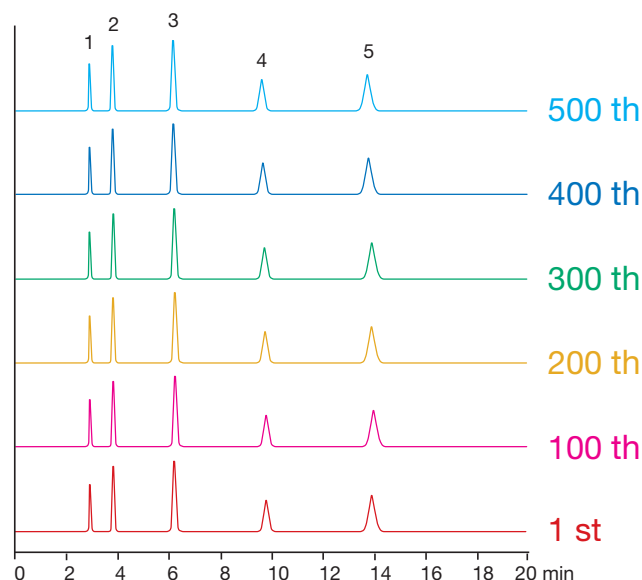
Stable under harsh conditions: pH 1-12 and temperature up to 90°C.

Stable retention times with 100% aqueous eluents!

Reproducible results day-after-day, column-to-column and lab-to-lab!

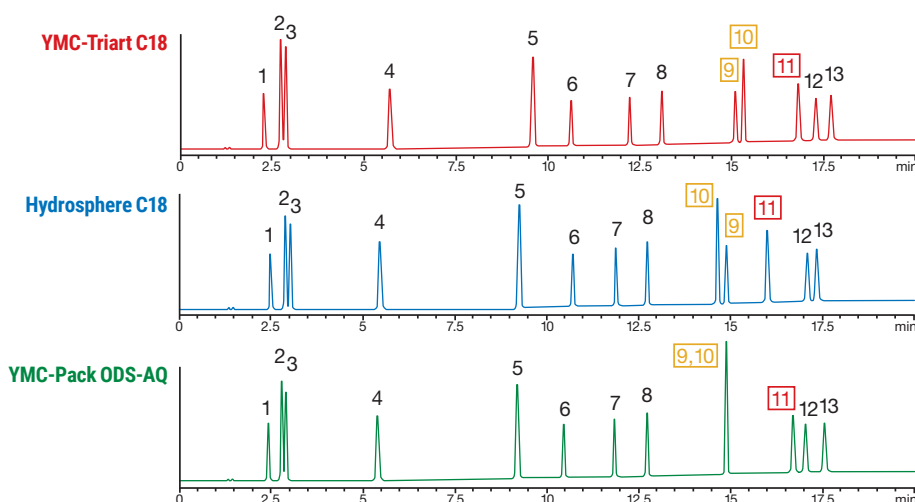
YMC-Triart "AQ" | YMC-Triart C18

Proven reliability*



Column: YMC-Triart C18 (5 μ m, 12 nm) 150 x 3.0 mm ID
 Part No.: TA12S05-1503WT
 Eluent: 20 mM KH_2PO_4 - K_2HPO_4 (pH 6.9)
 Flow rate: 0.425 mL/min
 Temperature: 37°C
 Detection: UV at 254 nm
 Sample: 1. Cytosine 2. Uracil 3. Guanine 4. Thymine 5. Adenine

No change is found in the separation parameters including retention times, even after 500 injections when using YMC-Triart C18.



1. L-Ascorbic acid 2-glucoside
2. L-Ascorbic acid (Vitamin C)
3. D-Isoascorbic acid
4. Nicotinic acid (Vitamin B₃)
5. Nicotinamide
6. D-(+)-Pantothenic acid calcium salt (Vitamin B₅)
7. Pyridoxal hydrochloride (Vitamin B₆)
8. Pyridoxine hydrochloride (Vitamin B₆)
9. Folic acid (Vitamin B₉)
10. Thiamine hydrochloride (Vitamin B₁)
11. Cyanocobalamin (Vitamin B₁₂)
12. D-Biotin (Vitamin B₇)
13. Riboflavin (Vitamin B₂)

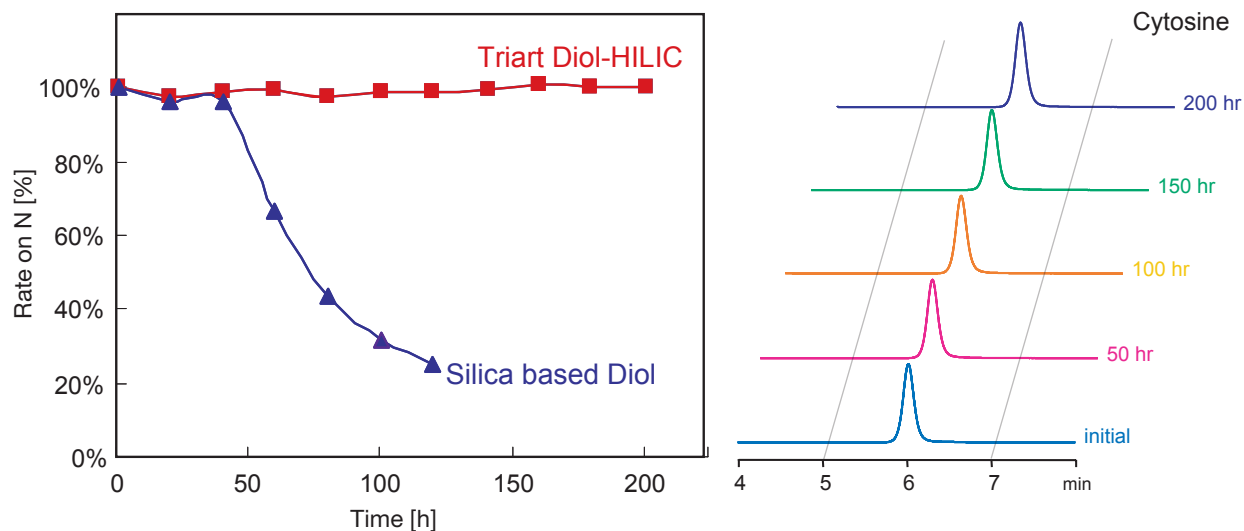
Column: 3 μ m, 150 x 3.0 mm ID
 Part No.: TA12S05-1503WT
 Eluent: A) 20 mM KH_2PO_4 - H_3PO_4 (pH 2.8) containing 5 mM $\text{CH}_3(\text{CH}_2)_5\text{SO}_3\text{Na}$
 B) 20 mM KH_2PO_4 - H_3PO_4 (pH 2.8) / acetonitrile (80/20) containing 5 mM $\text{CH}_3(\text{CH}_2)_5\text{SO}_3\text{Na}$
 Flow rate: 0.425 mL/min
 Temperature: 40°C
 Detection: 210 nm

Retention behaviour of water-soluble vitamins on three YMC ODS phases which can be used with 100% aqueous mobile phases is compared. The retention times and peak elution order for folic acid (peak 9), thiamine hydrochloride (peak 10) and cyanocobalamin (peak 11) are different for the three phases due to the balance of hydrophobicity and hydrogen bonding capacity differing between the three phases.

HILIC

Great stability and reproducibility at high pH*

Stability at high pH (pH 11, 50 °C)**

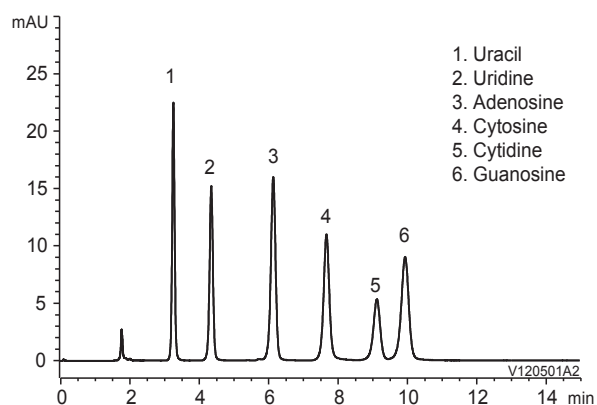


** pH ≤ 10 is recommended for regular use

Column: 5 µm, 150 x 4.6 mm ID
 Part No.: TDH12S05-1546WT
 Eluent: acetonitrile / water / NH₃ (90/10/0.1) pH 11.3
 Flow rate: 1.0 mL/min
 Temperature: 50 °C
 Sample: Cytosine

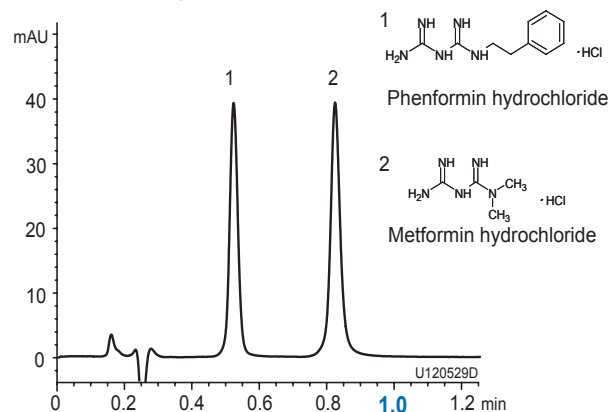
YMC-Triart Diol-HILIC offers highly reproducible separations even at high pH and high temperature. The lifetime of YMC-Triart Diol-HILIC is much longer than that of conventional silica-based Diol columns.

Nucleosides and bases*



Column: YMC-Triart Diol-HILIC (5 µm, 12 nm) 150 x 3.0 mm ID
 Part No.: TDH12S05-1503WT
 Eluent: 100 mM CH₃COONH₄ / acetonitrile (10/90)
 Flow rate: 0.425 mL/min
 Temperature: 30 °C
 Detection: UV at 254 nm
 Injection: 2 µL (5 ~ 10 µg/mL)

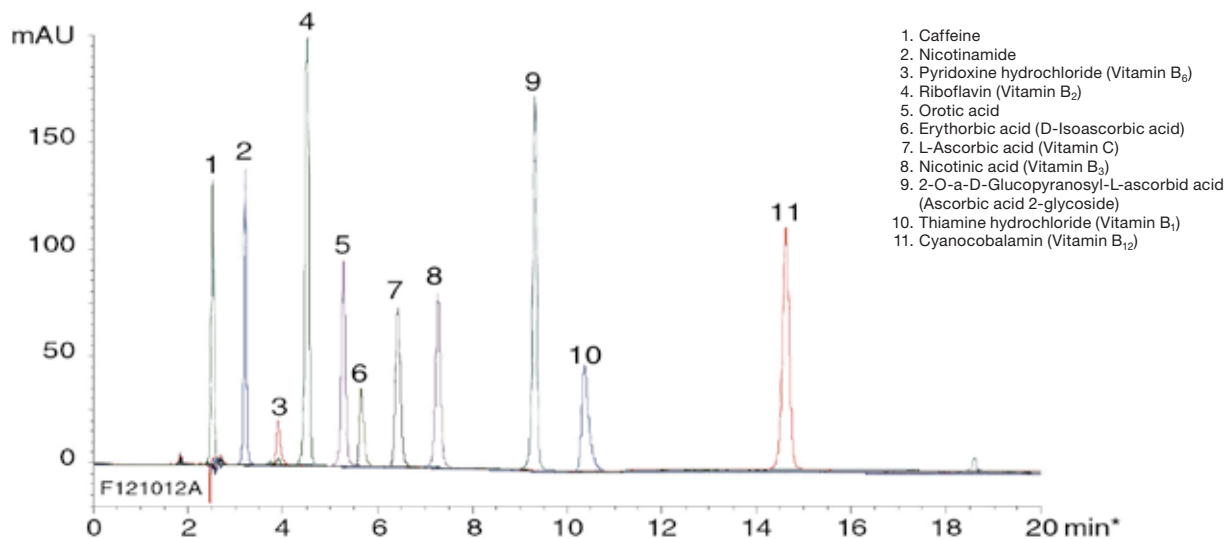
Diabetes drugs*



Column: YMC-Triart Diol-HILIC (1.9 µm, 12 nm) 50 x 2.0 mm ID
 Part No.: TDH12SP9-0502PT
 Eluent: 100 mM HCOOH-HCOONH₄ (pH 3.7) / acetonitrile (10/90)
 Flow rate: 0.8 mL/min
 Temperature: 25 °C
 Detection: UV at 235 nm
 Injection: 2 µL (10 µg/mL)

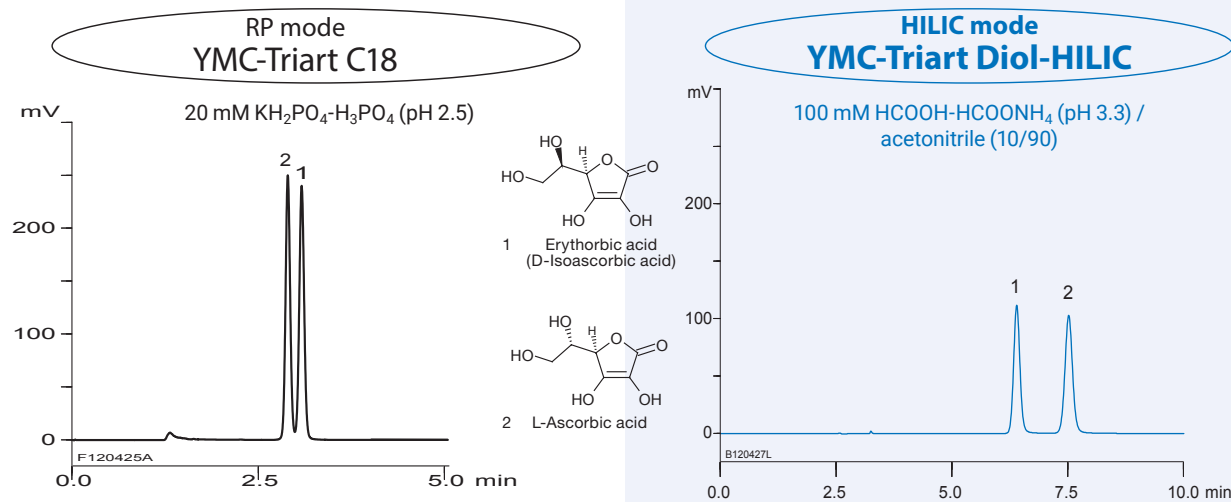
HILIC

Water soluble vitamins*



Column: YMC-Triart Diol-HILIC (5 μ m, 12 nm) 150 x 3.0 mm ID
 Part No.: TDH12S05-1503PTH
 Eluent: A) acetonitrile / 200 mM HCOOH-HCOONH₄ (pH 3.6) / water (90/5/5)
 B) acetonitrile / 200 mM HCOOH-HCOONH₄ (pH 3.6) / water (50/5/45)
 Gradient: 0-75% B (0-20 min)
 Flow rate: 0.425 mL/min
 Temperature: 40 °C
 Detection: UV at 254 nm
 Injection: 4 μ L (50 μ g/mL)

Polar and hydrophilic compounds*



Column: 5 μ m, 150 x 3.0 mm ID
 Flow rate: 0.425 mL/min
 Temperature: 40 °C
 Detection: UV at 254 nm
 Injection: 4 μ L (0.05 mg/mL)

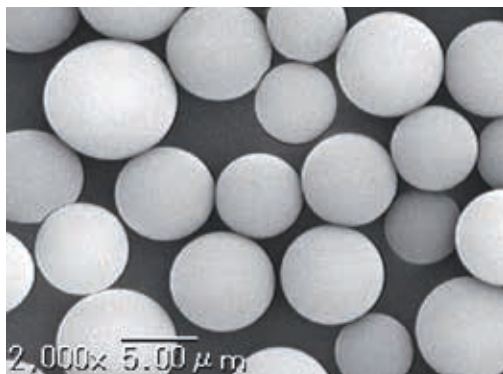
YMC-Triart C18 (RP) shows very weak retention and poor resolution of L-ascorbic acid and its stereoisomer (erythorbic acid) even if 100% aqueous mobile phase is used. However, YMC-Triart Diol-HILIC shows strong retention and good resolution of these compounds with mobile phase containing 90% organic solvent.

QC Data

YMC-Triart: Improved quality of particles

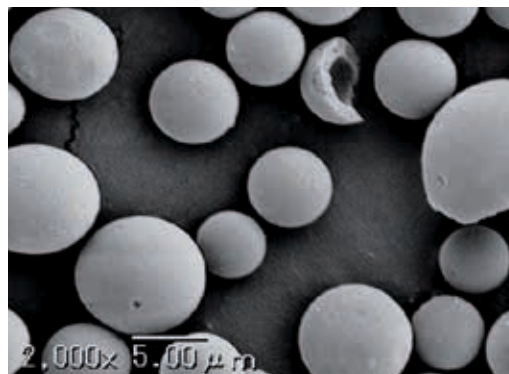
Uniform spherical particles

YMC-Triart



by courtesy of YMC Co., Ltd.

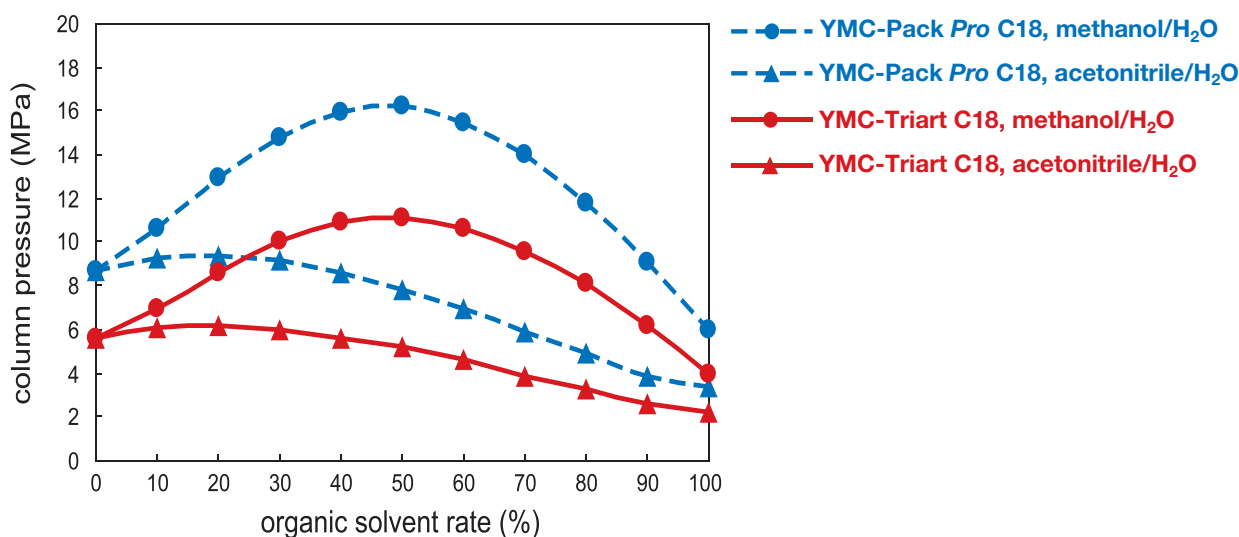
X-Bridge HILIC



The uniform spherical particle support is used for all YMC-Triart phases. The particles are produced using micro-reactor technology for the granulation process.

This results in reduction of the back-pressure and leads to more reproducibility in surface modification.

Low column back-pressure*



Column: YMC-Triart C18 (5 μm) 150 x 4.6 mm ID
 Part No.: TA12S05-1546WT
 Eluent: acetonitrile / water or methanol / water
 Flow rate: 1.0 mL/min
 Temperature: 25 °C

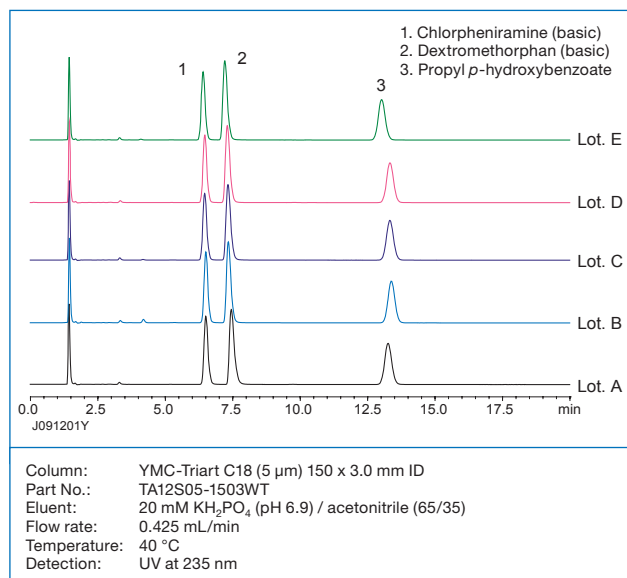
The revolutionary production technique, adapted from micro-reactor flow technology, produces a silica/organic hybrid stationary phase, with outstanding narrow pore size and particle size distributions which result in low back pressures. YMC-Triart is designed for use under a wide range of conditions. Elution with higher viscosity methanol (compared with acetonitrile), YMC-Triart generates lower pressure (approx. 30% lower than with conventional phases).

Batch-to-batch reproducibility

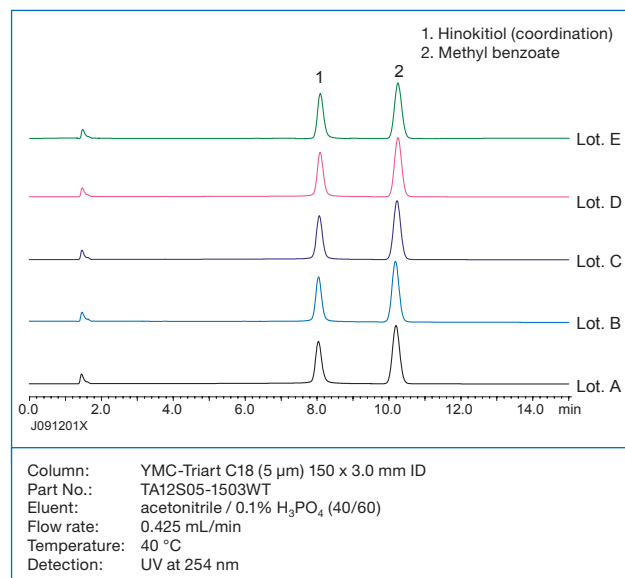
Excellent reproducibility of YMC-Triart phases is available even for the analysis of basic and coordination

compounds which normally exhibit tailing and adsorption effects.

Basic compounds*



Coordination compounds*



The reproducibility of packed columns is shown below in terms of theoretical plate number (N) and tailing factor (Tf). YMC-Triart packed columns exhibit a very narrow range of variation.

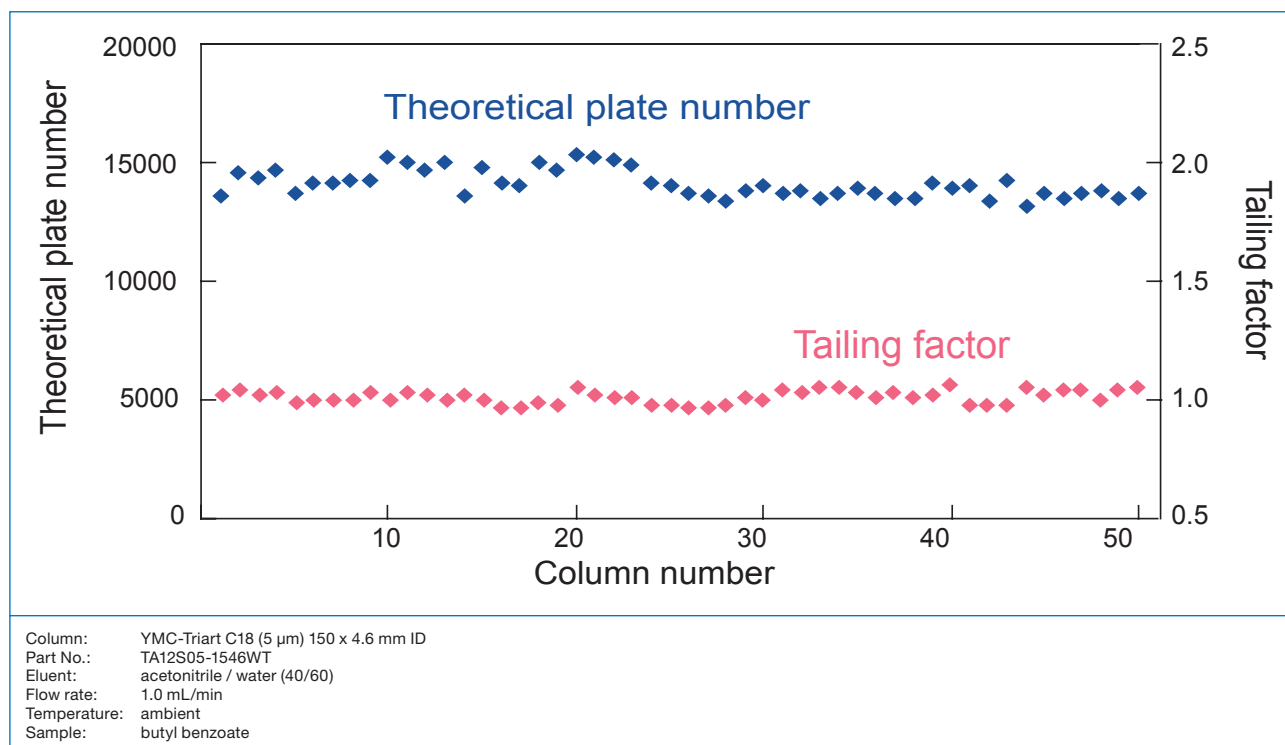


Figure 1 is a line graph showing the pore size distribution for three different particles. The x-axis represents 'Pore size (nm)' ranging from 0 to 35. The y-axis represents 'dVp/d logD' ranging from 0 to 4500. Three data series are plotted: YMC-Triart C18 particle (blue line with diamond markers), Conventional silica-based particle (red line with square markers), and X-Bridge HILIC (green line with square markers). The YMC-Triart C18 particle shows a sharp peak at approximately 11 nm. The Conventional silica-based particle shows a broad peak centered around 12-13 nm. The X-Bridge HILIC shows a broad peak centered around 19 nm.

Pore size (nm)	YMC-Triart C18 particle (dVp/d logD)	Conventional silica-based particle (dVp/d logD)	X-Bridge HILIC (dVp/d logD)
0	0	0	0
5	100	50	50
10	2500	1500	300
11	4200	2000	350
12	1000	2300	400
13	500	2100	700
15	100	1000	1300
19	0	300	1900
20	0	200	1000
25	0	0	0
30	0	0	0

Improved loadability

YMC-Triart C18

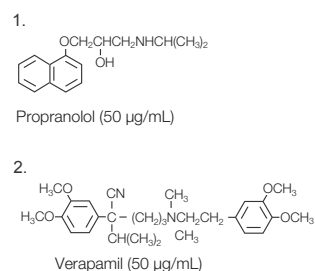
Hybrid-silica based C18

Silica based C18

Peak anomaly at 1.5 μ L

injection volume

- 1.0 μL
- 1.5 μL
- 2.0 μL
- 3.0 μL



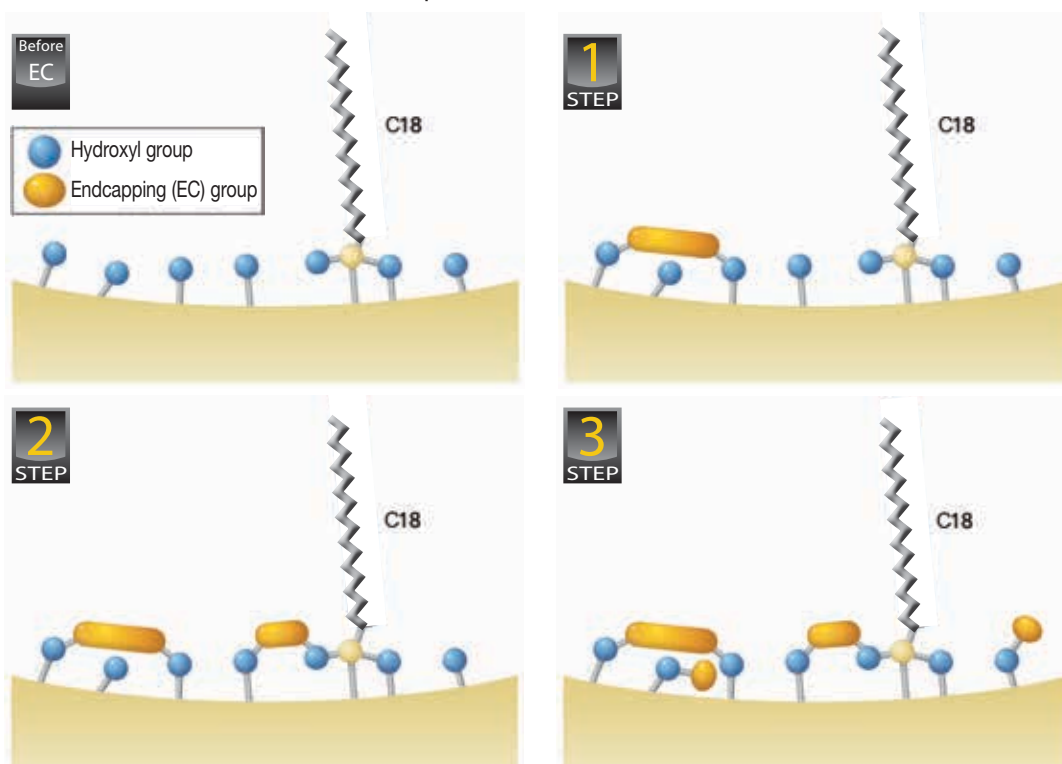
In order to prevent peak errors, there is a limit to the injection volume when a sample is injected in high elution solvents (such as 100% acetonitrile). Compared with traditional columns, more than double the injection volume can be injected into YMC-Triart columns as a result of the extremely narrow particle size distribution.

Multi-stage endcapping

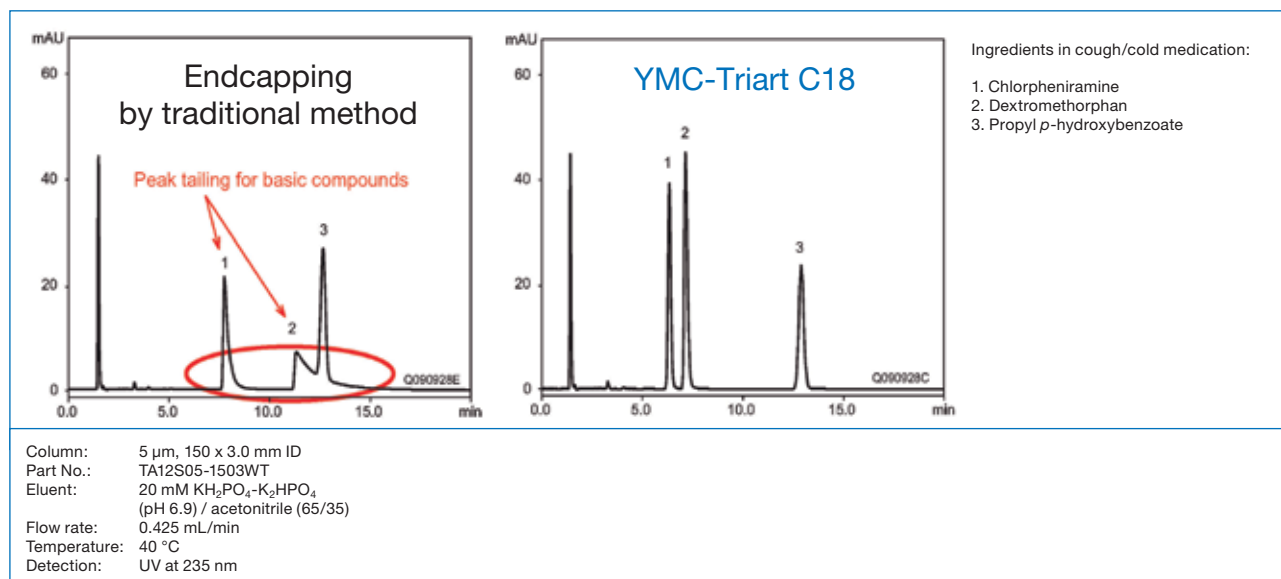
After bonding the alkyl chain, there are highly reactive and less reactive silanols on the surface. In traditional bonding processes, these are reacted with a single endcapping-compound in one step. However, the highly reactive silanols can be hydrolysed easily which contributes to the poor stability. The less reactive silanols are hard to endcap which

results in poor resolution due to peak tailing. YMC-Triart phases use an innovation in endcapping called “multi-stage endcapping” for its surface modification process.

By using a number of compounds with different reactivities in successive steps, all silanols can be capped to the maximum extent.

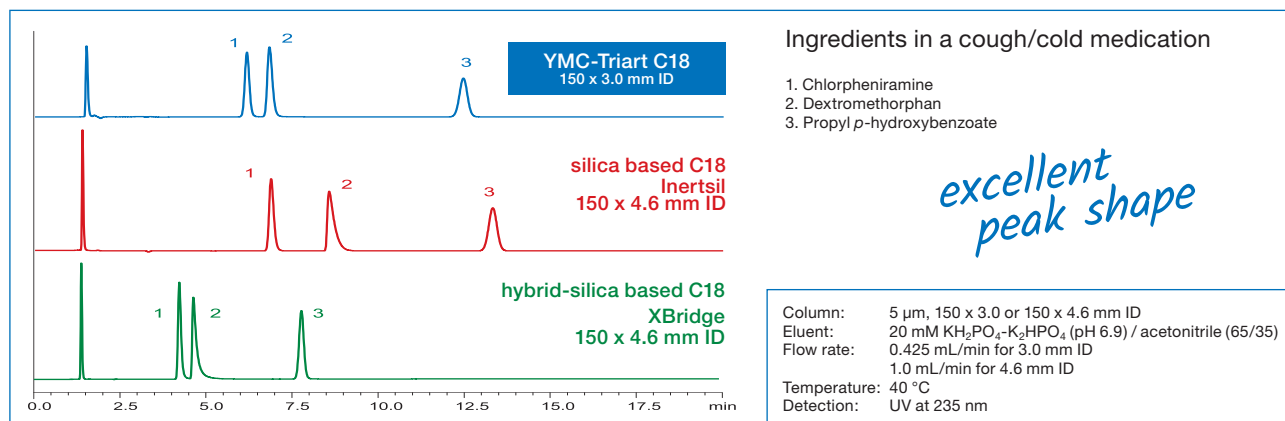


The chromatographic result of a “good” endcapping is demonstrated:



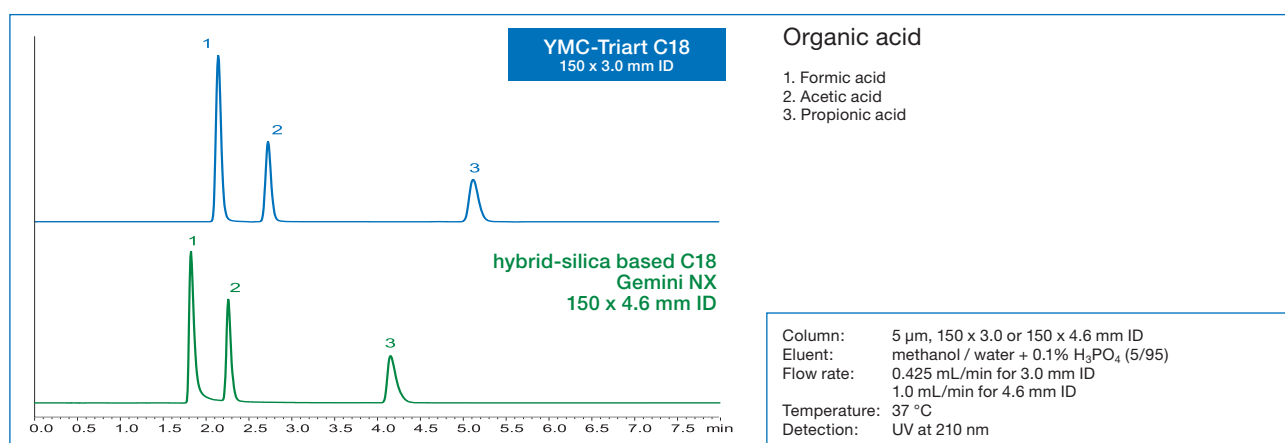
QC Data

Basic compounds*



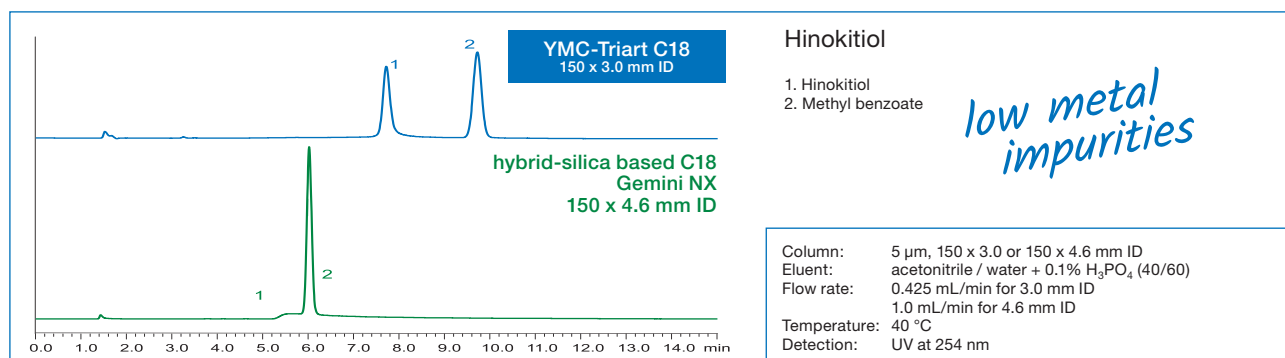
The innovative surface modification technology results in excellent peak shapes even for basic compounds that often exhibit peak tailing with conventional silica- and hybrid silica-based reversed phase columns.

Acidic compounds*



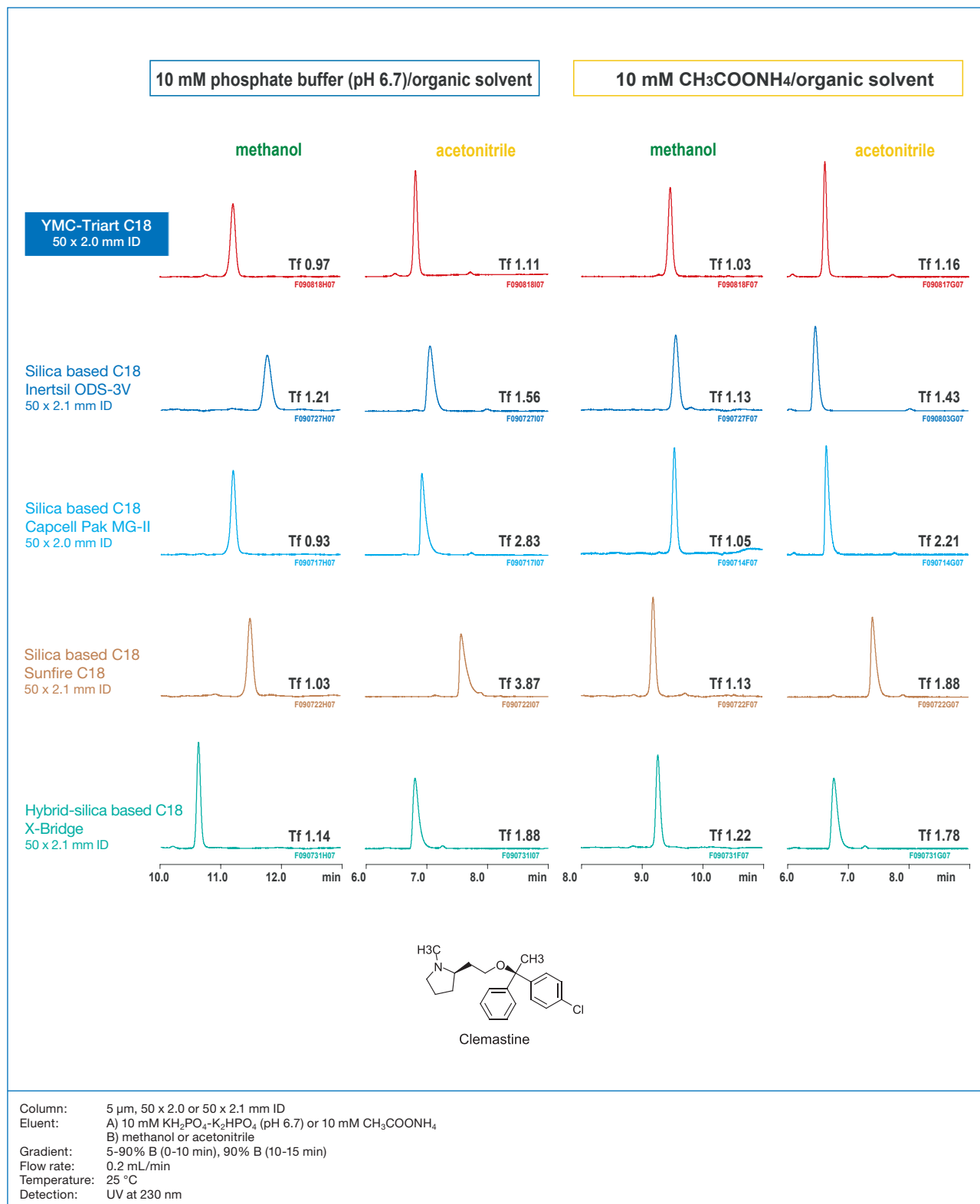
YMC-Triart phases are synthesised using methodology adapted from micro-reactor technology. This technique ensures a reduction of impurities that contribute to peak tailing during the analysis of some types acidic compounds.

Coordinating compounds*



YMC-Triart phases have an extremely low level of metal impurities, much lower than conventional products, ensuring excellent peak shape for coordination compounds.

Comparison of clemastine analysis*



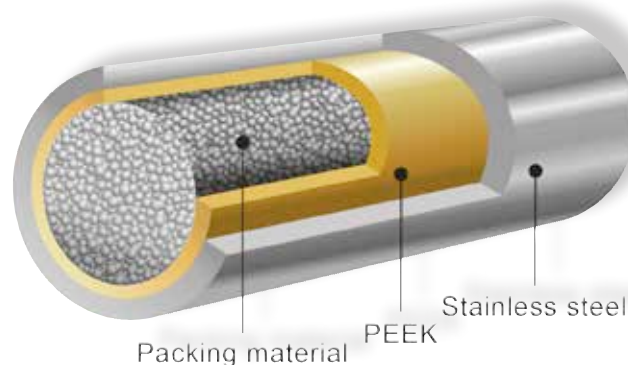
Clemastine is a well-known basic compound which readily exhibits peak tailing with conventional ODS columns. YMC-Triart C18 provides sharp separations with many different buffer/solvent compositions.

Column hardware for bioseparations and coordinating compounds

- Obtain excellent resolution and great sensitivity
- No carry-over effects
- Reproducible results day-after-day!

Specifications	
YMC-Triart Modifications	C18, C18 ExRS, C8, Bio C4, Phenyl, PFP, Diol-HILIC
Particle Size	1.9, 3, 5 μm
Inner layer	PEEK
Outer layer	Stainless steel
Frit	PEEK
Pressure limit	1.9 μm : 100 MPa (15,000 psi) 3/5 μm : 45 MPa (6,525 psi)

Special column connectors required. See below for recommendations.

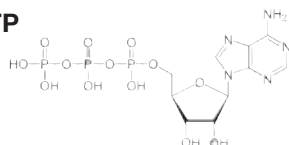


Metal coordinating compounds, which have a phosphate group in their structure, tend to show poor peak shape due to interactions with metals, such as the stainless steel in column bodies and frits. By using the metal-free column hardware, better peak shapes can

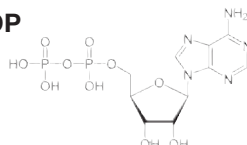
be expected. Nucleotides with phosphate groups also show better peak shapes when compared to the regular column hardware. The YMC-Triart metal-free column hardware is very suitable for highly sensitive analyses using LC/MS.

Improved sensitivity for coordination compounds*

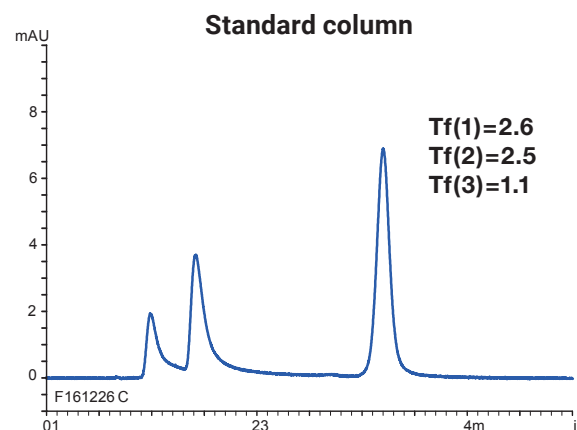
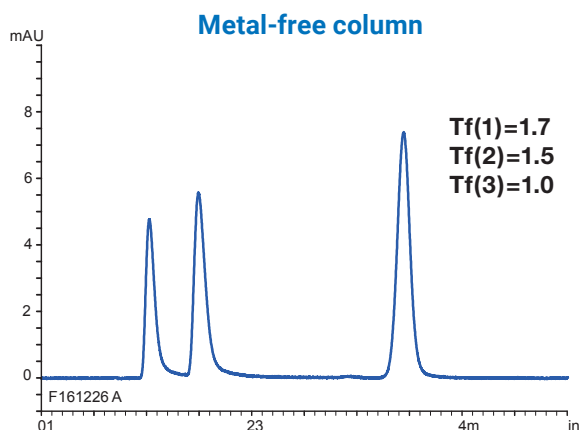
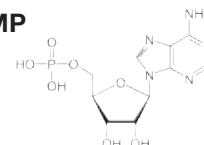
1. ATP



2. ADP



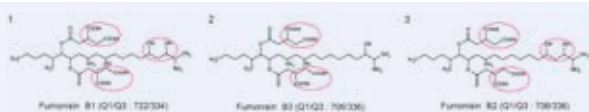
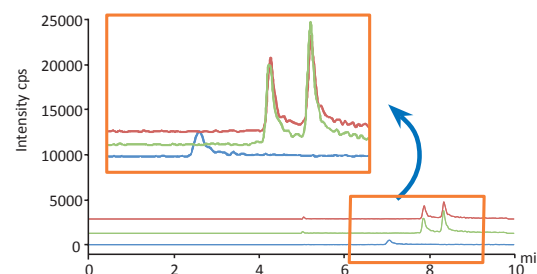
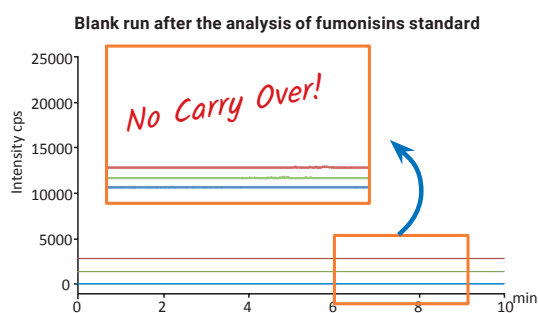
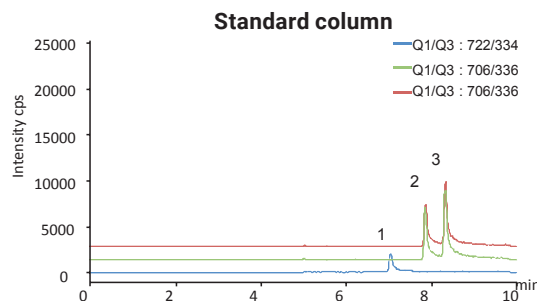
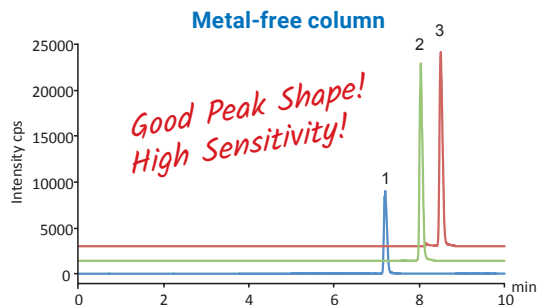
3. AMP



Column: YMC-Triart C18 (3 μm) 50 x 2.1 mm ID
Part Nos.: TA12S03-05Q1PTP (metal-free) or
TA12S03-05Q1PTH (regular hardware)
Eluent: 5 mM HCOONH_4
Flow rate: 0.21 mL/min
Temperature: 25°C
Detection: UV at 265 nm
Injection: 1 μL (10 mg/mL)

Column hardware for bioseparations and coordinating compounds

Improved LC/MS results*



○ = coordinating groups

Column: YMC-Triart C18 (3 μ m, 12 nm) 150 x 2.1 mm ID
 Part No.: TA12S03-15Q1PTP
 Eluent: A) water/HCOOH (100/0.1)
 B) acetonitrile
 25-50% B (0-5 min), 50% B (5-8 min), 50-90% B (8-10 min)
 Flow rate: 0.2 ml/min

Temperature: 40 °C
 Detection: ESI, positive
 Scheduled MRM (Metal free column)
 MRM (Standard column)
 Injection: 5 μ L (0.1 mg/mL)
 Instrument: LC) Shimadzu Prominence UFLC, MS) AB Sciex 3200 QTRAP

The YMC-Triart metal-free column showed excellent peak shapes when used to analyse fumonisins, while the regular column showed severe peak tailing due to interactions between the sample and the hardware. No carry over was observed when using the metal-free col-

umn, while the regular column showed sample carry over caused by adsorption of the sample on the hardware. The YMC-Triart metal-free column gives excellent peak shape for these coordination compounds and contributes to reliable analysis.

Column connectors

Recommendation	✓ ✓		✓	
Ferrule	no		replaceable	
Product	MarvelX™	MarvelXACT™	Handy connector 2	Hand-tight EXP® fitting
Manufacturer	IDEX Health & Science LLC	IDEX Health & Science LLC	YMC Co., Ltd.	Optimize Technologies, Inc.
				
Pressure rating	131 MPa / 1,310 bar	131 MPa / 1,310 bar	42 MPa / 420 bar	137 MPa / 1,370 bar
Product code	e.g. UPFP-6050250	e.g. UPFP-YM7050250	XRP0204	XRHTF-01

MarvelX (ACT) is a registered trademark of IDEX Health & Science LLC · EXP® is a registered trademark of Optimize Technologies, Inc.

Substance index

A		Benzethonium chloride	14	Delphinidin-3-O-galactoside	35	Guanine	48, 49, 51
Acesulfame K	11	Benzyl alcohol	7	Delphinidin-3-O-glucoside	35	Guanosine	52
4-Acetamidoacetophenone	15	Betablockers	13	Dextromethorphan	8, 10, 55, 57, 58	H	
2-Acetamidophenol	15, 16	Bevacizumab	40	Diazepam	23	Halosulfuronmethyl	9
Acetaminophene	16	D-Biotin	51	Dichlorophenols	19	Hexobarbital	27
Acetaminophenone	15	BSA	36, 37, 38	Dihydroquinine	27	Hinokitiol	55, 58
Acetanilide	15, 16	Bovine insulin	12	3,4-Dihydroxymandelic acid (DOMA)	25	L-Histidine (His)	42, 43
Acetic acid	50, 58	n-Butylbenzene	18	3,4-Dihydroxyphenylacetic acid (DOPAC)	25	Human insulin	12, 36
6''-O-Acetyldaidzin	34	Butyl benzoate	7, 10, 55	3,4-Dihydroxyphenylalanine (DOPA)	25	Homovanillic acid (HVA)	25
6''-O-Acetylgenistin	34	Brilliant blue FCF	24	1,2-Dimethoxyl benzene	15	Hydrochlorothiazide	26
6''-O-Acetylglycitin	34	C		25	2-Hydroxyacetophenone	15	
Acetylsalicylic acid	16	Caffeine	16, 53	13	2-Hydroxyalprazolam	23	
Aciclovir	30	Candesartan cilexetil	26	Diquat	13	Hydrocortison	22
Acidic compounds	50, 58	Carvedilol	26	Docosahexaenoic acid	19	5-Hydroxyindoleacetic acid (5HIAA)	25
Acrylic acid	50	Catecholamines	25	Dopamine hydrochloride (DA)	25	Hydroxychloroquine sulfate	16
Adalimumab	40	Chavidine	24	Doxycycline	32	21-Hydroxyprogesterone	22
Adenine	48, 49, 51	4-Chloroacetanilide	15	Duloxetine hydrochloride	17	5-Hydroxytryptamine hydrochloride (5HT)	25
Adenosine	48, 52	Chlorophenol	19	E		I	
Adenosine diphosphate (ADP)	60	Chloroquine phosphate	16	Eicosapentaenoic acid	19	Ibuprofen	18
Adenosine monophosphate (AMP)	60	Chlorpheniramine	8, 10, 55, 57, 58	β-Endorphin	39, 41	Imipramine	23
Adenosine triphosphate (ATP)	60	Chlorpheniramine maleate	14	γ-Endorphin	41	Insulin	12, 36, 37, 38, 39
Adrenaline hydrochloride (A)	25	Chlortetracycline	13, 32	Epinephrine hydrochloride	25	D-Isoascorbic acid	51, 53
Alanine (Ala)	43	α-Chymotrypsin	36, 38, 40	Erythorbic acid	34, 53	Isobutyl p-hydroxybenzoate	30
Alkaloids	29	α-Chymotrypsinogen	39	Erythromycin	12, 28	Isochavicine	24
4-Aminophenol	15	Cinchonine	27	Erythromycin estolate	28	Isoleucine (Ile)	43
4-Aminophenone	16	trans-Cinnamic acid	29	Erythromycin ethylsuccinate	28	Isopiperine	24
γ-Aminobutyric acid (GABA)	43	Citric acid	50	α-Estradiol	22	K	
Amitriptyline	18, 23	Citrulline (Cit)	43	β-Estradiol	22	Kaempferol	29
Amlodipine besilate	26, 30	Clemastine	59	Estriol	22	L	
Amyloid β	37	Clindamycin HCl	30	Estrone	22	Lactic acid	50
Angiotensin I	12	Clonazepam	23	Etizolam	31	Lactoferrin	37
Angiotensin II	12	Conalbumin	38	F		β-Lactoglobulin A	36, 38, 39
Angiotensin III	12	Coordinating compounds	58	Fexofenadine hydrochloride	22, 23	Leucin (Leu)	43
Anthocyanidins	35	Copper 8-quinolinolate	9	Flavonoids	29	Leu-Enkephalin	39
Anthocyanins	35	Corticosterone	22	Flazasulfuron	9	Lincomycin HCl	30
Arachidonic acid	19	Cortisol	22	Folic acid	51	Linoleic acid	19
L-Arginine (Arg)	42, 43	Cortisone	22	Formic acid	50, 58	α-Linolenic acid	19
Artificial sweeteners	11	Cyanidin	35	Fumaric acid	50	γ-Linolenic acid	19
L-Ascorbic acid	34, 51, 53	Cyanidin-3-O-arabinoside	35	Fumonisin B1-3	61	Luteolin	29
L-Ascorbic acid		Cyanidin-3-O-galactoside	35	G		Lysine (Lys)	43
2-glucoside	34, 51, 53	Cyanidin-3-O-glucoside	35	Genistein	34	Lysozyme	36, 38, 39
Asparagine (Asn)	43	Cyanocobalamin	34, 51, 53	Genistin	34	M	
L-Aspartic acid (Asp)	42, 43	Cyclamate Na	11	Glutamic acid (Glu)	43	Macrolide antibiotics	12
Asulam	9	Cysteine (Cys)	43	Glutamine (Gln)	43	Maleic acid sodium salt	14, 50
Atenolol	13	Cytidine	52	Glycidic acid	50	L-Malic acid	50
Atorvastatin calcium hydrate	26	Cytochrome-C	36, 38	Glycine (Gly)	43	Malonic acid	50
Atropine	27	Cytosine	48, 49, 51, 52	Glycitein	34	6''-O-Malonyldaidzin	34
Azoxystrobin	9	D		Glycitin	34		
B		Daidzein	29, 34	Glycyrrhizin acid ammonium salt	14		
Baicalein	29	Daidzin	34	Guaiacol	15		
Barbital	27	Delphinidin	35				
Barbiturates	27	Delphinidin-3-O-arabinoside	35				
Basic compounds	58						

Substance index

6''-O-Malonylgenistin	34	Ornithine HCl (Orn)	43	Propyl paraben	8, 10	Testosterone	18
6''-O-Malonylglucitin	34	Orotic acid	53	Propyl p-hydroxybenzoate	55, 58	Tetracycline antibiotics	13, 32
Malvidin	35	Oxalic acid	50	Pyridoxal HCl	51	Tetrahydrozoline HCl	14
Malvidin-3-O-arabinoside	35	Oxazepam	23	Pyridoxine HCl	14, 34, 51, 53	Thiamine HCl	34, 51, 53
Malvidin-3-O-galactoside	35	Oxine-copper	9	Pyrocatechol	15, 24	Thiram	9
Malvidin-3-O-glucoside	35	Oxytetracycline	13, 32			Threonine (Thr)	43
Mecoprop	9	Oxytocin	39, 41	Q		Thymine	48, 49, 51
Met-Enkephalin	41			Quinine	27	Toluol	23
Metformin hydrochloride	52	P		8-Quinololinol	18	Transferin	36
L- Methionine (Met)	42, 43	Palmitoleic acid	19			Triazolam	31
3-Methoxy-4-hydroxyphenylglycol (MHPG)	25	D-(+)-Pantothenic acid		R		Triclopyr	9
3-Methoxytyramine		calcium salt	51	Rebaudioside A	14	Triphenylene	18
hydrochloride (3MT)	25	Paracetamol	15	Resorcinole	24	Tryptophan (Trp)	25, 43
Methyl benzoate	15, 55, 58	Paraquat	13	Riboflavin	34, 51, 53	Tyrosine (Tyr)	25, 43
4-Methylcatechol	24	Pentobarbital	27	Ribonuclease A	38		
Methyl p-hydroxybenzoate	29	Peonidin	35	miRNA	45	U	
2-Methylresorcinol	24	Peonidin-3-O-arabinoside	35	siRNA	45	Uracil	12, 48, 49, 51, 52
2, 5-Methylresorcinol	24	Peonidin-3-O-galactoside	35			Uridine	52
Metoprolol	13	Peonidin-3-O-glucoside	35	S			
		Peptides	41, 42	Saccharin	11	V	
N		Pesticides	33	Salicylic acid	16, 29	Valine (Val)	43
Nadolol	13	Petunidin	35	Scopolamine	27	Valsartan	26
Naphazolin HCl	14	Petunidin-3-O-arabinoside	35	Secobarbital	27	Vanillylmandelic acid (VMA)	25
Naphthalene	18	Petunidin-3-O-galactoside	35	Serine (Ser)	43	Verapamil	52
Neostigmine methylsulfate	14	Petunidin-3-O-glucoside	35	Serotonin hydrochloride	25	Vitamin B1	34, 51, 53
Neurotensin	41	Phenacetine	16	Siduron	9	Vitamin B2	34, 51, 53
Nicotinamide	34, 51, 53	Phenobarbital	27	Soy isoflavones	34	Vitamin B3	34, 51, 53
Nicotinic acid	30, 34, 51, 53	Phenformin hydrochloride	52	Spiramycin	12	Vitamin B5	51
4-Nitrocatechol	24	Phenol	7, 15	Stevioside hydrate	14	Vitamin B6	34, 51, 53
4-Nitrophenol	15	Phenylalanine (Phe)	43	Succinic acid	50	Vitamin B7	51
Noradrenaline hydrochloride (NA)	25	Pindolol	13	Sulpha drugs	12	Vitamin B12	34, 51, 53
Norepinephrine hydrochloride	25	Piperine	24	Sulphamerazine	12	Vitamin C	34, 51, 53
Nortriptyline	23	Porcine insulin	12	Sulphamethoxazole	12	Vitamin D2	20, 21
		Prednisone	22	Sulphathiazole	12	Vitamin D3	20, 21
		Progesterone	22				
O		Proline (Pro)	43	T		W	
Oleic acid	19	Propranolol	13, 56	Tartaric acid	50	Water-soluble vitamins	34, 51, 53
Oligonucleotides	44, 45	Propionic acid	50, 58	Temazepam	23		
Organic acid	50, 58	n-Propylbenzene	18	o-Terphenyl	18		

* Application data by courtesy YMC Co., Ltd.

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Ordering information

YMC-Triart 1.9 µm, UHPLC columns (max. pressure 1,000 bar)

Phase	Column ID (mm)	Column length (mm)						Guard cartridges* with 5 mm length
		20	30	50	75	100	150	(pack of 3)
C18	2.0	TA12SP9-0202PT	TA12SP9-0302PT	TA12SP9-0502PT	TA12SP9-L502PT	TA12SP9-1002PT	TA12SP9-1502PT	TA12SP9-E5Q1CC**
	2.1	TA12SP9-02Q1PT	TA12SP9-03Q1PT	TA12SP9-05Q1PT	TA12SP9-L5Q1PT	TA12SP9-10Q1PT	TA12SP9-15Q1PT	TA12SP9-E5Q1CC**
	3.0	—	—	TA12SP9-0503PT	TA12SP9-L503PT	TA12SP9-1003PT	TA12SP9-1503PT	TA12SP9-E503CC
C18 ExRS	2.0	TAR08SP9-0202PT	TAR08SP9-0302PT	TAR08SP9-0502PT	TAR08SP9-L502PT	TAR08SP9-1002PT	TAR08SP9-1502PT	TAR08SP9-E5Q1CC**
	2.1	TAR08SP9-02Q1PT	TAR08SP9-03Q1PT	TAR08SP9-05Q1PT	TAR08SP9-L5Q1PT	TAR08SP9-10Q1PT	TAR08SP9-15Q1PT	TAR08SP9-E5Q1CC**
	3.0	—	—	TAR08SP9-0503PT	TAR08SP9-L503PT	TAR08SP9-1003PT	TAR08SP9-1503PT	TAR08SP9-E503CC
C8	2.0	TO12SP9-0202PT	TO12SP9-0302PT	TO12SP9-0502PT	TO12SP9-L502PT	TO12SP9-1002PT	TO12SP9-1502PT	TO12SP9-E5Q1CC**
	2.1	TO12SP9-02Q1PT	TO12SP9-03Q1PT	TO12SP9-05Q1PT	TO12SP9-L5Q1PT	TO12SP9-10Q1PT	TO12SP9-15Q1PT	TO12SP9-E5Q1CC**
	3.0	—	—	TO12SP9-0503PT	TO12SP9-L503PT	TO12SP9-1003PT	TO12SP9-1503PT	TO12SP9-E503CC
Bio C4	2.0	TB30SP9-0202PT	TB30SP9-0302PT	TB30SP9-0502PT	TB30SP9-L502PT	TB30SP9-1002PT	TB30SP9-1502PT	TB30SP9-E5Q1CC**
	2.1	TB30SP9-02Q1PT	TB30SP9-03Q1PT	TB30SP9-05Q1PT	TB30SP9-L5Q1PT	TB30SP9-10Q1PT	TB30SP9-15Q1PT	TB30SP9-E5Q1CC**
	3.0	—	—	TB30SP9-0503PT	TB30SP9-L503PT	TB30SP9-1003PT	TB30SP9-1503PT	TB30SP9-E503CC
Phenyl	2.0	TPH12SP9-0202PT	TPH12SP9-0302PT	TPH12SP9-0502PT	TPH12SP9-L502PT	TPH12SP9-1002PT	TPH12SP9-1502PT	TPH12SP9-E5Q1CC**
	2.1	TPH12SP9-02Q1PT	TPH12SP9-03Q1PT	TPH12SP9-05Q1PT	TPH12SP9-L5Q1PT	TPH12SP9-10Q1PT	TPH12SP9-15Q1PT	TPH12SP9-E5Q1CC**
	3.0	—	—	TPH12SP9-0503PT	TPH12SP9-L503PT	TPH12SP9-1003PT	TPH12SP9-1503PT	TPH12SP9-E503CC
PPF	2.0	TPF12SP9-0202PT	TPF12SP9-0302PT	TPF12SP9-0502PT	TPF12SP9-L502PT	TPF12SP9-1002PT	TPF12SP9-1502PT	TPF12SP9-E5Q1CC**
	2.1	TPF12SP9-02Q1PT	TPF12SP9-03Q1PT	TPF12SP9-05Q1PT	TPF12SP9-L5Q1PT	TPF12SP9-10Q1PT	TPF12SP9-15Q1PT	TPF12SP9-E5Q1CC**
	3.0	—	—	TPF12SP9-0503PT	TPF12SP9-L503PT	TPF12SP9-1003PT	TPF12SP9-1503PT	TPF12SP9-E503CC
Diol-HILIC	2.0	TDH12SP9-0202PT	TDH12SP9-0302PT	TDH12SP9-0502PT	TDH12SP9-L502PT	TDH12SP9-1002PT	TDH12SP9-1502PT	TDH12SP9-E5Q1CC**
	2.1	TDH12SP9-02Q1PT	TDH12SP9-03Q1PT	TDH12SP9-05Q1PT	TDH12SP9-L5Q1PT	TDH12SP9-10Q1PT	TDH12SP9-15Q1PT	TDH12SP9-E5Q1CC**
	3.0	—	—	TDH12SP9-0503PT	TDH12SP9-L503PT	TDH12SP9-1003PT	—	—

*Guard cartridge holder required, part no. XPCHUHP

**Guard cartridge: 2.1 mm ID

YMC-Triart 1.9 µm, metal-free UHPLC columns (max. pressure 1,000 bar)

Phase	Column ID (mm)	Column length (mm)		
		50	100	150
C18	2.1	TA12SP9-05Q1PTP	TA12SP9-10Q1PTP	TA12SP9-15Q1PTP
C18 ExRS	2.1	TAR08SP9-05Q1PTP	TAR08SP9-10Q1PTP	TAR08SP9-15Q1PTP
C8	2.1	TO12SP9-05Q1PTP	TO12SP9-10Q1PTP	TO12SP9-15Q1PTP
Bio C4	2.1	TB30SP9-05Q1PTP	TB30SP9-10Q1PTP	TB30SP9-15Q1PTP
Phenyl	2.1	TPH12SP9-05Q1PTP	TPH12SP9-10Q1PTP	TPH12SP9-15Q1PTP
PPF	2.1	TPF12SP9-05Q1PTP	TPF12SP9-10Q1PTP	TPF12SP9-15Q1PTP
Diol-HILIC	2.1	TDH12SP9-05Q1PTP	TDH12SP9-10Q1PTP	TDH12SP9-15Q1PTP

Ordering information

YMC-Triart 1.9 µm, 1/16" | 1/32" fitting*, microLC capillary columns (max. pressure 600 bar)

Phase	Column ID (µm)	Column length (mm)				Guard cartridges** with 5 mm length
		50	75	100	150	
C18	300	TA12SP9-05H0AU	TA12SP9-L5H0AU	TA12SP9-10H0AU	TA12SP9-15H0AU	TA12SP9-E5H0AU
	500	TA12SP9-05J0AU	TA12SP9-L5J0AU	TA12SP9-10J0AU	TA12SP9-15J0AU	TA12SP9-E5J0AU
C18 ExRS	300	TAR08SP9-05H0AU	TAR08SP9-L5H0AU	TAR08SP9-10H0AU	TAR08SP9-15H0AU	TAR08SP9-E5H0AU
	500	TAR08SP9-05J0AU	TAR08SP9-L5J0AU	TAR08SP9-10J0AU	TAR08SP9-15J0AU	TAR08SP9-E5J0AU
C8	300	T012SP9-05H0AU	T012SP9-L5H0AU	T012SP9-10H0AU	T012SP9-15H0AU	T012SP9-E5H0AU
	500	T012SP9-05J0AU	T012SP9-L5J0AU	T012SP9-10J0AU	T012SP9-15J0AU	T012SP9-E5J0AU
Bio C4	300	TB30SP9-05H0AU	TB30SP9-L5H0AU	TB30SP9-10H0AU	TB30SP9-15H0AU	TB30SP9-E5H0AU
	500	TB30SP9-05J0AU	TB30SP9-L5J0AU	TB30SP9-10J0AU	TB30SP9-15J0AU	TB30SP9-E5J0AU
Phenyl	300	TPH12SP9-05H0AU	TPH12SP9-L5H0AU	TPH12SP9-10H0AU	TPH12SP9-15H0AU	TPH12SP9-E5H0AU
	500	TPH12SP9-05J0AU	TPH12SP9-L5J0AU	TPH12SP9-10J0AU	TPH12SP9-15J0AU	TPH12SP9-E5J0AU
PFP	300	TPF12SP9-05H0AU	TPF12SP9-L5H0AU	TPF12SP9-10H0AU	TPF12SP9-15H0AU	TPF12SP9-E5H0AU
	500	TPF12SP9-05J0AU	TPF12SP9-L5J0AU	TPF12SP9-10J0AU	TPF12SP9-15J0AU	TPF12SP9-E5J0AU
Diol-HILIC	300	TDH12SP9-05H0AU	TDH12SP9-L5H0AU	TDH12SP9-10H0AU	TDH12SP9-15H0AU	TDH12SP9-E5H0AU
	500	TDH12SP9-05J0AU	TDH12SP9-L5J0AU	TDH12SP9-10J0AU	TDH12SP9-15J0AU	TDH12SP9-E5J0AU

* YMC capillary columns are available with 1/16" (10-32 thread) or with 1/32" (6-40 thread) connections.

The connection size is indicated by the terminal letters of the order code:

1/16" fittings end with AU; 1/32" fittings end with RU. For ordering 1/32" connections, simply exchange AU by RU.

** no holder required, comes with a column coupler

YMC-Triart 3 µm, high pressure rated analytical columns (max. pressure 450 bar)

Phase	Column ID (mm)	Column length (mm)							Guard cartridges* with 10 mm length
		20	33	50	75	100	150	250	
C18	2.1	TA12S03-02Q1PTH	TA12S03-H3Q1PTH	TA12S03-05Q1PTH	TA12S03-L5Q1PTH	TA12S03-10Q1PTH	TA12S03-15Q1PTH	—	TA12S03-01Q1GC
	3.0	—	—	TA12S03-05Q3PTH	TA12S03-L5Q3PTH	TA12S03-10Q3PTH	TA12S03-15Q3PTH	—	TA12S03-01Q3GC
	4.6	—	TA12S03-H346PTH	TA12S03-0546PTH	TA12S03-L546PTH	TA12S03-1046PTH	TA12S03-1546PTH	TA12S03-2546PTH	TA12S03-01Q4GC
C18 ExRS	2.1	TAR08S03-02Q1PTH	TAR08S03-H3Q1PTH	TAR08S03-05Q1PTH	TAR08S03-L5Q1PTH	TAR08S03-10Q1PTH	TAR08S03-15Q1PTH	—	TAR08S03-01Q1GC
	3.0	—	—	TAR08S03-05Q3PTH	TAR08S03-L5Q3PTH	TAR08S03-10Q3PTH	TAR08S03-15Q3PTH	—	TAR08S03-01Q3GC
	4.6	—	TAR08S03-H346PTH	TAR08S03-0546PTH	TAR08S03-L546PTH	TAR08S03-1046PTH	TAR08S03-1546PTH	TAR08S03-2546PTH	TAR08S03-01Q4GC
C8	2.1	T012S03-02Q1PTH	T012S03-H3Q1PTH	T012S03-05Q1PTH	T012S03-L5Q1PTH	T012S03-10Q1PTH	T012S03-15Q1PTH	—	T012S03-01Q1GC
	3.0	—	—	T012S03-05Q3PTH	T012S03-L5Q3PTH	T012S03-10Q3PTH	T012S03-15Q3PTH	—	T012S03-01Q3GC
	4.6	—	T012S03-H346PTH	T012S03-0546PTH	T012S03-L546PTH	T012S03-1046PTH	T012S03-1546PTH	T012S03-2546PTH	T012S03-01Q4GC
Bio C4	2.1	TB30S03-02Q1PTH	TB30S03-H3Q1PTH	TB30S03-05Q1PTH	TB30S03-L5Q1PTH	TB30S03-10Q1PTH	TB30S03-15Q1PTH	—	TB30S03-01Q1GC
	3.0	—	—	TB30S03-05Q3PTH	TB30S03-L5Q3PTH	TB30S03-10Q3PTH	TB30S03-15Q3PTH	—	TB30S03-01Q3GC
	4.6	—	TB30S03-H346PTH	TB30S03-0546PTH	TB30S03-L546PTH	TB30S03-1046PTH	TB30S03-1546PTH	TB30S03-2546PTH	TB30S03-01Q4GC
Phenyl	2.1	TPH12S03-02Q1PTH	TPH12S03-H3Q1PTH	TPH12S03-05Q1PTH	TPH12S03-L5Q1PTH	TPH12S03-10Q1PTH	TPH12S03-15Q1PTH	—	TPH12S03-01Q1GC
	3.0	—	—	TPH12S03-05Q3PTH	TPH12S03-L5Q3PTH	TPH12S03-10Q3PTH	TPH12S03-15Q3PTH	—	TPH12S03-01Q3GC
	4.6	—	TPH12S03-H346PTH	TPH12S03-0546PTH	TPH12S03-L546PTH	TPH12S03-1046PTH	TPH12S03-1546PTH	TPH12S03-2546PTH	TPH12S03-01Q4GC
PFP	2.1	TPF12S03-02Q1PTH	TPF12S03-H3Q1PTH	TPF12S03-05Q1PTH	TPF12S03-L5Q1PTH	TPF12S03-10Q1PTH	TPF12S03-15Q1PTH	—	TPF12S03-01Q1GC
	3.0	—	—	TPF12S03-05Q3PTH	TPF12S03-L5Q3PTH	TPF12S03-10Q3PTH	TPF12S03-15Q3PTH	—	TPF12S03-01Q3GC
	4.6	—	TPF12S03-H346PTH	TPF12S03-0546PTH	TPF12S03-L546PTH	TPF12S03-1046PTH	TPF12S03-1546PTH	TPF12S03-2546PTH	TPF12S03-01Q4GC
Diol-HILIC	2.1	TDH12S03-02Q1PTH	TDH12S03-H3Q1PTH	TDH12S03-05Q1PTH	TDH12S03-L5Q1PTH	TDH12S03-10Q1PTH	TDH12S03-15Q1PTH	—	TDH12S03-01Q1GC
	3.0	—	—	TDH12S03-05Q3PTH	TDH12S03-L5Q3PTH	TDH12S03-10Q3PTH	TDH12S03-15Q3PTH	—	TDH12S03-01Q3GC
	4.6	—	TDH12S03-H346PTH	TDH12S03-0546PTH	TDH12S03-L546PTH	TDH12S03-1046PTH	TDH12S03-1546PTH	TDH12S03-2546PTH	TDH12S03-01Q4GC

*Guard cartridge holder required, part no. XPGCH-Q1

Ordering information

YMC-Triart 3 µm, metal-free analytical columns (max. pressure 450 bar)

Phase	Column ID (mm)	Column length (mm)		
		50	100	150
C18	2.1	TA12S03-05Q1PTP	TA12S03-10Q1PTP	TA12S03-15Q1PTP
	4.6	TA12S03-0546PTP	TA12S03-1046PTP	TA12S03-1546PTP
C18 ExRS	2.1	TAR08S03-05Q1PTP	TAR08S03-10Q1PTP	TAR08S03-15Q1PTP
	4.6	TAR08S03-0546PTP	TAR08S03-1046PTP	TAR08S03-1546PTP
C8	2.1	TO12S03-05Q1PTP	TO12S03-10Q1PTP	TO12S03-15Q1PTP
	4.6	TO12S03-0546PTP	TO12S03-1046PTP	TO12S03-1546PTP
Bio C4	2.1	TB30S03-05Q1PTP	TB30S03-10Q1PTP	TB30S03-15Q1PTP
	4.6	TB30S03-0546PTP	TB30S03-1046PTP	TB30S03-1546PTP
Phenyl	2.1	TPH12S03-05Q1PTP	TPH12S03-10Q1PTP	TPH12S03-15Q1PTP
	4.6	TPH12S03-0546PTP	TPH12S03-1046PTP	TPH12S03-1546PTP
PFP	2.1	TPF12S03-05Q1PTP	TPF12S03-10Q1PTP	TPF12S03-15Q1PTP
	4.6	TPF12S03-0546PTP	TPF12S03-1046PTP	TPF12S03-1546PTP
Diol-HILIC	2.1	TDH12S03-05Q1PTP	TDH12S03-10Q1PTP	TDH12S03-15Q1PTP
	4.6	TDH12S03-0546PTP	TDH12S03-1046PTP	TDH12S03-1546PTP

YMC-Triart 3 µm, analytical columns (max. pressure 200/250 bar)

Phase	Column ID (mm)	Column length (mm)							Guard cartridges* with 10 mm length
		20	30	50	75	100	150	250	
C18	2.0	TA12S03-0202WT	TA12S03-0302WT	TA12S03-0502WT	TA12S03-L502WT	TA12S03-1002WT	TA12S03-1502WT	—	TA12S03-01Q1GC
	3.0	—	—	TA12S03-0503WT	TA12S03-L503WT	TA12S03-1003WT	TA12S03-1503WT	—	TA12S03-0103GC
	4.6	—	—	TA12S03-0546WT	TA12S03-L546WT	TA12S03-1046WT	TA12S03-1546WT	TA12S03-2546WT	TA12S03-0104GC
C8	2.0	TO12S03-0202WT	TO12S03-0302WT	TO12S03-0502WT	TO12S03-L502WT	TO12S03-1002WT	TO12S03-1502WT	—	TO12S03-01Q1GC
	3.0	—	—	TO12S03-0503WT	TO12S03-L503WT	TO12S03-1003WT	TO12S03-1503WT	—	TO12S03-0103GC
	4.6	—	—	TO12S03-0546WT	TO12S03-L546WT	TO12S03-1046WT	TO12S03-1546WT	TO12S03-2546WT	TO12S03-0104GC
Phenyl	2.0	TPH12S03-0202WT	TPH12S03-0302WT	TPH12S03-0502WT	TPH12S03-L502WT	TPH12S03-1002WT	TPH12S03-1502WT	—	TPH12S03-01Q1GC
	3.0	—	—	TPH12S03-0503WT	TPH12S03-L503WT	TPH12S03-1003WT	TPH12S03-1503WT	—	TPH12S03-0103GC
	4.6	—	—	TPH12S03-0546WT	TPH12S03-L546WT	TPH12S03-1046WT	TPH12S03-1546WT	TPH12S03-2546WT	TPH12S03-0104GC
PFP	2.0	TPF12S03-0202WT	TPF12S03-0302WT	TPF12S03-0502WT	TPF12S03-L502WT	TPF12S03-1002WT	TPF12S03-1502WT	—	TPF12S03-01Q1GC
	3.0	—	—	TPF12S03-0503WT	TPF12S03-L503WT	TPF12S03-1003WT	TPF12S03-1503WT	—	TPF12S03-0103GC
	4.6	—	—	TPF12S03-0546WT	TPF12S03-L546WT	TPF12S03-1046WT	TPF12S03-1546WT	TPF12S03-2546WT	TPF12S03-0104GC
Diol-HILIC	2.0	TDH12S03-0202WT	TDH12S03-0302WT	TDH12S03-0502WT	TDH12S03-L502WT	TDH12S03-1002WT	TDH12S03-1502WT	—	TDH12S03-01Q1GC
	3.0	—	—	TDH12S03-0503WT	TDH12S03-L503WT	TDH12S03-1003WT	TDH12S03-1503WT	—	TDH12S03-0103GC
	4.6	—	—	TDH12S03-0546WT	TDH12S03-L546WT	TDH12S03-1046WT	TDH12S03-1546WT	TDH12S03-2546WT	TDH12S03-0104GC

*Guard cartridge holder required, part no. XPGCH-Q1

Ordering information

YMC-Triart 3 µm, 1/16" | 1/32" fitting*, microLC capillary columns (max. pressure 550 bar)

Phase	Column ID (µm)	Column length (mm)				Guard columns** with 5 mm length
		50	75	100	150	
C18	75	TA12S03-05E8AU	TA12S03-L5E8AU	TA12S03-10E8AU	TA12S03-15E8AU	—
	100	TA12S03-05F0AU	TA12S03-L5F0AU	TA12S03-10F0AU	TA12S03-15F0AU	—
	300	TA12S03-05H0AU	TA12S03-L5H0AU	TA12S03-10H0AU	TA12S03-15H0AU	TA12S03-E5H0AU
	500	TA12S03-05J0AU	TA12S03-L5J0AU	TA12S03-10J0AU	TA12S03-15J0AU	TA12S03-E5J0AU
C18ExRS	75	TAR08S03-05E8AU	TAR08S03-L5E8AU	TAR08S03-10E8AU	TAR08S03-15E8AU	—
	100	TAR08S03-05F0AU	TAR08S03-L5F0AU	TAR08S03-10F0AU	TAR08S03-15F0AU	—
	300	TAR08S03-05H0AU	TAR08S03-L5H0AU	TAR08S03-10H0AU	TAR08S03-15H0AU	TAR08S03-E5H0AU
	500	TAR08S03-05J0AU	TAR08S03-L5J0AU	TAR08S03-10J0AU	TAR08S03-15J0AU	TAR08S03-E5J0AU
C8	75	T012S03-05E8AU	T012S03-L5E8AU	T012S03-10E8AU	T012S03-15E8AU	—
	100	T012S03-05F0AU	T012S03-L5F0AU	T012S03-10F0AU	T012S03-15F0AU	—
	300	T012S03-05H0AU	T012S03-L5H0AU	T012S03-10H0AU	T012S03-15H0AU	T012S03-E5H0AU
	500	T012S03-05J0AU	T012S03-L5J0AU	T012S03-10J0AU	T012S03-15J0AU	T012S03-E5J0AU
Bio C4	75	TB30S03-05E8AU	TB30S03-L5E8AU	TB30S03-10E8AU	TB30S03-15E8AU	—
	100	TB30S03-05F0AU	TB30S03-L5F0AU	TB30S03-10F0AU	TB30S03-15F0AU	—
	300	TB30S03-05H0AU	TB30S03-L5H0AU	TB30S03-10H0AU	TB30S03-15H0AU	TB30S03-E5H0AU
	500	TB30S03-05J0AU	TB30S03-L5J0AU	TB30S03-10J0AU	TB30S03-15J0AU	TB30S03-E5J0AU
Phenyl	75	TPH12S03-05E8AU	TPH12S03-L5E8AU	TPH12S03-10E8AU	TPH12S03-15E8AU	—
	100	TPH12S03-05F0AU	TPH12S03-L5F0AU	TPH12S03-10F0AU	TPH12S03-15F0AU	—
	300	TPH12S03-05H0AU	TPH12S03-L5H0AU	TPH12S03-10H0AU	TPH12S03-15H0AU	TPH12S03-E5H0AU
	500	TPH12S03-05J0AU	TPH12S03-L5J0AU	TPH12S03-10J0AU	TPH12S03-15J0AU	TPH12S03-E5J0AU
PFP	75	TPF12S03-05E8AU	TPF12S03-L5E8AU	TPF12S03-10E8AU	TPF12S03-15E8AU	—
	100	TPF12S03-05F0AU	TPF12S03-L5F0AU	TPF12S03-10F0AU	TPF12S03-15F0AU	—
	300	TPF12S03-05H0AU	TPF12S03-L5H0AU	TPF12S03-10H0AU	TPF12S03-15H0AU	TPF12S03-E5H0AU
	500	TPF12S03-05J0AU	TPF12S03-L5J0AU	TPF12S03-10J0AU	TPF12S03-15J0AU	TPF12S03-E5J0AU
Diol-HILIC	75	TDH12S03-05E8AU	TDH12S03-L5E8AU	TDH12S03-10E8AU	TDH12S03-15E8AU	—
	100	TDH12S03-05F0AU	TDH12S03-L5F0AU	TDH12S03-10F0AU	TDH12S03-15F0AU	—
	300	TDH12S03-05H0AU	TDH12S03-L5H0AU	TDH12S03-10H0AU	TDH12S03-15H0AU	TDH12S03-E5H0AU
	500	TDH12S03-05J0AU	TDH12S03-L5J0AU	TDH12S03-10J0AU	TDH12S03-15J0AU	TDH12S03-E5J0AU

* YMC capillary columns are available with 1/16" (10-32 thread) or with 1/32" (6-40 thread) connections.

The connection size is indicated by the terminal letters of the order code:

1/16" fittings end with AU; 1/32" fittings end with RU. For ordering 1/32" connections, simply exchange AU by RU.

** no holder required, comes with a column coupler

YMC-Triart 1.9 and 3 µm Method Development Kits

Phases	Dimensions	Particle size	Part No.
C18 / C18 ExRS / Phenyl	50 x 2.1 mm	1.9 µm	TATARTPHSP9-05Q1PT
C18 / C8 / Phenyl		3 µm	TATARTPHS03-05Q1PTH
		1.9 µm	TATOTPHSP9-05Q1PT
		3 µm	TATOTPHS03-05Q1PTH
		C18 / PFP / Diol-HILIC	1.9 µm
3 µm			TATPFTDHS03-05Q1PTH

Ordering information

YMC-Triart 5 µm, high pressure rated analytical columns (max. pressure 450 bar)

Phase	Column ID (mm)	Column length (mm)							Guard cartridges* with 10 mm length
		20	33	50	75	100	150	250	
C18	2.1	TA12S05-02Q1PTH	TA12S05-H3Q1PTH	TA12S05-05Q1PTH	TA12S05-L5Q1PTH	TA12S05-10Q1PTH	TA12S05-15Q1PTH	—	TA12S05-01Q1GC
	3.0	—	—	TA12S05-05Q3PTH	TA12S05-L5Q3PTH	TA12S05-10Q3PTH	TA12S05-15Q3PTH	—	TA12S05-01Q3GC
	4.6	—	TA12S05-H346PTH	TA12S05-0546PTH	TA12S05-L546PTH	TA12S05-1046PTH	TA12S05-1546PTH	TA12S05-2546PTH	TA12S05-01Q4GC
C18 ExRS	2.1	TAR08S05-02Q1PTH	TAR08S05-H3Q1PTH	TAR08S05-05Q1PTH	TAR08S05-L5Q1PTH	TAR08S05-10Q1PTH	TAR08S05-15Q1PTH	—	TAR08S05-01Q1GC
	3.0	—	—	TAR08S05-05Q3PTH	TAR08S05-L5Q3PTH	TAR08S05-10Q3PTH	TAR08S05-15Q3PTH	—	TAR08S05-01Q3GC
	4.6	—	TAR08S05-H346PTH	TAR08S05-0546PTH	TAR08S05-L546PTH	TAR08S05-1046PTH	TAR08S05-1546PTH	TAR08S05-2546PTH	TAR08S05-01Q4GC
C8	2.1	TO12S05-02Q1PTH	TO12S05-H3Q1PTH	TO12S05-05Q1PTH	TO12S05-L5Q1PTH	TO12S05-10Q1PTH	TO12S05-15Q1PTH	—	TO12S05-01Q1GC
	3.0	—	—	TO12S05-05Q3PTH	TO12S05-L5Q3PTH	TO12S05-10Q3PTH	TO12S05-15Q3PTH	—	TO12S05-01Q3GC
	4.6	—	TO12S05-H346PTH	TO12S05-0546PTH	TO12S05-L546PTH	TO12S05-1046PTH	TO12S05-1546PTH	TO12S05-2546PTH	TO12S05-01Q4GC
Bio C4	2.1	TB30S05-02Q1PTH	TB30S05-H3Q1PTH	TB30S05-05Q1PTH	TB30S05-L5Q1PTH	TB30S05-10Q1PTH	TB30S05-15Q1PTH	—	TB30S05-01Q1GC
	3.0	—	—	TB30S05-05Q3PTH	TB30S05-L5Q3PTH	TB30S05-10Q3PTH	TB30S05-15Q3PTH	—	TB30S05-01Q3GC
	4.6	—	TB30S05-H346PTH	TB30S05-0546PTH	TB30S05-L546PTH	TB30S05-1046PTH	TB30S05-1546PTH	TB30S05-2546PTH	TB30S05-01Q4GC
Phenyl	2.1	TPH12S05-02Q1PTH	TPH12S05-H3Q1PTH	TPH12S05-05Q1PTH	TPH12S05-L5Q1PTH	TPH12S05-10Q1PTH	TPH12S05-15Q1PTH	—	TPH12S05-01Q1GC
	3.0	—	—	TPH12S05-05Q3PTH	TPH12S05-L5Q3PTH	TPH12S05-10Q3PTH	TPH12S05-15Q3PTH	—	TPH12S05-01Q3GC
	4.6	—	TPH12S05-H346PTH	TPH12S05-0546PTH	TPH12S05-L546PTH	TPH12S05-1046PTH	TPH12S05-1546PTH	TPH12S05-2546PTH	TPH12S05-01Q4GC
PFP	2.1	TPF12S05-02Q1PTH	TPF12S05-H3Q1PTH	TPF12S05-05Q1PTH	TPF12S05-L5Q1PTH	TPF12S05-10Q1PTH	TPF12S05-15Q1PTH	—	TPF12S05-01Q1GC
	3.0	—	—	TPF12S05-05Q3PTH	TPF12S05-L5Q3PTH	TPF12S05-10Q3PTH	TPF12S05-15Q3PTH	—	TPF12S05-01Q3GC
	4.6	—	TPF12S05-H346PTH	TPF12S05-0546PTH	TPF12S05-L546PTH	TPF12S05-1046PTH	TPF12S05-1546PTH	TPF12S05-2546PTH	TPF12S05-01Q4GC
Diol-HILIC	2.1	TDH12S05-02Q1PTH	TDH12S05-H3Q1PTH	TDH12S05-05Q1PTH	TDH12S05-L5Q1PTH	TDH12S05-10Q1PTH	TDH12S05-15Q1PTH	—	TDH12S05-01Q1GC
	3.0	—	—	TDH12S05-05Q3PTH	TDH12S05-L5Q3PTH	TDH12S05-10Q3PTH	TDH12S05-15Q3PTH	—	TDH12S05-01Q3GC
	4.6	—	TDH12S05-H346PTH	TDH12S05-0546PTH	TDH12S05-L546PTH	TDH12S05-1046PTH	TDH12S05-1546PTH	TDH12S05-2546PTH	TDH12S05-01Q4GC

YMC-Triart 5 µm, metal-free analytical columns (max. pressure 450 bar)

Phase	Column ID (mm)	Column length (mm)		
		50	100	150
C18	2.1	TA12S05-05Q1PTP	TA12S05-10Q1PTP	TA12S05-15Q1PTP
	4.6	TA12S05-0546PTP	TA12S05-1046PTP	TA12S05-1546PTP
C18 ExRS	2.1	TAR08S05-05Q1PTP	TAR08S05-10Q1PTP	TAR08S05-15Q1PTP
	4.6	TAR08S05-0546PTP	TAR08S05-1046PTP	TAR08S05-1546PTP
C8	2.1	TO12S05-05Q1PTP	TO12S05-10Q1PTP	TO12S05-15Q1PTP
	4.6	TO12S05-0546PTP	TO12S05-1046PTP	TO12S05-1546PTP
Bio C4	2.1	TB30S05-05Q1PTP	TB30S05-10Q1PTP	TB30S05-15Q1PTP
	4.6	TB30S05-0546PTP	TB30S05-1046PTP	TB30S05-1546PTP
Phenyl	2.1	TPH12S05-05Q1PTP	TPH12S05-10Q1PTP	TPH12S05-15Q1PTP
	4.6	TPH12S05-0546PTP	TPH12S05-1046PTP	TPH12S05-1546PTP
PFP	2.1	TPF12S05-05Q1PTP	TPF12S05-10Q1PTP	TPF12S05-15Q1PTP
	4.6	TPF12S05-0546PTP	TPF12S05-1046PTP	TPF12S05-1546PTP
Diol-HILIC	2.1	TDH12S05-05Q1PTP	TDH12S05-10Q1PTP	TDH12S05-15Q1PTP
	4.6	TDH12S05-0546PTP	TDH12S05-1046PTP	TDH12S05-1546PTP

Ordering information

YMC-Triart 5 µm analytical columns (max. pressure 200/250 bar)

Phase	Column ID (mm)	Column length (mm)							Guard cartridges* with 10 mm length
		20	30	50	75	100	150	250	
C18	2.0	TA12S05-0202WT	TA12S05-0302WT	TA12S05-0502WT	TA12S05-L502WT	TA12S05-1002WT	TA12S05-1502WT	—	TA12S05-01Q1GC
	3.0	—	—	TA12S05-0503WT	TA12S05-L503WT	TA12S05-1003WT	TA12S05-1503WT	—	TA12S05-0103GC
	4.6	—	—	TA12S05-0546WT	TA12S05-L546WT	TA12S05-1046WT	TA12S05-1546WT	TA12S05-2546WT	TA12S05-0104GC
	10**	—	—	—	—	—	TA12S05-1510WT	TA12S05-2510WT	TA12S05-0110CC
C8	2.0	T012S05-0202WT	T012S05-0302WT	T012S05-0502WT	T012S05-L502WT	T012S05-1002WT	T012S05-1502WT	—	T012S05-01Q1GC
	3.0	—	—	T012S05-0503WT	T012S05-L503WT	T012S05-1003WT	T012S05-1503WT	—	T012S05-0103GC
	4.6	—	—	T012S05-0546WT	T012S05-L546WT	T012S05-1046WT	T012S05-1546WT	T012S05-2546WT	T012S05-0104GC
	10**	—	—	—	—	—	T012S05-1510WT	T012S05-2510WT	T012S05-0110CC
Phenyl	2.0	TPH12S05-0202WT	TPH12S05-0302WT	TPH12S05-0502WT	TPH12S05-L502WT	TPH12S05-1002WT	TPH12S05-1502WT	—	TPH12S05-01Q1GC
	3.0	—	—	TPH12S05-0503WT	TPH12S05-L503WT	TPH12S05-1003WT	TPH12S05-1503WT	—	TPH12S05-0103GC
	4.6	—	—	TPH12S05-0546WT	TPH12S05-L546WT	TPH12S05-1046WT	TPH12S05-1546WT	TPH12S05-2546WT	TPH12S05-0104GC
	10**	—	—	—	—	—	TPH12S05-1510WT	TPH12S05-2510WT	TPH12S05-0110CC
PFP	2.0	TPF12S05-0202WT	TPF12S05-0302WT	TPF12S05-0502WT	TPF12S05-L502WT	TPF12S05-1002WT	TPF12S05-1502WT	—	TPF12S05-01Q1GC
	3.0	—	—	TPF12S05-0503WT	TPF12S05-L503WT	TPF12S05-1003WT	TPF12S05-1503WT	—	TPF12S05-0103GC
	4.6	—	—	TPF12S05-0546WT	TPF12S05-L546WT	TPF12S05-1046WT	TPF12S05-1546WT	TPF12S05-2546WT	TPF12S05-0104GC
	10**	—	—	—	—	—	TPF12S05-1510WT	TPF12S05-2510WT	TPF12S05-0110CC
Diol-HILIC	2.0	TDH12S05-0202WT	TDH12S05-0302WT	TDH12S05-0502WT	TDH12S05-L502WT	TDH12S05-1002WT	TDH12S05-1502WT	—	TDH12S05-01Q1GC
	3.0	—	—	TDH12S05-0503WT	TDH12S05-L503WT	TDH12S05-1003WT	TDH12S05-1503WT	—	TDH12S05-0103GC
	4.6	—	—	TDH12S05-0546WT	TDH12S05-L546WT	TDH12S05-1046WT	TDH12S05-1546WT	TDH12S05-2546WT	TDH12S05-0104GC

*Guard cartridge holder required, part no. XPGCH-Q1 (2.1, 3, 4 mm ID)
XPOCHSPW1 (10 mm ID)

**Max. pressure 100 bar

Ordering information

YMC-Triart 5 µm, 1/16" | 1/32" fitting*, microLC capillary columns (max. pressure 550 bar)

Phase	Column ID (µm)	Column length (mm)				Guard columns** with 5 mm length
		50	75	100	150	(pack of 3)
C18	75	TA12S05-05E8AU	TA12S05-L5E8AU	TA12S05-10E8AU	TA12S05-15E8AU	—
	100	TA12S05-05F0AU	TA12S05-L5F0AU	TA12S05-10F0AU	TA12S05-15F0AU	—
	300	TA12S05-05H0AU	TA12S05-L5H0AU	TA12S05-10H0AU	TA12S05-15H0AU	TA12S05-E5H0AU
	500	TA12S05-05J0AU	TA12S05-L5J0AU	TA12S05-10J0AU	TA12S05-15J0AU	TA12S05-E5J0AU
C18 ExRS	75	TAR08S05-05E8AU	TAR08S05-L5E8AU	TAR08S05-10E8AU	TAR08S05-15E8AU	—
	100	TAR08S05-05F0AU	TAR08S05-L5F0AU	TAR08S05-10F0AU	TAR08S05-15F0AU	—
	300	TAR08S05-05H0AU	TAR08S05-L5H0AU	TAR08S05-10H0AU	TAR08S05-15H0AU	TAR08S05-E5H0AU
	500	TAR08S05-05J0AU	TAR08S05-L5J0AU	TAR08S05-10J0AU	TAR08S05-15J0AU	TAR08S05-E5J0AU
C8	75	T012S05-05E8AU	T012S05-L5E8AU	T012S05-10E8AU	T012S05-15E8AU	—
	100	T012S05-05F0AU	T012S05-L5F0AU	T012S05-10F0AU	T012S05-15F0AU	—
	300	T012S05-05H0AU	T012S05-L5H0AU	T012S05-10H0AU	T012S05-15H0AU	T012S05-E5H0AU
	500	T012S05-05J0AU	T012S05-L5J0AU	T012S05-10J0AU	T012S05-15J0AU	T012S05-E5J0AU
Bio C4	75	TB30S05-05E8AU	TB30S05-L5E8AU	TB30S05-10E8AU	TB30S05-15E8AU	—
	100	TB30S05-05F0AU	TB30S05-L5F0AU	TB30S05-10F0AU	TB30S05-15F0AU	—
	300	TB30S05-05H0AU	TB30S05-L5H0AU	TB30S05-10H0AU	TB30S05-15H0AU	TB30S05-E5H0AU
	500	TB30S05-05J0AU	TB30S05-L5J0AU	TB30S05-10J0AU	TB30S05-15J0AU	TB30S05-E5J0AU
Phenyl	75	TPH12S05-05E8AU	TPH12S05-L5E8AU	TPH12S05-10E8AU	TPH12S05-15E8AU	—
	100	TPH12S05-05F0AU	TPH12S05-L5F0AU	TPH12S05-10F0AU	TPH12S05-15F0AU	—
	300	TPH12S05-05H0AU	TPH12S05-L5H0AU	TPH12S05-10H0AU	TPH12S05-15H0AU	TPH12S05-E5H0AU
	500	TPH12S05-05J0AU	TPH12S05-L5J0AU	TPH12S05-10J0AU	TPH12S05-15J0AU	TPH12S05-E5J0AU
PFP	75	TPF12S05-05E8AU	TPF12S05-L5E8AU	TPF12S05-10E8AU	TPF12S05-15E8AU	—
	100	TPF12S05-05F0AU	TPF12S05-L5F0AU	TPF12S05-10F0AU	TPF12S05-15F0AU	—
	300	TPF12S05-05H0AU	TPF12S05-L5H0AU	TPF12S05-10H0AU	TPF12S05-15H0AU	TPF12S05-E5H0AU
	500	TPF12S05-05J0AU	TPF12S05-L5J0AU	TPF12S05-10J0AU	TPF12S05-15J0AU	TPF12S05-E5J0AU
Diol-HILIC	75	TDH12S05-05E8AU	TDH12S05-L5E8AU	TDH12S05-10E8AU	TDH12S05-15E8AU	—
	100	TDH12S05-05F0AU	TDH12S05-L5F0AU	TDH12S05-10F0AU	TDH12S05-15F0AU	—
	300	TDH12S05-05H0AU	TDH12S05-L5H0AU	TDH12S05-10H0AU	TDH12S05-15H0AU	TDH12S05-E5H0AU
	500	TDH12S05-05J0AU	TDH12S05-L5J0AU	TDH12S05-10J0AU	TDH12S05-15J0AU	TDH12S05-E5J0AU

* YMC capillary columns are available with 1/16" (10-32 thread) or with 1/32" (6-40 thread) connections.

The connection size is indicated by the terminal letters of the order code:

1/16" fittings end with AU; 1/32" fittings end with RU. For ordering 1/32" connections, simply exchange AU by RU.

** no holder required, comes with a column coupler

Ordering information

YMC-Triart 5 µm in YMC-Actus high-throughput semipreparative hardware (max. pressure 300 bar)

Phase	Column ID (mm)	Column length (mm)					Guard cartridges* with 10 mm length
		50	75	100	150	250	(pack of 2)
C18	20	TA12S05-0520WX	TA12S05-L520WX	TA12S05-1020WX	TA12S05-1520WX	TA12S05-2520WX	TA12S05-0120CC
	30	TA12S05-0530WX	TA12S05-L530WX	TA12S05-1030WX	TA12S05-1530WX	TA12S05-2530WX	TA12S05-0130CC
	50	TA12S05-0553DX	—	TA12S05-1053DX	TA12S05-1553DX	TA12S05-2553DX	TA12S05-0553DXG**
C18 ExRS	20	TAR08S05-0520WX	TAR08S05-L520WX	TAR08S05-1020WX	TAR08S05-1520WX	TAR08S05-2520WX	TAR08S05-0120CC
	30	TAR08S05-0530WX	TAR08S05-L530WX	TAR08S05-1030WX	TAR08S05-1530WX	TAR08S05-2530WX	TAR08S05-0130CC
	50	TAR08S05-0553DX	—	TAR08S05-1053DX	TAR08S05-1553DX	TAR08S05-2553DX	TAR08S05-0553DXG**
C8	20	TO12S05-0520WX	TO12S05-L520WX	TO12S05-1020WX	TO12S05-1520WX	TO12S05-2520WX	TO12S05-0120CC
	30	TO12S05-0530WX	TO12S05-L530WX	TO12S05-1030WX	TO12S05-1530WX	TO12S05-2530WX	TO12S05-0130CC
	50	TO12S05-0553DX	—	TO12S05-1053DX	TO12S05-1553DX	TO12S05-2553DX	TO12S05-0553DXG**
Bio C4	20	TB30S05-0520WX	TB30S05-L520WX	TB30S05-1020WX	TB30S05-1520WX	TB30S05-2520WX	TB30S05-0120CC
	30	TB30S05-0530WX	TB30S05-L530WX	TB30S05-1030WX	TB30S05-1530WX	TB30S05-2530WX	TB30S05-0130CC
	50	TB30S05-0553DX	—	TB30S05-1053DX	TB30S05-1553DX	TB30S05-2553DX	TB30S05-0553DXG**
Phenyl	20	TPH12S05-0520WX	TPH12S05-L520WX	TPH12S05-1020WX	TPH12S05-1520WX	TPH12S05-2520WX	TPH12S05-0120CC
	30	TPH12S05-0530WX	TPH12S05-L530WX	TPH12S05-1030WX	TPH12S05-1530WX	TPH12S05-2530WX	TPH12S05-0130CC
	50	TPH12S05-0553DX	—	TPH12S05-1053DX	TPH12S05-1553DX	TPH12S05-2553DX	TPH12S05-0553DXG**
PPF	20	TPF12S05-0520WX	TPF12S05-L520WX	TPF12S05-1020WX	TPF12S05-1520WX	TPF12S05-2520WX	TPF12S05-0120CC
	30	TPF12S05-0530WX	TPF12S05-L530WX	TPF12S05-1030WX	TPF12S05-1530WX	TPF12S05-2530WX	TPF12S05-0130CC
	50	TPF12S05-0553DX	—	TPF12S05-1053DX	TPF12S05-1553DX	TPF12S05-2553DX	TPF12S05-0553DXG**

*Guard cartridge holder required, part no. XPCCHSPW2 (20 mm ID)/XPCCHSPW3 (30 mm ID)

** no holder required for 50 x 50 mm ID guard columns (no cartridge)

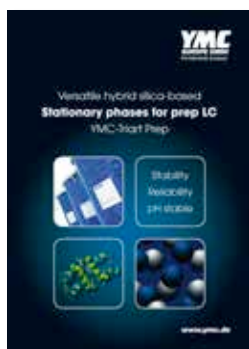
YMC-Triart, preparative bulk media

YMC-Triart C18-S			YMC-Triart C8-S		
Pore size (nm)	Particle size (µm)	Product Code	Pore size (nm)	Particle size (µm)	Product Code
12	10	TAS12S11	20	10	TOS20S11
	15	TAS12S16		15	TOS20S16
	20	TAS12S21		20	TOS20S21

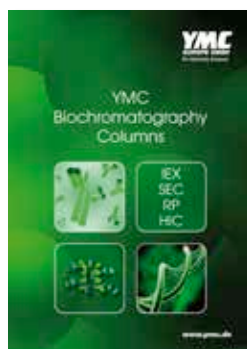
NOTE: customised particle sizes and pore sizes are available on request.
Contact YMC Europe GmbH for further details.

Please inquire for the corresponding brochures:

YMC-Triart Prep
Brochure



YMC Biochromatography
Columns - Brochure



MicroLC
Brochure



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