
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

YMC-Triart

Contents

Introduction

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 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.

Phases Overview

YMC-Triart C18

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

YMC-Triart C18 ExRS

extended pH and stability
hydrophobic substances
positional isomers
pH-stable 1 - 12

YMC-Triart C8

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

YMC-Triart Phenyl

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

YMC-Triart PFP

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

YMC-Triart Diol-HILIC

good alternative for
very polar compounds
100% aqueous eluents

YMC-Triart

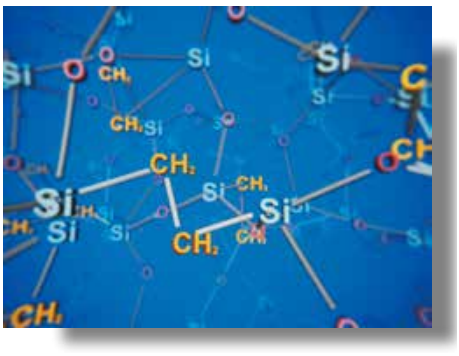
Specification

	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)	Pentafluoro-phenyl (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
Carbon content	20%	25%	17%	17%	15%	—
Bonding	trifunctional					
Endcapping	multi-stage	multi-stage	multi-stage	multi-stage	none	none
pH range	1 ~ 12	1 ~ 12	1 ~ 12	1 ~ 10	1 ~ 8	2 ~ 10
Temp. 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
100% aqueous eluents	✓	✗	✗	✓	✓	✓

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.

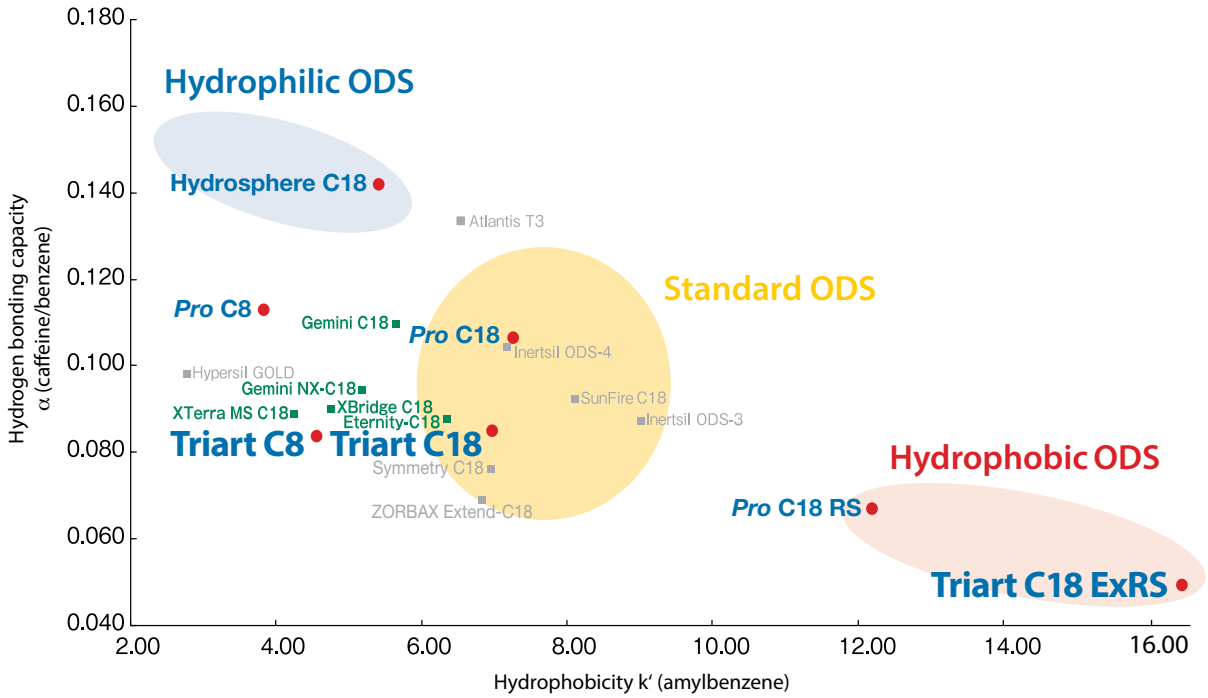
With YMC-Triart, challenging pH and high temperature conditions are no longer a limitation to the day-to-day work in laboratories. Most importantly, due to its unique particle composition, a balanced hydrophobicity and silanol activity are achieved which makes YMC-Triart a “First Choice” column in method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



* Application data by courtesy YMC Co., Ltd.

YMC-Triart

“First choice” column for method development



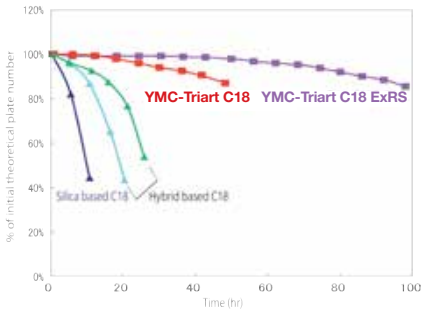
Conventional hybrid silica-based ODS columns tend to be less hydrophobic than silica-based columns. YMC-Triart C18 has a higher carbon load, giving it a hydrophobicity comparable to that of standard ODS columns, thereby making it a “versatile first-choice” column for method development.

On the other hand, YMC-Triart C18 ExRS has been designed to provide contrastingly different separation characteristics!

pH & Temperature

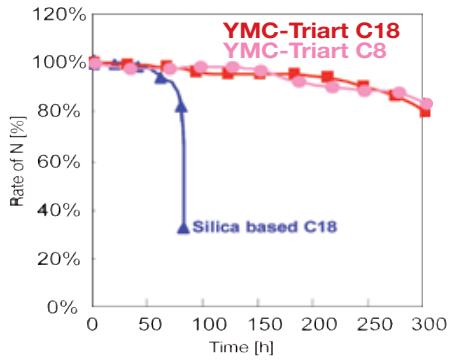
Versatile wide pH stability

Phosphate buffer (pH 11.5, 40 °C)*



Column:	5 µm, 150 x 4.6 mm ID
Part No.:	TA12S05-1546WT
Eluent:	50 mM K_2HPO_4-K_3PO_4 (pH 11.5) / methanol (90/10)
Flow rate:	1.0 mL/min
Temperature:	40 °C
Sample:	benzyl alcohol

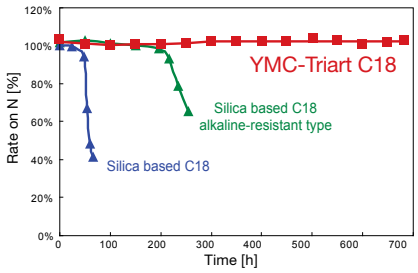
Triethylamine (pH 11.5, 40 °C)*



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
Temperature:	40 °C
Sample:	benzyl alcohol

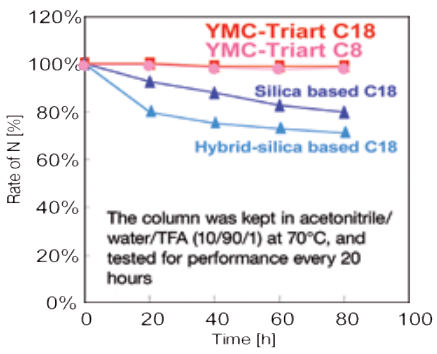
Stability at high temperature

pH 6.9, 70 °C*



Column:	5 µm, 50 x 2.0 mm ID
Part No.:	TA12S05-0502WT
Eluent:	20mM KH_2PO_4-K_2HPO_4(pH6.9)/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:	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 10x greater than conventional reversed phase columns.

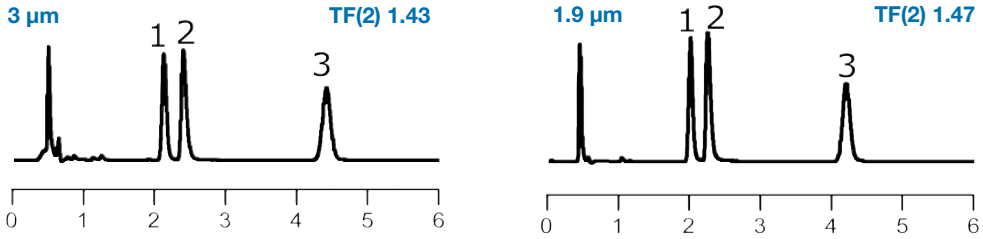
* Application data by courtesy YMC Co., Ltd.

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.

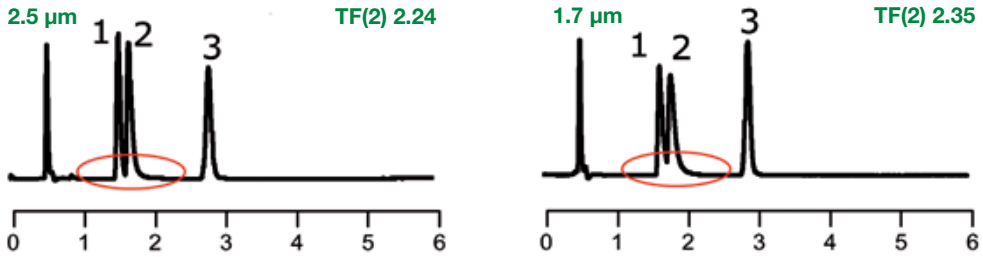
YMC-Triart C18



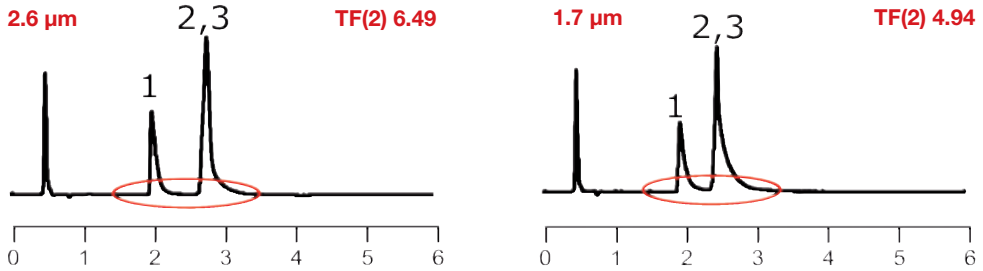
YMC has addressed this issue of method transfer. YMC-Triart columns show identical selectivity and excellent peak shapes for basic compounds for all 3.0 µm to 1.9 µm particle sizes. It allows predictable scale up from UHPLC to conventional HPLC and even to semi-preparative LC, and vice versa.

Case Studies**

X-Bridge BEH C18 and Acquity UPLC BEH C18



Kinetex™ C18



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

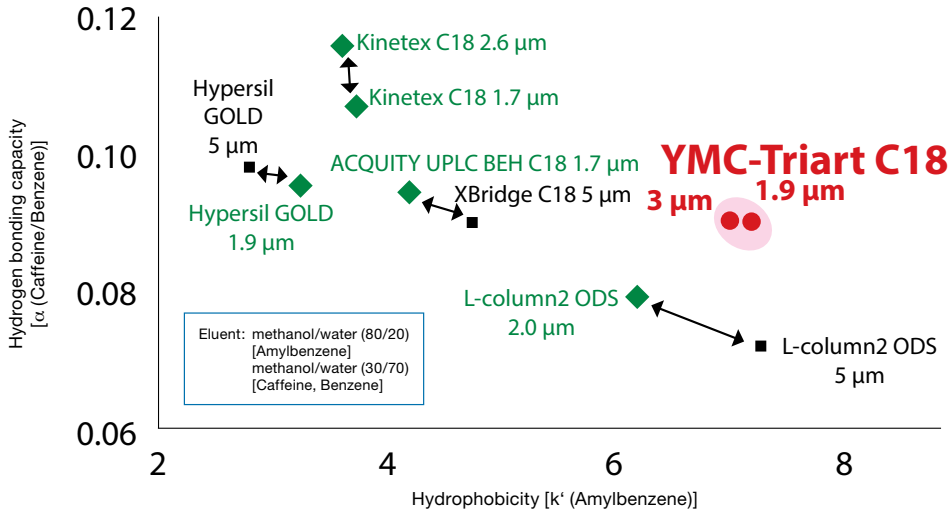
Column:	50 x 2.0 mm ID or 2.1 mm ID
Eluent:	20 mM KH_2PO_4-K_2HPO_4 (pH 6.9) / acetonitrile (65/35)
Temperature:	40 °C
Flow rate:	0.2 mL/min
Detection:	UV at 235 nm

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

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

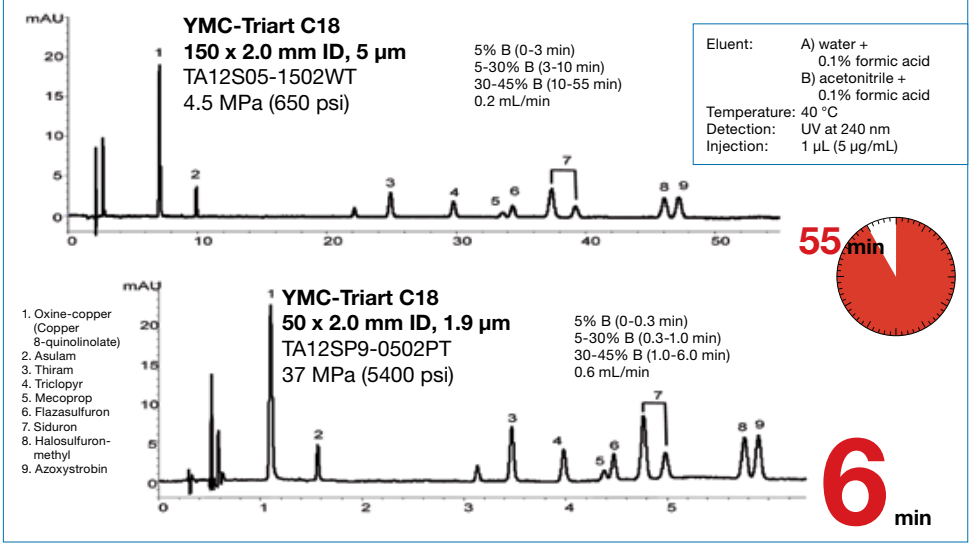
Transfer HPLC ⟷ UHPLC

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 between HPLC ⟷ UHPLC*

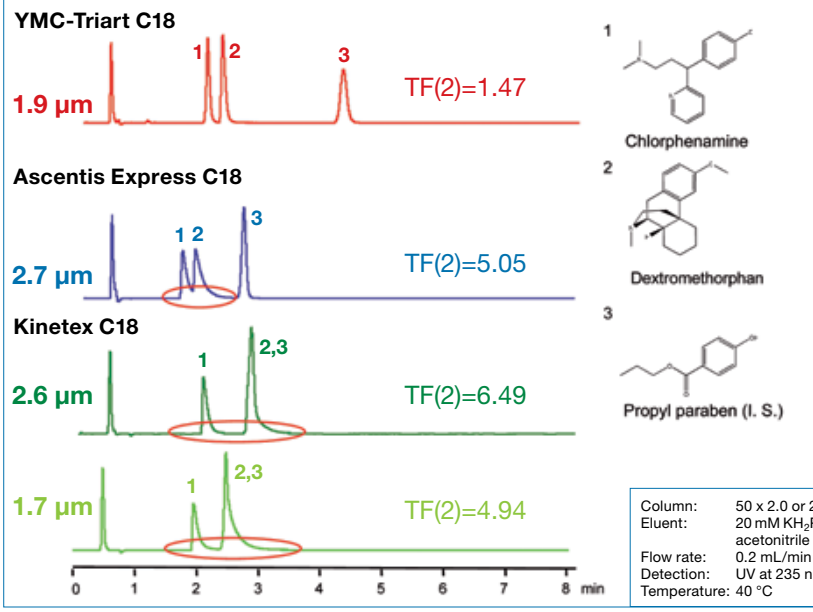


When transferring the 55 min HPLC method to UHPLC scale, the resolution remains the same although the separation time is reduced to only 6 min.

* Application data by courtesy YMC Co., Ltd.

UHPLC

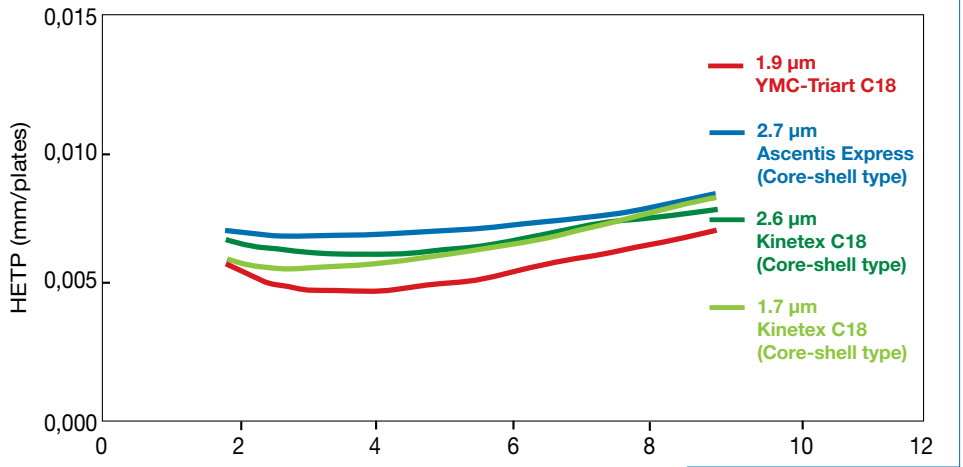
Higher resolution and good loadability*



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

YMC-Triart C18 shows superior resolution to the other three phases thereby allowing considerable higher loadability.

Lower HETP means higher resolution!*

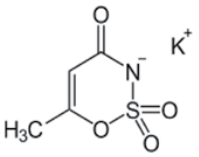


Column: 50 x 2.0 or 2.1 mm ID
Eluent: acetonitrile / water (60/40)
Detection: UV at 254 nm
Sample: Butyl benzoate

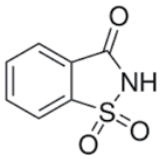
YMC-Triart C18 always shows the lowest HETP compared to the three Core-Shell products over the range of linear velocity applied.

UHPLC & MS

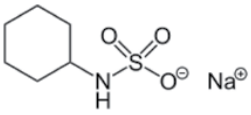
Determination of Artificial Sweeteners with LC-MS/MS



Acesulfam-K

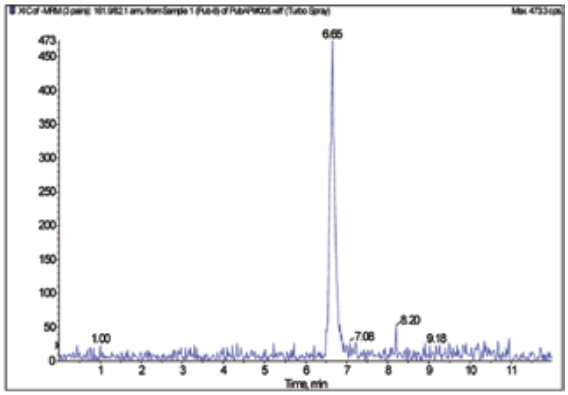


Saccharin

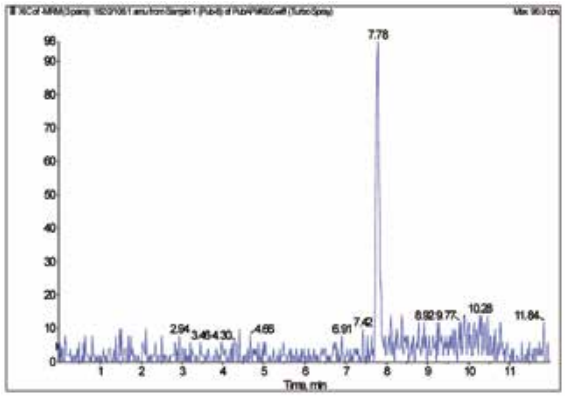


Cyclamat-Na

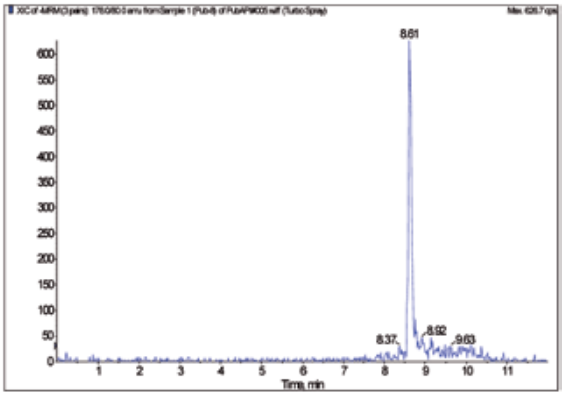
➔ Non-biological markers of wastewater entries in ground and surface water



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



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



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

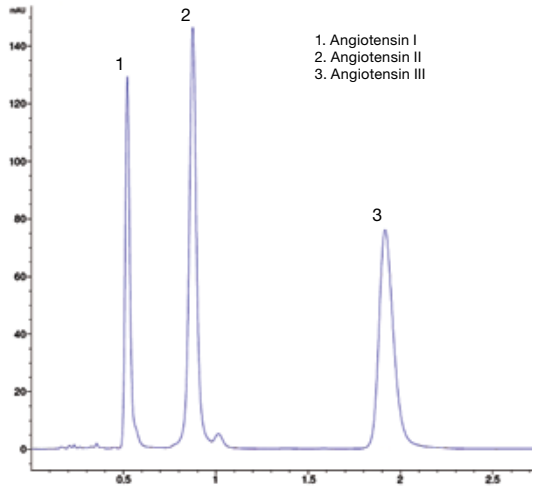
Column:	YMC-Triart C18 (12 nm, 1.9 µm) 100 x 3.0 mm ID
Part No.:	TA12SP9-1003PT
LC-System:	Agilent 1100 HPLC system and CTC Analytics HTC-Pal Autosampler
MS/MS System:	Applied Biosystems MDS Sciex API 4000, ESI negative
Temperature:	35°C
Flow rate:	0.3 mL/min
Injection:	40 µL, direct injection
Eluent:	A: H_2O (containing 10 mmol NH_4 formate)
	B: MeOH (containing 10 mmol NH_4 formate)

Gradient:	Time	0	6.0	6.1	12.0
	% B	2	75	2	2

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

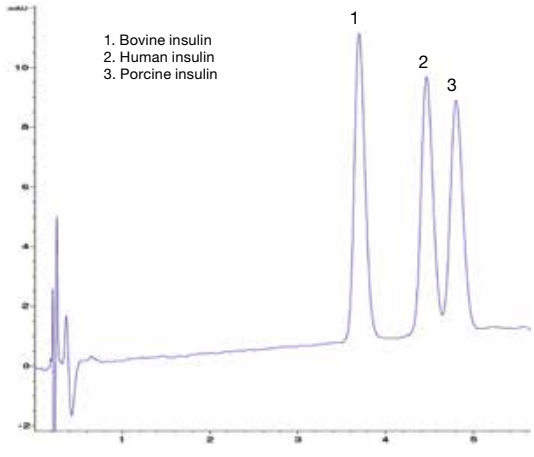
UHPLC

Angiotensin I, II and III



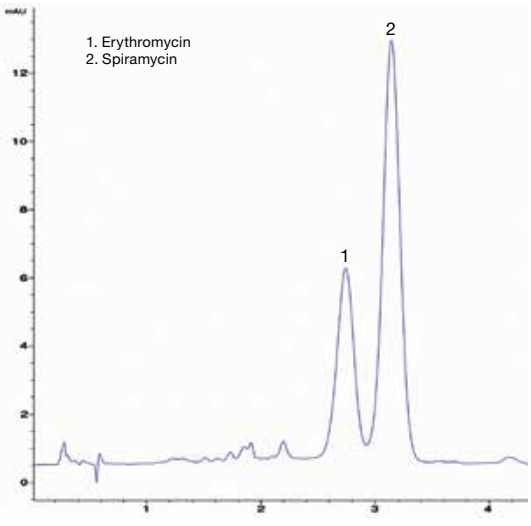
Column:	YMC-Trairt C18 (12 nm, 1.9 µm) 50 x 2.0 mm ID
Part No.:	TA12SP9-0502PT
Eluent:	20 mM KH_2PO_4 + K_2HPO_4 (pH 7.9) / acetonitrile (22/78)
Flow rate:	0.7 mL/min
Detection:	UV at 220 nm
Pressure:	720 bar
Injection:	0.5 µL
Temperature:	40 °C

Insulin



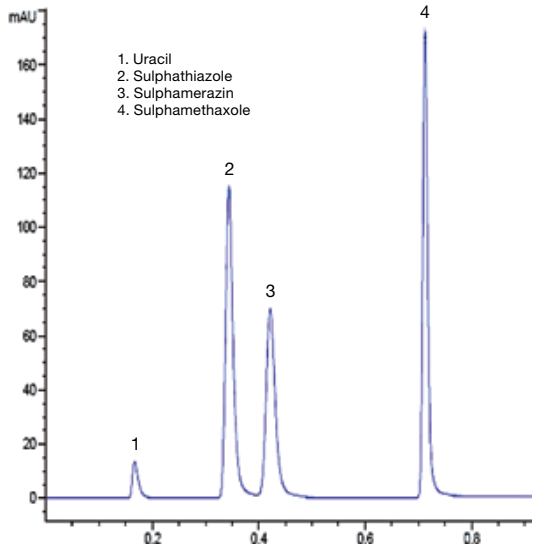
Column:	YMC-Trairt C18 (12 nm, 1.9 µm) 50 x 2.0 mm ID
Part No.:	TA12SP9-0502PT
Eluent:	A) H_2O + 0.1% TFA B) acetonitrile + 0.1% TFA
Gradient:	30% B (0 min); 30-32% B (0-5 min); 32% B (55 min)
Flow rate:	0.6 mL/min
Detection:	UV at 220 nm
Pressure:	611 bar
Injection:	0.5 µL
Temperature:	30 °C

Macrolide antibiotics



Column:	YMC-Trairt C18 (12 nm, 1.9 µm) 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 µL
Temperature:	50 °C

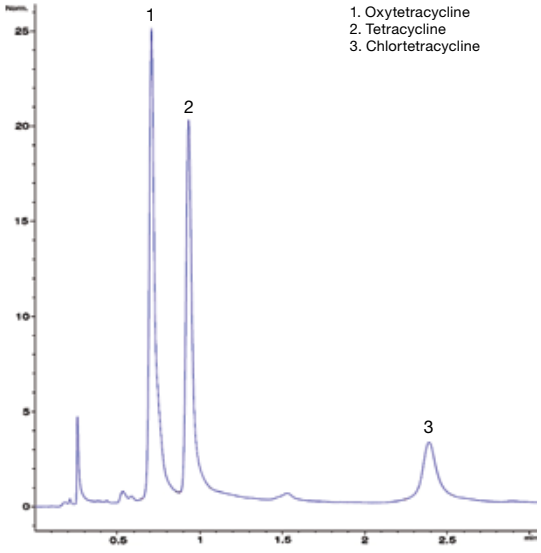
Sulpha drugs



Column:	YMC-Trairt C18 (12 nm, 1.9 µm) 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 µL
Temperature:	50 °C

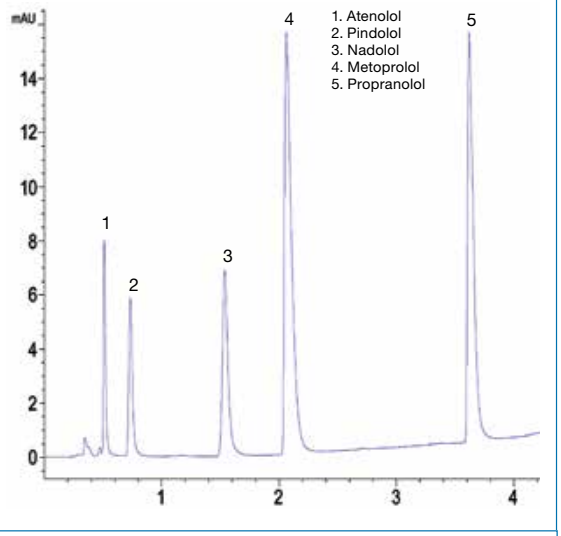
UHPLC

Tetracycline antibiotics



Column:	YMC-Trairt C18 (12 nm, 1.9 µm) 50 x 2.0 mm ID
Part No.:	TA12SP9-0502PT
Eluent:	5 mM CH_3COONH_4 / acetonitrile (87/13)
Flow rate:	0.65 mL/min
Detection:	UV at 280 nm
Pressure:	662 bar
Injection:	1 µL
Temperature:	40 °C

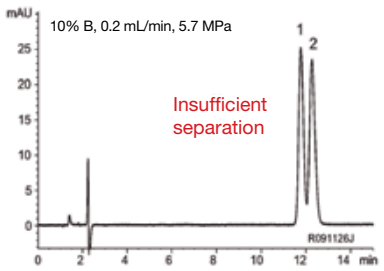
Betablockers



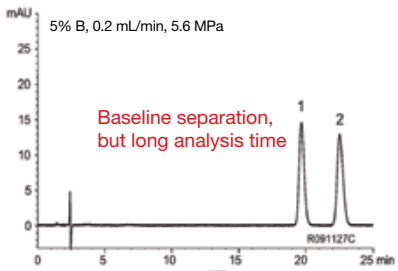
Column:	YMC-Trairt C18 (12 nm, 1.9 µm) 50 x 2.0 mm ID
Part No.:	TA12SP9-0502PT
Eluent:	A) 20 mM CH_3COONH_4 + ammonia (pH 9.0) B) acetonitrile
Gradient:	25% B (1.0 min); 75% B (1-6 min)
Flow rate:	0.35 mL/min
Detection:	UV at 254 nm
Pressure:	450 bar
Injection:	1 µL
Temperature:	40 °C

Fast LC for conventional HPLC*

YMC-Triart C18, 5 µm, 150 x 2.0 mm ID

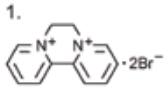


optimisation



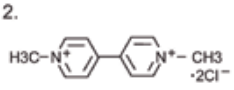
Down scaling

1.



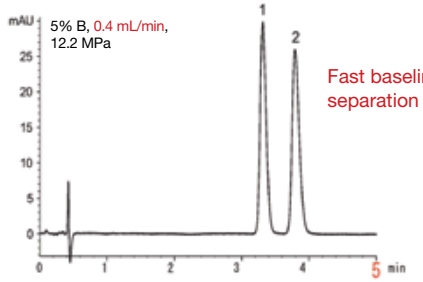
Diquat

2.



Paraquat

YMC-Triart C18, 3 µm, 50 x 2.0 mm ID



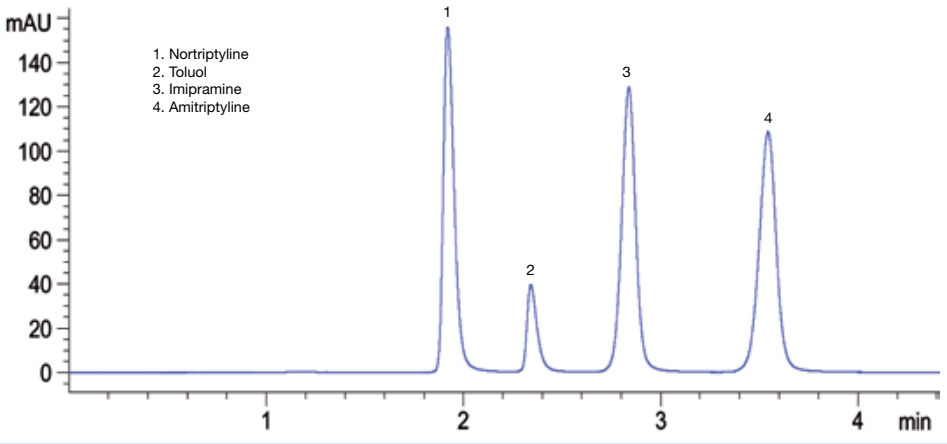
Eluent:	A) water / HFBA* (100/0.1) B) acetonitrile / HFBA* (100/0.1)
Temperature:	37 °C
Detection:	UV at 290 nm
Injection:	1 µL (0.1 mg/mL)

*heptafluorobutyric acid

* Application data by courtesy YMC Co., Ltd.

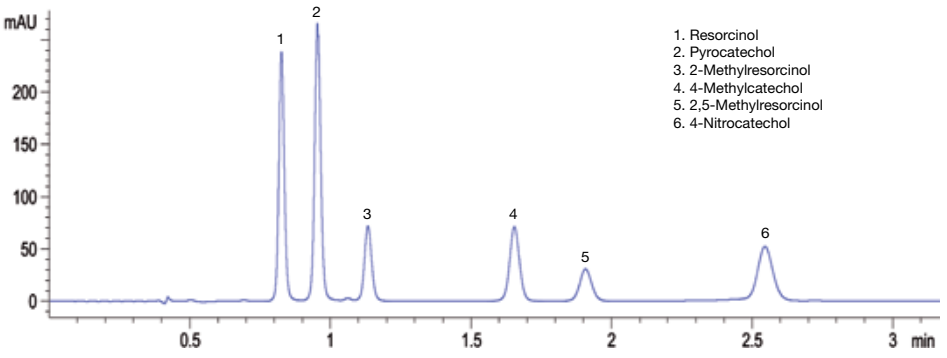
UHPLC

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 °C

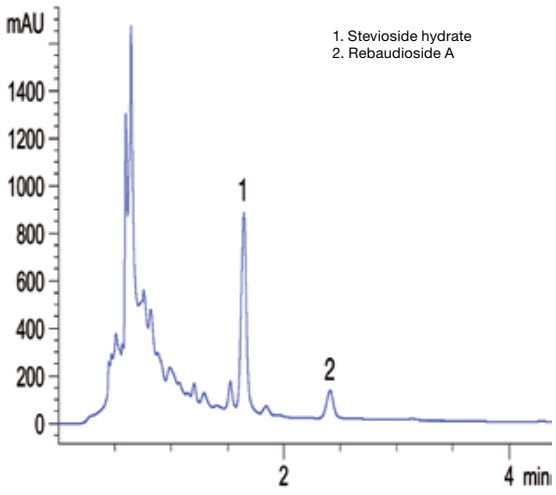
Resorcinol



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 °C

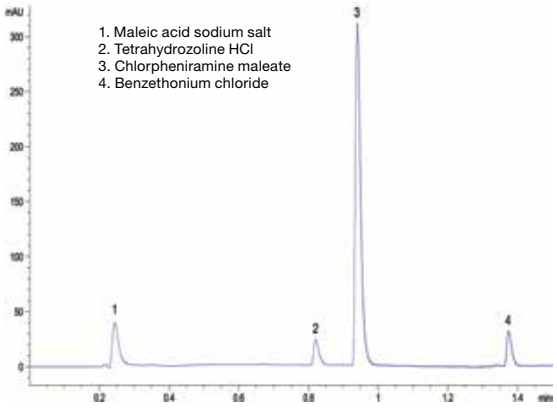
UHPLC

Stevia leaves



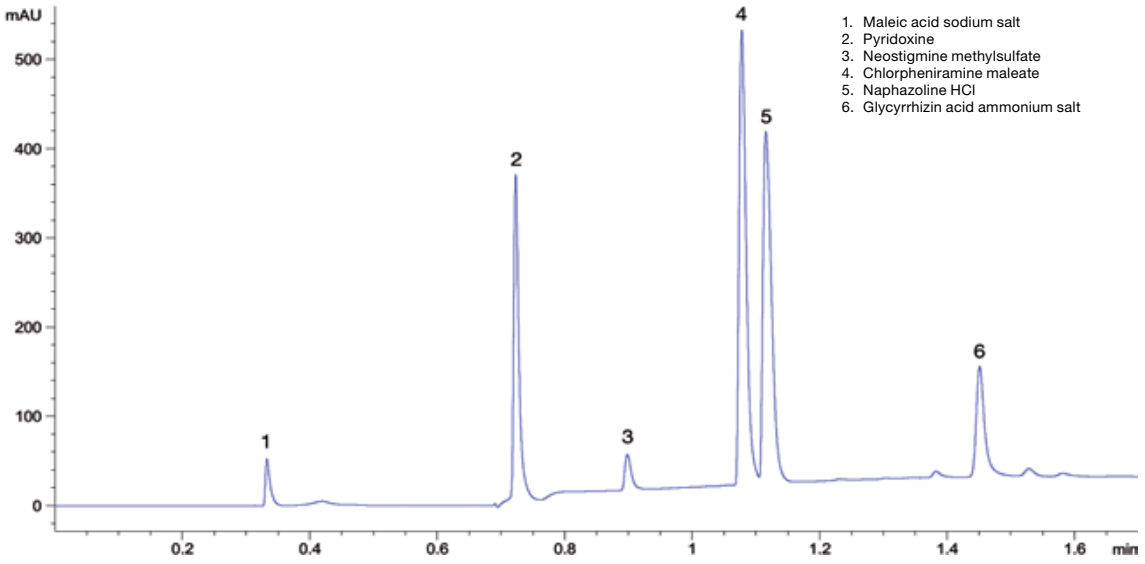
Column:	YMC-Triart Diol-HILIC (1.9 µm) 100 x 3.0 mm ID
Part No.:	TDH12SP9-1003PT
Eluent:	acetonitrile / water (85/15)
Flow rate:	1 mL/min
Detection:	UV at 200 nm
Injection:	2 µL
Temperature:	30 °C

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 °C

Eye drop formulation

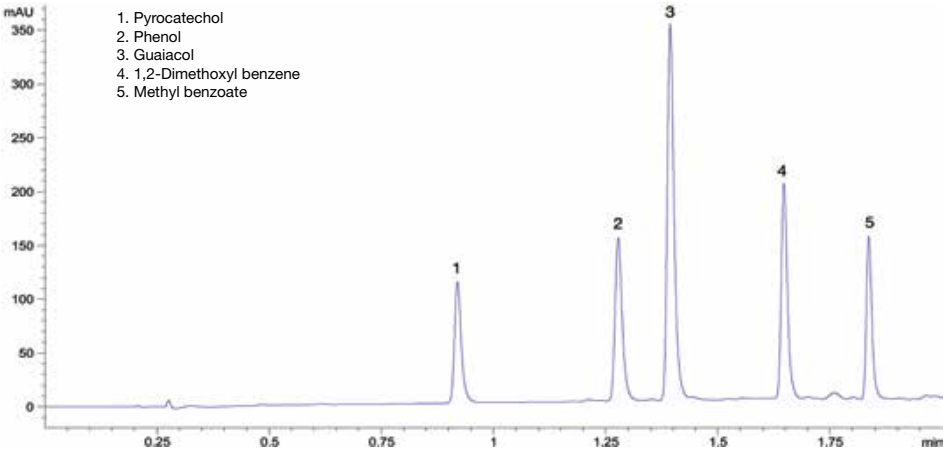


Column:	YMC-Triart C18 (1.9 µm, 12 nm) 50 x 2.0 mm ID
Part No.:	TA12SP9-0502PT
Eluent:	A water + 0.05% TFA B) acetonitrile
Flow rate:	0.6 mL/min
Detection:	UV at 265 nm
Injection:	0.5 µL
Temperature:	40 °C

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

UHPLC

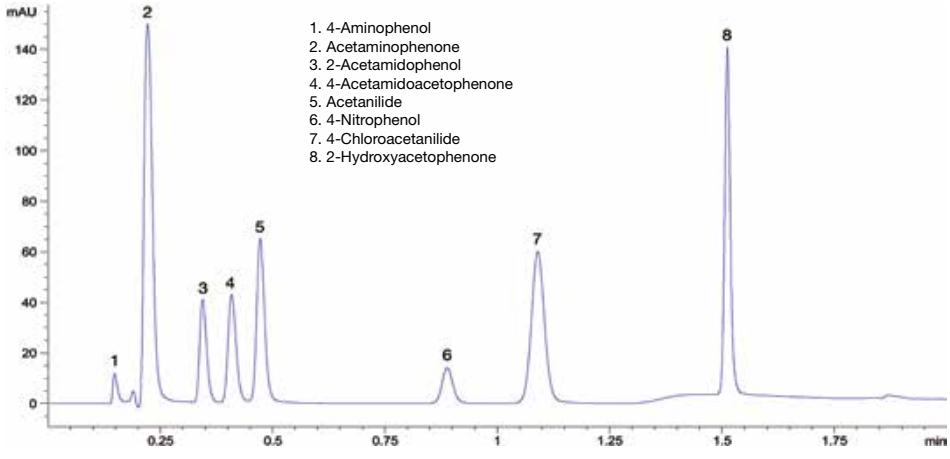
Guaiacol and impurities



1. Pyrocatechol
2. Phenol
3. Guaiacol
4. 1,2-Dimethoxyl benzene
5. Methyl benzoate

Column:	YMC-Triart C18 (1.9 µm, 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 µL
Temperature:	40 °C

Paracetamol



1. 4-Aminophenol
2. Acetaminophenone
3. 2-Acetamidophenol
4. 4-Acetamidoacetophenone
5. Acetanilide
6. 4-Nitrophenol
7. 4-Chloroacetanilide
8. 2-Hydroxyacetophenone

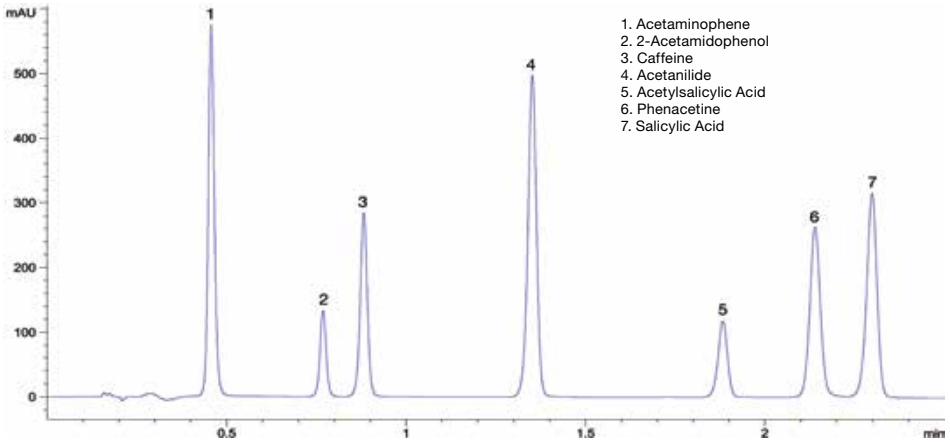
Column:	YMC-Triart C18 (1.9 µm, 12 nm) 50 x 2.0 mm ID
Part No.:	TA12SP9-0502PT
Eluent:	A) water + formic acid (pH 2.5) / B) acetonitrile
Flow rate:	0.7 mL/min
Detection:	UV at 254 nm
Injection:	0.5 µL
Temperature:	40 °C

Gradient:

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

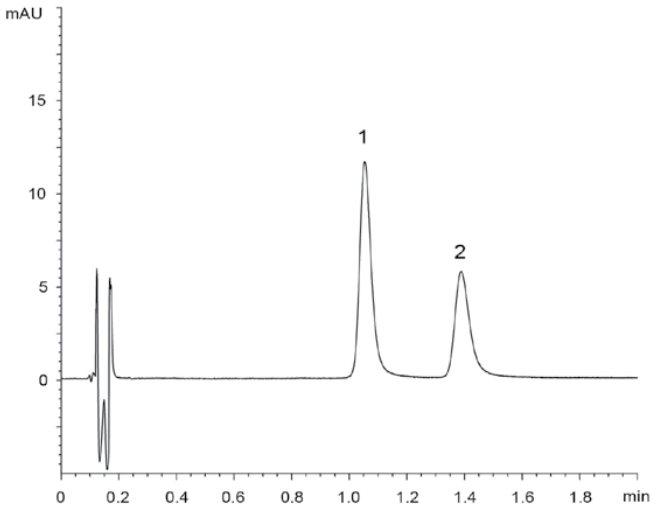
UHPLC

7 Analgesics

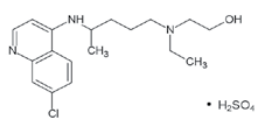


Column: YMC-Triart C18 (1.9 µm, 12 nm) 50 x 2.0 mm ID
Part No.: TA12SP9-0502PT
Eluent: water + formic acid (pH 2.5) / acetonitrile (50/50)
Flow rate: 0.8 mL/min
Detection: UV at 240 nm
Injection: 1 µL
Temperature: 40 °C

Hydroxychloroquine and chloroquine

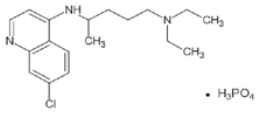


1



Hydroxychloroquine sulfate

2



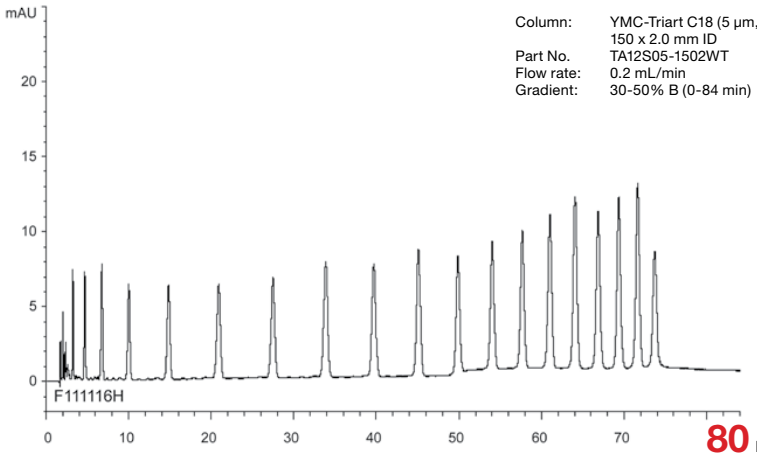
Chloroquine phosphate

Column: YMC-Triart C18 (1.9 µm, 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 µL (10 µg/mL)
Temperature: 25 °C

UHPLC

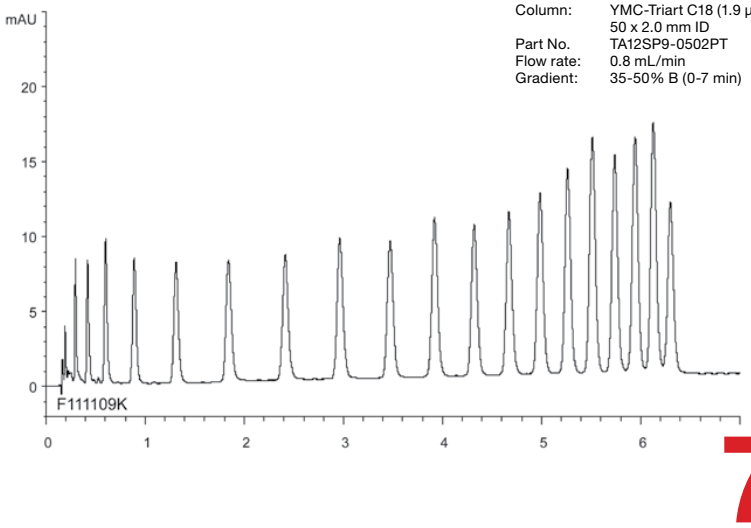
Oligonucleotides $d(T)_{2-20}$ method transfer from HPLC to UHPLC*

Conventional LC method



Column: YMC-Triart C18 (5 µm, 12 nm)
150 x 2.0 mm ID
Part No. TA12S05-1502WT
Flow rate: 0.2 mL/min
Gradient: 30-50% B (0-84 min)

UHPLC method



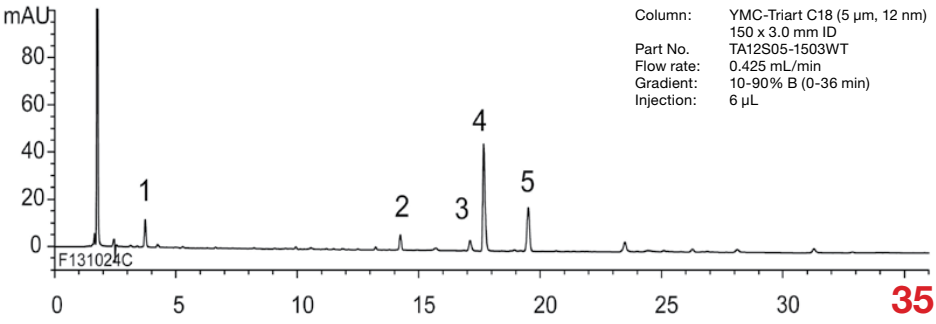
Column: YMC-Triart C18 (1.9 µm, 12 nm)
50 x 2.0 mm ID
Part No. TA12SP9-0502PT
Flow rate: 0.8 mL/min
Gradient: 35-50% B (0-7 min)

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

UHPLC

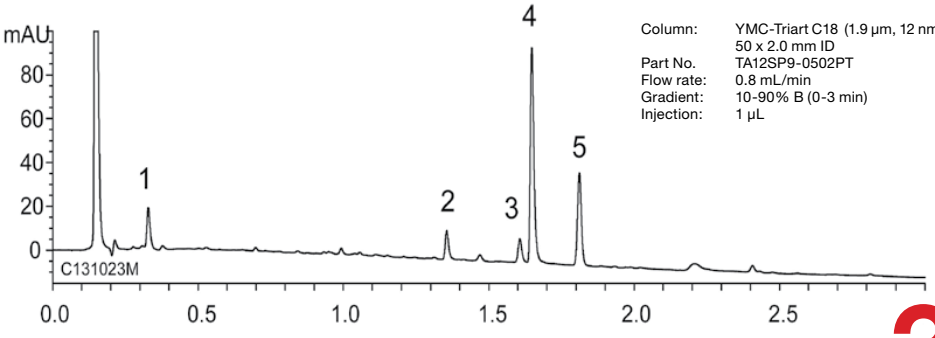
Duloxetine and its degradation products

(A) HPLC method



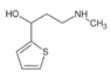
Column: YMC-Triart C18 (5 µm, 12 nm) 150 x 3.0 mm ID
Part No. TA12S05-1503WT
Flow rate: 0.425 mL/min
Gradient: 10-90% B (0-36 min)
Injection: 6 µL

(B) UHPLC method

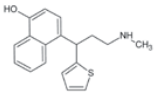


Column: YMC-Triart C18 (1.9 µm, 12 nm) 50 x 2.0 mm ID
Part No. TA12SP9-0502PT
Flow rate: 0.8 mL/min
Gradient: 10-90% B (0-3 min)
Injection: 1 µL

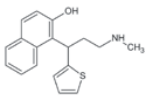
11x faster

1. 

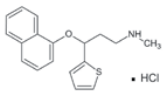
Amino alcohol
(3-Methylamino-1-thiophen-2-yl-propan-1-ol)

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 CH_3COONH_4 (pH 6.0)
B) acetonitrile
Detection: UV at 230 nm
Temperature: 30 °C
Sample: Oxidative degradation products of duloxetine hydrochloride*

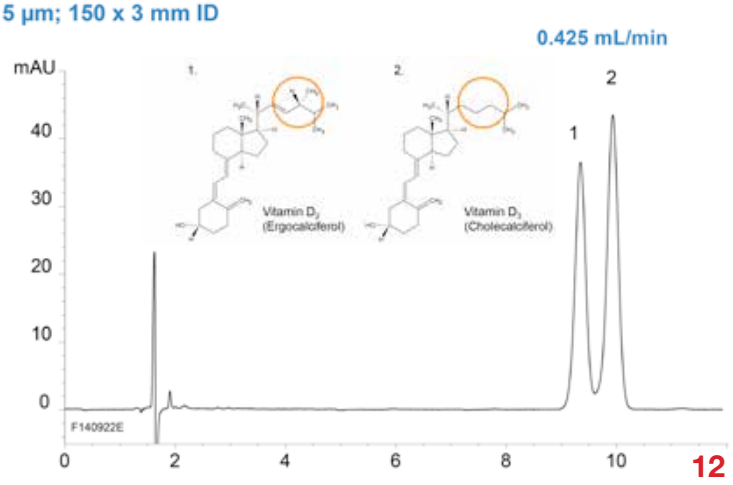
* Sample preparation was performed as described by Veera Reddy. Arava et al. Der Pharma Chemica, 2012 4 (4): 1735-1741

* Application data by courtesy YMC Co., Ltd.

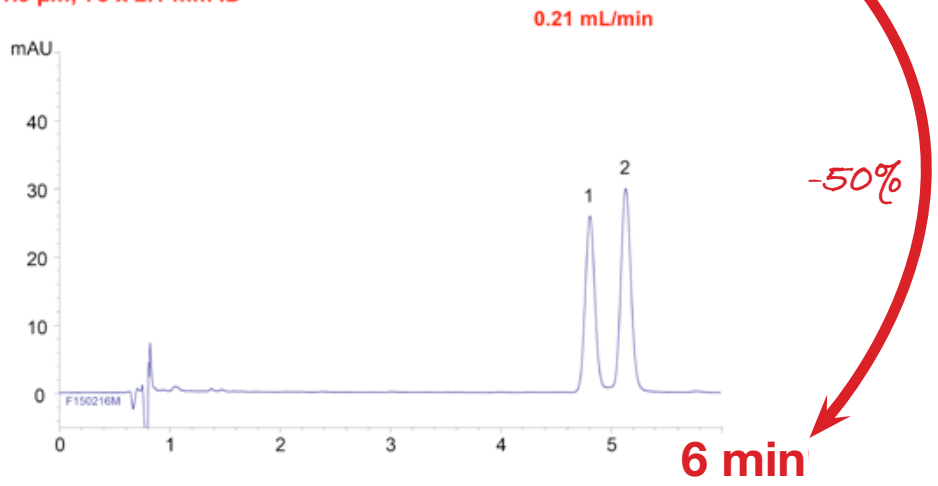
YMC-Triart C18 ExRS

Structural analogs*

HPLC method
5 µm; 150 x 3 mm ID



UHPLC method
1.9 µm; 75 x 2.1 mm ID

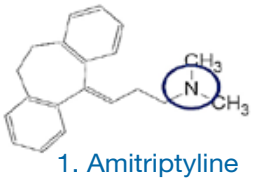


Part No.: TAR08S05-1503PTH / TAR08SP9-L5Q1PT
Eluent: THF / acetonitrile (10/90)
Flow rate: 0.425 ml/min
Detection: UV at 265 nm
Temperature: 30 °C

YMC-Triart C18 ExRS

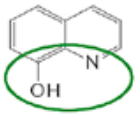
High hydrophobicity & high steric recognition ability*

Basic Compound



1. Amitriptyline

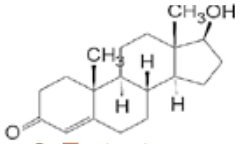
Coordination Compound



2. 8-Quinolinol

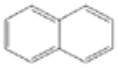
Neutral Compounds

Polar



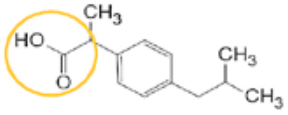
3. Testosterone

π-π interaction



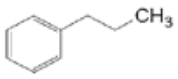
4. Naphthalene

Acidic Compound

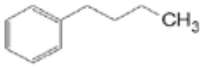


5. Ibuprofen

Hydrophobic



6. *n*-Propylbenzene

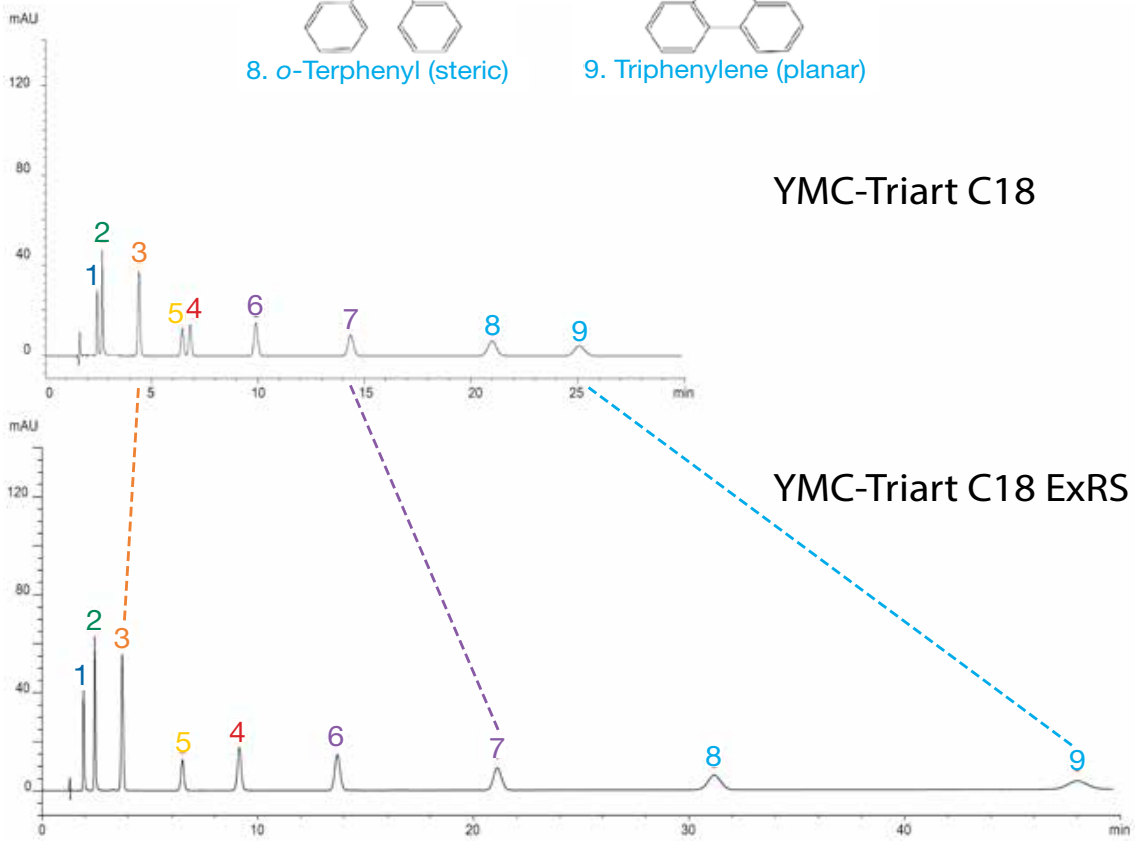


7. *n*-Butylbenzene

Steric Cognitive Ability

8. *o*-Terphenyl (steric)

9. Triphenylene (planar)



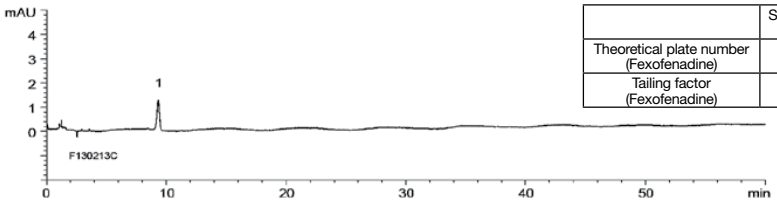
Column:	5 µm, 150 x 3.0 ID
Part No.:	TA12S05-1503PTH / TAR08S05-1503PTH
Eluent:	20 mM HCOOH-$HCOONH_4$ (pH 4.3) / acetonitrile (90/10)
Flow rate:	1.0 mL/min
Detection:	UV at 254 nm
Injection:	2 µL (10 µg/mL)
Temperature:	25 °C

* Application data by courtesy YMC Co., Ltd.

YMC-Triart Phenyl

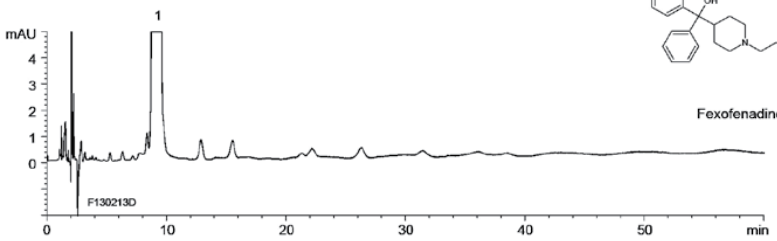
Fexofenadine hydrochloride (Japanese Pharmacopoeia)*

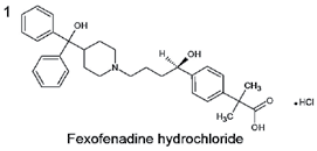
A) Standard solution *1 (0.001 mg/mL fexofenadine hydrochloride)



	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)





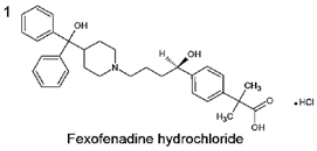
Fexofenadine hydrochloride

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 NaH_2PO_4-$2H_2O$ and 0.96 g of $NaClO_4$-H_2O in 1000 mL water, adjust pH 2.0 with H_3PO_4
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)

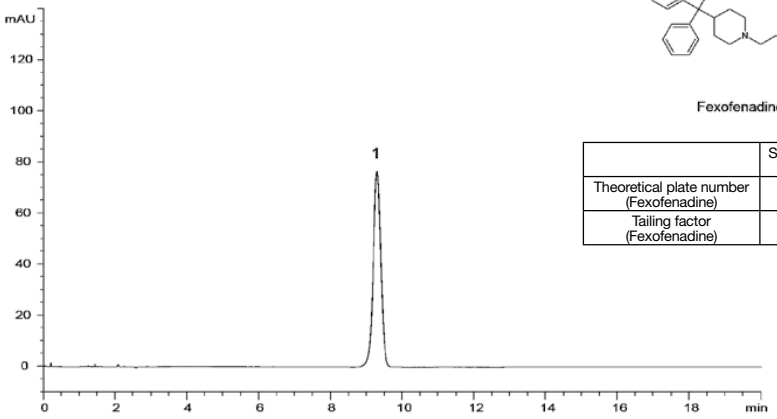
*1 *All standard and sample solutions were prepared from fexofenadine hydrochloride supplied as a reagent for laboratory use.*

Fexofenadine hydrochloride (Japanese Pharmacopoeia)*

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



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.: TPH12S05-2546WT
Eluent: acetonitrile / buffer *2 / triethylamine (350/650/3)
*2 Dissolve 7.51 g of NaH_2PO_4-$2H_2O$ and 0.96 g of $NaClO_4$-H_2O in 1000 mL water, adjust pH 2.0 with H_3PO_4
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.*

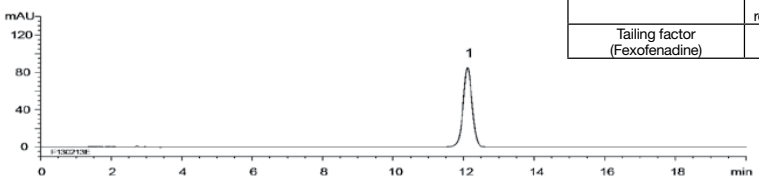
YMC-Triart Phenyl

Fexofenadine hydrochloride (US Pharmacopoeia)*

A) Assay preparation *1 (assay), Reference solution *1 (related compounds)

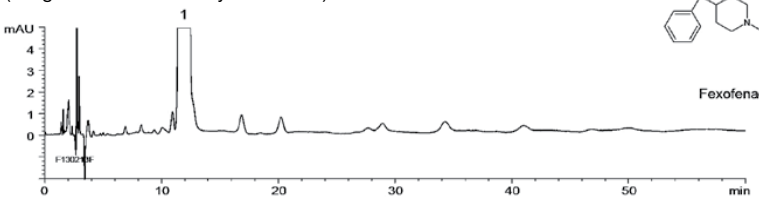
(0.06 mg/mL fexofenadine hydrochloride)

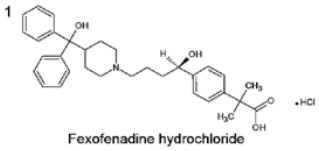
	System suitability requirement (assay)	result
Tailing factor (Fexofenadine)	≤ 2.0	1.00



B) Test solution *1 (related compounds)

(1 mg/mL fexofenadine hydrochloride)





Fexofenadine hydrochloride

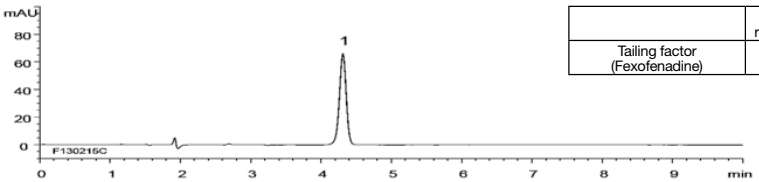
Column: YMC-Triart Phenyl (5 µm, 12 nm) 250 x 4.6 mm ID
Part No.: TPH12S05-2546WT
Eluent: acetonitrile / buffer *2 / triethylamine (350/650/3)
*2 Dissolve 7.51 g of NaH_2PO_4-$2H_2O$ and 0.96 g of $NaClO_4$-H_2O in 1000 mL water, adjust pH 2.0 with H_3PO_4
Flow rate: 1.5 mL/min
Detection: UV at 220 nm
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.*

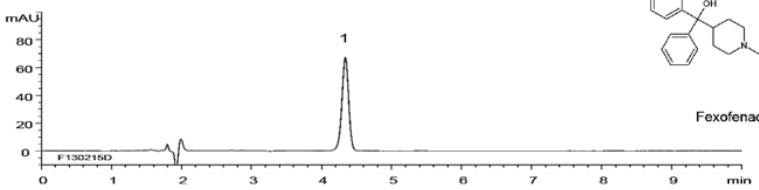
Fexofenadine hydrochloride (US Pharmacopoeia)*

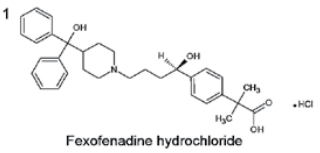
A) Standard solution *1 (0.015 mg/mL fexofenadine hydrochloride)

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



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





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 H_3PO_4
Flow rate: 1.5 mL/min
Detection: UV at 220 nm
Injection: 20 µL
Temperature: 35 °C
(The United States Pharmacopoeia 36th; assay)

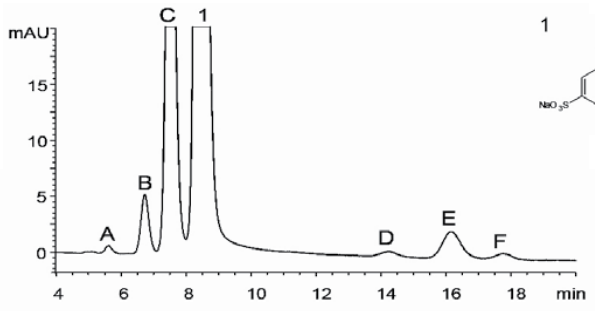
*1 *Standard solution was prepared from fexofenadine hydrochloride supplied as a reagent for laboratory use.*
*2 *Sample solution was prepared from fexofenadine hydrochloride tablets.*

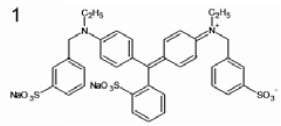
* Application data by courtesy YMC Co., Ltd.

YMC-Triart Phenyl

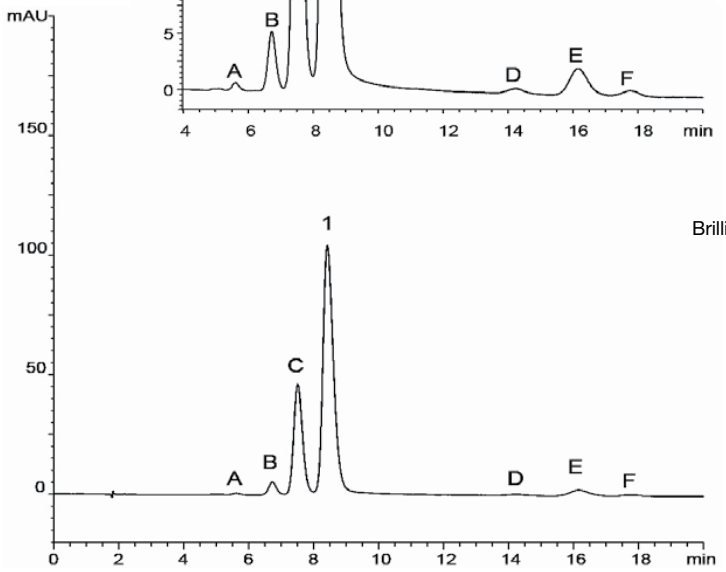
Analysis of coal tar dye (Brilliant blue FCF) and its impurities*

Enlarged chromatogram





Brilliant blue FCF

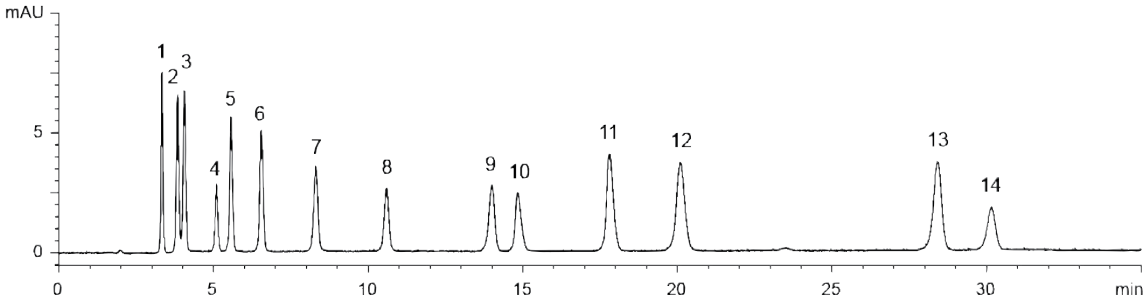


A-E:
Impurities in
Brilliant blue FCF reagent

Column:	YMC-Triart Phenyl (5 µm, 12 nm) 150 x 3.0 mm ID
Part No.:	TPH12S05-1503WT
Eluent:	water + 0.1% phosphoric acid / methanol (55/45)
Flow rate:	0.425 mL/min
Detection:	UV at 630 nm
Injection:	2.0 µL
Temperature:	40 °C

YMC-Triart PFP

Catecholamines, serotonin, and their precursors and metabolites*



1 Noradrenaline hydrochloride (NA) (Norepinephrine hydrochloride)

2 3,4-Dihydroxymandelic acid (DOMA)

3 3,4-Dihydroxyphenylalanine (DOPA)

4 Tyrosine (Tyr)

5 Adrenaline hydrochloride (A) (Epinephrine hydrochloride)

6 Dopamine hydrochloride (DA)

7 Vanillylmandelic acid (VMA)

8 3-Methoxy-4-hydroxyphenylglycol (MHPG)

9 3,4-Dihydroxyphenylacetic acid (DOPAC)

10 3-Methoxytyramine hydrochloride (3MT)

11 Serotonin hydrochloride (5-Hydroxytryptamine hydrochloride, 5HT)

12 Tryptophan (Trp)

13 5-Hydroxyindoleacetic acid (5HIAA)

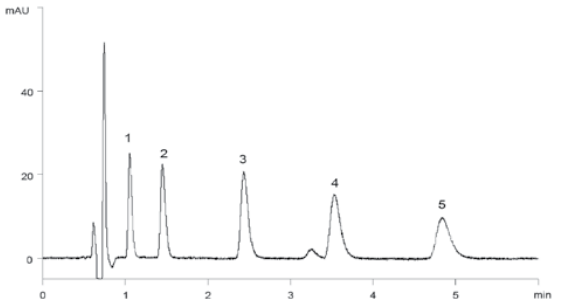
14 Homovanillic acid (HVA)

Column:	YMC-Triart PFP (3 µm, 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 0-20% B (0-30 min), 20% B (30-35 min)
Flow rate:	0.425 mL/min
Detection:	UV at 280 nm
Injection:	4 µL (5 µg/mL)
Temperature:	25 °C

* Application data by courtesy YMC Co., Ltd.

Pharmaceuticals

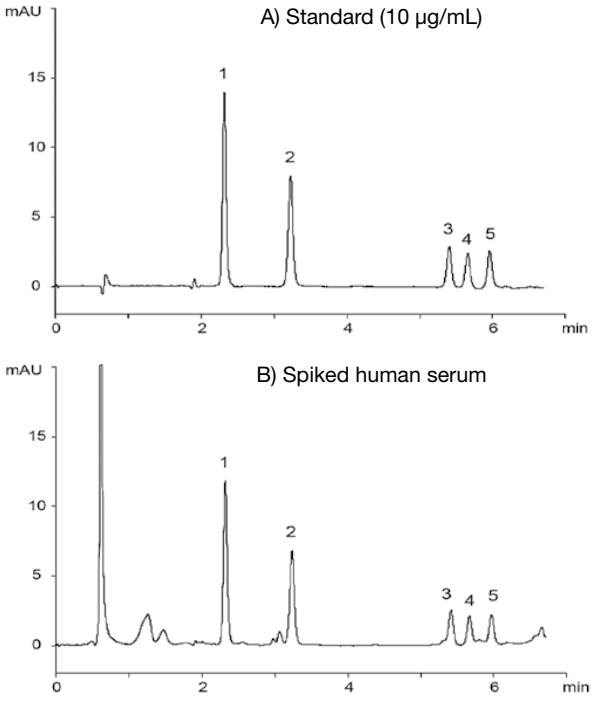
Separation of alkaloids*

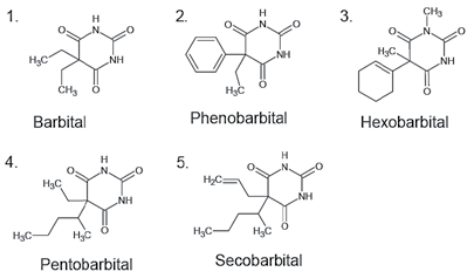


1. Scopolamine
2. Atropine
3. Cinchonine
4. Quinine
5. Dihydroquinine

Column:	YMC-Triart C18 (5 µm, 12 nm) 50 x 2.0 mm ID
Part No.:	TA12S05-0502WT
Eluent:	20 mM CH_3COOH-CH_3COONH_4 (pH 4.9) / acetonitrile (80/20)
Flow rate:	0.2 mL/min
Temperature:	40 °C
Detection:	UV at 220 nm
Injection:	1 µL (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 µL spiked human serum solution (each 10 µg)

Elute
500 µL methanol/water (85/15)

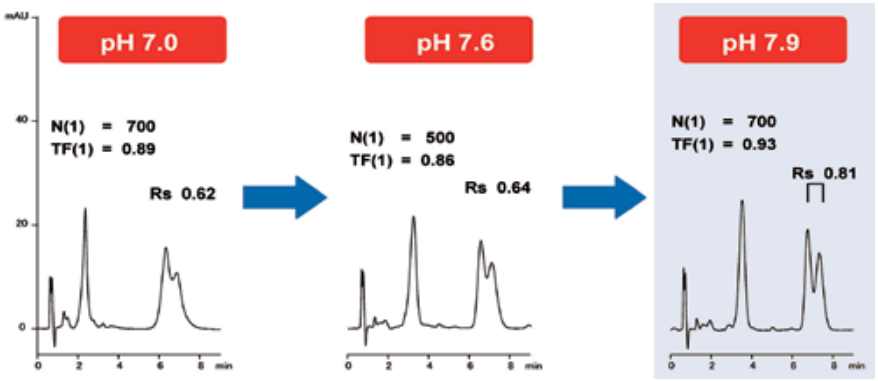
Dilute
500 µL 20 mM ammonium formate buffer (pH 9.5)

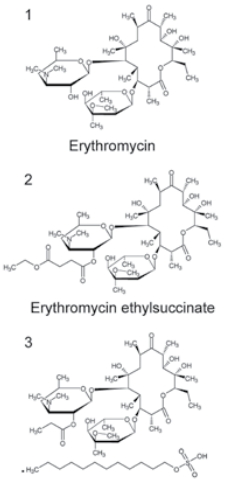
Column:	YMC-Triart C18 (5 µm, 12 nm) 50 x 2.0 mm ID
Part No.:	TA12S05-0502WT
Eluent:	A) 20 mM $HCOONH_4$-NH_3 (pH 9.5) B) methanol
Gradient:	0-90% B (0-7 min)
Flow rate:	0.2 mL/min
Temperature:	25 °C
Detection:	UV at 240 nm
Injection:	1 µL

Pharmaceuticals

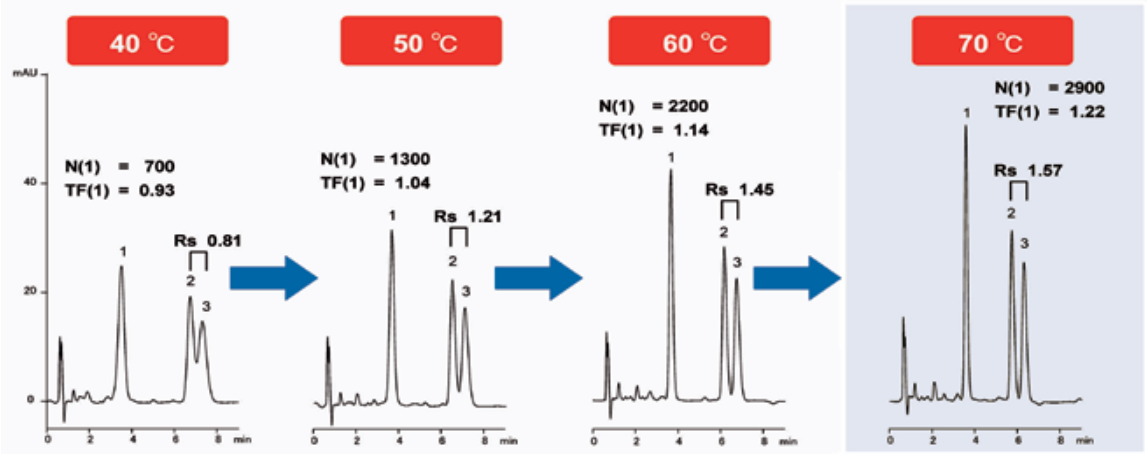
Erythromycin at elevated pH and temperature*

1. Optimisation of pH

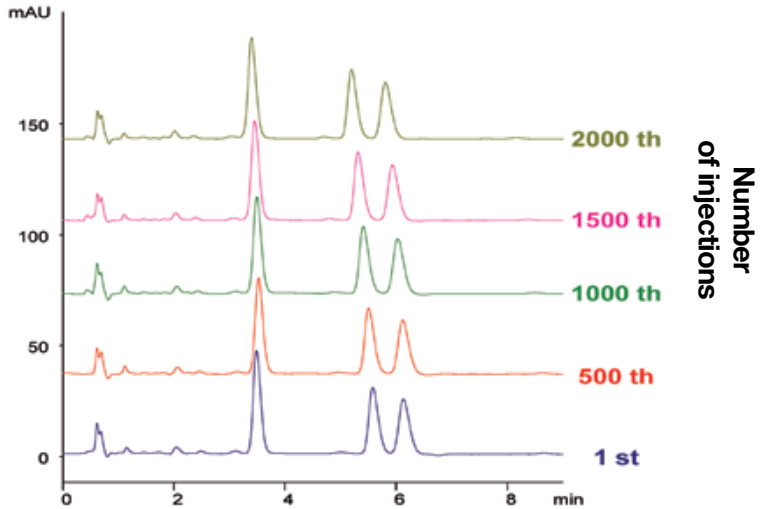




2. Optimisation of temperature (pH 7.9)



3. Stability test: pH 7.9, 70 °C

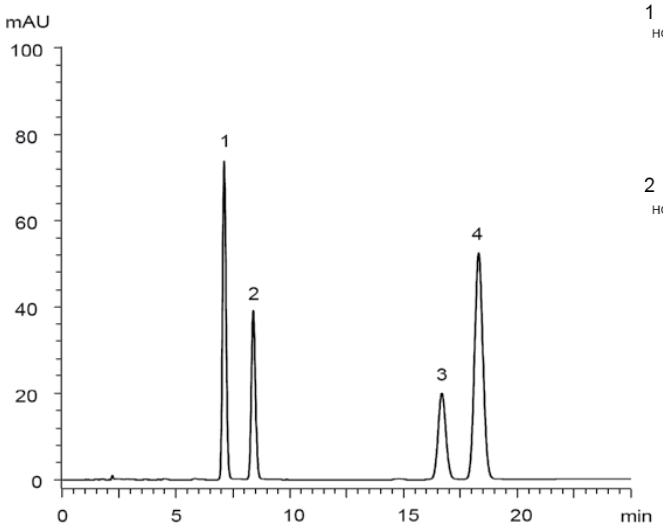


Column:	YMC-Triart C18 (3 µm, 12 nm) 50 x 2.0 mm ID
Part No.:	TA12S03-0502WT
Eluent:	20 mM KH_2PO_4-K_2HPO_4 / acetonitrile / methanol (40/45/15)
Flow rate:	0.2 mL/min
Detection:	UV at 210 nm

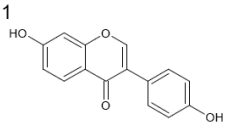
* Application data by courtesy YMC Co., Ltd.

Pharmaceuticals

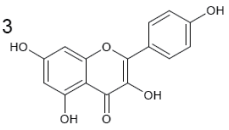
Separation of flavonoids*



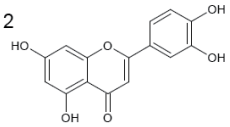
1 Daidzein



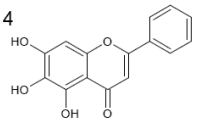
3 Kaempferol



2 Luteolin

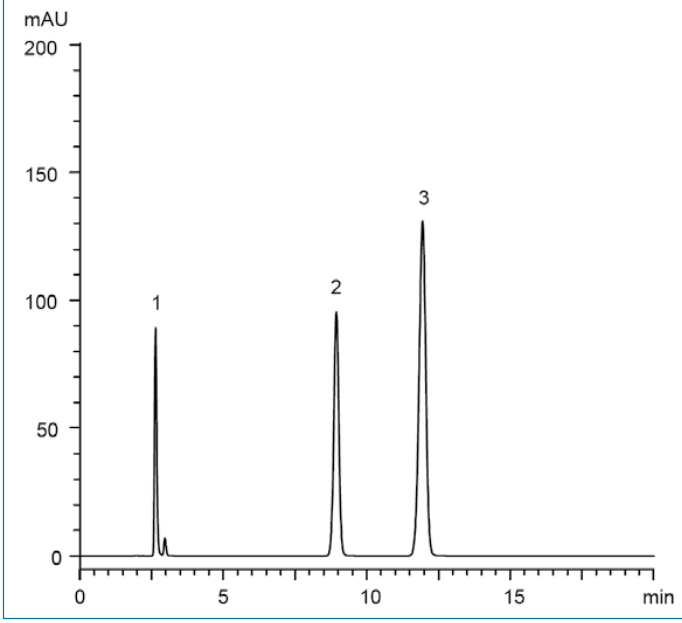


4 Baicalein

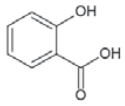


Column:	YMC-Triart C18 (5 µm, 12 nm) 150 x 3.0 mm ID
Part No.:	TA12S05-1503WT
Eluent:	acetonitrile / 10 mM H_3PO_4 (30/70)
Flow rate:	0.425 mL/min
Temperature:	37 °C
Detection:	UV at 280 nm
Injection:	2 µL (50 µg/mL)

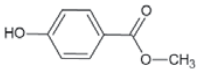
Separation of aromatic carboxylic acids*



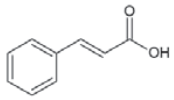
1 Salicylic acid



2 Methyl *p*-hydroxybenzoate (I.S.)



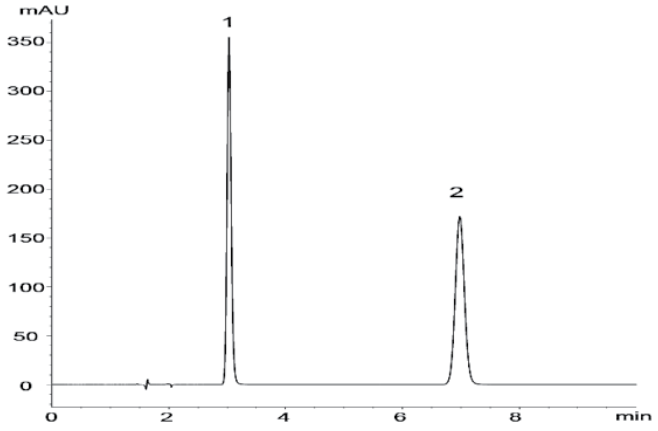
3 *trans*-Cinnamic acid



Column:	YMC-Triart C18 (5 µm, 12 nm) 150 x 3.0 mm ID
Part No.:	TA12S05-1503WT
Eluent:	10 mM CH_3COOH-CH_3COONH_4 (pH 4.2) / acetonitrile (75/25)
Flow rate:	0.425 mL/min
Temperature:	40 °C
Detection:	UV at 254 nm
Injection:	4 µL (0.02 ~ 0.3 mg/mL)

Pharmaceuticals

Aciclovir syrup and injection*

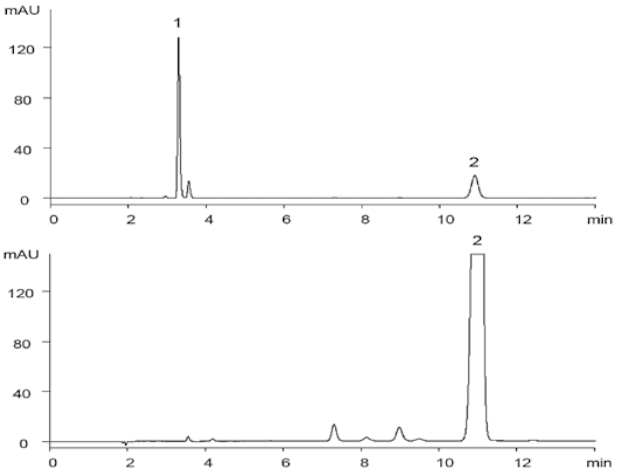


1. Nicotinic acid

2. Aciclovir

Column:	YMC-Triart C18 (5 µm, 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 → 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 µL (0.05 mg/mL, 0.032 mg/mL)

Clindamycin hydrochloride*

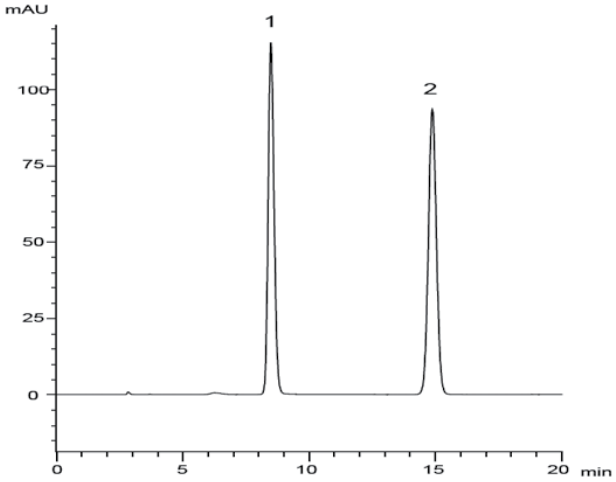


1. Lincomycin hydrochloride

2. Clindamycin hydrochloride

Column:	YMC-Triart C18 (5 µm, 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 °C
Detection:	UV at 210 nm
Injection:	10 µL

Analysis of amlodipine besilate*



1. Amlodipine besilate

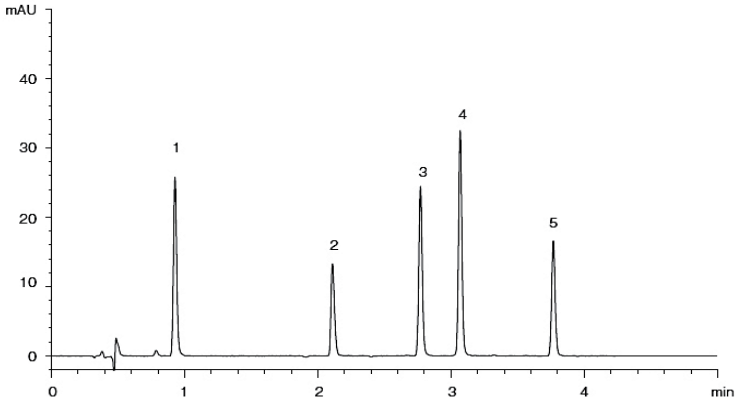
2. Isobutyl *p*-hydroxybenzoate

Column:	YMC-Triart C18 (5 µm, 12 nm) 150 x 3.0 mm ID
Part No.:	TA12S05-1503WT
Eluent:	10 mM CH_3COOH-CH_3COONH_4 (pH 4.2) / acetonitrile (75/25)
Flow rate:	0.425 mL/min
Temperature:	40 °C
Detection:	UV at 254 nm
Injection:	4 µL (0.02 ~ 0.3 mg/mL)

* Application data by courtesy YMC Co., Ltd.

Pharmaceuticals

Basic drugs*

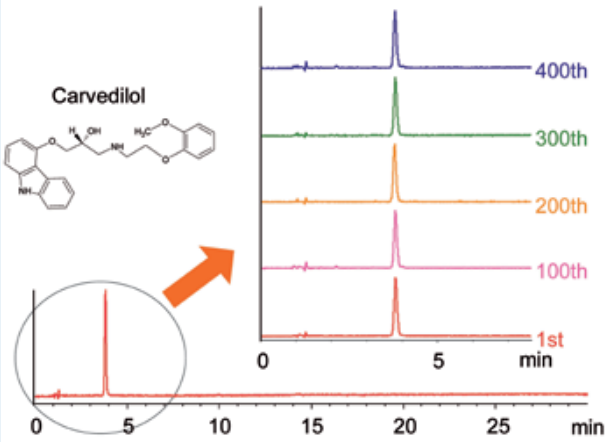


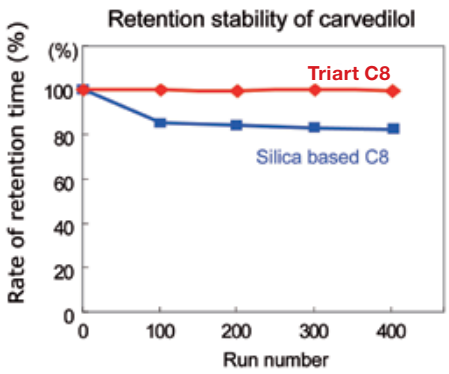
1. Hydrochlorothiazide
2. Amlodipine besilate
3. Valsartan
4. Atorvastatin calcium hydrate
5. Candesartan cilexetil

YMC-Triart C8

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

Sequential analysis of Carvedilol*





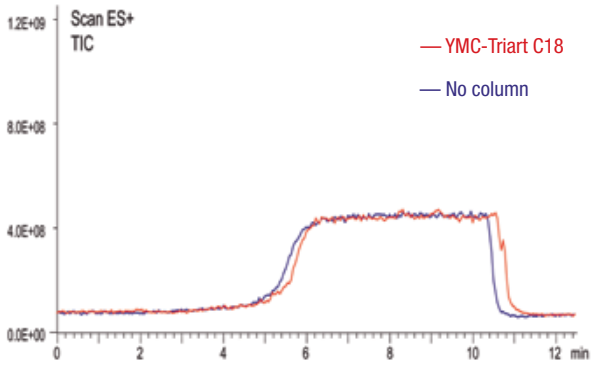
YMC-Triart C8

Column:	YMC-Triart C8 (5 µm, 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.

LC/MS

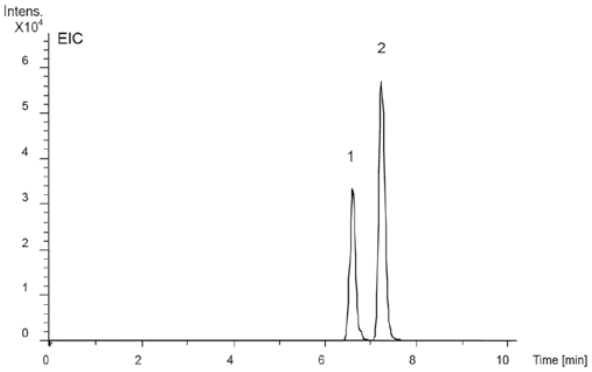
LC/MS compatibility*



Column:	5 µm, 50 x 2.0 mm ID
Part No.:	TA12S05-0502WT
Eluent:	A) water / formic acid (100/0.1) B) acetonitrile / formic acid (100/0.1) 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)

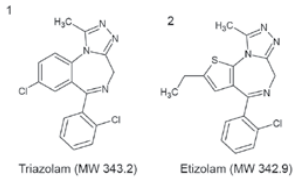
Column bleeding, caused by the fragments of stationary phase, is the main reason for background noise and restrictions on detection limits. No bleed is observed in the test of total ion current (TIC) measured by LC/MS with blank or with YMC-Triart C18. So in terms of the signal/noise ratio (S/N ratio),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

LC/MS analysis of benzodiazepine derivates



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

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



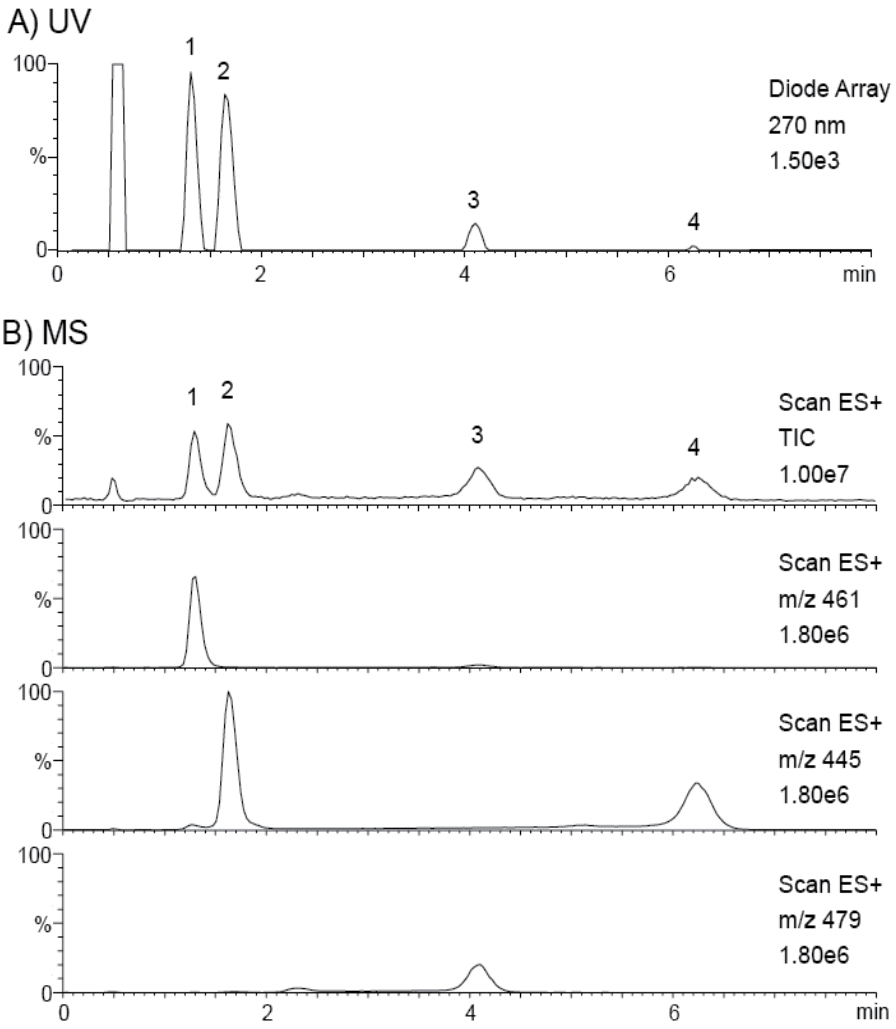
Triazolam (MW 343.2) Etizolam (MW 342.9)

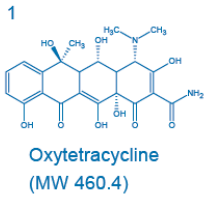
Column:	YMC-Triart C18 (5 µm, 12 nm) 50 x 2.0 mm ID
Part No.:	TA12S05-0502WT
Eluent:	A) 10 mM formic acid B) acetonitrile
Gradient:	25-50% B (0-10 min)
Flow rate:	0.2 mL/min
Temperature:	40 °C
Detection:	Bruker Daltonics micrOTOF, ESI, positive mode
Injection:	5 µL (100 ng/mL)

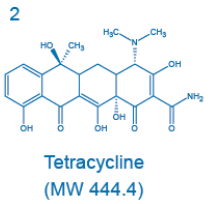
* Application data by courtesy YMC Co., Ltd.

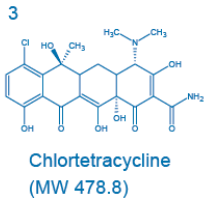
LC/MS

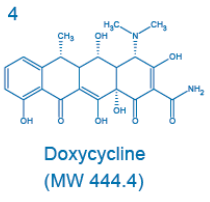
LC/MS analysis of tetracycline antibiotics*

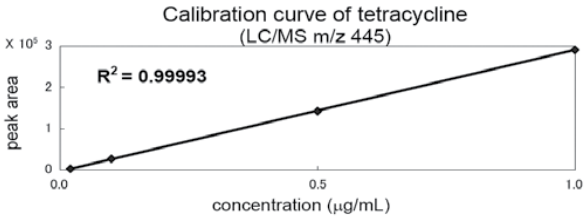








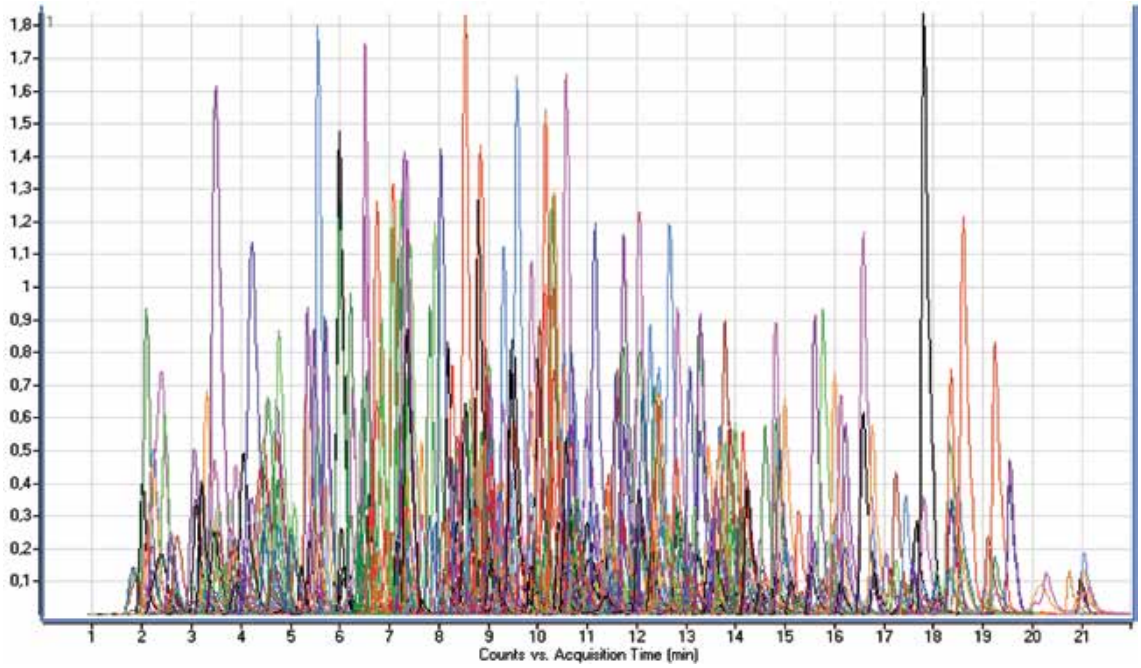




Column:	YMC-Triart C18 (5 µm, 12 nm) 50 x 2.0 mm ID
Part No.:	TA12S05-0502WT
Eluent:	acetonitrile / water / formic acid (15/85/0.1)
Flow rate:	0.4 mL/min
Temperature:	40 °C
Detection:	A) UV at 270 nm B) ESI positive-mode
Injection:	10 µL (1 µg/mL)

LC/MS

Analysis of 360 pesticides in a single run



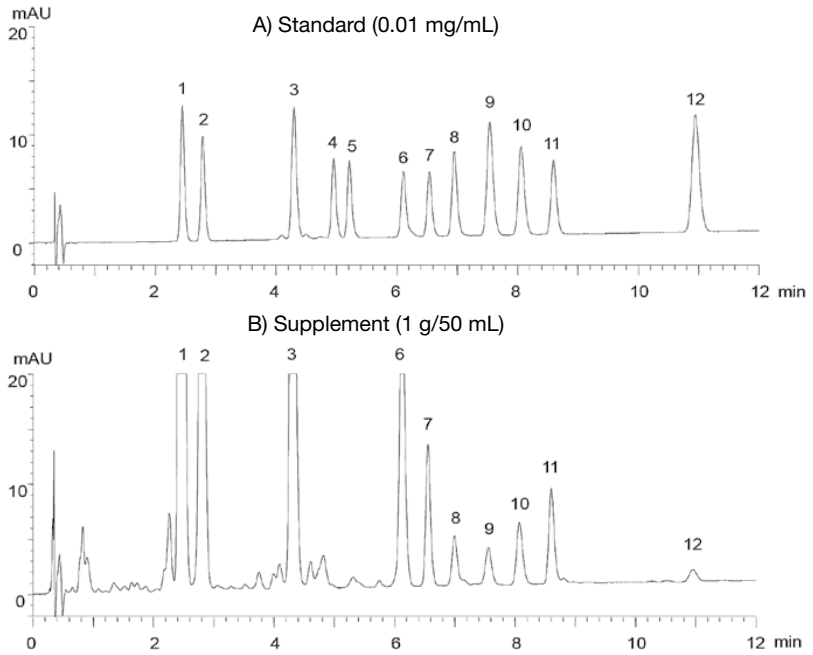
Column:	YMC-Triart C18 (3 µm) 100 x 2.0 mm ID	Injection:	5 µL
Part No.:	TA12S03-1002WT	Gradient:	0 min: 30% B, 0.1 min: 50% B, 18 min: 100% B, 21 min: 100% B, 21.01 min: 30% B, 29 min: 30% B
Eluent:	A) 5 mM ammonium formate / water B) 5 mM ammonium formate / methanol	Total run time:	30 min
Flow rate: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

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

* Application data by courtesy YMC Co., Ltd.

Food

Soy isoflavones in supplement*



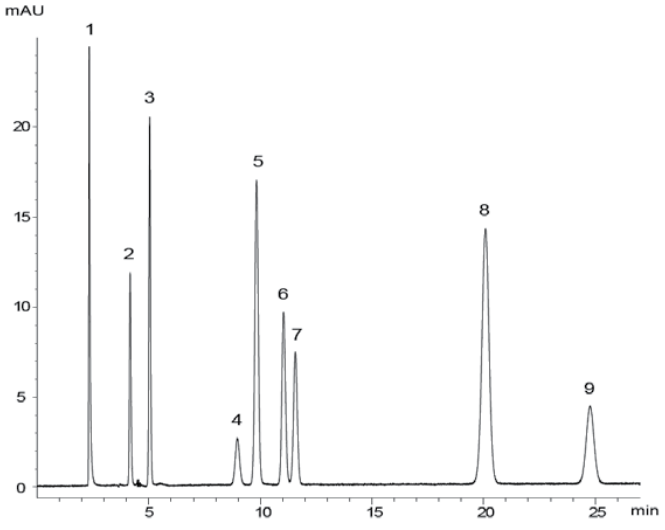
1. Daidzin
2. Glycitin
3. Genistin
4. 6"-*O*-Malonyldaidzin
5. 6"-*O*-Malonylglycitin
6. 6"-*O*-Acetyldaidzin
7. 6"-*O*-Acetylglycitin
8. 6"-*O*-Malonylgenistin
9. Daidzein
10. Glycitein
11. 6"-*O*-Acetylgenistin
12. Genistein

Sample preparation method

Supplement
← 50% aqueous ethanol
Stirred at r.t. for 1 hr
Filtration
Injection

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

Separation of water-soluble vitamins*

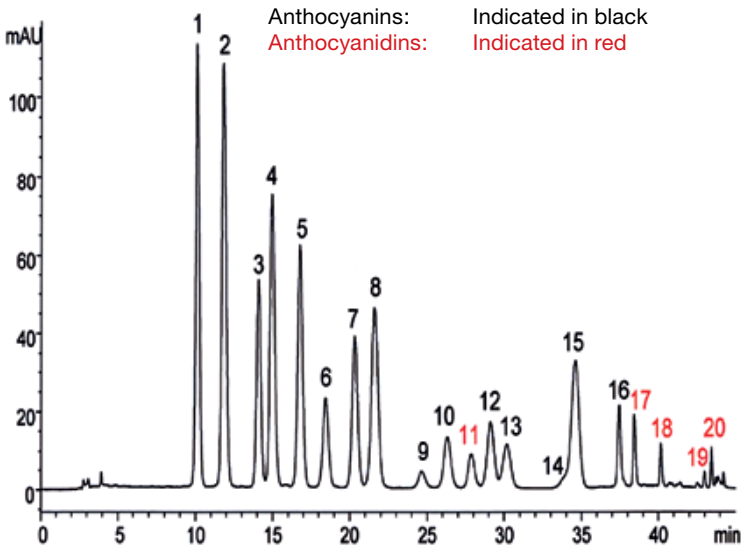


1. Thiamine HCl (Vitamin B_1)
2. Pyridoxine HCl (Vitamin B_6)
3. Nicotinamide
4. Cyanocobalamin (Vitamin B_{12})
5. L-Ascorbic acid 2-glucoside
6. L-Ascorbic acid (Vitamin C)
7. Erythorbic acid
8. Riboflavin (Vitamin B_2)
9. Nicotinic acid

Column:	YMC-Triart C18 (5 µm, 12 nm) 250 x 4.6 mm ID
Part No.:	TA12S05-2546WT
Eluent:	phospate buffer* / acetonitrile (90/10) * Dissolve 1.4 g KH_2PO_4 in 800 mL water → add 26 mL 10% TBA·OH → adjust pH 5.2 by 20% H_3PO_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)

Food

Analysis of anthocyanins and anthocyanidins*



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

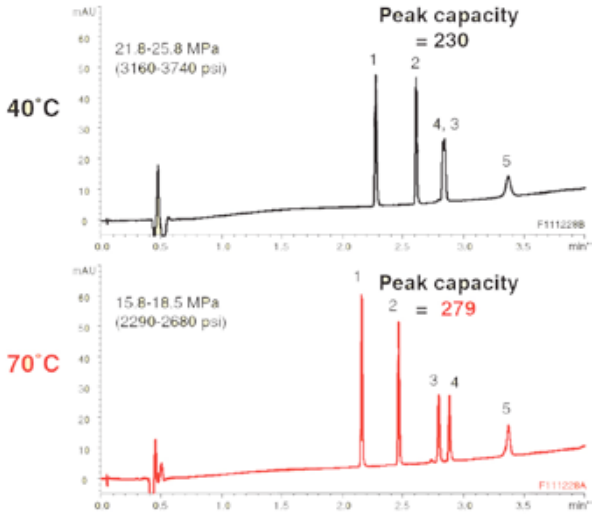
Column:	YMC-Triart C18 (5 µm, 12 nm) 250 x 4.6 mm ID
Part No.:	TA12S05-2546WT
Eluent:	A) water / formic acid (90/10) B) acetonitrile / methanol / water / formic acid (22.5/22.5/40/10)
Gradient:	20-28% B (0-30 min), 28-70% B (30-40 min), 100% B (40-45 min)
Flow rate:	1.0 mL/min
Temperature:	25 °C
Detection: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

* Application data by courtesy YMC Co., Ltd.

Peptides

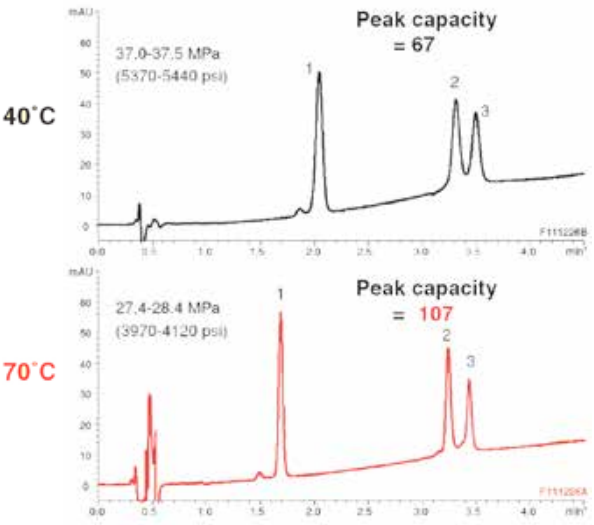
Highly efficient RP-HPLC separation of proteins and peptides using high temperature*

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)

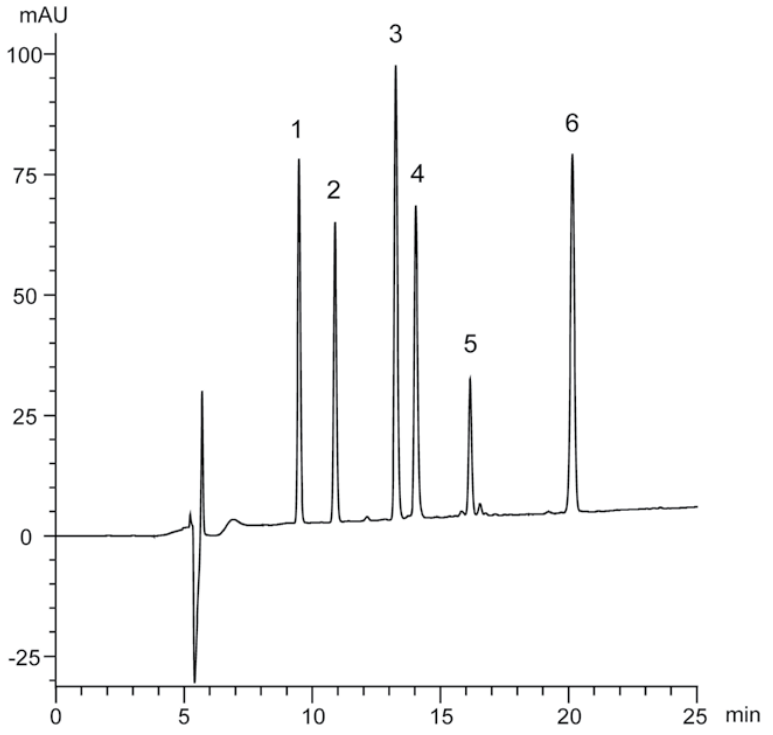


Column:	YMC-Triart C18 (1.9 µm, 12 nm) 50 x 2.0 mm ID	Flow rate:	0.4 mL/min
Part-No.:	TA12SP9-0502WT	Detection:	UV at 220 nm
Eluent:	A) water / TFA (100/0.1)	Injection:	1 µL (50 µg/mL) - condition A
	B) acetonitrile / TFA (100/0.1) - mixture A		1 µl (250 µg/mL) - condition B
	B) acetonitrile / 2-propanol / TFA (50/50/0.1) - mixture B	System:	Agilent 1200SL
Gradient:	10-80% B (0-5 min) - mixture A		
	30-60% B (0-5 min) - mixture B		

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

Peptides

Peptides (MW 556 - 3,465)*



1. Oxytocin (MW 1,007)
2. Met-Enkephalin (MW 574)
3. Leu-Enkephalin (MW 556)
4. Neurotensin (MW 1,673)
5. γ-Endorphin (MW 1,859)
6. β-Endorphin (MW 3,465)

Column:	YMC-Triart C18 (5 µm, 12 nm) 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.

YMC-Triart “AQ”

YMC-Triart C18

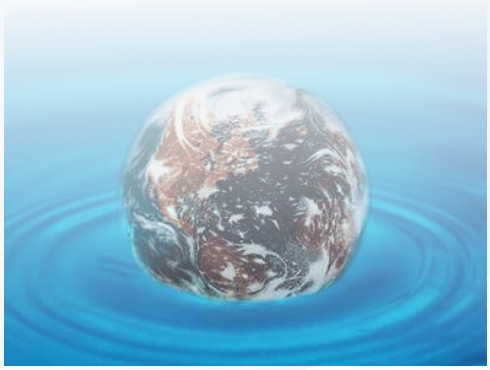
General

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.

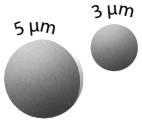
2000



1985

YMC-Pack ODS-AQ

- “hydrophilic” C18
- balanced surface chemistry
- polar recognition
- metabolite recognition



YMC-Triart “AQ”

YMC-Triart C18

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)

5 µm 3 µm 2 µm

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 70°C
- 100% H_2O

1.9 µm 3 µm 5 µm

Therefore, YMC-Triart provides freedom in method development, robustness and enhanced column lifetimes 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.

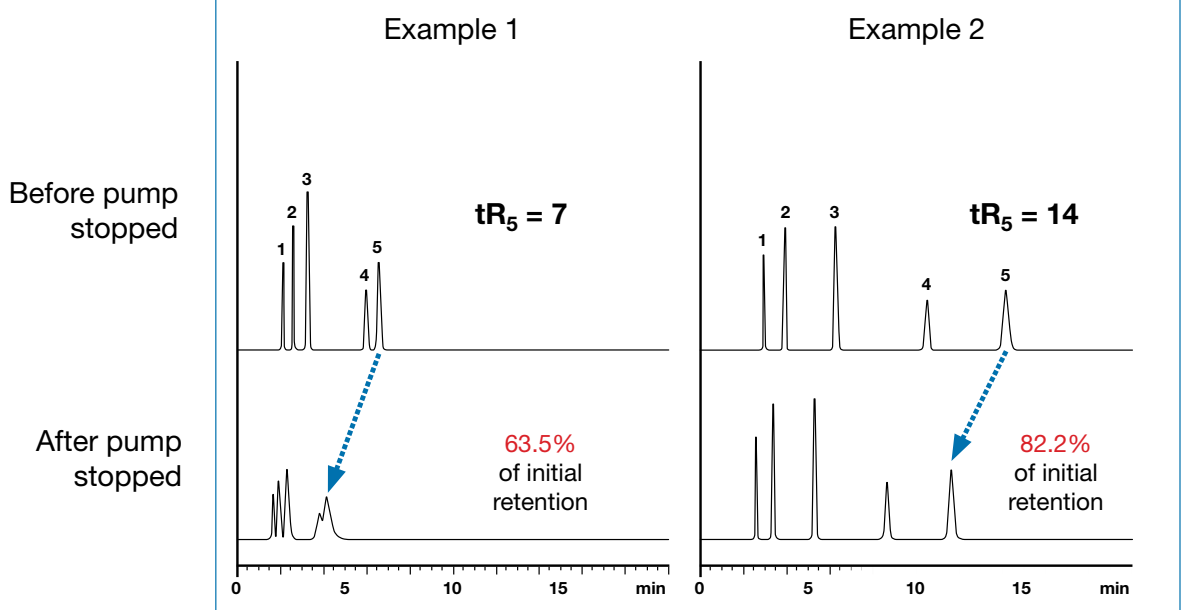
* Application data by courtesy YMC Co., Ltd.

YMC-Triart “AQ”

YMC-Triart C18

Problem with conventional C18 columns

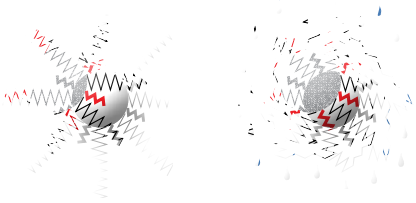
Aqueous conditions deteriorate column performance*



Column:	5 µm, 150 x 4.6 mm ID XBridge C18 (Example 1) and Atlantis T3 (Example 2)	Sample:	1. Cytosine 2. Uracil 3. Guanine 4. Thymine 5. Adenine
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		

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.

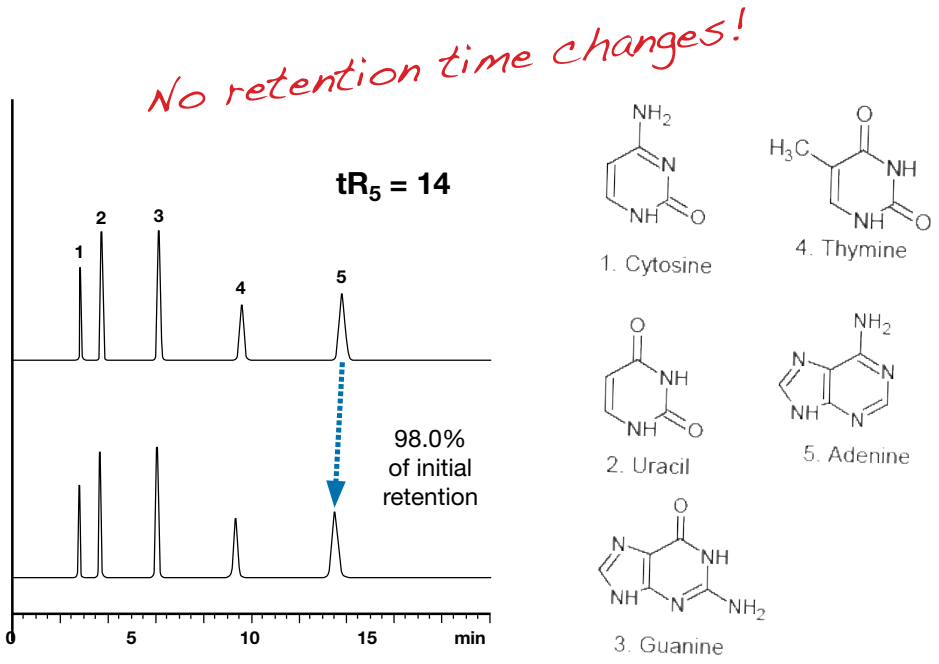
This behaviour is caused by poor hydration of the phase. Polar compounds cannot easily distribute between the mobile phase and the stationary phase.

YMC-Triart “AQ”

YMC-Triart C18

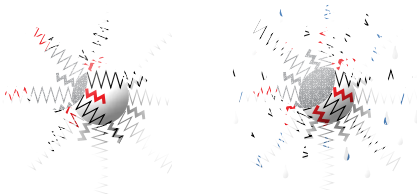
Solution with YMC-Triart C18

Reproducible stable performance!*



Column:	YMC-Triart C18 (5 µm, 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 Triart C18 columns are used for applications involving 100% aqueous buffers, the retention times are unchanged after the flow was stopped between analyses.

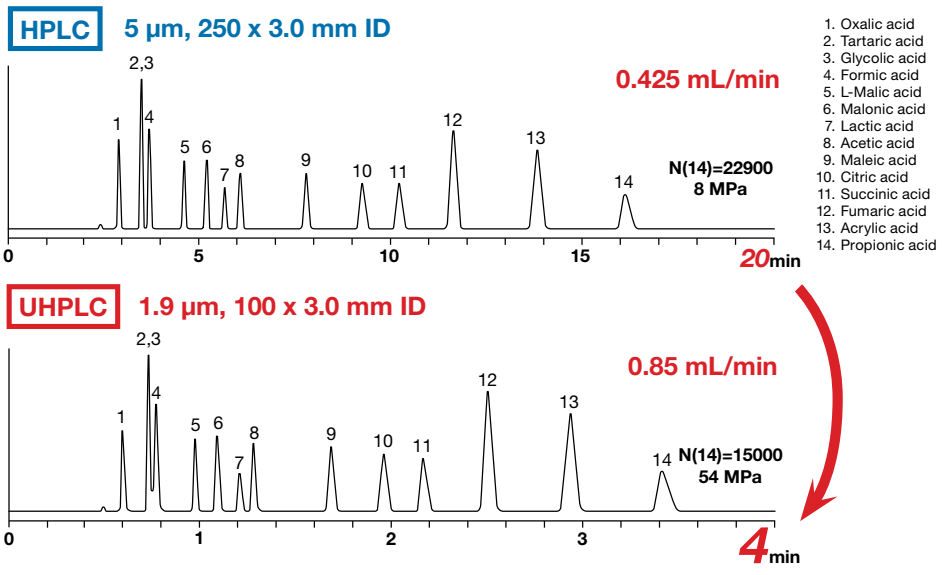
This is due to the improved hydration of the phase. Polar compounds can easily distribute between the mobile phase and the stationary phase.

* Application data by courtesy YMC Co., Ltd.

YMC-Triart “AQ”

YMC-Triart C18

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



Column:	YMC-Triart C18
Eluent:	20 mM H_3PO_4
Flow rate:	0.425 mL/min
Temperature:	37°C
Detection:	220 nm

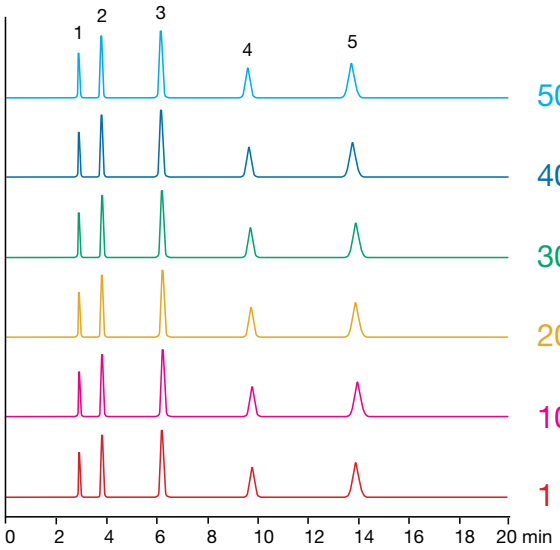
100% aqueous conditions!

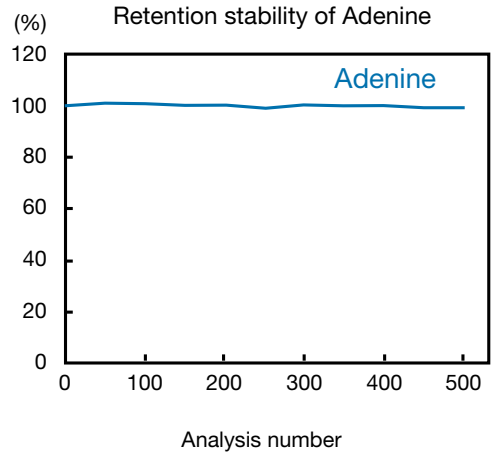
Stable under harsh conditions: pH 1-12 and temperature up to 70°C.
Stable retention times with 100% aqueous eluents!
Reproducible results day after day, column to column and lab to lab!

YMC-Triart “AQ”

YMC-Triart C18

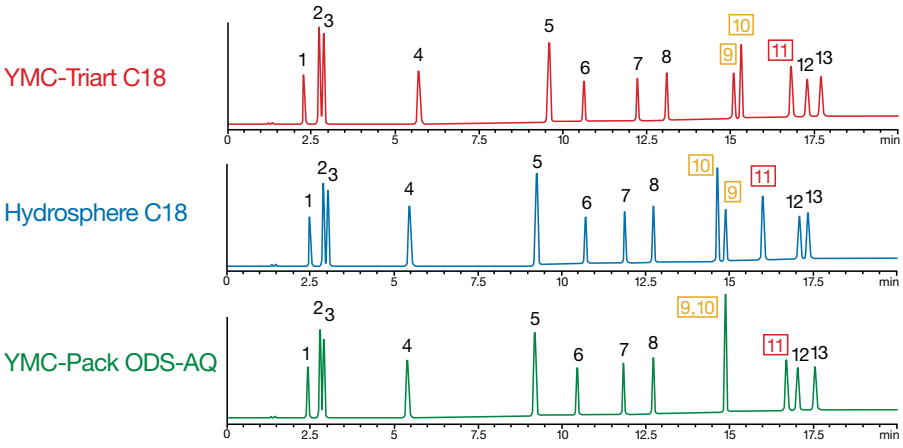
Proven reliability*





Column:	YMC-Triart C18 (5 µm, 12 nm) 150 x 3.0 mm ID
Part No.:	TA12S05-1530WT
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
3. D-Isoascorbic acid
4. Nicotinic acid
5. Nicotinamide
6. D-(+)-Pantothenic acid calcium salt
7. Pyridoxal hydrochloride
8. Pyridoxine hydrochloride
9. Folic acid
10. Thiamine hydrochloride
11. Cyanocobalamin
12. D-Biotin
13. Riboflavin

Column:	3 µm, 150 x 3.0 mm ID
Part No.:	TA12S05-1530WT
Eluent:	A) 20 mM KH_2PO_4-H_3PO_4 (pH 2.8) containing 5 mM $CH_3(CH_2)5SO_3Na$ B) 20 mM KH_2PO_4-H_3PO_4 (pH 2.8) / acetonitrile (80/20) containing 5 mM $CH_3(CH_2)5SO_3Na$
Flow rate:	0.425 mL/min
Temperature:	40°C
Detection:	210 nm

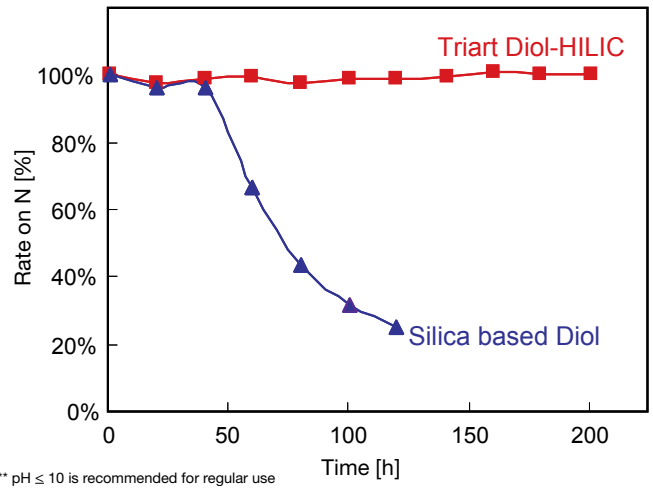
Retention behaviour of water-soluble vitamins on three YMC ODS phases which can be used with 100% aqueous mobile phases is compared. The retention times and peak elution order for folic acid (peak 9), thiamine hydrochloride (peak 10) and cyanocobalamin (peak 11) are different for the three phases due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

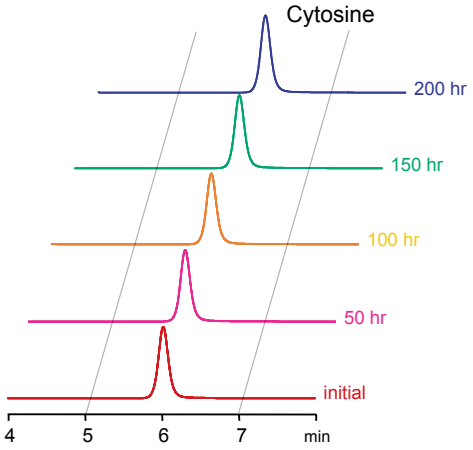
* Application data by courtesy YMC Co., Ltd.

HILIC

Great stability and reproducibility at high pH*

Stability in high pH (pH 11, 50 °C)**



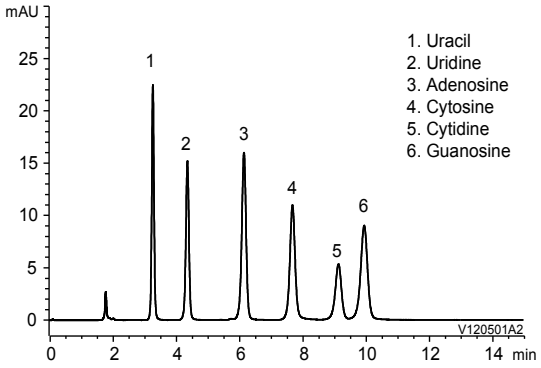


** pH ≤ 10 is recommended for regular use

Column:	5 µm, 150 x 4.6 mm ID	Flow rate:	1.0 mL/min
Part No.:	TDH12S05-1546WT	Temperature:	50 °C
Eluent:	acetonitrile / water / NH_3 (90/10/0.1) pH 11.3	Sample:	Cytosine

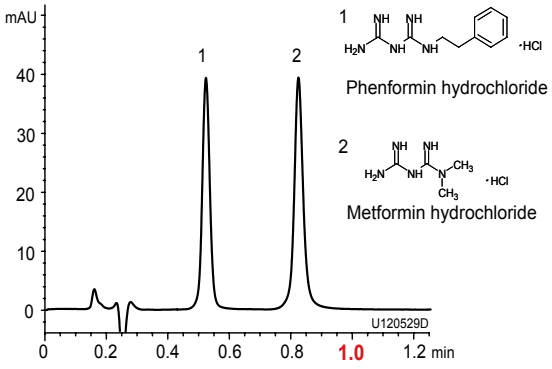
YMC-Triart Diol-HILC offers highly reproducible separations even at high pH and high temperature. The lifetime of YMC-Triart Diol-HILIC is much longer than that of conventional silica-based Diol columns.

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 CH_3COONH_4 / acetonitrile (10/90)
Flow rate:	0.425 mL/min
Temperature:	30 °C
Detection:	UV at 254 nm
Injection:	2 µL (5 ~ 10 µg/mL)

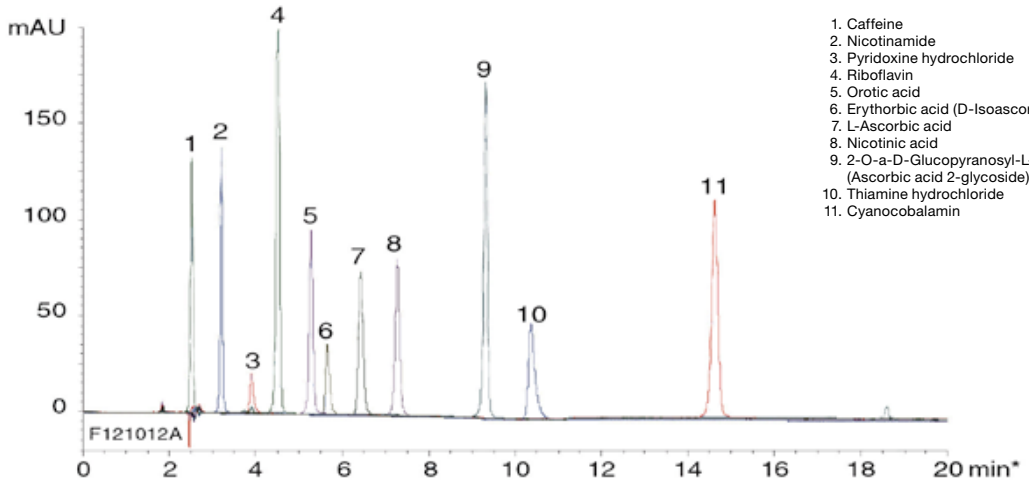
Diabetes drugs*



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

HILIC

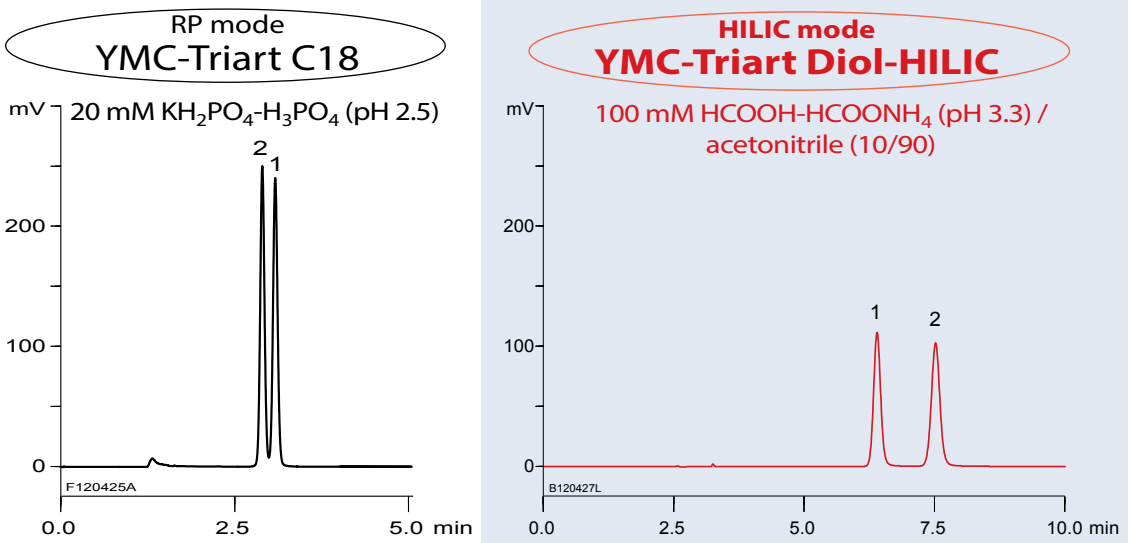
Water soluble vitamins*

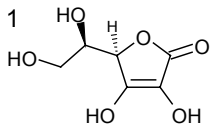


1. Caffeine
2. Nicotinamide
3. Pyridoxine hydrochloride
4. Riboflavin
5. Orotic acid
6. Erythorbic acid (D-Isoascorbic acid)
7. L-Ascorbic acid
8. Nicotinic acid
9. 2-O-a-D-Glucopyranosyl-L-ascorbid acid (Ascorbic acid 2-glycoside)
10. Thiamine hydrochloride
11. Cyanocobalamin

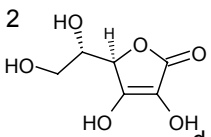
Column: YMC-Triart Diol-HILIC (5 µm, 12 nm) 150 x 3.0 mm ID
Part No.: TDH12S05-1503PTH
Eluent: A) acetonitrile / 200 mM HCOOH-HCOONH4 (pH 3.6) / water (90/5/5)
B) acetonitrile / 200 mM HCOOH-HCOONH4 (pH 3.6) / water (50/5/45)
Gradient: 0-75% B (0-20 min)
Flow rate: 0.425 mL/min
Temperature: 40 °C
Detection: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

Polar and hydrophilic compounds*





Erythorbic acid
(D-Isoascorbic acid)



L-Ascorbic acid

Column: 5 µm, 150 x 3.0 mm ID
Flow rate: 0.425 mL/min
Temperature: 40 °C
Detection: UV at 254 nm
Injection: 4 µL (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.

* Application data by courtesy YMC Co., Ltd.

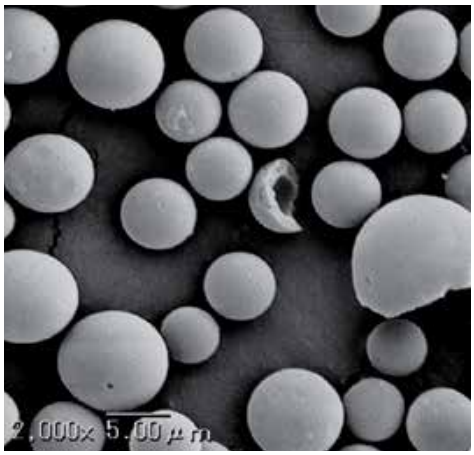
QC Data

YMC-Triart: Improved quality of particles

Uniform spherical particles

YMC-Triart

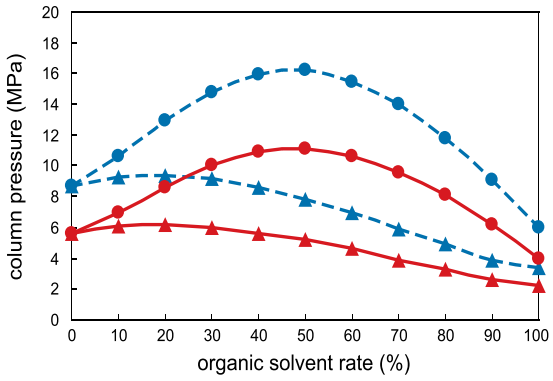
X-Bridge HILIC



by courtesy of YMC Co., Ltd.

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).

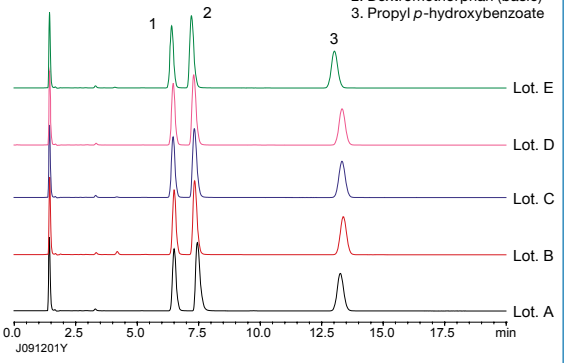
QC Data

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

Batch-to-batch reproducibility

Basic compounds*

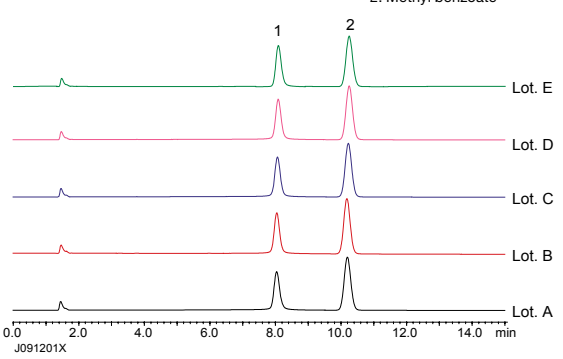
1. Chlorpheniramine (basic)
2. Dextromethorphan (basic)
3. Propyl *p*-hydroxybenzoate



Column:	YMC-Triart C18 (5 µm) 150 x 3.0 mm ID
Part No.:	TA12S05-1503WT
Eluent:	20 mM KH_2PO_4 (pH 6.9) / acetonitrile (65/35)
Flow rate:	0.425 mL/min
Temperature:	40 °C
Detection:	UV at 235 nm

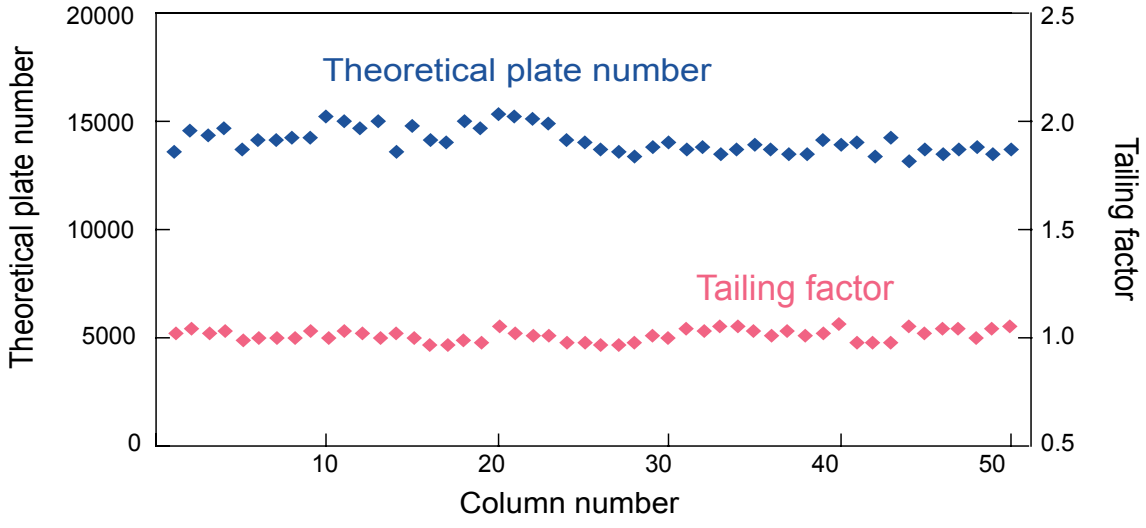
Coordination compounds*

1. Hinokitiol (coordination)
2. Methyl benzoate



Column:	YMC-Triart C18 (5 µm) 150 x 3.0 mm ID
Part No.:	TA12S05-1503WT
Eluent:	acetonitrile / 0.1% H_3PO_4 (40/60)
Flow rate:	0.425 mL/min
Temperature:	40 °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.

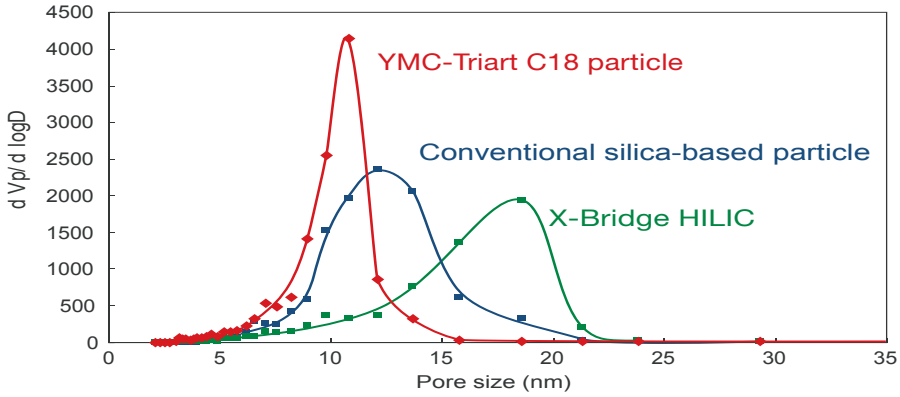


Column:	YMC-Triart C18 (5 µm) 150 x 4.6 mm ID	Flow rate:	1.0 mL/min
Part No.:	TA12S05-1546WT	Temperature:	ambient
Eluent:	acetonitrile / water (40/60)	Sample:	butyl benzoate

* Application data by courtesy YMC Co., Ltd.

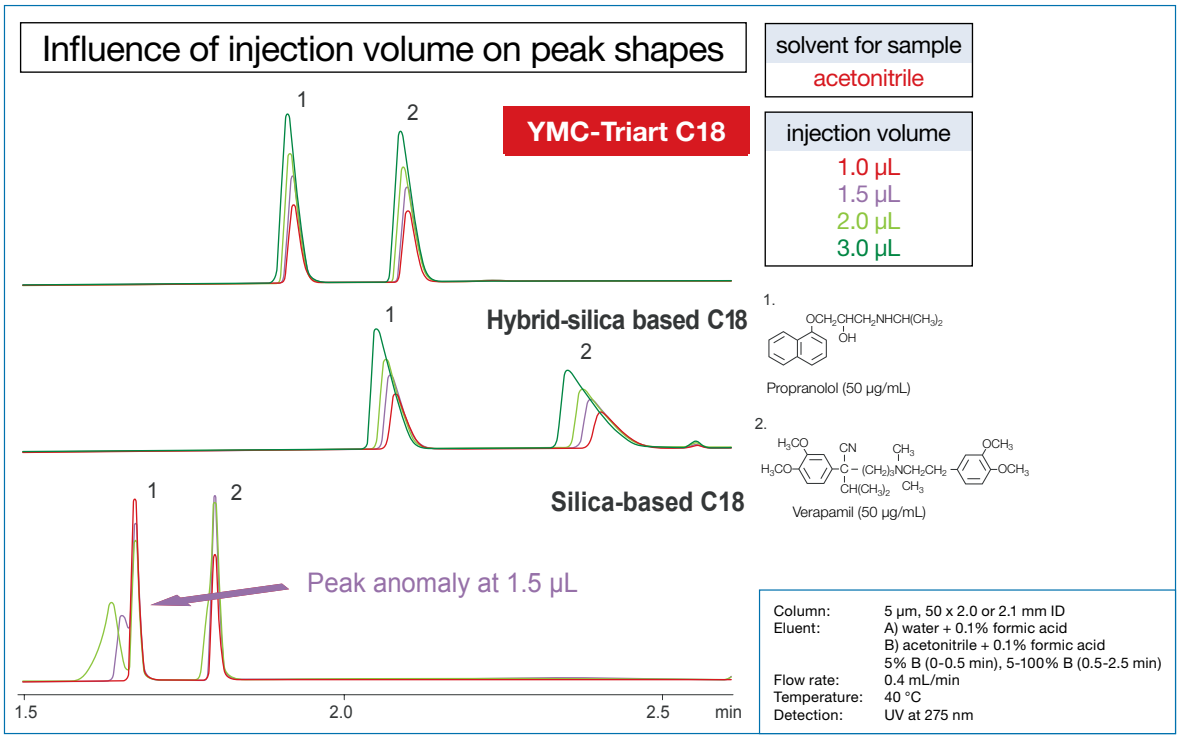
QC Data

Narrow pore distribution



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

Improved loadability



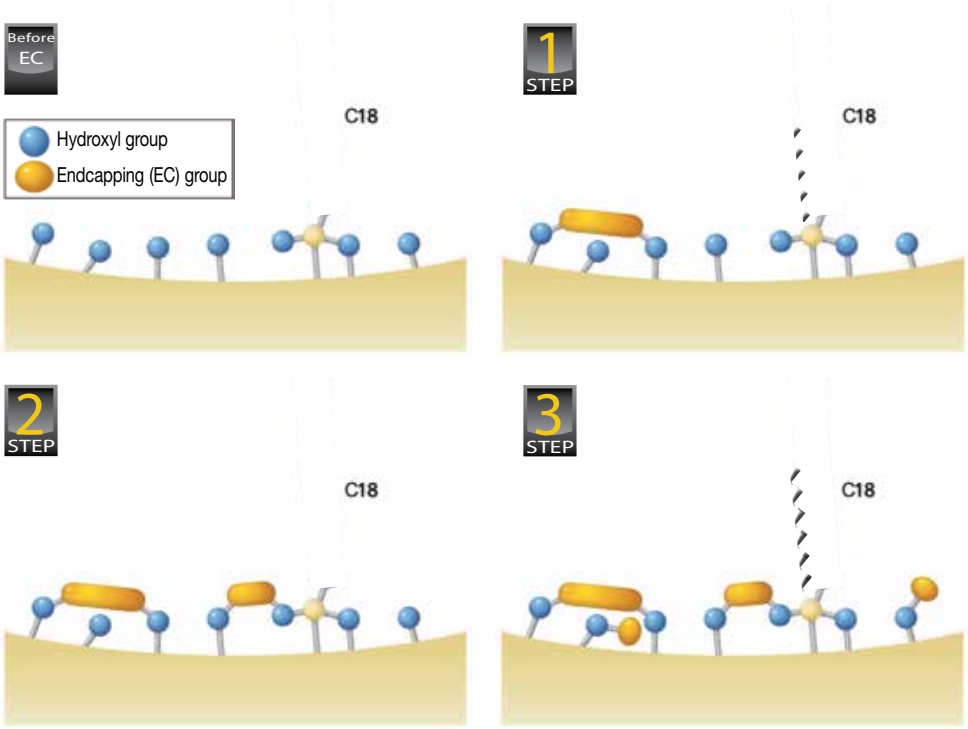
In order to prevent peak errors, there is a limit to the injection volume when a sample is injected in high elution solvents (such as 100% acetonitrile). Compared with traditional columns, more than double the injection volume can be injected into YMC-Triart columns as a result of the extremely narrow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

QC Data

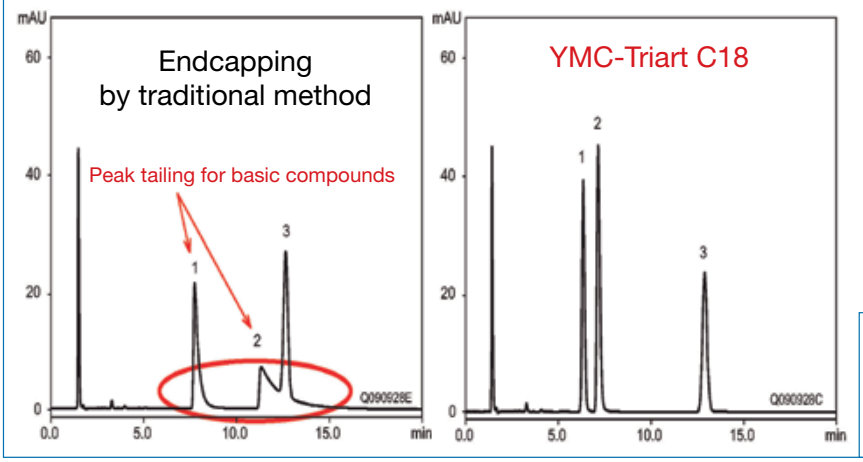
Multi-stage endcapping

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 “multistage 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:



Ingredients in cough/cold medication:

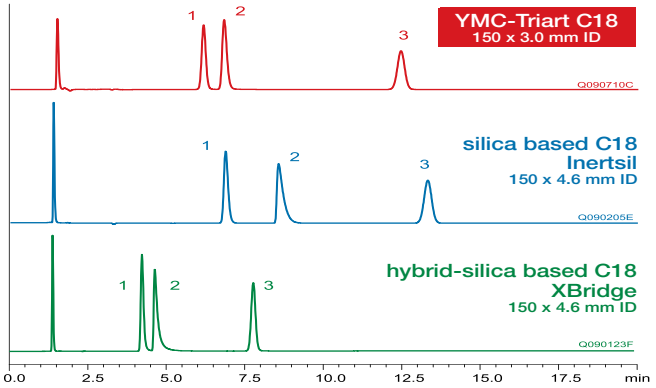
1. Chlorpheniramine
2. Dextromethorphan
3. Propyl *p*-hydroxybenzoate

Column:	5 µm, 150 x 3.0 mm ID
Part No.:	TA12S05-1503WT
Eluent:	20 mM KH_2PO_4-K_2HPO_4 (pH 6.9) / acetonitrile (65/35)
Flow rate:	0.425 mL/min
Temperature:	40 °C
Detection:	UV at 235 nm

* Application data by courtesy YMC Co., Ltd.

QC Data

Basic compounds*



Ingredients in a cough/cold medication

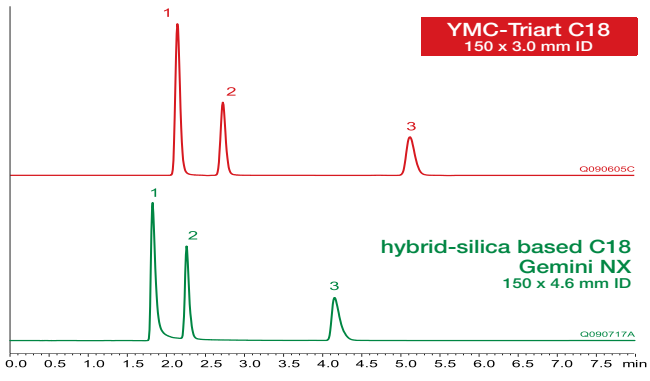
1. Chlorpheniramine
2. Dextromethorphan
3. Propyl *p*-hydroxybenzoate

excellent peak shape

Column:	5 µm, 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*



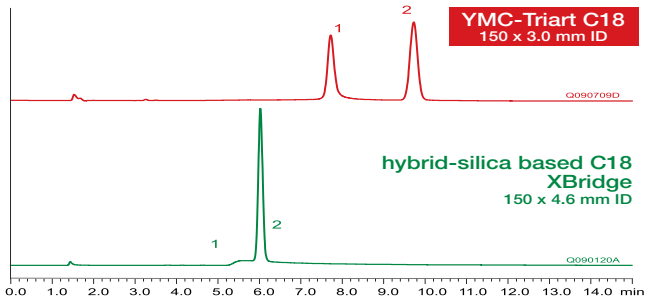
Organic acid

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

Column:	5 µm, 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 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*



Hinokitiol

1. Hinokitiol
2. Methyl benzoate

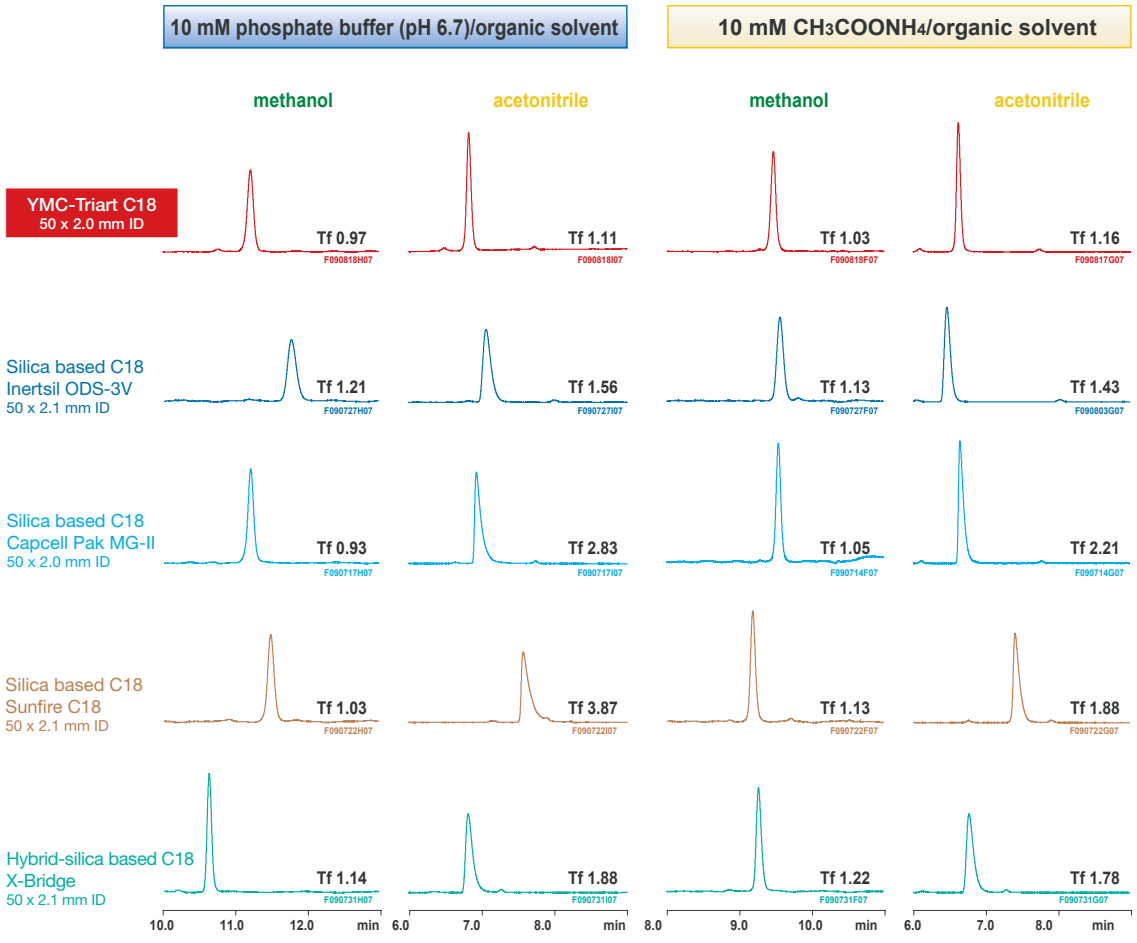
low metal impurities

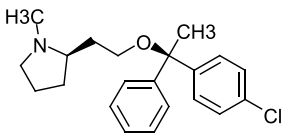
Column:	5 µm, 150 x 3.0 or 150 x 4.6 mm ID
Eluent:	acetonitrile / water + 0.1% H_3PO_4 (40/60)
Flow rate:	0.425 mL/min for 3.0 mm ID 1.0 mL/min for 4.6 mm ID
Temperature:	40 °C
Detection:	UV at 254 nm

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

QC Data

Comparison of clemastine analysis*





Clemastine

Column:	5 µm, 50 x 2.0 or 50 x 2.1 mm ID
Eluent:	A) 10 mM KH_2PO_4-K_2HPO_4 (pH 6.7) or 10 mM CH_3COONH_4 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.

* Application data by courtesy YMC Co., Ltd.

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
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
PFP	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
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

For other dimensions please refer to page 386-387
For method validation and development kits refer to page 12-13

Ordering Information

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	(pack of 5)
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	T012S03-02Q1PTH	T012S03-H3Q1PTH	T012S03-05Q1PTH	T012S03-L5Q1PTH	T012S03-10Q1PTH	T012S03-15Q1PTH	—	T012S03-01Q1GC
	3.0	—	—	T012S03-0503PTH	T012S03-L503PTH	T012S03-1003PTH	T012S03-1503PTH	—	T012S03-0103GC
	4.6	—	T012S03-H346PTH	T012S03-0546PTH	T012S03-L546PTH	T012S03-1046PTH	T012S03-1546PTH	T012S03-2546PTH	T012S03-0104GC
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
PFP	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 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	(pack of 5)
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	T012S05-02Q1PTH	T012S05-H3Q1PTH	T012S05-05Q1PTH	T012S05-L5Q1PTH	T012S05-10Q1PTH	T012S05-15Q1PTH	—	T012S05-01Q1GC
	3.0	—	—	T012S05-0503PTH	T012S05-L503PTH	T012S05-1003PTH	T012S05-1503PTH	—	T012S05-0103GC
	4.6	—	T012S05-H346PTH	T012S05-0546PTH	T012S05-L546PTH	T012S05-1046PTH	T012S05-1546PTH	T012S05-2546PTH	T012S05-0104GC
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
PFP	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

Novel column hardware technology with increased pressure rating; specifications for the individual bonding chemistries remain identical irrespective of the column hardware format selected.

Ordering Information

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	(pack of 5)
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	T012S03-0202WT	T012S03-0302WT	T012S03-0502WT	T012S03-L502WT	T012S03-1002WT	T012S03-1502WT	—	T012S03-01Q1GC
	3.0	—	—	T012S03-0503WT	T012S03-L503WT	T012S03-1003WT	T012S03-1503WT	—	T012S03-0103GC
	4.6	—	—	T012S03-0546WT	T012S03-L546WT	T012S03-1046WT	T012S03-1546WT	T012S03-2546WT	T012S03-0104GC
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
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 (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	(pack of 5)
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
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)
XPCHSPW1 (10 mm ID)
**Max. pressure 100 bar

Ordering Information

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

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