

YMC-Triart

Versatile hybrid silica based (U)HPLC columns

YMC
EUROPE GMBH
The Selectivity Company



Transfer

Scalable particles:
EASY
UHPLC ↔ HPLC

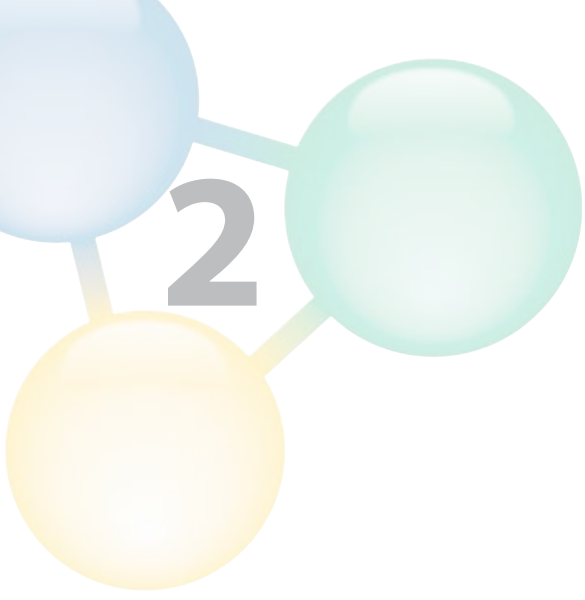
Flexible

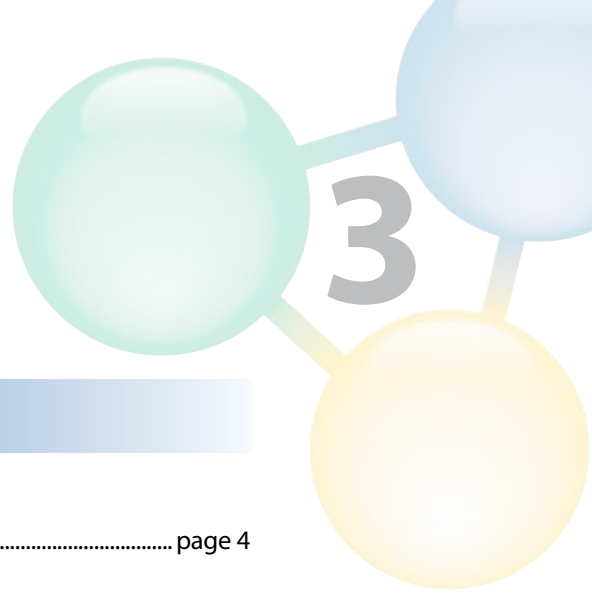
pH = 1 – 12
Temp. up to 70°C
100% aqueous
conditions

Universal

YMC-Triart
for acidic, basic and
neutral analytes

www.ymc.de





YMC-Triart

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Phases


YMC-Triart C18



C18

- versatile applications
- first choice for method development
- 100% aqueous eluents
- pH-stable 1 - 12

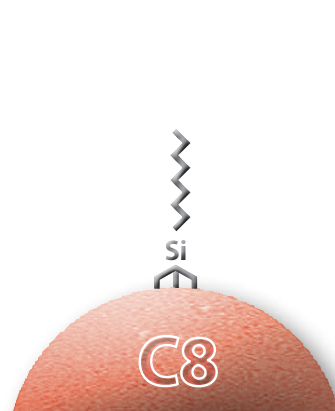
YMC-Triart C18 ExRS



C18 ExRS

- extended pH and stability
- hydrophobic substances
- positional isomers

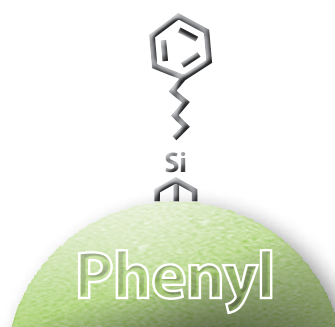
YMC-Triart C8



C8

- alternative to C18
- short retention time
- pH-stable 1 - 12

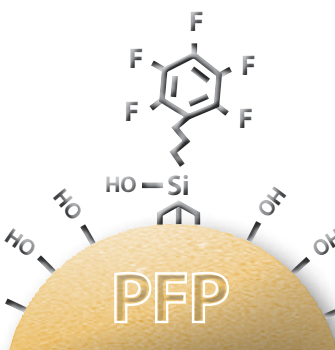
YMC-Triart Phenyl



Phenyl

- aromatic compounds (π-electron acceptor)
- conjugated systems
- 100% aqueous eluents

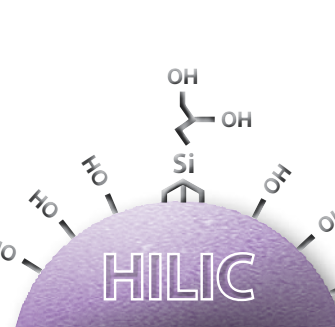
YMC-Triart PFP



PFP

- aromatic compounds (π-electron donor)
- cis-trans isomer
- polar halogenated compounds
- 100% aqueous eluents

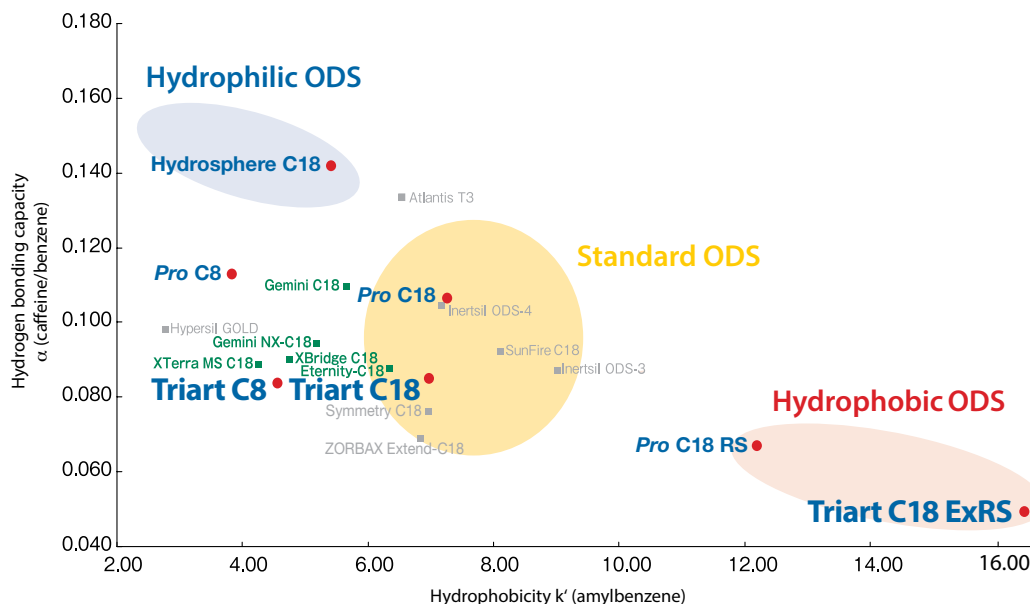
YMC-Triart Diol-HILIC



HILIC

- good alternative for very polar compounds
- 100% aqueous eluents

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. Whereas YMC-Triart C18 ExRS is designed to provide contrastive separation characteristics!

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 addition narrow, symmetrical peak shapes are necessary in order to cope with rapid analysis of demanding samples. This has required manufacturers to seek more innovative ways to produce suitable stationary phases.

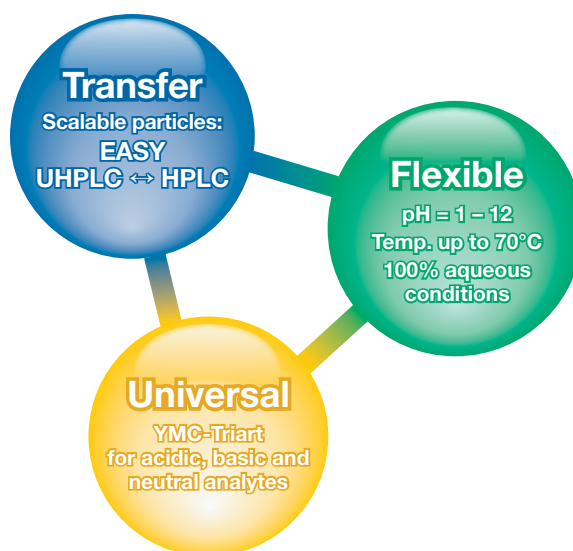
In order to meet these goals, YMC has developed a new particle technology. This is based on a multi-layered particle produced via a tightly controlled granulation technology which has been adapted from micro-reactor technology. The revolutionary production technique provides a multi-layer silica-organic 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.

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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 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.



Specification

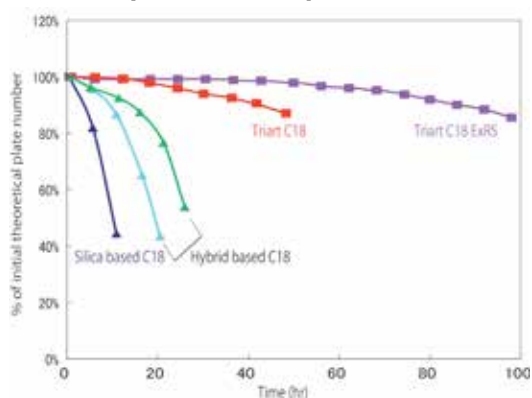
	YMC-Triart C18	YMC-Triart C18 ExRS	YMC-Triart C8	YMC-Triart Phenyl	YMC-Triart PFP	YMC-Triart Diol-HILIC
Base	organic/inorganic silica					
Stationary phase	C18 (USP L1)	C18 (USP L1)	C8 (USP L7)	Phenyl (USP L11)	Pentafluorophenyl (USP L43)	Diol (USP L20)
Particle size	1.9, 3 and 5 µm					
Pore size	12 nm	8 nm	12 nm	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
Bonding	polymeric type					
Endcapping	multi-stage hybrid groups	multi-stage hybrid groups	multi-stage hybrid groups	multi-stage hybrid groups	none	none
pH range	1 ~ 12	1 ~ 12	1 ~ 12	1 ~ 10	1 ~ 8	2 ~ 10
Temperature range	pH 1-7: 70 °C, pH 7-12: 50 °C	pH 1-7: 70 °C, pH 7-12: 50 °C	pH 1-7: 70 °C, pH 7-12: 50 °C	50 °C	50 °C	50 °C

pH & temperature

7

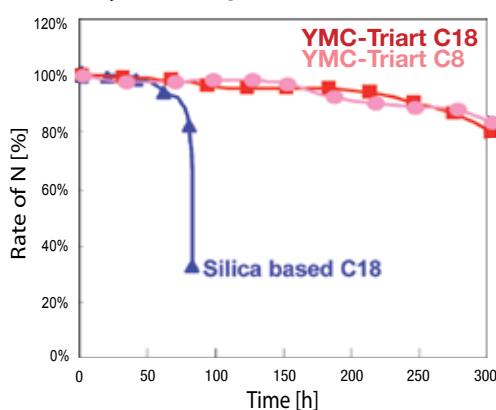
Versatile wide pH stability

Phosphate buffer (pH 11.5, 40 °C)



Column: 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
 Sample: benzyl alcohol

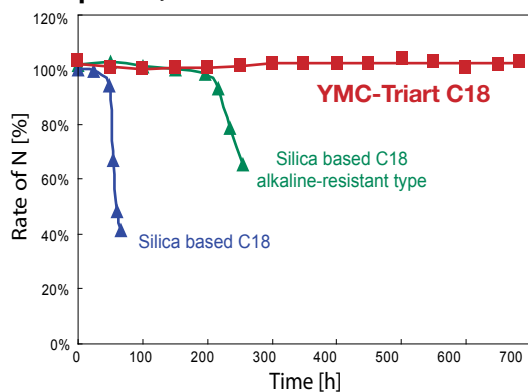
Triethylamine (pH 11.5, 40 °C)



Column: 5 µm, 150 x 4.6 mm ID
 Part-No.: TA12S05-1546WT
 Eluent: 50 mM triethylamine (pH 11.5) / methanol (90/10)
 Flow rate: 1.0 ml/min
 Sample: benzyl alcohol

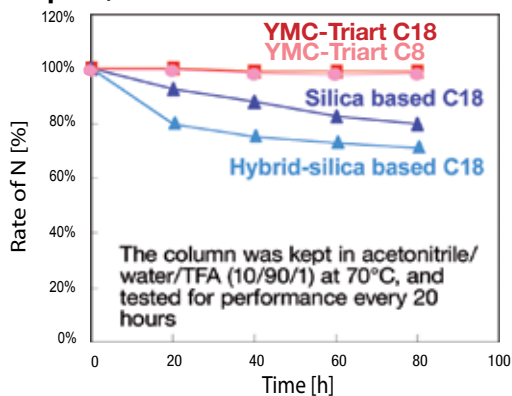
Stability at high temperature

pH 6.9, 70 °C



Column: 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, 70 °C



Column: 5 µm, 50 x 2.0 mm ID
 Part-No.: TA12S05-0502WT
 Eluent: acetonitrile / water (60/40)
 Flow rate: 0.2 ml/min
 Temperature: 70 °C
 Sample: butyl benzoate

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

Application Data by courtesy YMC Co., Ltd.

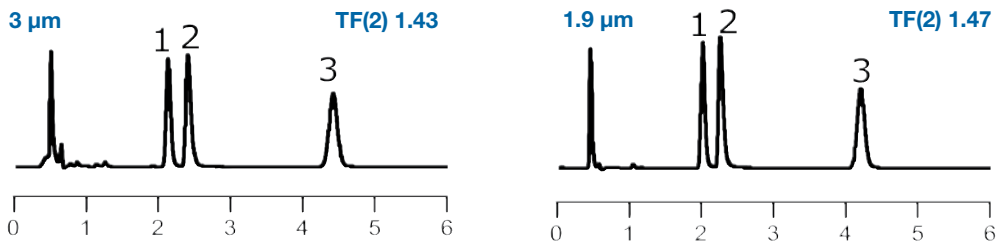
8

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 manufacture) have been observed.

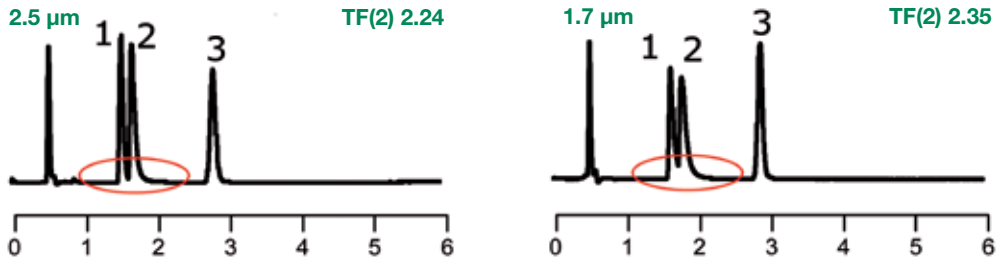
YMC-Triart C18



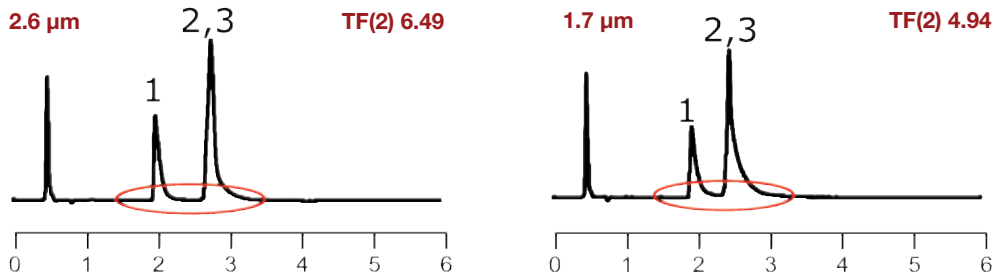
YMC has addressed this issue of method transfer. YMC-Triart columns show identical selectivity and excellent peak shapes for basic compounds for all 3.0 µm to 1.9 µm particle sizes. It allows predictable scale up from UHPLC to conventional HPLC and even to semi-preparative LC, and vice versa.

Case Studies*

X-Bridge BEH C18 and Acquity UPLC BEH C18



Kinetex™ C18



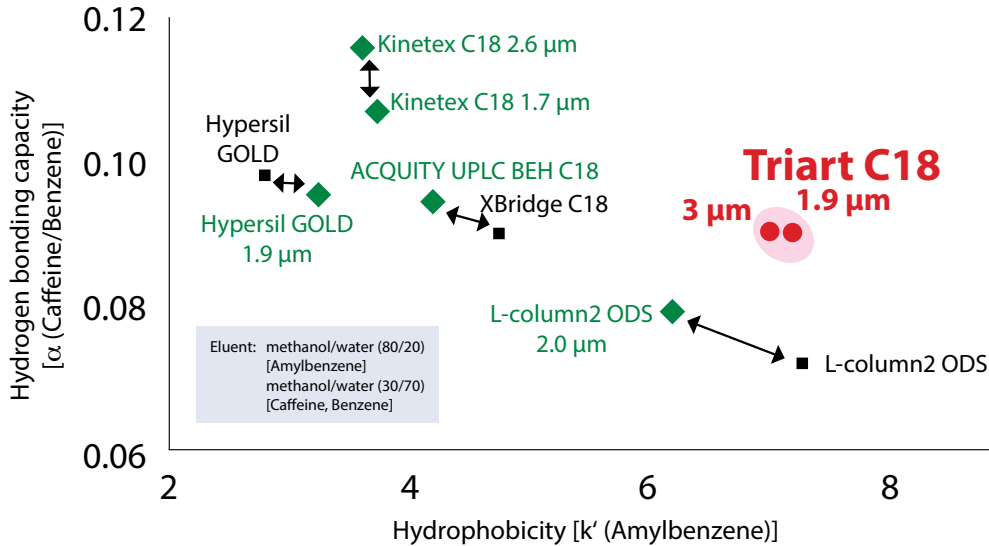
Kinetex™ C18 columns show significant peak tailing™ and have limited scalability due to lack of larger particle sizes.

Column: 50 x 2.0 mm ID or 2.1 mm ID
Eluent: 20 mM KH_2PO_4 - K_2HPO_4 (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)

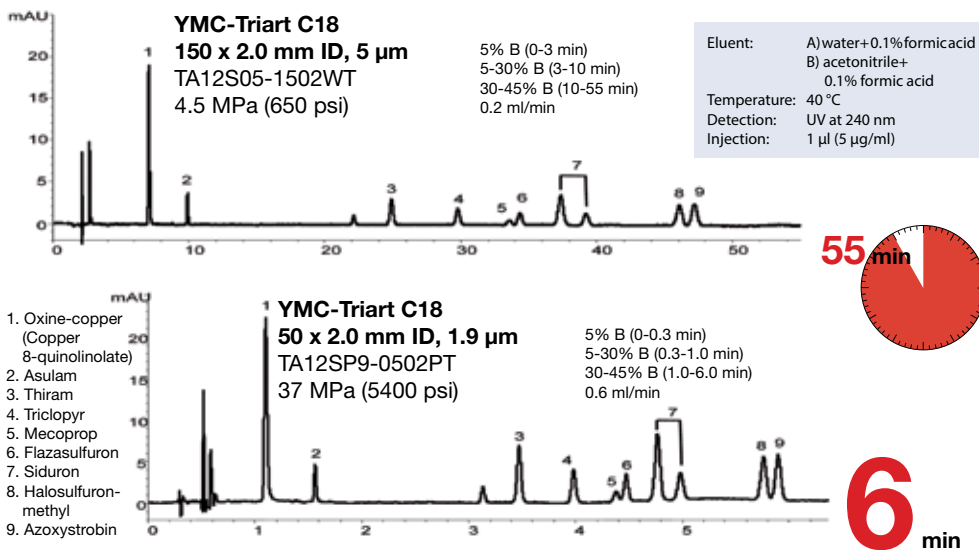
* There observations might not be representative for all applications but have been reported in some cases.

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 between HPLC ↔ UHPLC

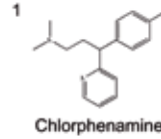


Application Data by courtesy YMC Co., Ltd.

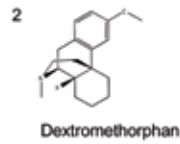
10 UHPLC

Higher resolution and good loadability

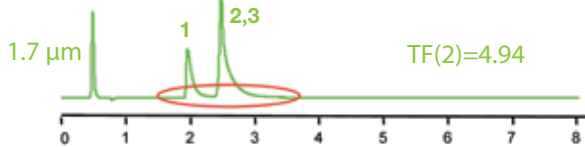
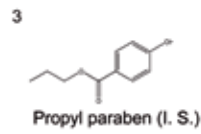
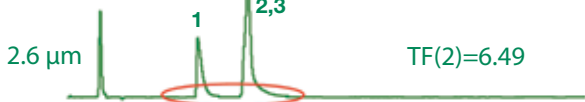
YMC-Triart C18



Ascentis Express C18

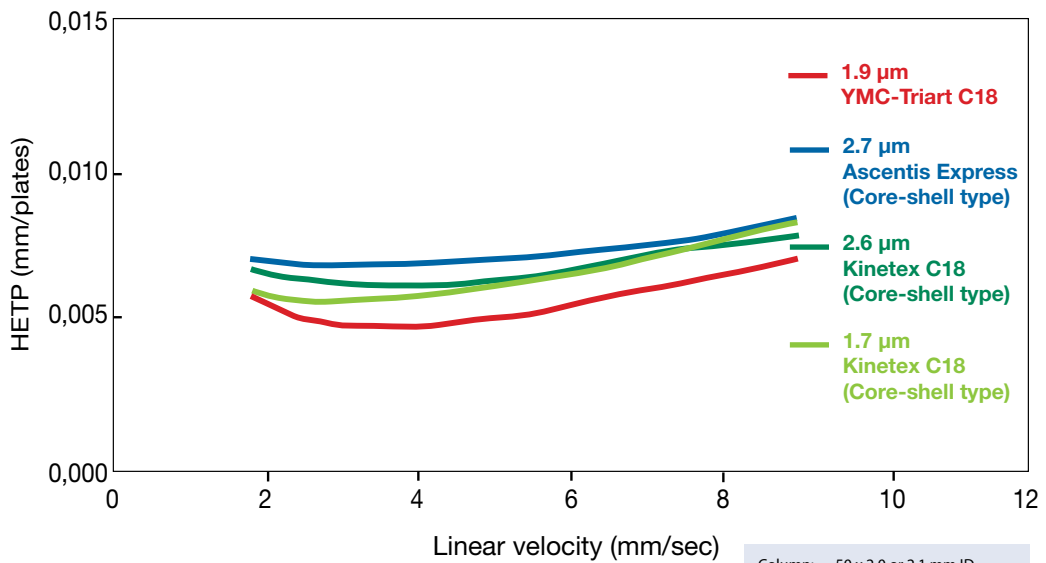


Kinetex C18



Column: 50 x 2.0 or 2.1 mm ID
 Eluent: 20 mM KH_2PO_4 - K_2HPO_4 (pH 6.9)/ acetonitrile (65/35)
 Flow rate: 0.2 ml/min
 Detection: UV at 235 nm
 Temperature: 40 °C

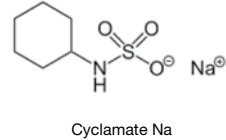
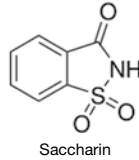
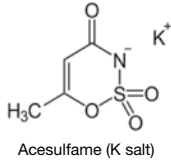
Lower HETP means higher resolution!



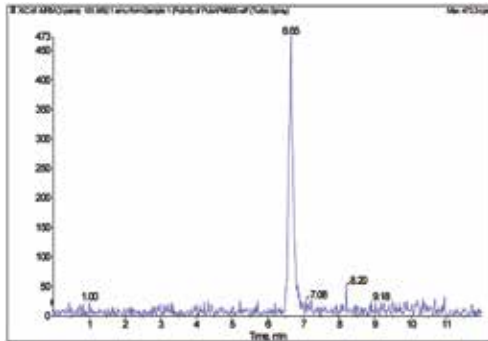
Column: 50 x 2.0 or 2.1 mm ID
 Eluent: acetonitrile / water (60/40)
 Detection: UV at 254 nm
 Sample: Butylbenzoate

Application Data by courtesy YMC Co., Ltd.

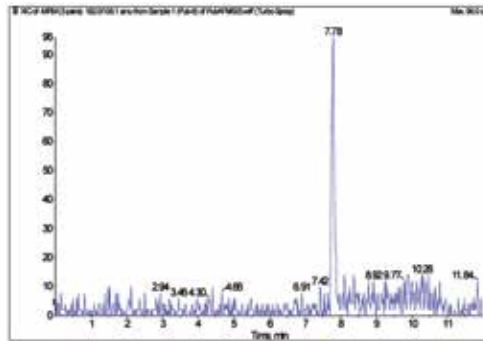
Determination of artificial sweeteners with LC-MS/MS



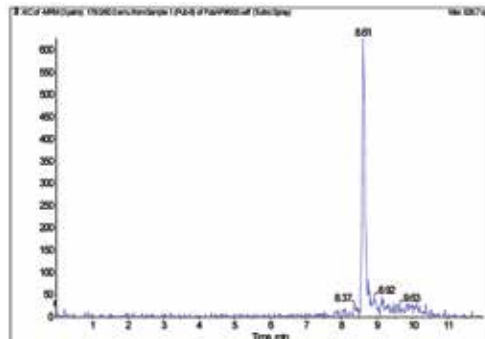
→ Non biological markers of wastewater entries in ground and surface water



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

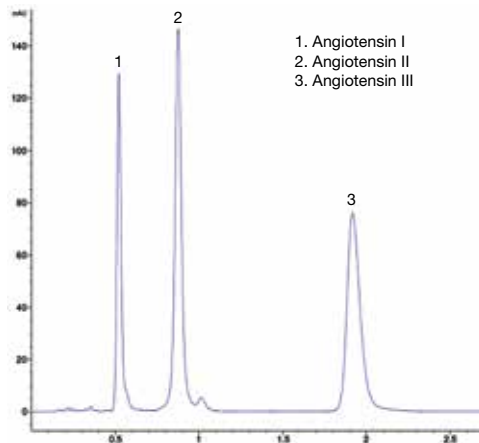
Column: YMC-Triart C18, 12 nm, 1.9 µm, 100 x 3.0 mm ID
Part-No.: TA12SP9-1003PT
LC-System: Agilent 1100 HPLC system and CTC Analytics
HTC-Pal Autosampler
MS/MS System: Applied Biosystems MDS Sciex API 4000,
ESI negative
Temperature: 35°C
Flow: 0.3 ml/min
Injection: 40 µL, direct injection
Eluent: A: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

by courtesy of: Thomas Class, Sandro Jooß
PTRL Europe, Helmholtzstraße 22, Science Park I, D-89081 Ulm

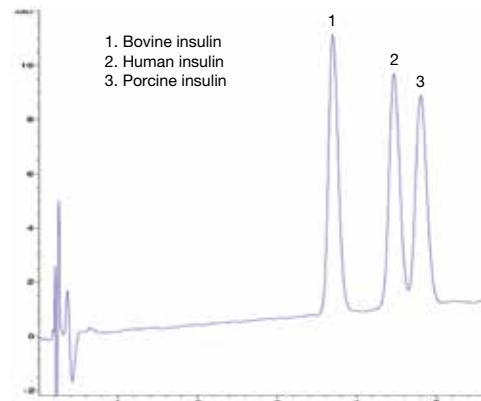
12 UHPLC

Angiotensin I, II and III



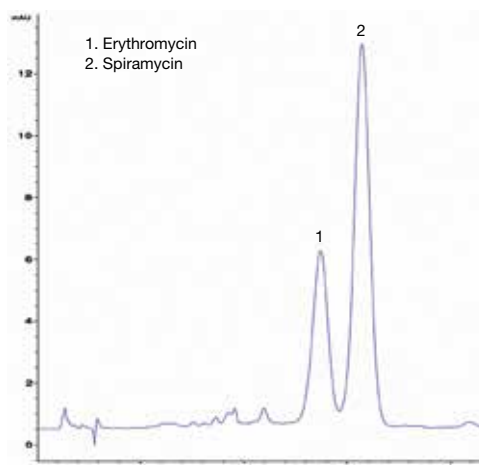
Column: YMC-Triart C18, 1.9 μ m (50 x 2.0 mm ID)
Part-No.: TA12SP9-0502PT
Eluent: 20 mM KH_2PO_4 + K_2HPO_4 (pH 7.9) / acetonitrile (22/78)
Flow rate: 0.7 ml/min
Detection: UV at 220 nm
Injection: 0.5 μ l
Temperature: 40 $^\circ\text{C}$

Insulin



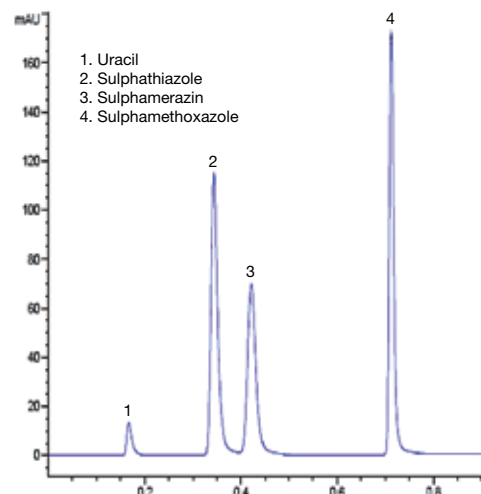
Column: YMC-Triart C18, 1.9 μ m (50 x 2.0 mm ID)
Part-No.: TA12SP9-0502PT
Eluent: A) water + 0.1% TFA
B) acetonitrile + 0.1% TFA
Gradient: 30% B (0 min); 30-32% B (0-5 min); 32% B (55 min)
Flow rate: 0.6 ml/min
Detection: UV at 220 nm
Injection: 0.5 μ l
Temperature: 30 $^\circ\text{C}$

Macrolide antibiotics



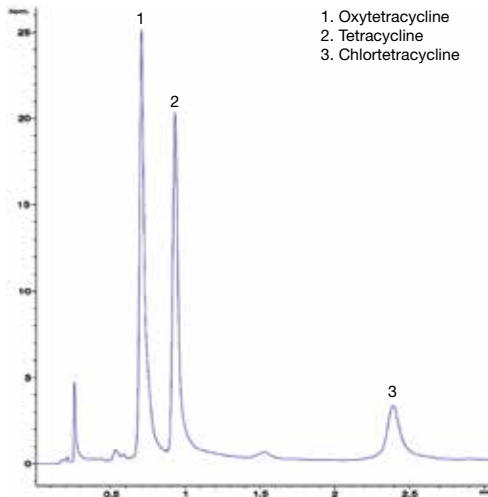
Column: YMC-Triart C18, 1.9 μ m (50 x 2.0 mm ID)
Part-No.: TA12SP9-0502PT
Eluent: A) 20 mM K_2HPO_4 + 20 mM KH_2PO_4 (pH 7.9)
B) acetonitrile
Gradient: 60% B (0.5 min); 60-70% B (0.5-1.5 min); 70% B (3.5 min)
Flow rate: 0.45 ml/min
Detection: UV at 210 nm
Injection: 1 μ l
Temperature: 50 $^\circ\text{C}$

Sulpha drugs



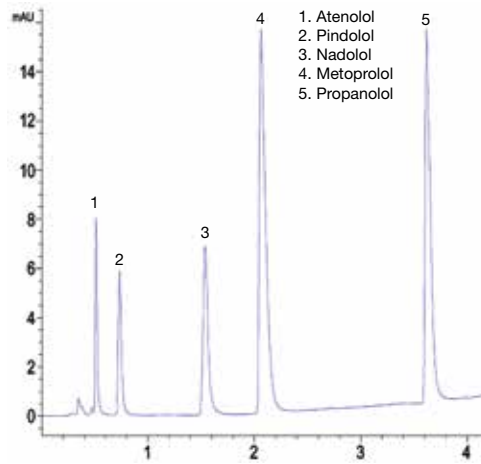
Column: YMC-Triart C18, 1.9 μ m (50 x 2.0 mm ID)
Part-No.: TA12SP9-0502PT
Eluent: water + formic acid (pH 2.5) / acetonitrile (75/25)
Flow rate: 0.75 ml/min
Detection: UV at 280 nm
Injection: 0.5 μ l
Temperature: 50 $^\circ\text{C}$

Tetracycline antibiotics



Column: YMC-Triart C18, 1.9 μm (50 x 2.0 mm ID)
Part-No.: TA12SP9-0502PT
Eluent: 5 mM $\text{NH}_4\text{CH}_2\text{COOH}$ / acetonitrile (87/13)
Flow rate: 0.65 ml/min
Detection: UV at 280 nm
Injection: 1 μl
Temperature: 40 $^\circ\text{C}$

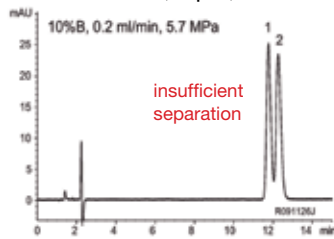
Betablockers



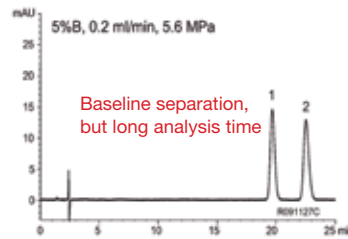
Column: YMC-Triart C18, 1.9 μm (50 x 2.0 mm ID)
Part-No.: TA12SP9-0502PT
Eluent: A) 20 mM $\text{NH}_4\text{CH}_2\text{COOH}$ + ammonia (pH 9.0)
B) acetonitrile
Gradient: 25% B (1.0 min); 75% B (1-6 min)
Flow rate: 0.35 ml/min
Detection: UV at 254 nm
Injection: 1 μl
Temperature: 40 $^\circ\text{C}$

Fast LC for conventional HPLC

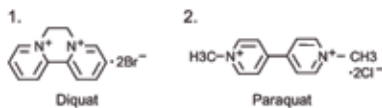
YMC-Triart C18, 5 μm , 150 x 2.0 mm ID



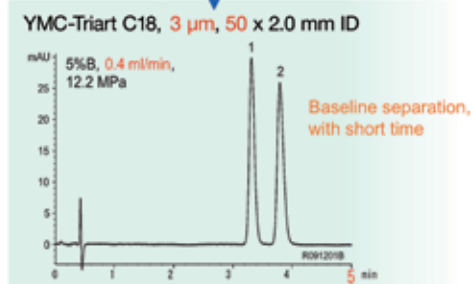
optimisation



Down scaling

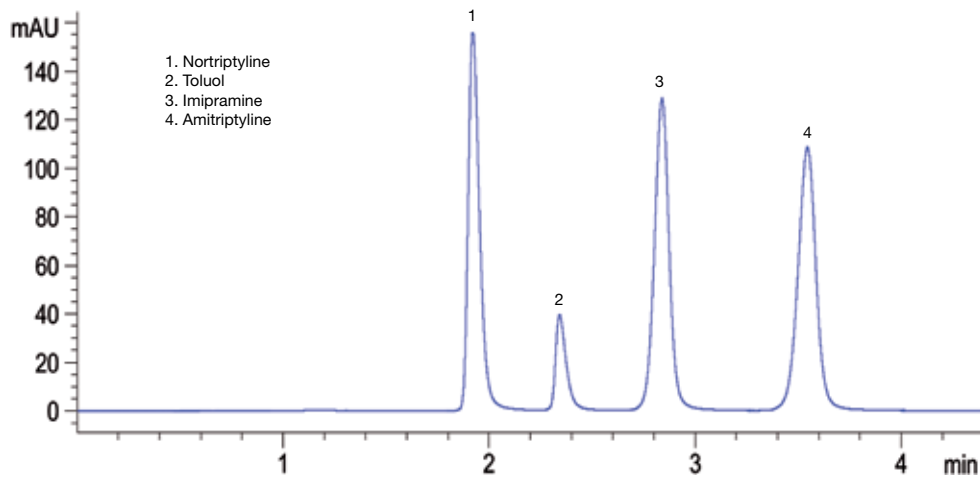


Eluent: A) water + 0.1% HFBA*
B) acetonitrile + 0.1% HFBA*
Temperature: 37 $^\circ\text{C}$
Detection: UV at 290 nm
Injection: 1 μl (0.1 mg/ml)
*heptafluorobutyric acid



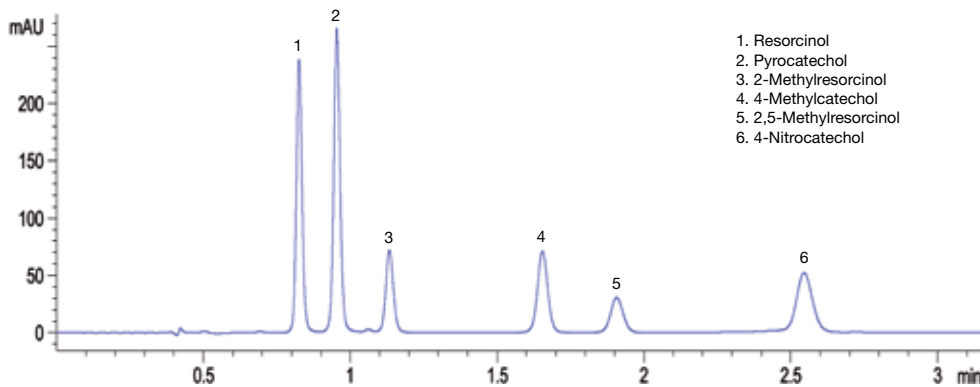
Application Data by courtesy YMC Co., Ltd.

Antidepressants



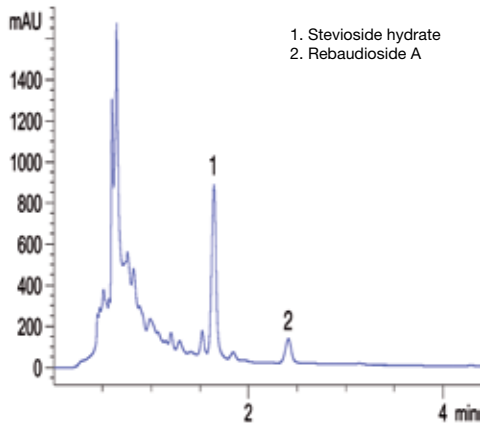
Column: YMC-Triart Phenyl, 1.9 μm (100 x 2.0 mm ID)
 Part-No.: TPH12SP9-1002PT
 Eluent: methanol / 25 mM KH_2PO_4 (pH 6.0) (65/35)
 Flow rate: 0.4 ml/min
 Detection: UV at 254 nm
 Injection: 2 μl
 Temperature: 25 $^\circ\text{C}$

Resorcinol



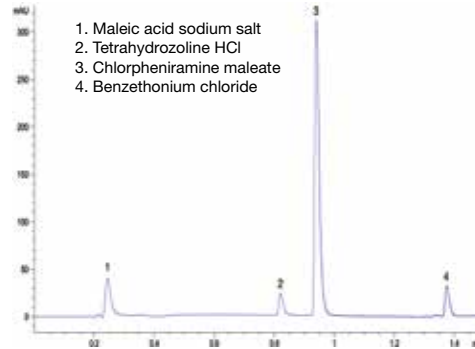
Column: YMC-Triart PFP, 1.9 μm (100 x 2.0 mm ID)
 Part-No.: TPF12SP9-1002PT
 Eluent: water + 0.1% formic acid / acetonitrile + 0.1% formic acid (85/15)
 Flow rate: 0.8 ml/min
 Detection: UV at 270 nm
 Injection: 0.5 μl
 Temperature: 25 $^\circ\text{C}$

Stevia leaves



Column: YMC-Triart Diol-HILIC, 1.9 μm (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 μl
Temperature: 30 $^{\circ}\text{C}$

Nasal Spray

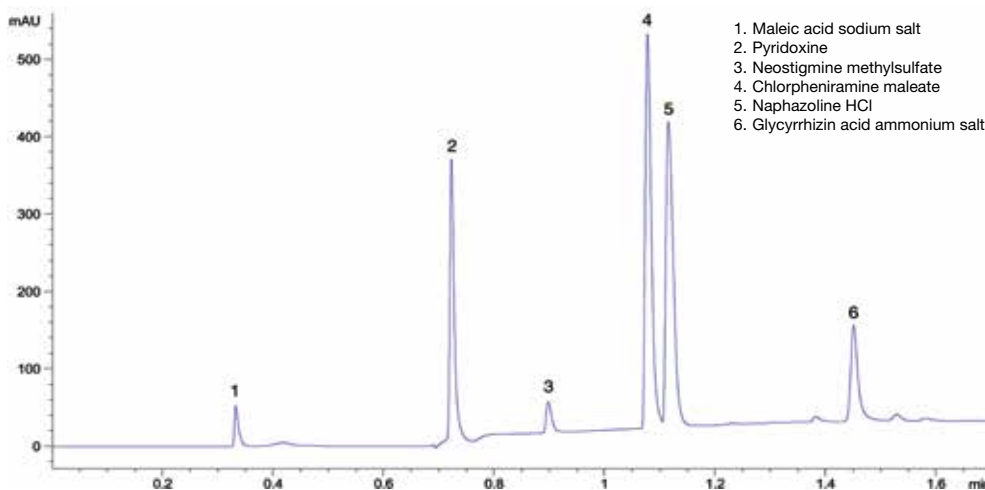


Column: YMC-Triart C18, 1.9 μm , 12 nm (50 x 2.0 mm ID)
Part-No.: TA12SP9-0502PT
Eluent: A) water + 0.05% TFA / B) methanol (50/50)
Gradient:

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 μl
Temperature: 40 $^{\circ}\text{C}$

Eye drop formulation



Column: YMC-Triart C18, 1.9 μm , 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 μl
Temperature: 40 $^{\circ}\text{C}$

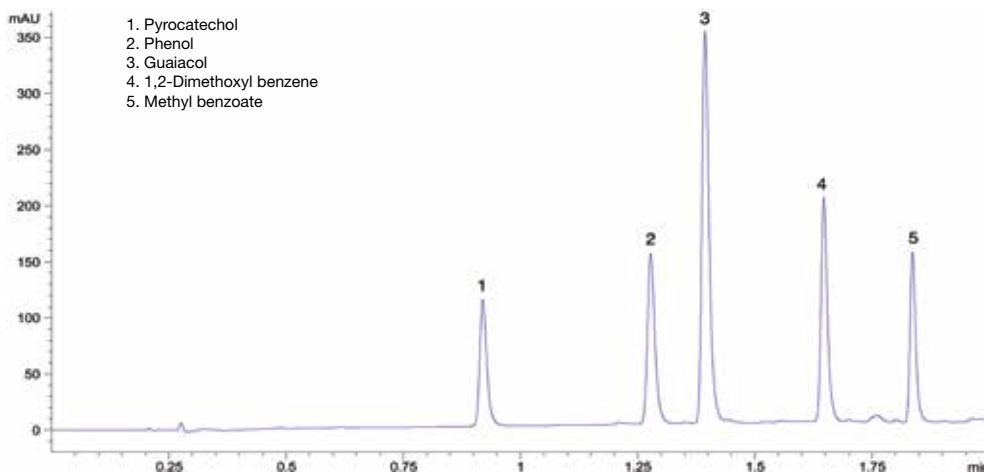
Gradient:

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

Application Data by courtesy YMC Co., Ltd.

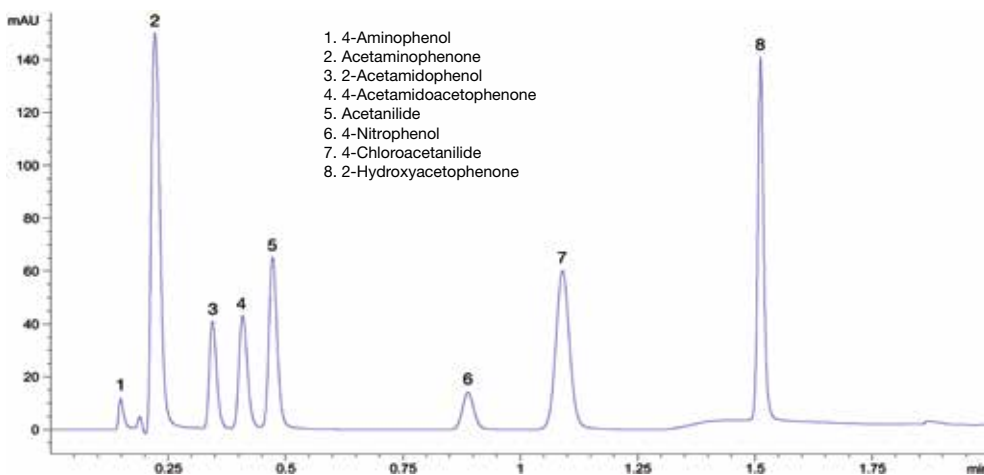
16 UHPLC

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

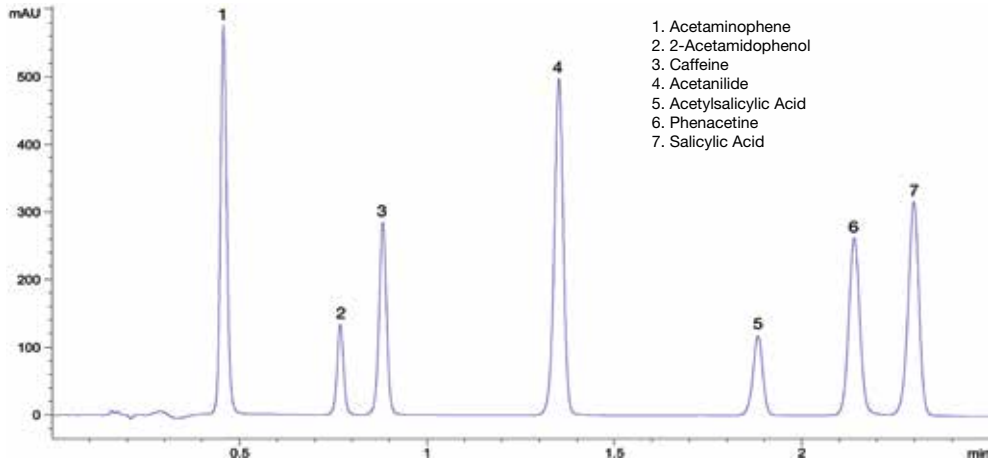
Paracetamol



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

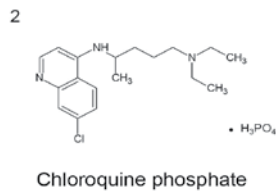
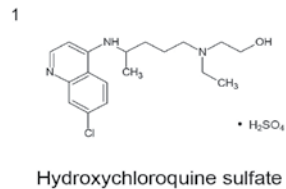
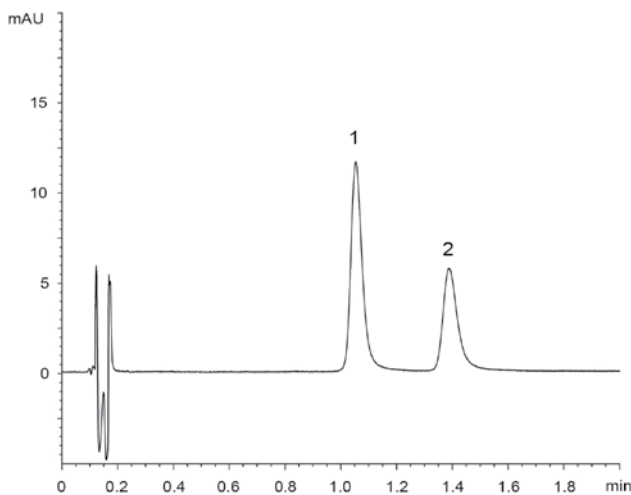
7 Analgesics



1. Acetaminophene
2. 2-Acetamidophenol
3. Caffeine
4. Acetanilide
5. Acetylsalicylic Acid
6. Phenacetine
7. Salicylic Acid

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



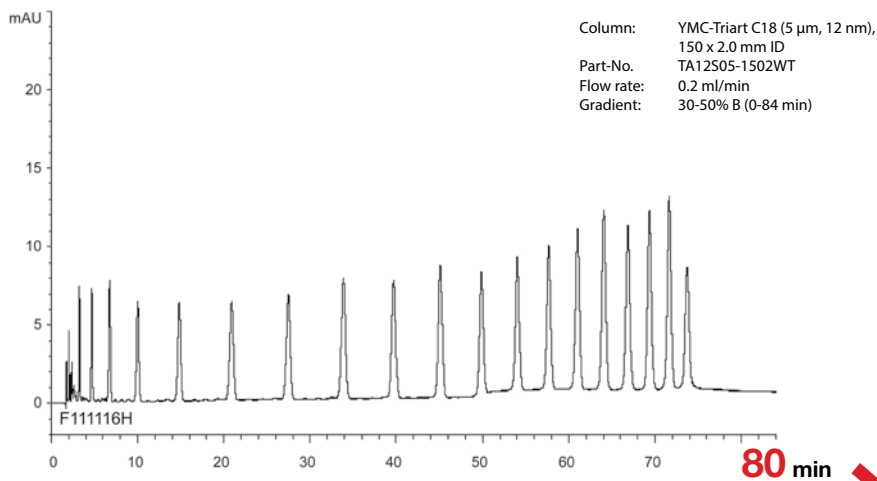
Column: YMC-Triart C18, 1.9 μ m, 12 nm (50 x 2.0 mm ID)
 Part-No.: TA12SP9-0502PT
 Eluent: 20 mM HCOOH-HCOONH₄ (pH 4.3) / acetonitrile (90/10)
 Flow rate: 1.0 ml/min
 Detection: UV at 254 nm
 Injection: 2 μ l (10 μ g/ml)
 Temperature: 25 $^{\circ}$ C

Application Data by courtesy YMC Co., Ltd.

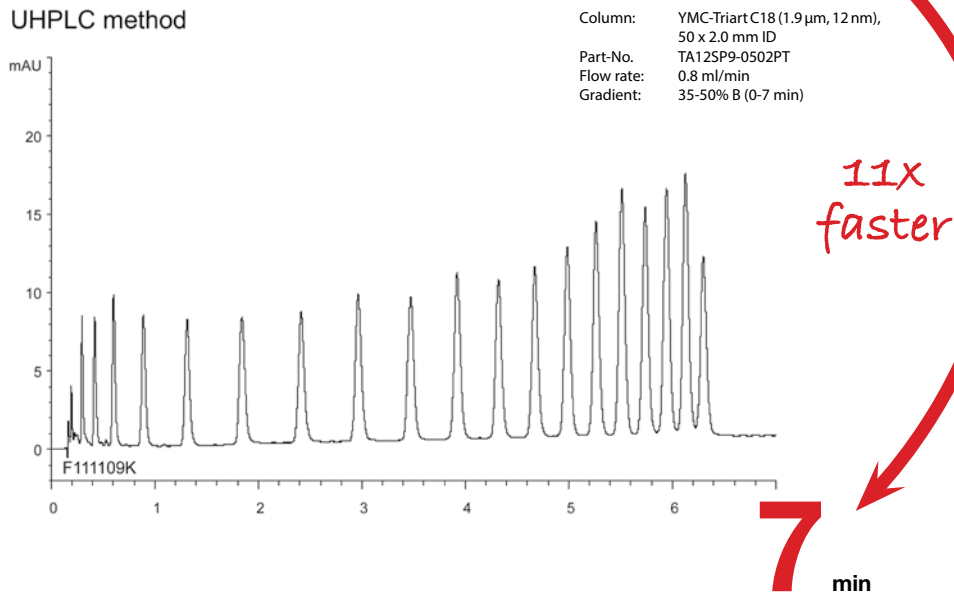
18 UHPLC

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

Conventional LC method



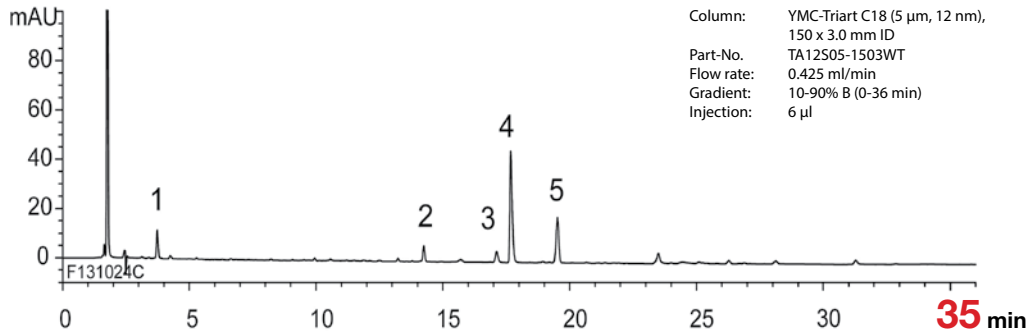
UHPLC method



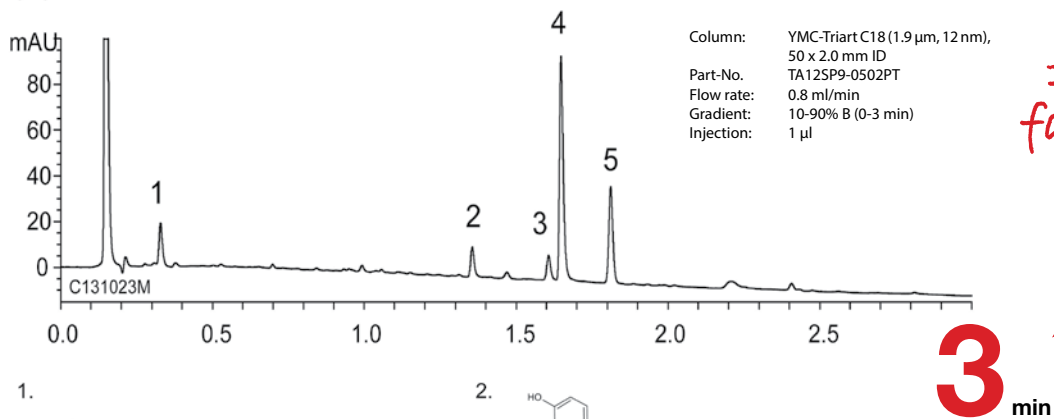
Eluent: A) 10 mM di-n-butylamine-acetic acid (pH 6.0)
B) methanol
Detection: UV at 269 nm
Injection: 1 µl (5 nmol/ml)
Temperature: 37 °C

Duloxetine and its degradation products

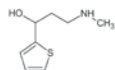
(A) HPLC method



(B) UHPLC method

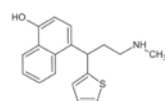


1.



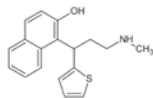
Amino alcohol
(3-Methylamino-1-thiophen-2-yl-propan-1-ol)

2.



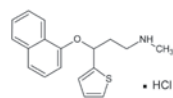
Para isomer
(4-(3-Methylamino-1-thiophen-2-yl-propyl)-naphthalen-1-ol))

3.



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

4.



Duloxetine hydrochloride

5.



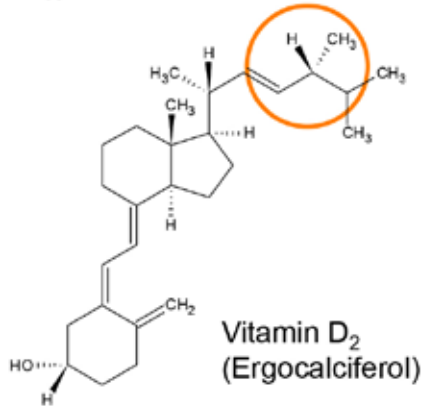
α-Naphthol

Eluent: A) 10 mM CH₃COONH₄ (pH 6.0)
 B) acetonitrile
 Detection: UV at 230 nm
 Temperature: 30 °C
 Sample: Oxidative degradation products of duloxetine hydrochloride*

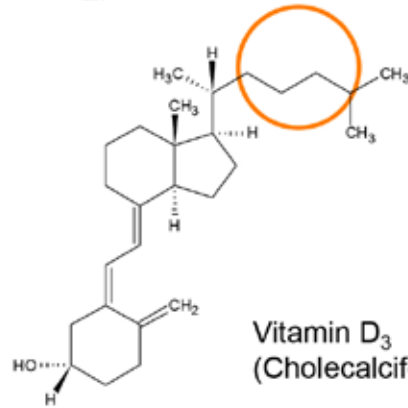
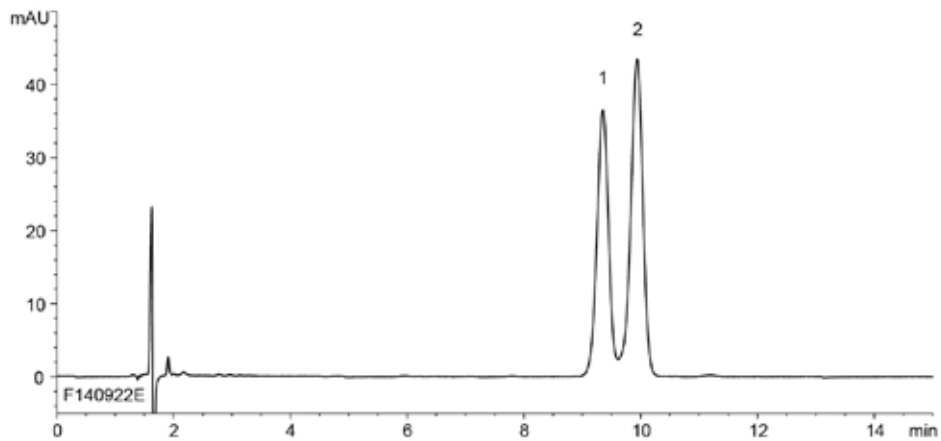
* Sample preparation was performed as described by Veera Reddy, Arava et al. *Der Pharma Chemica*, 2012 4 (4): 1735-1741

Structural analogs

1.

Vitamin D₂
(Ergocalciferol)

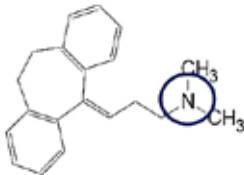
2.

Vitamin D₃
(Cholecalciferol)

Column: YMC-Triart C18 ExRS, 5 μ m, 8 nm (150 x 3.0 mm ID)
 Part-No.: TAR08S05-1503PTH
 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

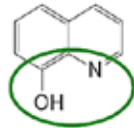
High hydrophobicity & high steric recognition ability

Basic Compound

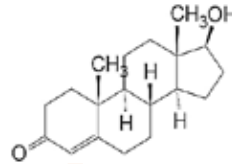


1. Amitriptyline

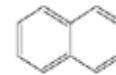
Coordination Compound



2. 8-Quinololinol

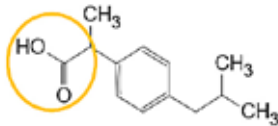
Neutral Compounds
Polar π - π interaction

3. Testosterone



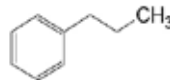
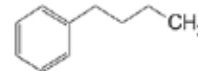
4. Naphthalene

Acidic Compound



5. Ibuprofen

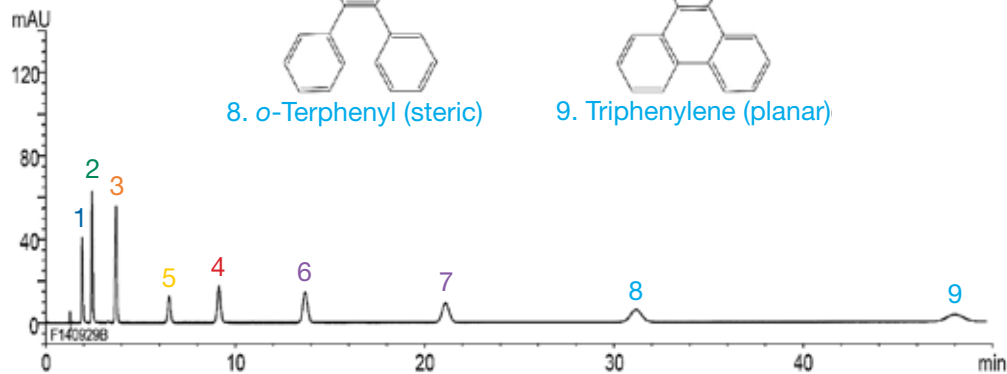
Hydrophobic

6. *n*-Propylbenzene7. *n*-Butylbenzene

Steric Cognitive Ability

8. *o*-Terphenyl (steric)

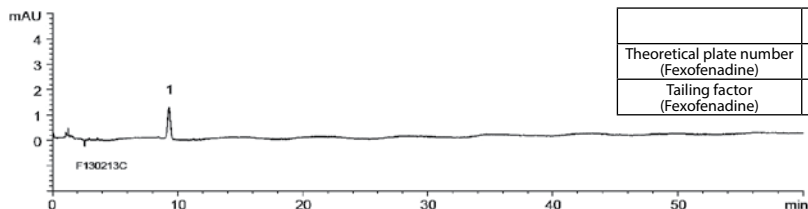
9. Triphenylene (planar)



Column: YMC-Triart C18 ExRS, 5 μ m, 8 nm (150 x 3.0 mm ID)
Part-No.: TAR08505-1503PTH
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 $^{\circ}$ C

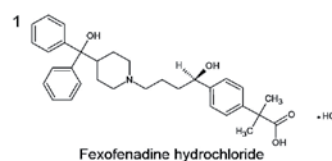
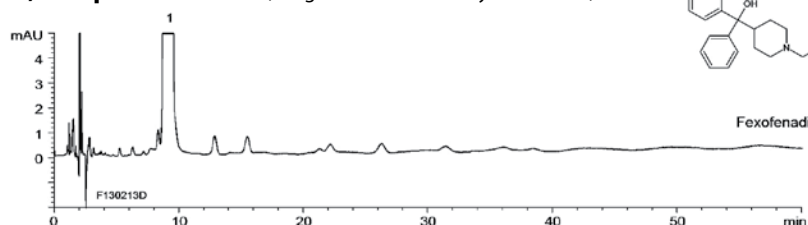
Fexofenadine hydrochloride (Japanese Pharmacopoeia)

A) Standard solution *1 (0.001 mg/ml fexofenadine hydrochloride)



	System suitability requirement	result
Theoretical plate number (Fexofenadine)	≥ 8000	10100
Tailing factor (Fexofenadine)	≤ 2.0	1.00

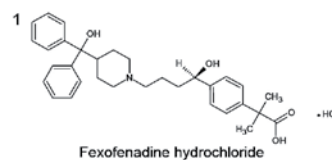
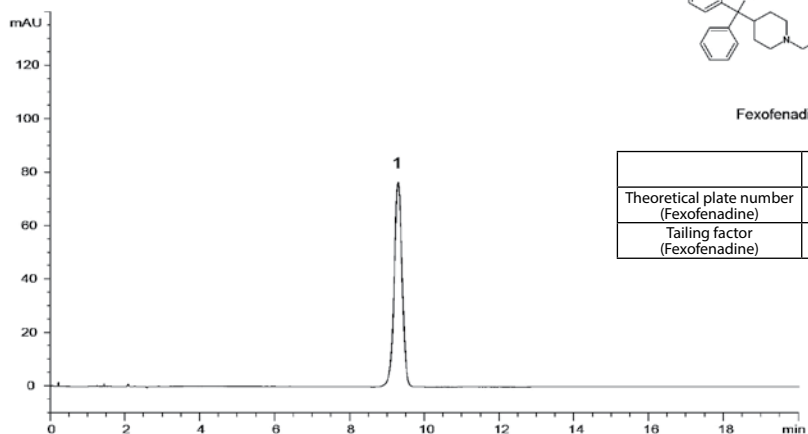
B) Sample solution *1 (1 mg/ml fexofenadine hydrochloride)



Column: YMC-Triart Phenyl, 5 μm, 12 nm (250 x 4.6 mm ID)
 Part-No.: TPH12505-2546WT
 Eluent: acetonitrile / buffer *2 / triethylamine (350/650/3)
 *2 Dissolve 7.51 g of NaH₂PO₄·2H₂O and 0.96 g of NaClO₄·H₂O in 1000 ml water, adjust pH 2.0 with H₃PO₄
 Flow rate: 2.0 ml/min (adjust the flow rate so that the retention time of fexofenadine is about 9 min)
 Detection: UV at 220 nm
 Injection: 20 μl
 Temperature: 25 °C
 (The Japanese Pharmacopoeia 16th; related substances)

*1 All standard and sample solutions were prepared from fexofenadine hydrochloride supplied as a reagent for laboratory use.

Standard solution *1 (0.06 mg/ml fexofenadine hydrochloride)



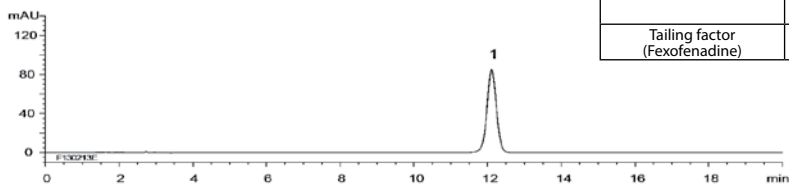
	System suitability requirement	result
Theoretical plate number (Fexofenadine)	≥ 8000	9500
Tailing factor (Fexofenadine)	≤ 2.0	0.98

Column: YMC-Triart Phenyl, 5 μm, 12 nm (250 x 4.6 mm ID)
 Part-No.: TPH12505-2546WT
 Eluent: acetonitrile / buffer *2 / triethylamine (350/650/3)
 *2 Dissolve 7.51 g of NaH₂PO₄·2H₂O and 0.96 g of NaClO₄·H₂O in 1000 ml water, adjust pH 2.0 with H₃PO₄
 Flow rate: 2.0 ml/min (adjust the flow rate so that the retention time of fexofenadine is about 9 min)
 Detection: UV at 220 nm
 Injection: 20 μl
 Temperature: 25 °C
 (The Japanese Pharmacopoeia 16th; assay)

*1 Standard solutions was prepared from fexofenadine hydrochloride supplied as a reagent for laboratory use.

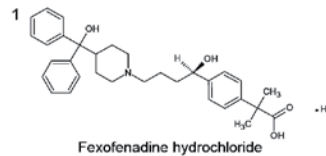
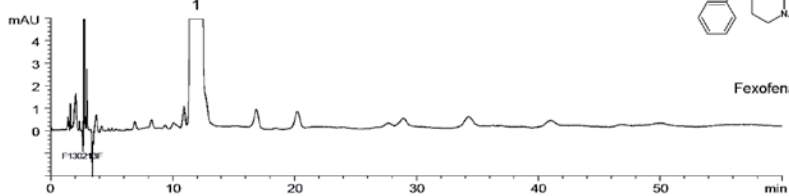
Fexofenadine hydrochloride (US Pharmacopoeia)

A) Assay preparation *1 (assay), Reference solution *1 (related compounds) (0.06 mg/ml fexofenadine hydrochloride)



	System suitability requirement (assay)	result
Tailing factor (Fexofenadine)	≤ 2.0	1.00

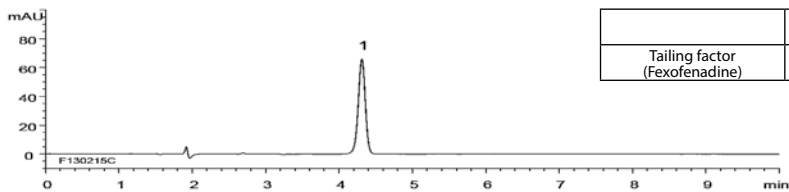
B) Test solution *1 (related compounds) (1 mg/ml fexofenadine hydrochloride)



Column: YMC-Triart Phenyl, 5 µm, 12 nm (250 x 4.6 mm ID)
 Part-No.: TPH12S05-2546WT
 Eluent: acetonitrile / buffer *2 / triethylamine (350/650/3)
 *2 Dissolve 7.51 g of NaH₂PO₄·2H₂O and 0.96 g of NaClO₄·H₂O in 1000 ml water, adjust pH 2.0 with H₃PO₄
 Flow rate: 1.5 ml/min
 Detection: UV at 220 nm
 Injection: 20 µl
 Temperature: 25 °C
 (The United States Pharmacopoeia 36th; assay, related compounds)

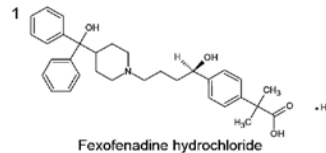
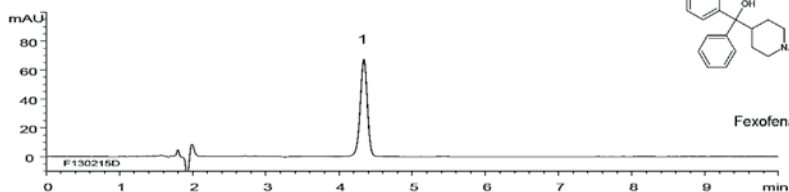
*1 All standard and sample solutions were prepared from fexofenadine hydrochloride supplied as a reagent for laboratory use.

A) Standard solution *1 (0.015 mg/ml fexofenadine hydrochloride)



	System suitability requirement (assay)	result
Tailing factor (Fexofenadine)	≤ 2.0	0.95

B) Sample solution *2 (0.018 mg/ml fexofenadine hydrochloride)



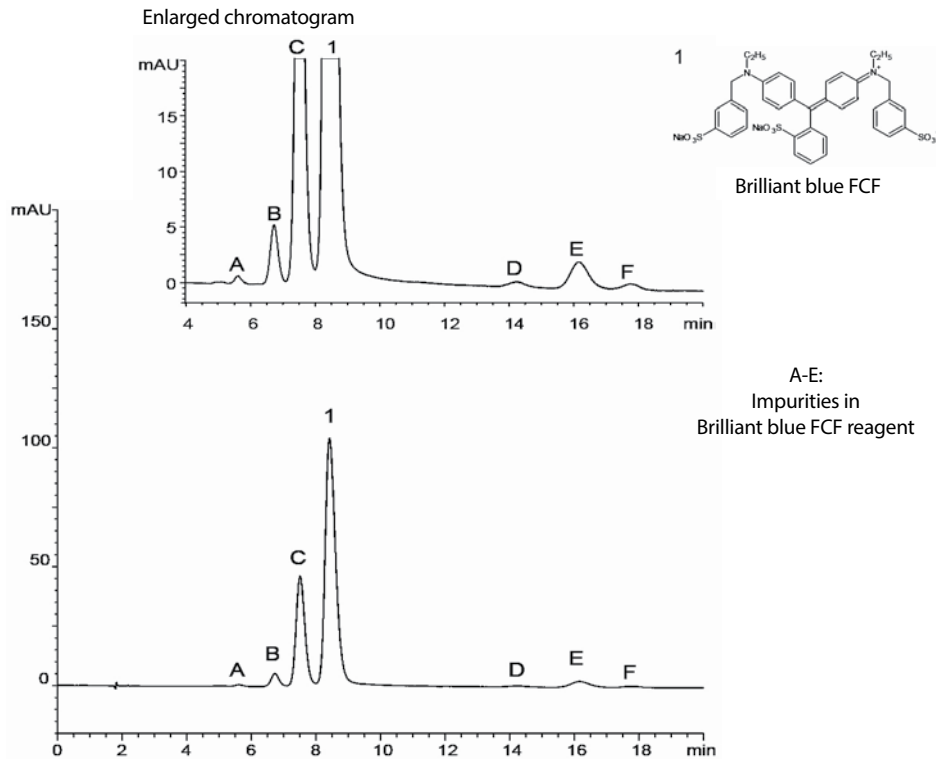
Column: YMC-Triart Phenyl, 5 µm, 12 nm (250 x 4.6 mm ID)
 Part-No.: TPH12S05-2546WT
 Eluent: acetonitrile / buffer *3 (9/16)
 *3 Add 15 ml of acetonitrile/triethylamine (1/1) to 1000 ml of acetic acid/water (17/9983), adjust pH 5.25 with H₃PO₄
 Flow rate: 1.5 ml/min
 Detection: UV at 220 nm
 Injection: 20 µl
 Temperature: 35 °C
 (The United States Pharmacopoeia 36th; assay)

*1 Standard solution was prepared from fexofenadine hydrochloride supplied as a reagent for laboratory use.

*2 Sample solution was prepared from fexofenadine hydrochloride tablets.

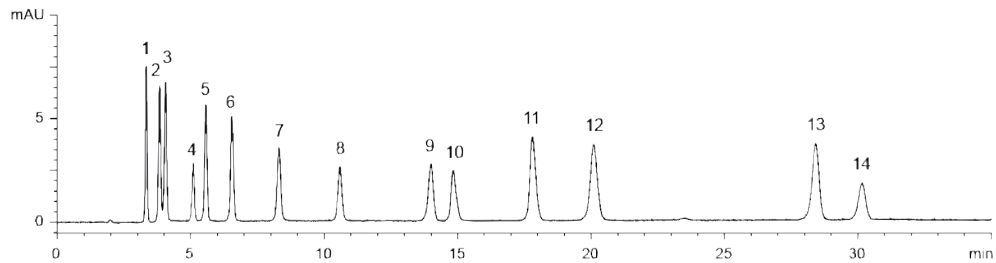
24 Triart Phenyl

Analysis of coal tar dye (Brilliant blue FCF) and its impurities



Column: YMC-Triart Phenyl, 5 μ m, 12 nm (150 x 3.0 mm ID)
 Part-No.: TPH12505-1503WT
 Eluent: water + 0.1% phosphoric acid / methanol (55/45)
 Flow rate: 0.425 ml/min
 Detection: UV at 630 nm
 Injection: 2.0 μ l
 Temperature: 40 $^{\circ}$ C

Catecholamines, serotonin, and their precursors and metabolites

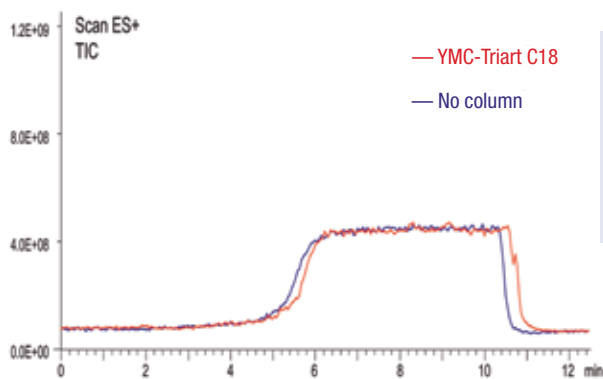


<p>1</p> <p>Noradrenaline hydrochloride (NA) (Norepinephrine hydrochloride)</p>	<p>2</p> <p>3,4-Dihydroxymandelic acid (DOMA)</p>	<p>3</p> <p>3,4-Dihydroxyphenylalanine (DOPA)</p>	<p>4</p> <p>Tyrosine (Tyr)</p>
<p>5</p> <p>Adrenaline hydrochloride (A) (Epinephrine hydrochloride)</p>	<p>6</p> <p>Dopamine hydrochloride (DA)</p>	<p>7</p> <p>Vanillylmandelic acid (VMA)</p>	<p>8</p> <p>3-Methoxy-4-hydroxyphenylglycol (MHPG)</p>
<p>9</p> <p>3,4-Dihydroxyphenylacetic acid (DOPAC)</p>	<p>10</p> <p>3-Methoxytyramine hydrochloride (3MT)</p>	<p>11</p> <p>Serotonin hydrochloride (5-Hydroxytryptamine hydrochloride, 5HT)</p>	<p>12</p> <p>Tryptophan (Trp)</p>
<p>13</p> <p>5-Hydroxyindoleacetic acid (5HIAA)</p>	<p>14</p> <p>Homovanillic acid (HVA)</p>		

Column: YMC-Triart PFP, 3 μ m, 12 nm (150 x 3.0 mm ID)
 Part-No.: TPF12503-1503WT
 Eluent: A) 10 mM formic acid
 B) methanol containing 10 mM formic acid
 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

26 LC/MS

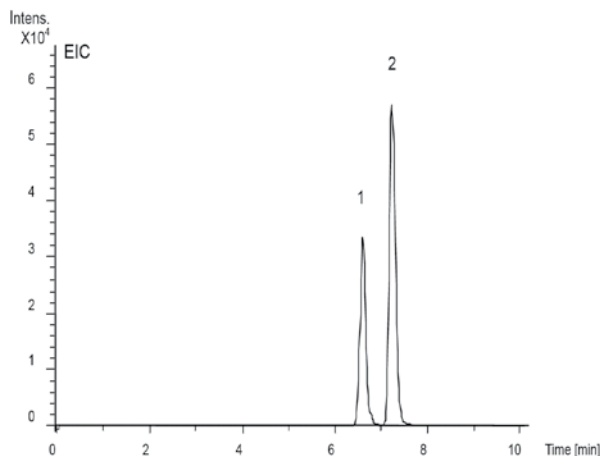
LC/MS compatibility



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
 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)

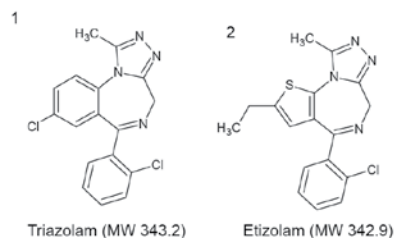
Column bleeding, caused by the fragments of stationary phase, is the main reason for background noise and restrictions on detection limits. No bleed is observed in the test of total ion current (TIC) measured by LC/MS with blank or with YMC-Triart C18. So in terms of the signal/noise ratio (S/N ratio), 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



Peak 1: 100ng_mL_RB4_01_2291.d: EIC 343.051 \pm 0.01+All MS
 Peak 2: 100ng_mL_RB4_01_2291.d: EIC 343.078 \pm 0.01+All MS

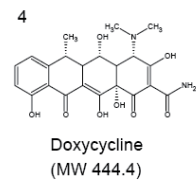
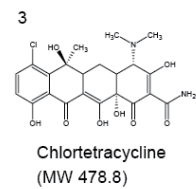
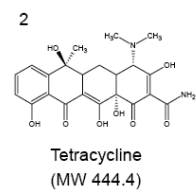
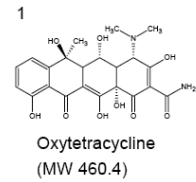
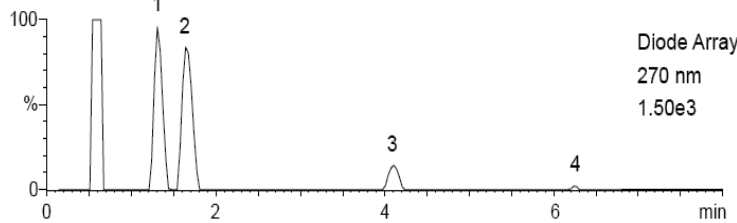
Courtesy of J. Watanabe, Bruker Daltonics K. K.



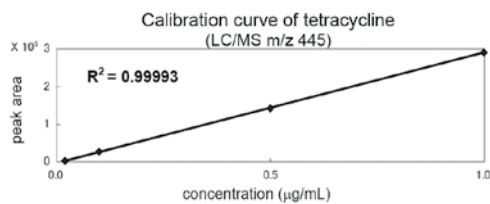
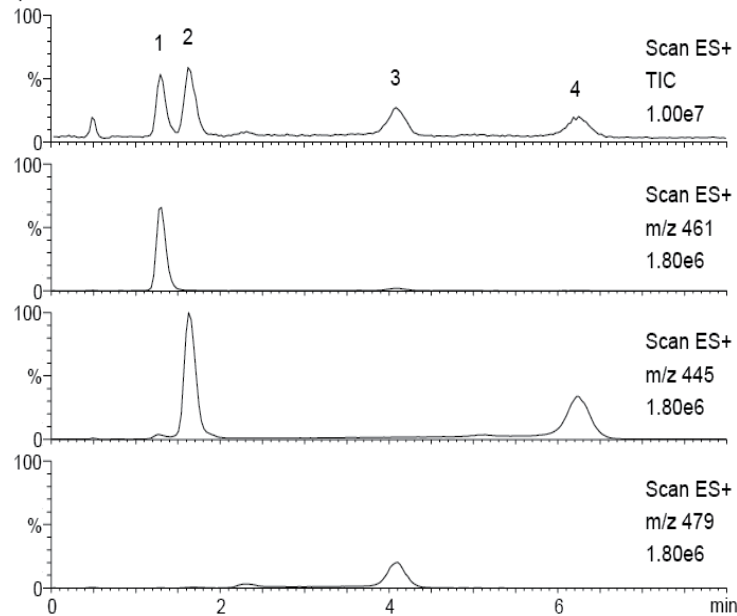
Column: YMC-Triart C18 (5 μ m, 12 nm)
 50 x 2.0 mm ID
Part-No.: TA12S05-0502WT
Eluent: A) 10 mM formic acid
 B) acetonitrile
Gradient: 25-50% B (0-10 min)
Flow rate: 0.2 ml/min
Temperature: 40 °C
Detection: Bruker Daltonics micrOTOF, ESI,
 positive mode
Injection: 5 μ l (100 ng/ml)

LC/MS analysis of tetracycline antibiotics

A) UV



B) MS

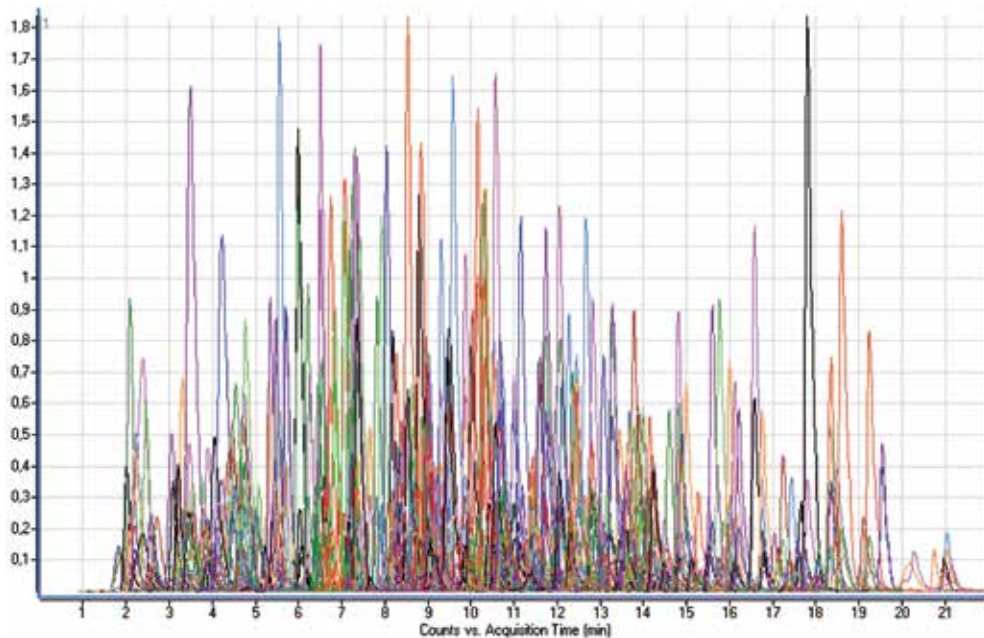


Column: YMC-Triart C18 (5 μm , 12 nm) 50 \times 2.0 mm ID
Part-No.: TA12S05-0502WT
Eluent: acetonitrile / water (15/85) + 0.1% formic acid
Flow rate: 0.4 ml/min
Temperature: 40 $^\circ\text{C}$
Detection: A) UV at 270 nm
B) ESI positive-mode
Injection: 10 μl (1 $\mu\text{g/ml}$)

Application Data by courtesy YMC Co., Ltd.

28 LC/MS

Analysis of 360 pesticides in a single run

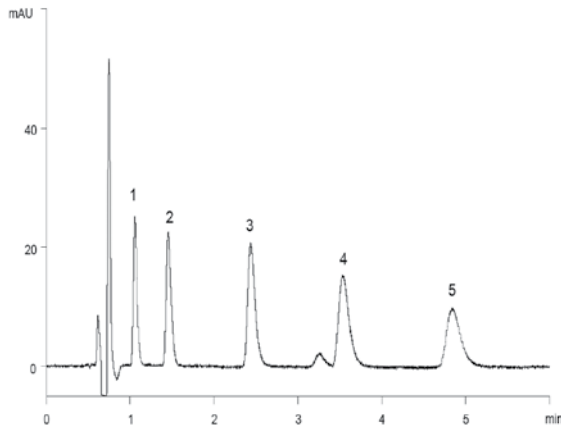


Column: YMC-Triart C18 (3 μ m, 100 x 2.0 mm ID)
Part-No.: TA12503-1002WT
Eluent: A) 5 mM ammonium formate / water
B) 5 mM ammonium formate / methanol
Flow rate: 0.25 ml/min
Temperature: 45 $^{\circ}$ C

Injection: 5 μ l
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
Sample: 100 ng/ml pesticide mix in acetonitrile

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

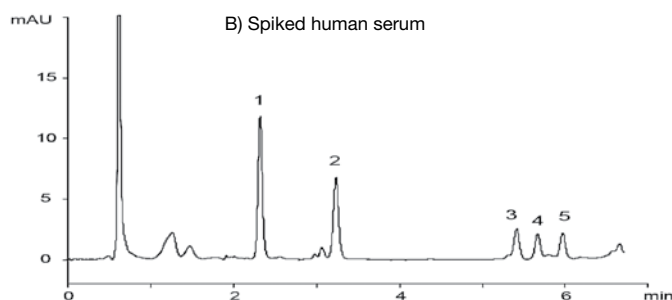
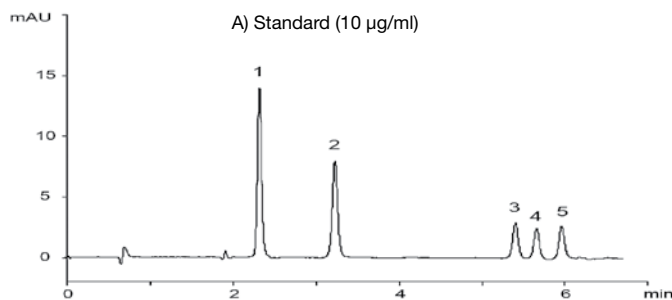
Separation of alkaloids



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 CH₃COOH-CH₃COONH₄
(pH 4.9) / acetonitrile (80/20)
Flow rate: 0.2 ml/min
Temperature: 40 °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

Condition

2 ml methanol
2 ml water

Load

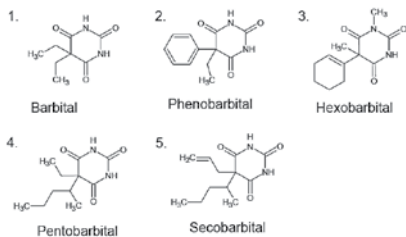
500 μ l spiked human serum
solution (each 10 μ g)

Elute

500 μ l methanol/water (85/15)

Dilute

500 μ l 20 mM ammonium
formate buffer (pH 9.5)

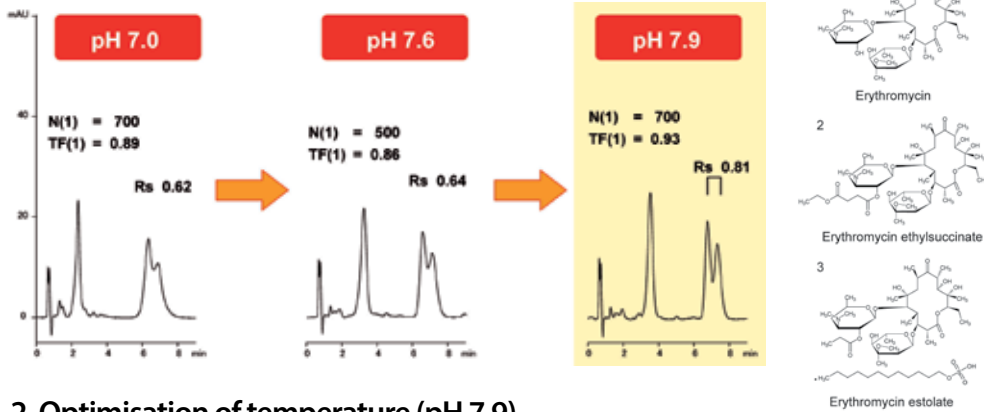


Column: YMC-Triart C18 (5 μ m, 12 nm)
50 x 2.0 mm ID
Part-No.: TA12S05-0502WT
Eluent: A) 20 mM HCOONH₄-NH₃ (pH 9.5)
B) methanol
Gradient: 0-90% B (0-7 min)
Flow rate: 0.2 ml/min
Temperature: 25 °C
Detection: UV at 240 nm
Injection: 1 μ l

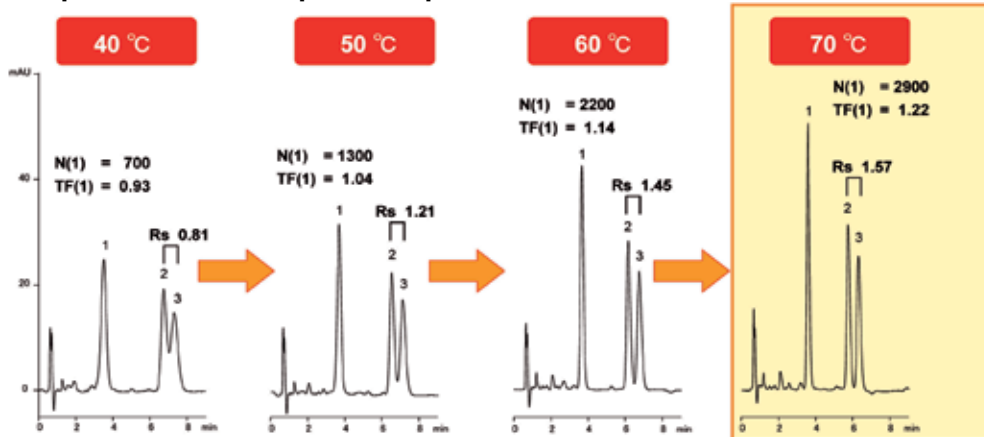
Application Data by courtesy YMC Co., Ltd.

Erythromycin at elevated pH and temperature

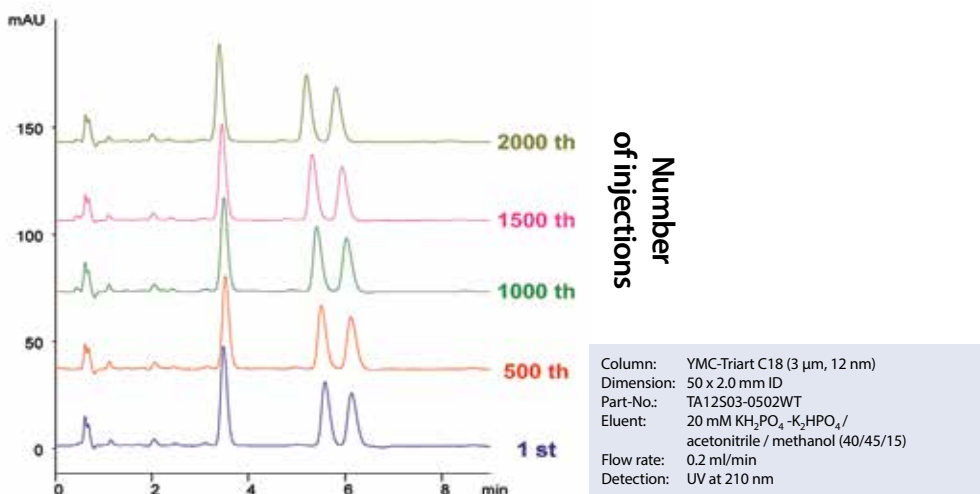
1. Optimisation of pH



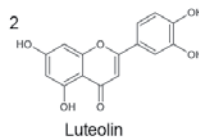
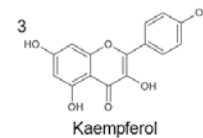
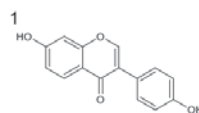
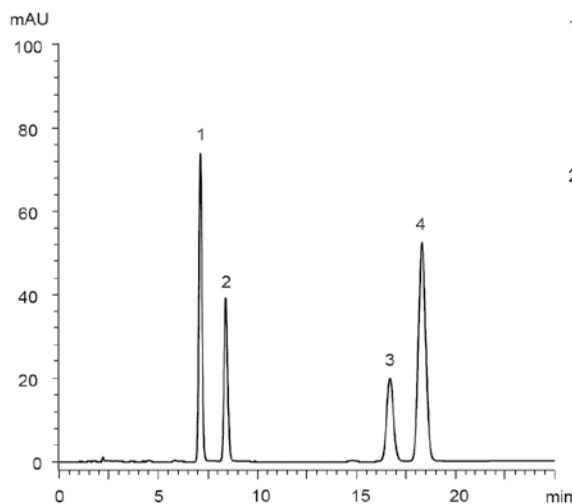
2. Optimisation of temperature (pH 7.9)



3. Stability test: pH 7.9, 70 °C

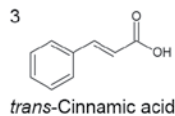
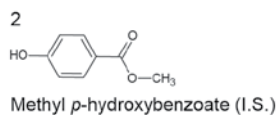
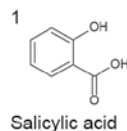
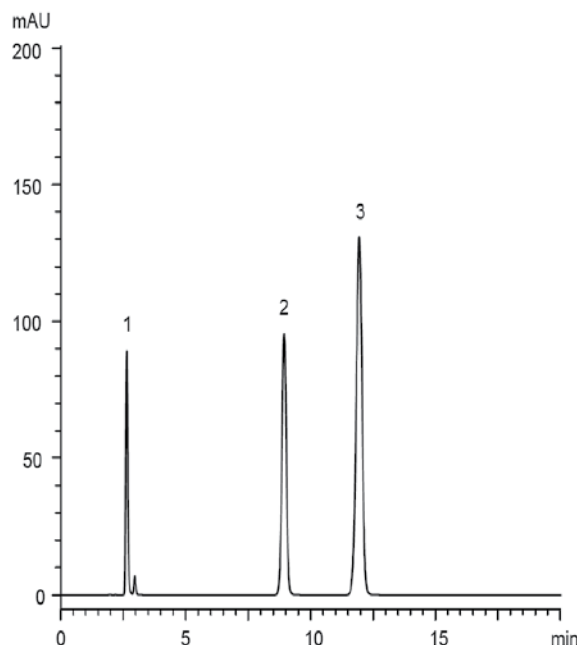


Separation of flavonoids



Column: YMC-Triart C18 (5 μ m, 12 nm)
Dimension: 150 x 3.0 mm ID
Part-No.: TA12505-1503WT
Eluent: acetonitrile / 10 mM H₃PO₄ (30/70)
Flow rate: 0.425 ml/min
Temperature: 37 °C
Detection: UV at 280 nm
Injection: 2 μ l (50 μ g/ml)

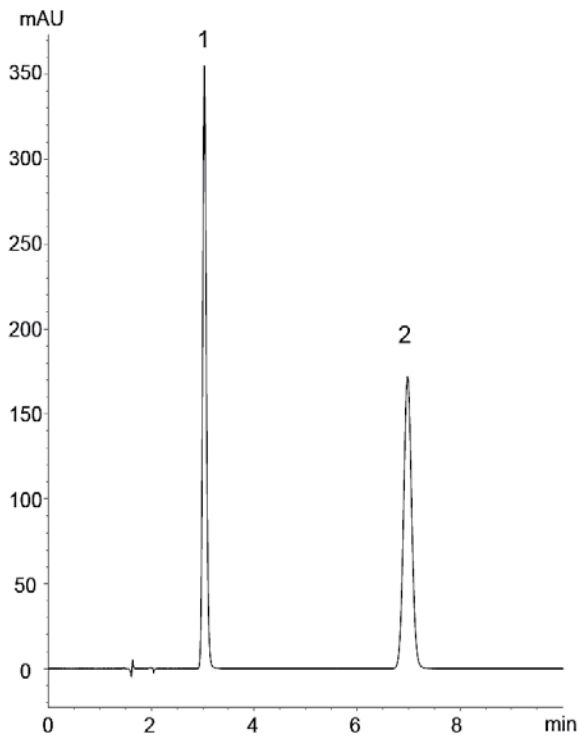
Separation of aromatic carboxylic acids



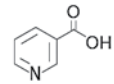
Column: YMC-Triart C18 (5 μ m, 12 nm)
Dimension: 150 x 3.0 mm ID
Part-No.: TA12505-1503WT
Eluent: 10 mM CH₃COOH-CH₃COONH₄ (pH 4.2) / acetonitrile (75/25)
Flow rate: 0.425 ml/min
Temperature: 40 °C
Detection: UV at 254 nm
Injection: 4 μ l (0.02 ~ 0.3 mg/ml)

Application Data by courtesy YMC Co., Ltd.

Aciclovir syrup and injection

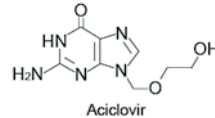


1.



Nicotinic acid

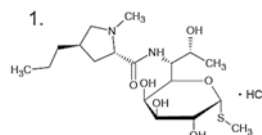
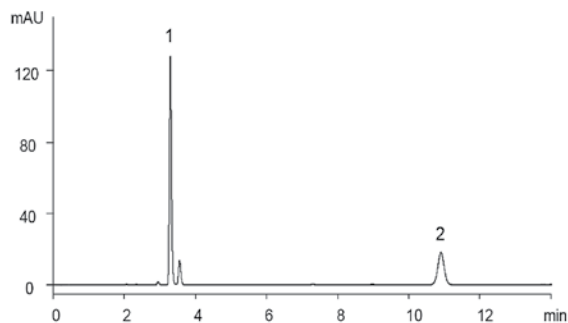
2.



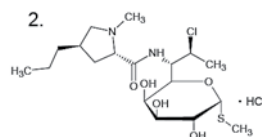
Aciclovir

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 H₃PO₄ and 25 ml of 1 mol/l CH₃COOH in water to make 900 ml → adjust pH 2.5 by 1 mol/l NaOH → add water to make 1000 ml
 Flow rate: 1.0 ml/min
 Temperature: 25 °C
 Detection: UV at 254 nm
 Injection: 20 μ l (0.05 mg/ml, 0.032 mg/ml)

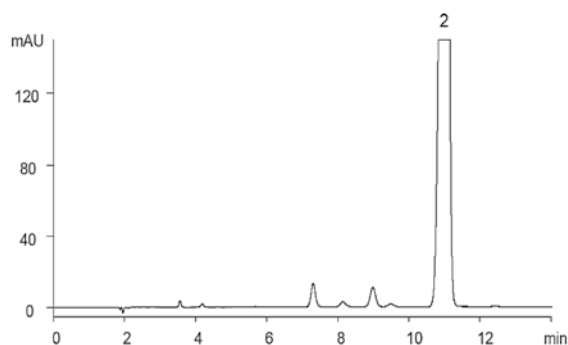
Clindamycin hydrochloride



Lincomycin hydrochloride

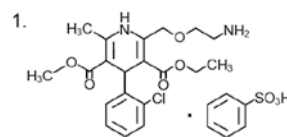
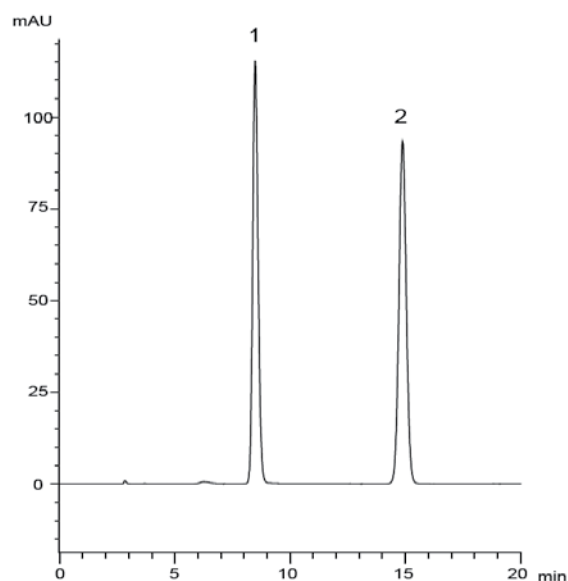


Clindamycin hydrochloride

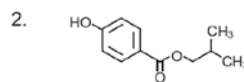


Column: YMC-Triart C18 (5 μ m, 12 nm)
 Dimension: 250 x 4.6 mm ID
 Part-No.: TA12S05-2546WT
 Eluent: 50 mM KH_2PO_4 (pH 7.5 adjusted by 8 M KOH) / acetonitrile (55/45)
 Flow rate: 1.0 ml/min
 Temperature: 25 $^\circ\text{C}$
 Detection: UV at 210 nm
 Injection: 10 μ l

Analysis of amlodipine besilate



Amlodipine besilate

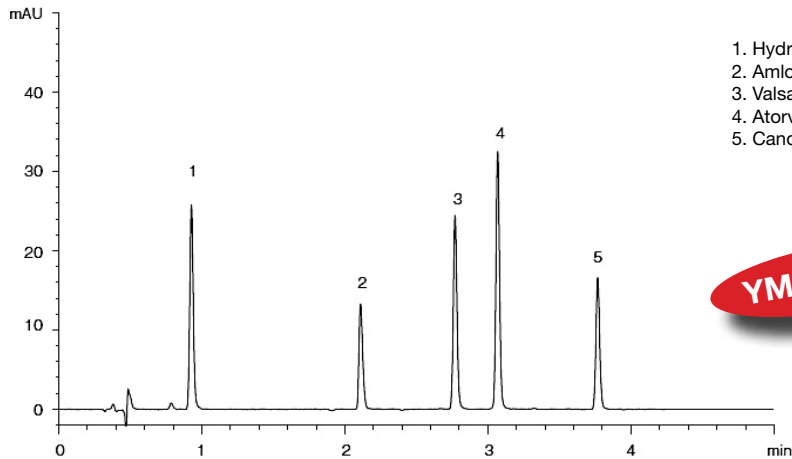


Isobutyl *p*-hydroxybenzoate

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

Application Data by courtesy YMC Co., Ltd.

Basic drugs



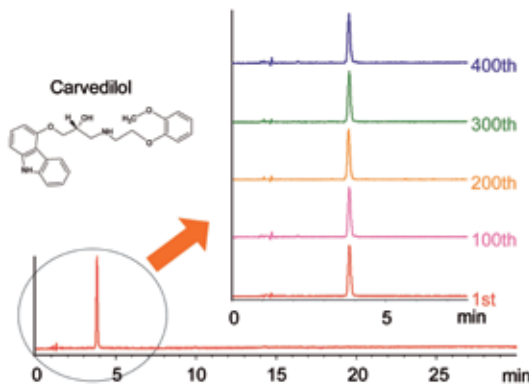
1. Hydrochlorothiazide
2. Amlodipine besilate
3. Valsartan
4. Atorvastatin calcium hydrate
5. Candesartan cilexetil

YMC-Triart C8

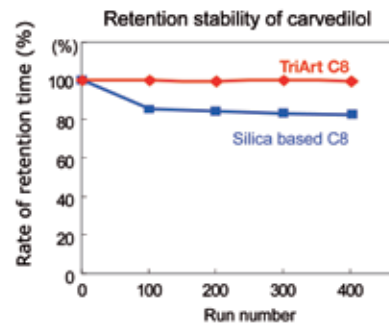
Column: YMC-Triart C8 (3 μ m, 12 nm), 50 x 2.0 mm ID
 Part-No.: TO12503-0502WT
 Eluent: A) water + 0.1% formic acid
 B) acetonitrile + 0.1% formic acid
 10-90% B (0-5 min), 90% B (5-7 min)

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



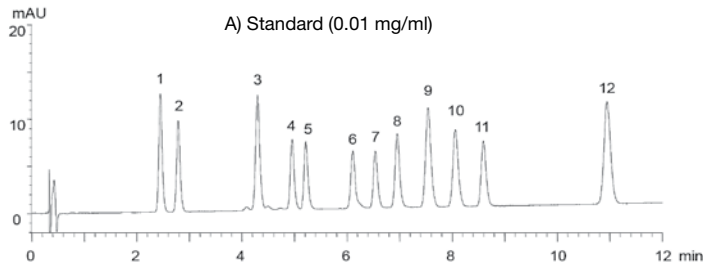
Column: YMC-Triart C8 (5 μ m, 150 x 2.0 mm ID)
 Part-No.: TO12505-1502WT
 Eluent: phosphate buffer (pH 2.0)* / acetonitrile (65/35)
 *Dissolve 2.72 g of KH_2PO_4 in 900 ml water, adjust pH 2.0 with H_3PO_4 and add water to make 1000 ml
 Flow rate: 0.28 ml/min (adjust the flow rate so that the retention time of carvedilol is about 4 min)
 Temperature: 55 °C
 Detection: UV at 240 nm



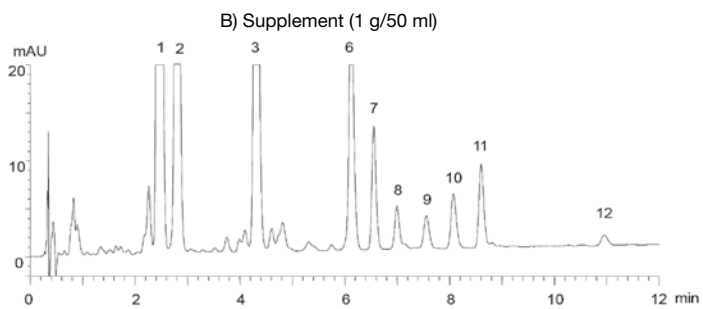
YMC-Triart C8

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

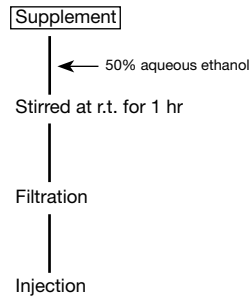
Soy isoflavones in supplement



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

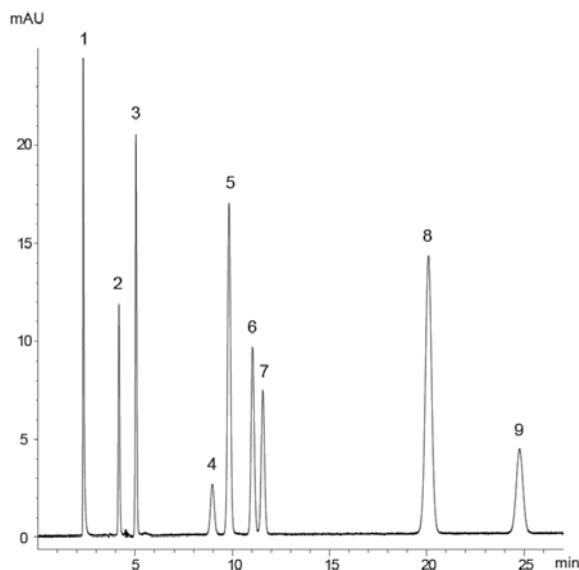


Sample preparation method



Column:	YMC-Triart C18 (3 µm, 12 nm) 50 x 2.0 mm ID	Gradient:	5-40% B (0-12 min)
Part-No.:	TA12503-0502WT	Flow rate:	0.4 ml/min
Eluent:	A) acetonitrile / water (10/90) + 0.1% HCOOH B) acetonitrile / water (60/40) + 0.1% HCOOH	Temperature:	25 °C
		Detection:	UV at 254 nm
		Injection:	2 µl

Separation of water-soluble vitamins



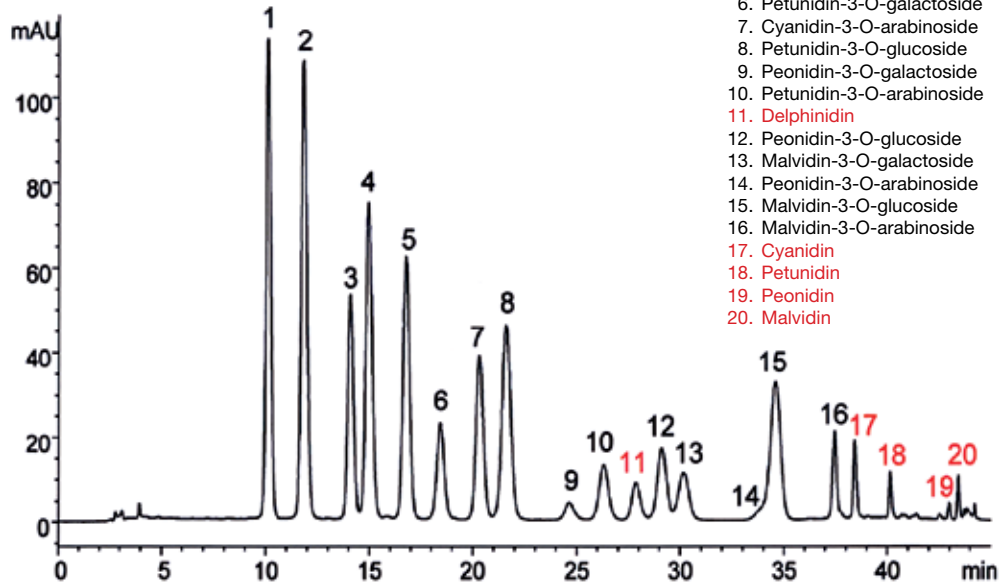
1. Thiamine HCl (Vitamin B₁)
2. Pyridoxine HCl (Vitamin B₆)
3. Nicotinamide
4. Cyanocobalamin (Vitamin B₁₂)
5. L-Ascorbic acid 2-glucoside
6. L-Ascorbic acid (Vitamin C)
7. Erythorbic acid
8. Riboflavin (Vitamin B₂)
9. Nicotinic acid

Column:	YMC-Triart C18 (5 µm, 12 nm) 250 x 4.6 mm ID
Part-No.:	TA12505-2546WT
Eluent:	phosphate buffer* / acetonitrile (90/10) * Dissolve 1.4 g KH ₂ PO ₄ in 800 ml water → add 26 ml 10% TBA:OH → adjust pH 5.2 by 20% H ₃ PO ₄ → add water to make 1000 ml
Flow rate:	0.8 ml/min
Temperature:	40 °C
Detection:	UV at 260 nm
Injection:	10 µl (5 µg/ml)

Application Data by courtesy YMC Co., Ltd.

Analysis of anthocyanins and anthocyanidins

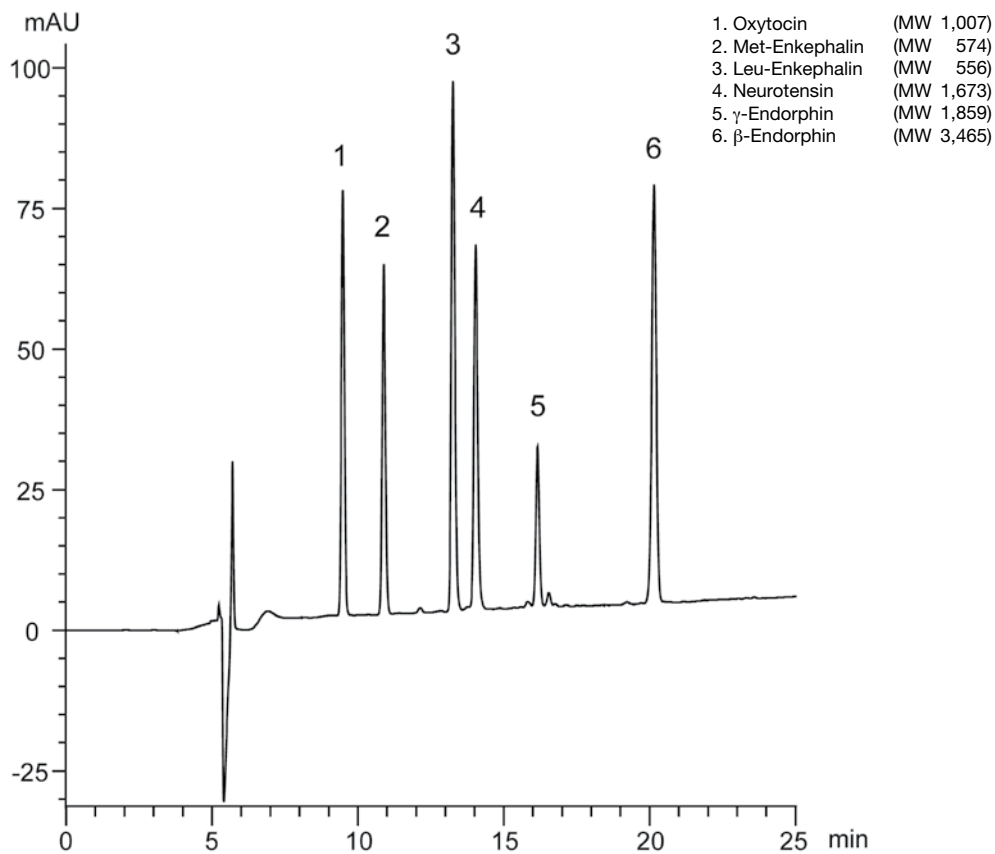
Anthocyanins: Indicated in black
 Anthocyanidins: Indicated in red



1. Delphinidin-3-O-galactoside
2. Delphinidin-3-O-glucoside
3. Cyanidin-3-O-galactoside
4. Delphinidin-3-O-arabinoside
5. Cyanidin-3-O-glucoside
6. Petunidin-3-O-galactoside
7. Cyanidin-3-O-arabinoside
8. Petunidin-3-O-glucoside
9. Peonidin-3-O-galactoside
10. Petunidin-3-O-arabinoside
11. Delphinidin
12. Peonidin-3-O-glucoside
13. Malvidin-3-O-galactoside
14. Peonidin-3-O-arabinoside
15. Malvidin-3-O-glucoside
16. Malvidin-3-O-arabinoside
17. Cyanidin
18. Petunidin
19. Peonidin
20. Malvidin

Column: YMC-Triart C18 (5 μ m, 12 nm) 250 x 4.6 mm ID
 Part-No.: TA12505-2546WT
 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)

Peptides (MW 556 - 3,465)



Column: YMC-Triart C18 (5 µm, 12 nm)
 Dimension: 150 x 2.0 mm ID
 Part-No.: TA12S05-1502WT
 Eluent: A) water + 0.1% TFA
 B) acetonitrile + 0.1% TFA
 20-45% B (0-25 min)

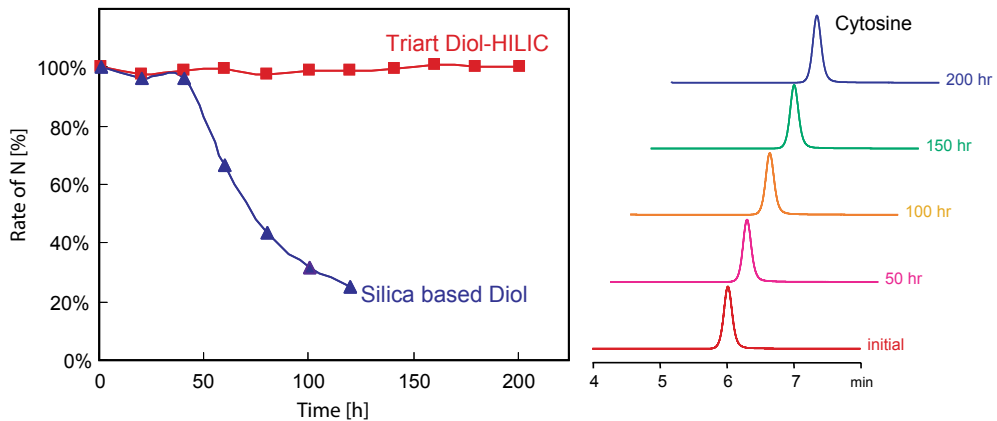
Flow rate: 0.2 ml/min
 Temperature: 37 °C
 Detection: UV at 220 nm
 Injection: 2 ml (0.075 - 0.25 mg/ml)

Application Data by courtesy YMC Co., Ltd.

38 HILIC

Great stability and reproducibility at high pH

Stability in high pH (pH 11, 50 °C)

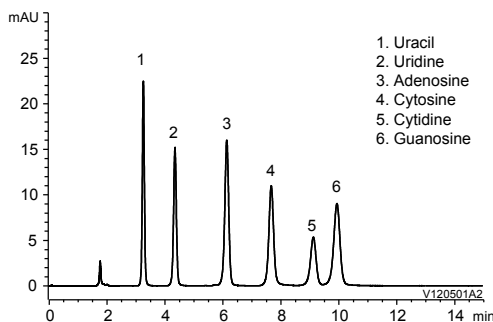


Column: 5 μm , 150 x 4.6 mm ID
 Part-No.: TDH12S05-1546WT
 Eluent: acetonitrile / water (90/10) + 0.1% NH_3 (pH 11.3)

Flow rate: 1.0 ml/min
 Temperature: 50 °C
 Sample: Cytosine

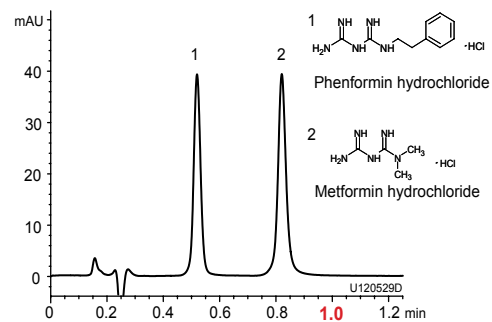
Triart Diol-HILC offers highly reproducible separations even at high pH and high temperature. The lifetime of Triart Diol-HILIC is much longer than that of conventional silica-based Diol columns.

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 $\text{CH}_3\text{COONH}_4$ / acetonitrile (10/90)
 Flow rate: 0.425 ml/min
 Temperature: 30 °C
 Detection: UV at 254 nm
 Injection: 2 μl (5 ~ 10 $\mu\text{g}/\text{ml}$)

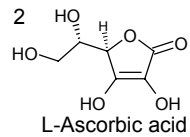
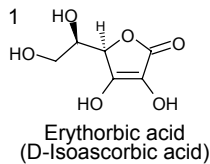
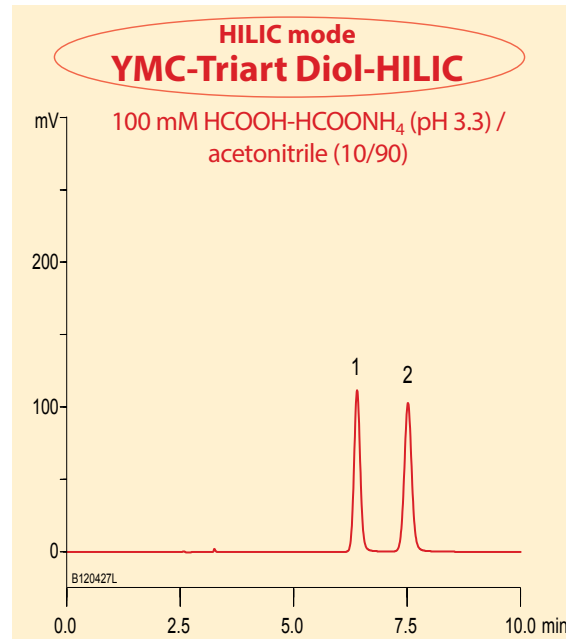
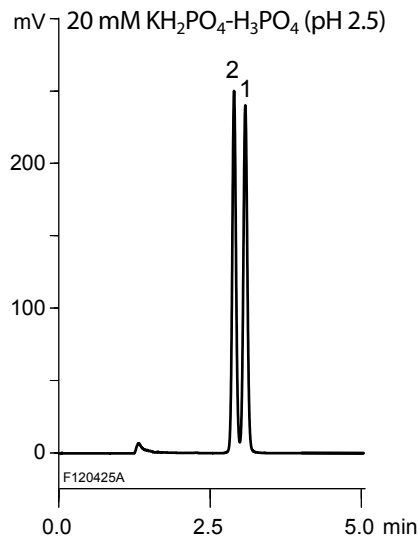
Diabetes drugs



Column: YMC-Triart Diol-HILIC (1.9 μm , 12 nm)
 50 x 2.0 mm ID
 Part-No.: TDH12SP9-0502PT
 Eluent: 100 mM HCOOH-HCOONH_4 (pH 3.7) / acetonitrile (10/90)
 Flow rate: 0.8 ml/min
 Temperature: 25 °C
 Detection: UV at 235 nm
 Injection: 2 μl (10 $\mu\text{g}/\text{ml}$)

Polar and hydrophilic compounds

RP mode YMC-Triart C18



Column: 5 μ m, 150 x 3.0 mm ID
 Flow rate: 0.425 ml/min
 Temperature: 40 $^{\circ}$ C
 Detection: UV at 254 nm
 Injection: 4 μ l (0.05 mg/ml)

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, Triart Diol-HILIC shows strong retention and good resolution of these compounds with mobile phase containing 90% organic solvent.

Application Data by courtesy YMC Co., Ltd.

40

QC
Data

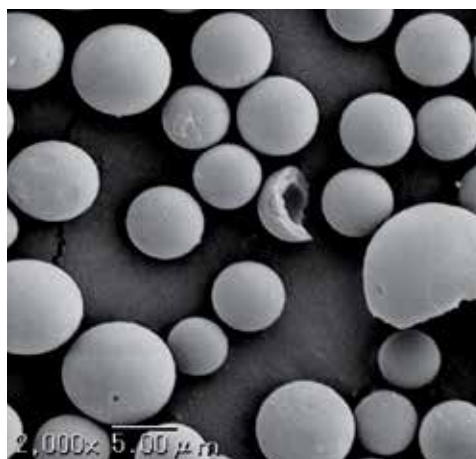
YMC-Triart: Improved quality of particles

Uniform spherical particles

YMC-Triart

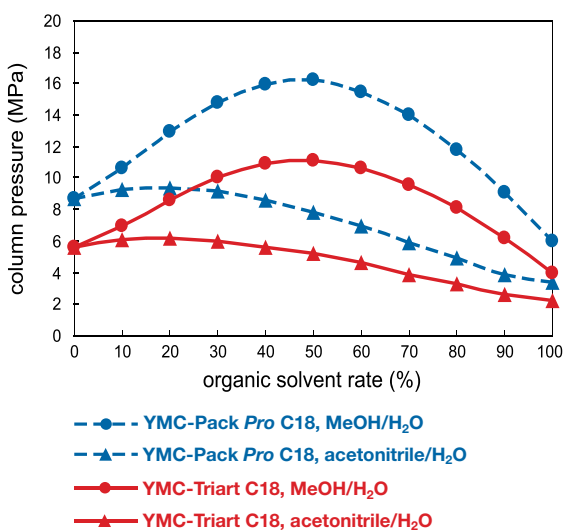


X-Bridge HILIC



The new uniform spherical particle support is used for YMC-Triart C18 and C8. The particle is 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

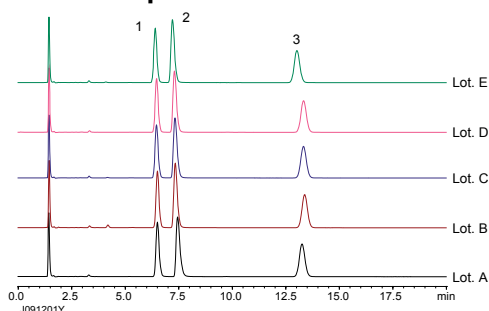
The revolutionary production technique, adapted from micro-reactor flow technology, produces a multi-layered silica/organic hybrid stationary phase with outstanding narrow pore size and particle size distributions, which results in low back pressures.

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

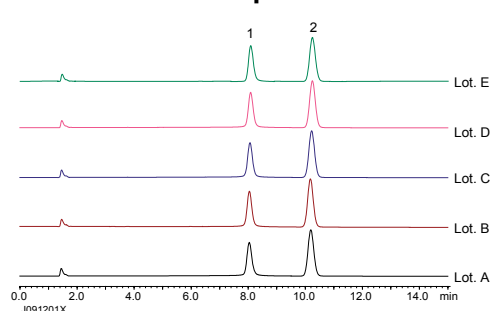
Excellent reproducibility of YMC-Triart phases is available even for the analysis for basic and coordination compounds which normally exhibit tailing and adsorption effects.

Basic compounds



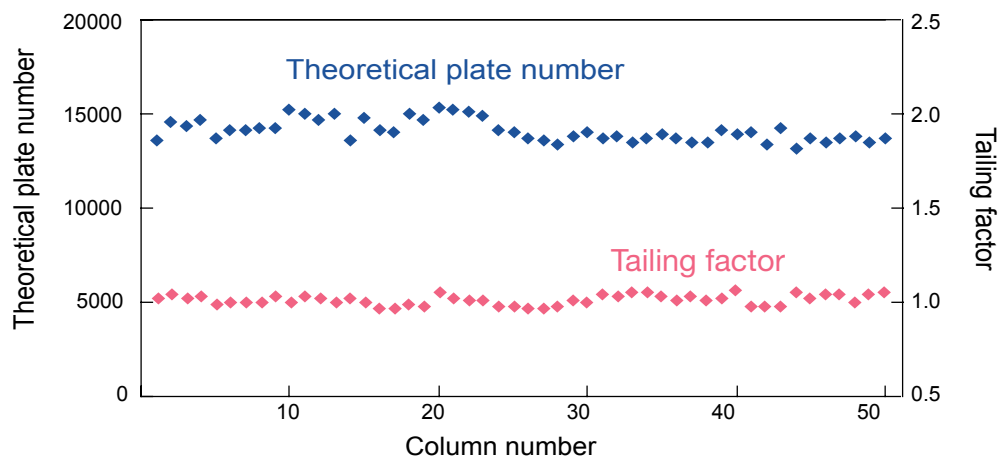
Column: YMC-Triart C18, 5 μ m, 150 x 3.0 mm ID
 Part-No.: TA12505-1503WT
 Eluent: 20 mM KH_2PO_4 (pH 6.9) / acetonitrile (65/35)
 Flow rate: 0.425 ml/min
 Temperature: 40 $^\circ\text{C}$
 Detection: UV at 235 nm

Coordination compounds



Column: YMC-Triart C18, 5 μ m, 150 x 3.0 mm ID
 Part-No.: TA12505-1503WT
 Eluent: acetonitrile / 0.1% H_3PO_4 (40/60)
 Flow rate: 0.425 ml/min
 Temperature: 40 $^\circ\text{C}$
 Detection: UV at 254 nm

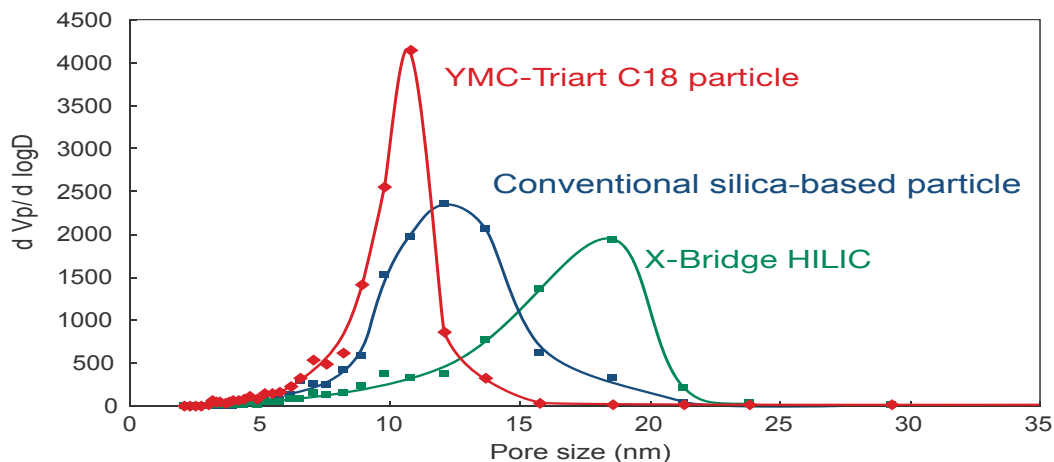
The reproducibility of packed columns is shown below in terms of theoretical plate number (N) and tailing factor (Tf). YMC-Triart packed columns exhibit a very narrow range of variation.



Column: YMC-Triart C18, 5 μ m, 150 x 4.6 mm ID
 Part-No.: TA12505-1546WT
 Eluent: acetonitrile / water (40/60)
 Flow rate: 1.0 ml/min
 Temperature: ambient
 Sample: butyl benzoate

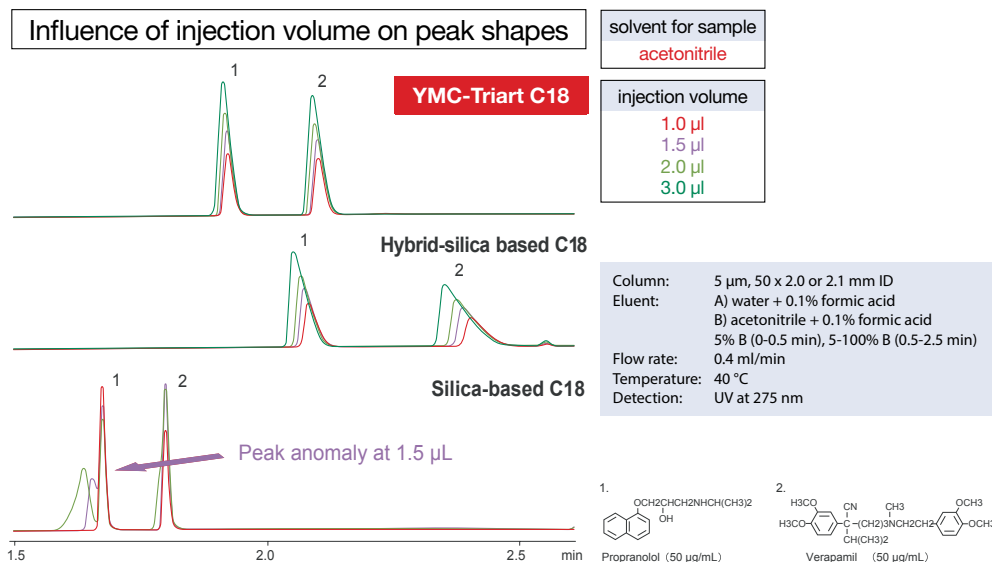
Application Data by courtesy YMC Co., Ltd.

Narrow pore distribution



This figure shows the pore size distributions of some competitive materials. Comparing the pore size distributions of some competitive materials shows that YMC-Triart has a narrower distribution which results in sharper peak shapes.

Improved loadability

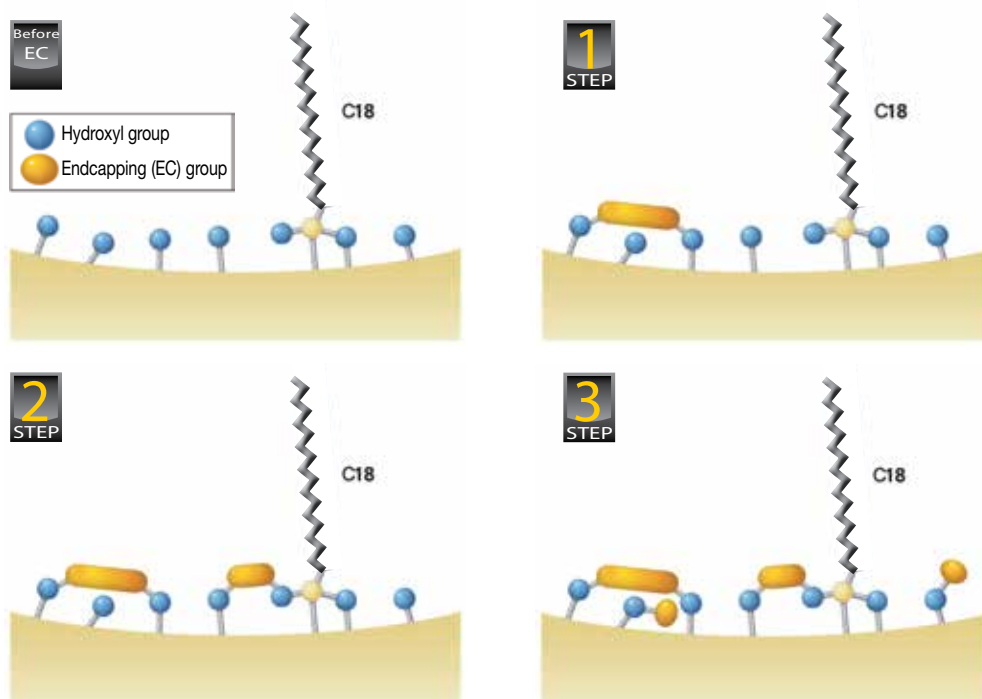


In order to prevent peak errors, there is the limit to the injection volume when the sample is injected in high elution solvents (such as 100% acetonitrile). Compared with traditional columns, more than double the injection volume can be injected into YMC-Triart columns as a result of the extremely narrow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

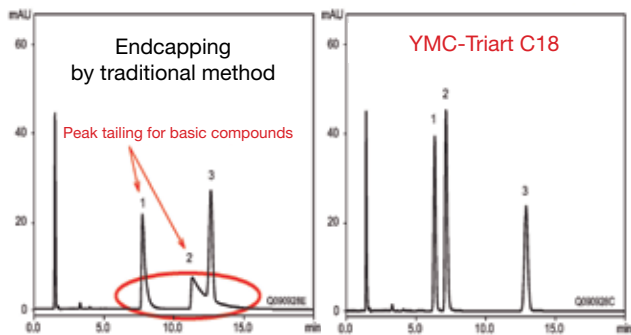
Multi-stage endcapping

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 capping-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 C18, C8 and Phenyl phases use a new innovation in endcapping called "multi-stage endcapping" for its surface modification process. By using a number of compounds with the different reactivities in successive steps, all silanols can be capped to the maximum extent.



The chromatographic result of a "good" endcapping is demonstrated:



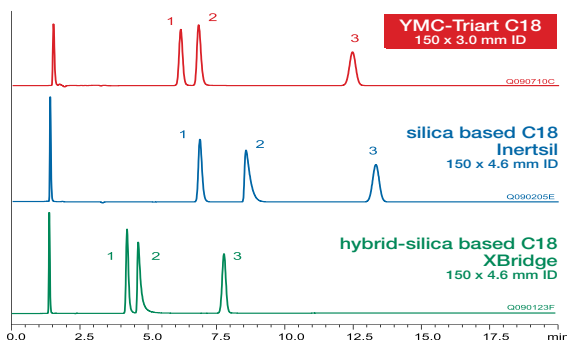
Ingredients in cough/cold medication:

1. Chlorpheniramine
2. Dextromethorphan
3. Propyl *p*-hydroxybenzoate

Column: 5 μ m, 150 x 3.0 mm ID
Part-No.: TA12505-1503WT
Eluent: 20 mM KH_2PO_4 - K_2HPO_4
(pH 6.9) / acetonitrile (65/35)
Flow rate: 0.425 ml/min
Temperature: 40 $^\circ\text{C}$
Detection: UV at 235 nm

Application Data by courtesy YMC Co., Ltd.

Basic compounds



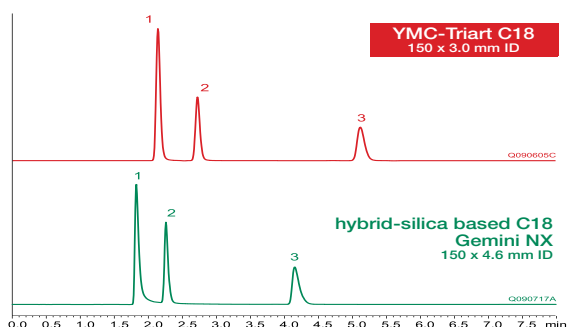
Ingredients in a cough/cold medication

1. Chlorpheniramine
2. Dextromethorphan
3. Propyl p-hydroxybenzoate

Column:	5 μ m, 150 x 3.0 or 150 x 4.6 mm ID
Eluent:	20 mM KH_2PO_4 - K_2HPO_4 (pH 6.9) / acetonitrile (65/35)
Flow rate:	0.425 ml/min for 3.0 mm ID 1.0 ml/min for 4.6 mm ID
Temperature:	40 °C
Detection:	UV at 235 nm

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



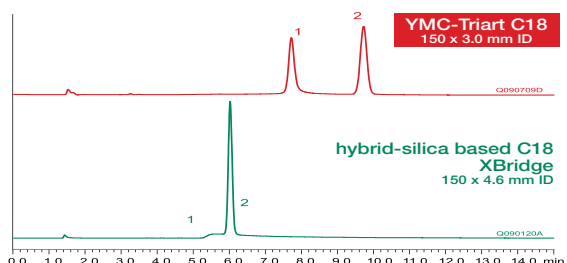
Organic acid

1. Formic acid
2. Acetic acid
3. Propionic acid

Column:	5 μ m, 150 x 3.0 or 150 x 4.6 mm ID
Eluent:	methanol / water + 0.1% H_3PO_4 (5/95)
Flow rate:	0.425 ml/min for 3.0 mm ID 1.0 ml/min for 4.6 mm ID
Temperature:	37 °C
Detection:	UV at 210 nm

YMC-Triart phases is 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



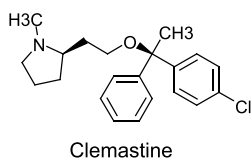
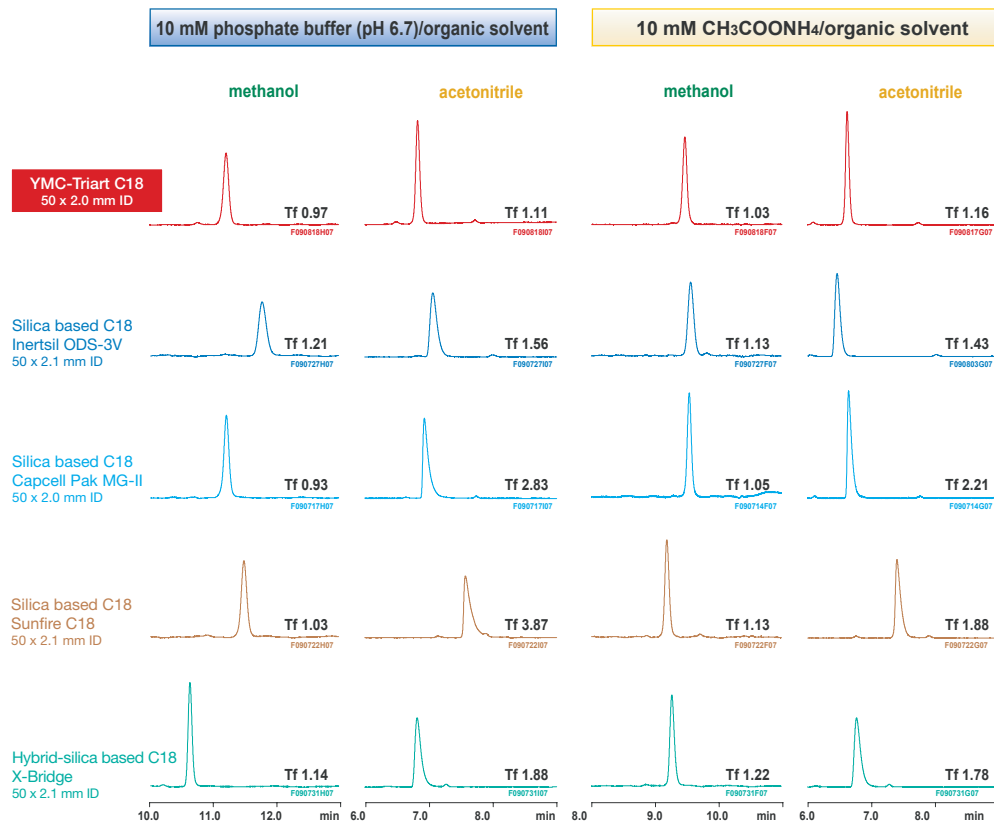
Hinokitiol

1. Hinokitiol
2. Methyl benzoate

Column:	5 μ m, 150 x 3.0 or 150 x 4.6 mm ID
Eluent:	acetonitrile / water + 0.1% H_3PO_4 (40/60)
Flow rate:	0.425 ml/min for 3.0 mm ID 1.0 ml/min for 4.6 mm ID
Temperature:	40 °C
Detection:	UV at 254 nm

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



Column: 5 μ m, 50 x 2.0 or 50 x 2.1 mm ID
 Eluent: A) 10 mM KH₂PO₄-K₂HPO₄ (pH 6.7) or 10 mM CH₃COONH₄
 B) methanol or acetonitrile
 5-90% B (0-10 min), 90% B (10-15 min)
 Flow rate: 0.2 ml/min
 Temperature: 25 °C
 Detection: UV at 230 nm

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.

Substance index

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Acesulfame K	11	Catecholamines	25	Flavonoids	31
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Acetaminophenone	16	Chlorpheniramine	8,43,44	Genistein	35
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6"-O-Acetylgenistin	35	Clemastine	45	Glycyrrhizin acid ammonium salt	15
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Azoxystrobin	9	Dopamine hydrochloride (DA)	25	Macrolide antibiotics	12
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Benzyl alcohol	7	Erythromycin	12,30	Malvidin-3-O-glucoside	36
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Substance index

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Nicotinamide	35	n-Propylbenzene	21	Triazolam	26
Nicotinic acid	32,35	Propyl paraben	8,10	Triclop pyr	9
4-Nitrocatechol	14	Propyl p-hydroxybenzoate	43,44	Triphenolene	21
4-Nitrophenol	16	Pyridoxine HCl	15,35	Tryptophan (Trp)	25
Noradrenaline hydrochloride (NA)	25	Pyrocatechol	14,16	Tyrosine (Tyr)	25
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Paraquat	13	Scopolamine	29	Vitamin C	35
Pentobarbital	29	Secobarbital	29	Vitamin D2	20
Peonidin	36	Serotonin hydrochloride	25	Vitamin D3	20
Peonidin-3-O-arabinoside	36	Siduron	9		
Peonidin-3-O-galactoside	36	Soy isoflavones	33	W	
Peonidin-3-O-glucoside	36	Spiramycin	12	Water-soluble vitamins	35

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Ordering information

YMC-Triart 1.9 μm UHPLC columns

Phase	Column ID (mm)	Column length (mm)						Guard cartridges* with 5 mm length (pack of 3)
		20	30	50	75	100	150	
C18	2.0	TA12SP9-0202PT	TA12SP9-0302PT	TA12SP9-0502PT	TA12SP9-L502PT	TA12SP9-1002PT	TA12SP9-1502PT	TA12SP9-E5Q1CC
	3.0	—	—	TA12SP9-0503PT	TA12SP9-L503PT	TA12SP9-1003PT	TA12SP9-1503PT	TA12SP9-E503CC
C18 ExRS	2.1	TAR08SP9-02Q1PT	TAR08SP9-H3Q1PT	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
	3.0	—	—	TO12SP9-0503PT	TO12SP9-L503PT	TO12SP9-1003PT	TO12SP9-1503PT	TO12SP9-E503CC
Phenyl	2.0	TPH12SP9-0202PT	TPH12SP9-0302PT	TPH12SP9-0502PT	TPH12SP9-L502PT	TPH12SP9-1002PT	TPH12SP9-1502PT	TPH12SP9-E5Q1CC
	3.0	—	—	TPH12SP9-0503PT	TPH12SP9-L503PT	TPH12SP9-1003PT	TPH12SP9-1503PT	TPH12SP9-E503CC
PPF	2.0	TPF12SP9-0202PT	TPF12SP9-0203PT	TPF12SP9-0502PT	TPF12SP9-L502PT	TPF12SP9-1002PT	TPF12SP9-1502PT	TPF12SP9-E5Q1CC
	3.0	—	—	TPF12SP9-0503PT	TPF12SP9-L503PT	TPF12SP9-1003PT	TPF12SP9-1503PT	TPF12SP9-E503CC
HILIC	2.0	—	—	TDH12SP9-0502PT	TDH12SP9-L502PT	TDH12SP9-1002PT	—	TDH12SP9-E5Q1CC
	3.0	—	—	TDH12SP9-0503PT	TDH12SP9-L503PT	TDH12SP9-1003PT	—	—

*Guard cartridge holder required, part no. XPCHUHP

Ordering Information

YMC-Triart plus 3 µm high pressure rated analytical columns

Phase	Column ID (mm)	Column length (mm)							Guard cartridges* with 10 mm length (pack of 5)
		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	—	—	TA12S03-0503PTH	TA12S03-L503PTH	TA12S03-1003PTH	TA12S03-1503PTH	—	TA12S03-0103GC
	4.6	—	TA12S03-H346PTH	TA12S03-0546PTH	TA12S03-L546PTH	TA12S03-1046PTH	TA12S03-1546PTH	TA12S03-2546PTH	TA12S03-0104GC
C18 ExRS	2.1	TAR08S03-02Q1PTH	TAR08S03-H3Q1PTH	TAR08S03-05Q1PTH	TAR08S03-L5Q1PTH	TAR08S03-10Q1PTH	TAR08S03-15Q1PTH	—	TAR08S03-01Q1GC
	3.0	—	—	TAR08S03-0503PTH	TAR08S03-L503PTH	TAR08S03-1003PTH	TAR08S03-1503PTH	—	TAR08S03-0103GC
	4.6	—	TAR08S03-H346PTH	TAR08S03-0546PTH	TAR08S03-L546PTH	TAR08S03-1046PTH	TAR08S03-1546PTH	TAR08S03-2546PTH	TAR08S03-0104GC
C8	2.1	TO12S03-02Q1PTH	TO12S03-H3Q1PTH	TO12S03-05Q1PTH	TO12S03-L5Q1PTH	TO12S03-10Q1PTH	TO12S03-15Q1PTH	—	TO12S03-01Q1GC
	3.0	—	—	TO12S03-0503PTH	TO12S03-L503PTH	TO12S03-1003PTH	TO12S03-1503PTH	—	TO12S03-0103GC
	4.6	—	TO12S03-H346PTH	TO12S03-0546PTH	TO12S03-L546PTH	TO12S03-1046PTH	TO12S03-1546PTH	TO12S03-2546PTH	TO12S03-0104GC
Phenyl	2.1	TPH12S03-02Q1PTH	TPH12S03-H3Q1PTH	TPH12S03-05Q1PTH	TPH12S03-L5Q1PTH	TPH12S03-10Q1PTH	TPH12S03-15Q1PTH	—	TPH12S03-01Q1GC
	3.0	—	—	TPH12S03-0503PTH	TPH12S03-L503PTH	TPH12S03-1003PTH	TPH12S03-1503PTH	—	TPH12S03-0103GC
	4.6	—	TPH12S03-H346PTH	TPH12S03-0546PTH	TPH12S03-L546PTH	TPH12S03-1046PTH	TPH12S03-1546PTH	TPH12S03-2546PTH	TPH12S03-0104GC
PPF	2.1	TPF12S03-02Q1PTH	TPF12S03-H3Q1PTH	TPF12S03-05Q1PTH	TPF12S03-L5Q1PTH	TPF12S03-10Q1PTH	TPF12S03-15Q1PTH	—	TPF12S03-01Q1GC
	3.0	—	—	TPF12S03-0503PTH	TPF12S03-L503PTH	TPF12S03-1003PTH	TPF12S03-1503PTH	—	TPF12S03-0103GC
	4.6	—	TPF12S03-H346PTH	TPF12S03-0546PTH	TPF12S03-L546PTH	TPF12S03-1046PTH	TPF12S03-1546PTH	TPF12S03-2546PTH	TPF12S03-0104GC
HILIC	2.1	TDH12S03-02Q1PTH	TDH12S03-H3Q1PTH	TDH12S03-05Q1PTH	TDH12S03-L5Q1PTH	TDH12S03-10Q1PTH	TDH12S03-15Q1PTH	—	TDH12S03-01Q1GC
	3.0	—	—	TDH12S03-0503PTH	TDH12S03-L503PTH	TDH12S03-1003PTH	TDH12S03-1503PTH	—	TDH12S03-0103GC
	4.6	—	TDH12S03-H346PTH	TDH12S03-0546PTH	TDH12S03-L546PTH	TDH12S03-1046PTH	TDH12S03-1546PTH	TDH12S03-2546PTH	TDH12S03-0104GC

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

YMC-Triart plus 5 µm high pressure rated analytical columns

Phase	Column ID (mm)	Column length (mm)							Guard cartridges* with 10 mm length (pack of 5)
		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	—	—	TA12S05-0503PTH	TA12S05-L503PTH	TA12S05-1003PTH	TA12S05-1503PTH	—	TA12S05-0103GC
	4.6	—	TA12S05-H346PTH	TA12S05-0546PTH	TA12S05-L546PTH	TA12S05-1046PTH	TA12S05-1546PTH	TA12S05-2546PTH	TA12S05-0104GC
C18 ExRS	2.1	TAR08S05-02Q1PTH	TAR08S05-H3Q1PTH	TAR08S05-05Q1PTH	TAR08S05-L5Q1PTH	TAR08S05-10Q1PTH	TAR08S05-15Q1PTH	—	TAR08S05-01Q1GC
	3.0	—	—	TAR08S05-0503PTH	TAR08S05-L503PTH	TAR08S05-1003PTH	TAR08S05-1503PTH	—	TAR08S05-0103GC
	4.6	—	TAR08S05-H346PTH	TAR08S05-0546PTH	TAR08S05-L546PTH	TAR08S05-1046PTH	TAR08S05-1546PTH	TAR08S05-2546PTH	TAR08S05-0104GC
C8	2.1	TO12S05-02Q1PTH	TO12S05-H3Q1PTH	TO12S05-05Q1PTH	TO12S05-L5Q1PTH	TO12S05-10Q1PTH	TO12S05-15Q1PTH	—	TO12S05-01Q1GC
	3.0	—	—	TO12S05-0503PTH	TO12S05-L503PTH	TO12S05-1003PTH	TO12S05-1503PTH	—	TO12S05-0103GC
	4.6	—	TO12S05-H346PTH	TO12S05-0546PTH	TO12S05-L546PTH	TO12S05-1046PTH	TO12S05-1546PTH	TO12S05-2546PTH	TO12S05-0104GC
Phenyl	2.1	TPH12S05-02Q1PTH	TPH12S05-H3Q1PTH	TPH12S05-05Q1PTH	TPH12S05-L5Q1PTH	TPH12S05-10Q1PTH	TPH12S05-15Q1PTH	—	TPH12S05-01Q1GC
	3.0	—	—	TPH12S05-0503PTH	TPH12S05-L503PTH	TPH12S05-1003PTH	TPH12S05-1503PTH	—	TPH12S05-0103GC
	4.6	—	TPH12S05-H346PTH	TPH12S05-0546PTH	TPH12S05-L546PTH	TPH12S05-1046PTH	TPH12S05-1546PTH	TPH12S05-2546PTH	TPH12S05-0104GC
PPF	2.1	TPF12S05-02Q1PTH	TPF12S05-H3Q1PTH	TPF12S05-05Q1PTH	TPF12S05-L5Q1PTH	TPF12S05-10Q1PTH	TPF12S05-15Q1PTH	—	TPF12S05-01Q1GC
	3.0	—	—	TPF12S05-0503PTH	TPF12S05-L503PTH	TPF12S05-1003PTH	TPF12S05-1503PTH	—	TPF12S05-0103GC
	4.6	—	TPF12S05-H346PTH	TPF12S05-0546PTH	TPF12S05-L546PTH	TPF12S05-1046PTH	TPF12S05-1546PTH	TPF12S05-2546PTH	TPF12S05-0104GC
HILIC	2.1	TDH12S05-02Q1PTH	TDH12S05-H3Q1PTH	TDH12S05-05Q1PTH	TDH12S05-L5Q1PTH	TDH12S05-10Q1PTH	TDH12S05-15Q1PTH	—	TDH12S05-01Q1GC
	3.0	—	—	TDH12S05-0503PTH	TDH12S05-L503PTH	TDH12S05-1003PTH	TDH12S05-1503PTH	—	TDH12S05-0103GC
	4.6	—	TDH12S05-H346PTH	TDH12S05-0546PTH	TDH12S05-L546PTH	TDH12S05-1046PTH	TDH12S05-1546PTH	TDH12S05-2546PTH	TDH12S05-0104GC

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

50

Ordering Information

YMC-Triart 3 µm analytical columns

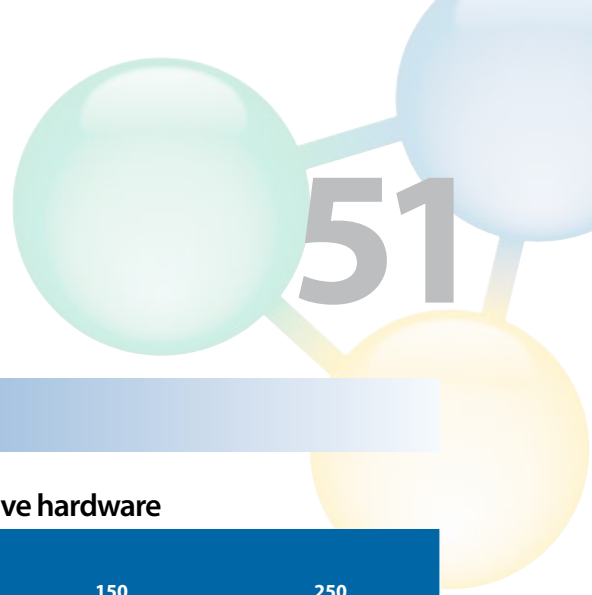
Phase	Column ID (mm)	Column length (mm)							Guard cartridges* with 10 mm length (pack of 5)
		20	30	50	75	100	150	250	
C18	2.0	TA12S03-0202WT	TA12S03-0302WT	TA12S03-0502WT	TA12S03-L502WT	TA12S03-1002WT	TA12S03-1502WT	—	TA12S03-01Q1GC
	3.0	—	—	TA12S03-0503WT	TA12S03-L503WT	TA12S03-1003WT	TA12S03-1503WT	—	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
PPF	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
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

YMC-Triart 5 µm analytical columns

Phase	Column ID (mm)	Column length (mm)							Guard cartridges* with 10 mm length (pack of 5)
		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	—
C8	2.0	TO12S05-0202WT	TO12S05-0302WT	TO12S05-0502WT	TO12S05-L502WT	TO12S05-1002WT	TO12S05-1502WT	—	TO12S05-01Q1GC
	3.0	—	—	TO12S05-0503WT	TO12S05-L503WT	TO12S05-1003WT	TO12S05-1503WT	—	TO12S05-0103GC
	4.6	—	—	TO12S05-0546WT	TO12S05-L546WT	TO12S05-1046WT	TO12S05-1546WT	TO12S05-2546WT	TO12S05-0104GC
	10	—	—	—	—	—	TO12S05-1510WT	TO12S05-2510WT	—
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	—
PPF	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	—
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



Ordering Information

YMC-Triart, 12 nm, 5 µm in ACTUS high-throughput semipreparative hardware

Phase	Column ID (mm)	Column length (mm)				
		50	75	100	150	250
C18	20.0	TA12S05-0520WX	—	TA12S05-1020WX	TA12S05-1520WX	TA12S05-2520WX
	30.0	TA12S05-0530WX	TA12S05-L530WX	TA12S05-1030WX	TA12S05-1530WX	TA12S05-2530WX
C18 ExRS	20.0	TAR08S05-0520WX	—	TAR08S05-1020WX	TAR08S05-1520WX	TAR08S05-2520WX
	30.0	TAR08S05-0530WX	TAR08S05-L530WX	TAR08S05-1030WX	TAR08S05-1530WX	TAR08S05-2530WX
C8	20.0	TO12S05-0520WX	—	TO12S05-1020WX	TO12S05-1520WX	TO12S05-2520WX
	30.0	TO12S05-0530WX	TO12S05-L530WX	TO12S05-1030WX	TO12S05-1530WX	TO12S05-2530WX
Phenyl	20.0	TPH12S05-0520WX	—	TPH12S05-1020WX	TPH12S05-1520WX	TPH12S05-2520WX
	30.0	TPH12S05-0530WX	TPH12S05-L530WX	TPH12S05-1030WX	TPH12S05-1530WX	TPH12S05-2530WX
PFP	20.0	TPF12S05-0520WX	—	TPF12S05-1020WX	TPF12S05-1520WX	TPF12S05-2520WX
	30.0	TPF12S05-0530WX	TPF12S05-L530WX	TPF12S05-1030WX	TPF12S05-1530WX	TPF12S05-2530WX

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
	—	—		—	—

Available in pack sizes 100 g, 500 g, 1 kg, 5 kg, 25 kg

Please inquire for the corresponding brochures:

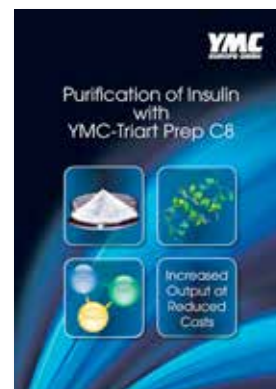
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