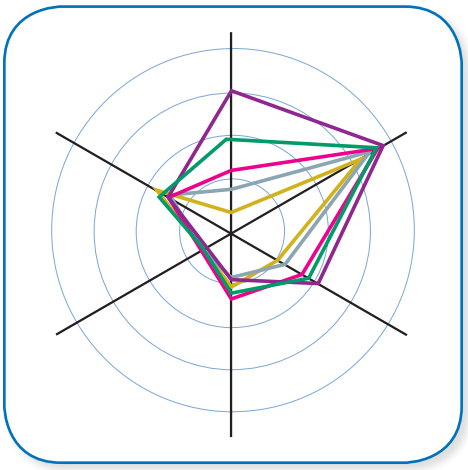
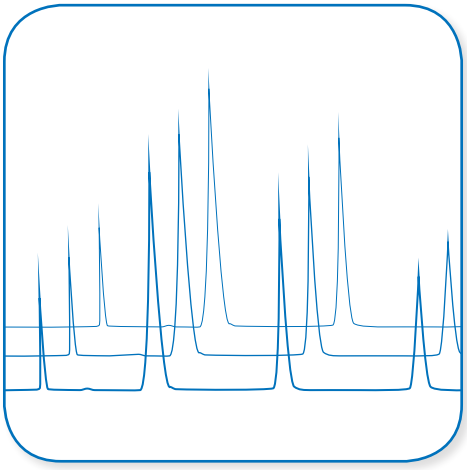


YMC
*Pro*Family



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YMC *Pro*Family

- ***YMC-Pack ProFamily based on ultra high purity silica***
- ***Hydrosphere C18 for stability in aqueous mobile phases***
- ***every packed column supplied with:***
  - *lot certificate*
  - *test chromatogram*

Specifications	*Pro* C18	*Pro* C8	*Pro* C4	*Pro* C18 RS	Hydrosphere C18
Particle size / µm	2; 3; 5	3; 5	3; 5	3; 5	2; 3; 5
Pore size / nm	12	12	12	8	12
Surface area / m^2g^{-1}	330	330	330	510	330
Carbon content / %	16	10	7	22	12
pH range	2.0 – 8.0	2.0 – 7.5	2.0 – 7.5	1.0 – 10.0	2.0 – 8.0
Metal content	(Randomly selected lots)				
Al / ppm	0.3	0.2	0.6	0.3	0.7
Fe / ppm	2.8	2.5	2.9	0.1	1.2
Na / ppm	0.3	1.4	1.0	1.3	0.7
Ti / ppm	0.1	0.1	0.1	0.1	0.1

YMC *Pro*Family

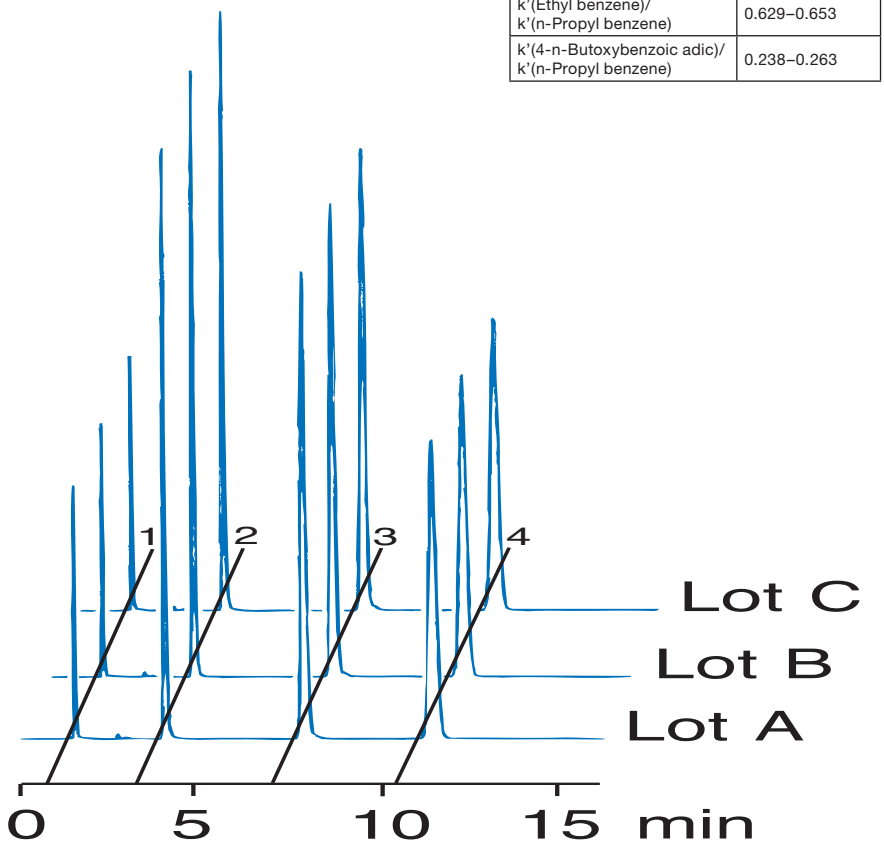
Properties

Strict quality control is enforced during the manufacturing of the underlying silica, bonding of the stationary phase, endcapping and column packing operations to supply high performance columns of high reproducible quality over a long period of time.

Lot-to-lot reproducibility of YMC-Pack Pro C18

1. Uracil
2. 4-n-Butoxybenzoic acid
3. Ethyl benzene
4. n-Propyl benzene

HPLC-Test A	Specification
k'(Ethyl benzene)/ k'(n-Propyl benzene)	0.629–0.653
k'(4-n-Butoxybenzoic adic)/ k'(n-Propyl benzene)	0.238–0.263



HPLC Test A
Column: 150 x 4.6 mm ID
Eluent: 20 mM KH_2PO_4-H_3PO_4 (pH 3.5) / acetonitrile (40/60, v/v)
Flow rate: 1.0 mL/min
Detection: UV at 254nm
Temperature: 37 °C

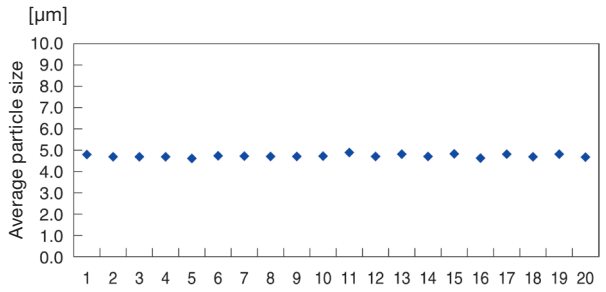
YMC *Pro*Family

Underlying silica gel support

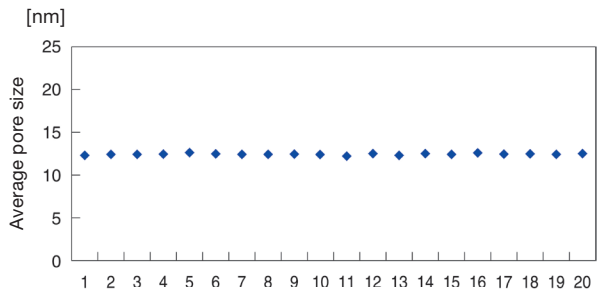
The physical properties of silica gel have a great effect on the selectivity and performance of the bonded packing. For the purpose of supplying columns of stable quality, the physical properties of silica gel used for packing such as particle size, pore size, specific surface area, pore volume and amount of metal contamination have to be strictly controlled.

Physical properties (*Pro* C18, 5 µm, 12 nm)

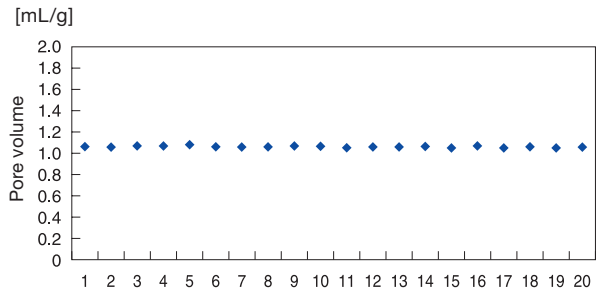
Particle size



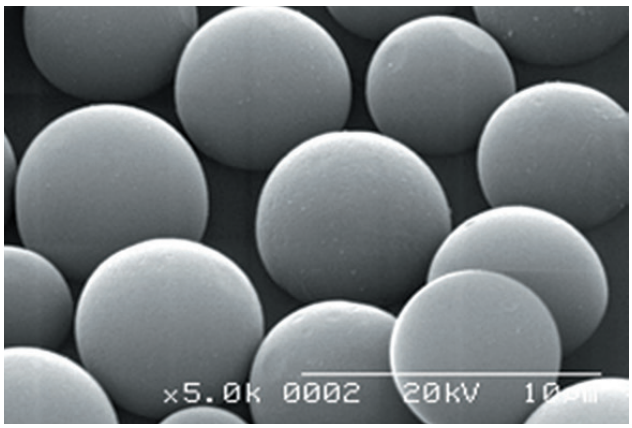
Pore size



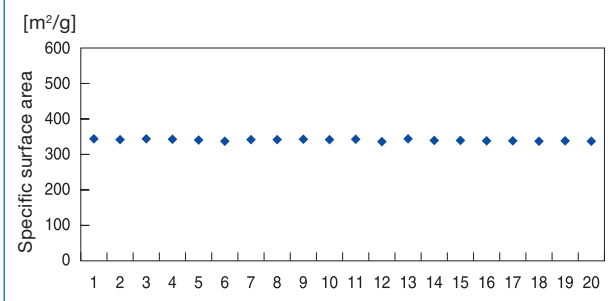
Pore volume



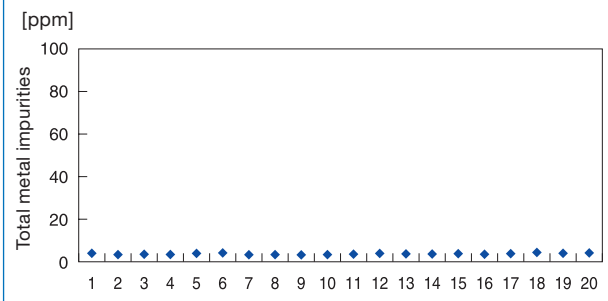
Silica Support Material (5 µm, 12 nm)



Specific surface area



Amount of metal content



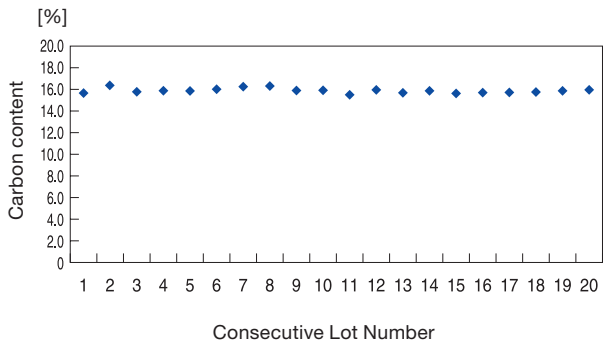
YMC *Pro*Family

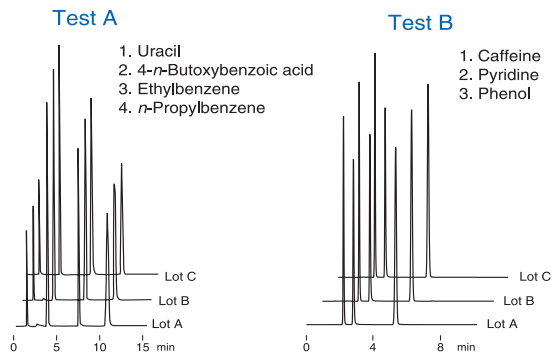
Packing material

Excellent reproducibility of the Pro C18 is shown not only in the separation of hydrophobic compounds but also in that of hydrophilic, basic, and acidic compounds.

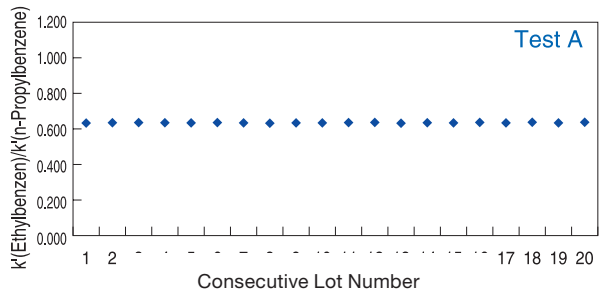
Pro C18 5 µm, Reproducibility between batches

Percent Carbon Content

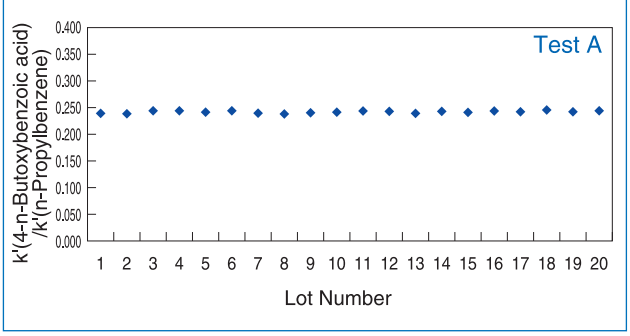




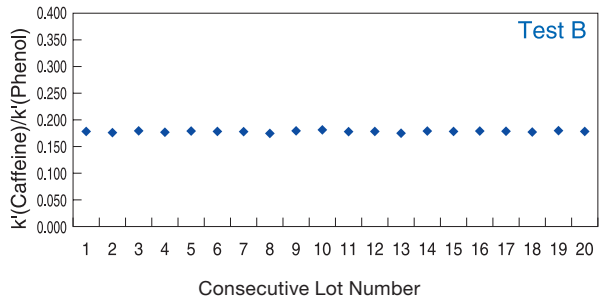
Hydrophobicity



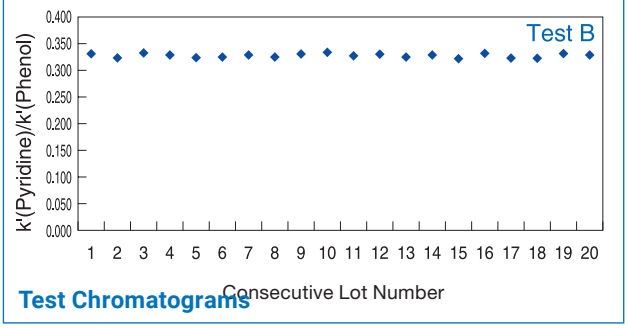
Acidic compounds



Hydrogen bonding ability



Basic compounds



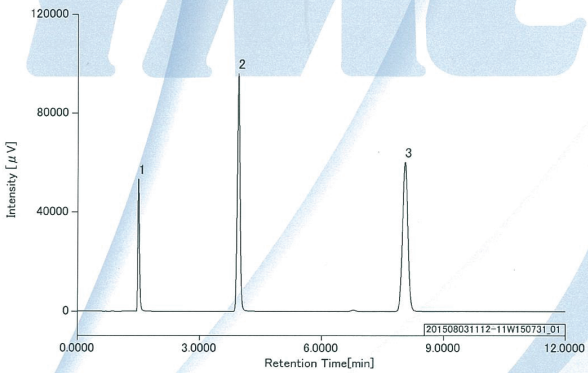
Test Chromatograms

YMC *Pro*Family

Individual Column Test

YMC HPLC COLUMN INSPECTION REPORT

Serial No.:	**0415226394**
Product code:	AS12S05-1546WT
Packing material:	YMC-Pack Pro C18 /S-5um /12nm Lot No. 12650
Column size:	150 x 4.6 mmI.D.
Eluent:	Acetonitrile/Water (60/40)
Flow rate:	1.00 mL/min
Temperature:	Ambient
Detection:	UV at 254 nm
Injection volume:	5 uL
Pressure:	6.0 MPa
Shipping solvent:	Mobile phase

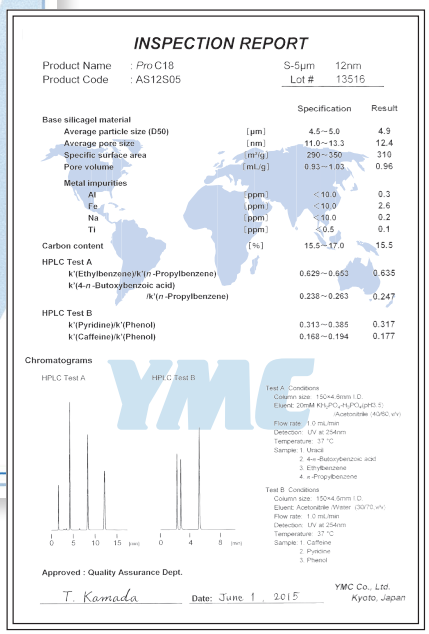


Sample Components	Retention time [min]	Capacity factor [k'=(tRn-tR1)/tR1]	Theoretical plates [N=5.54×(tR/W0.5)^2]	Tailing factor [Tf=W0.05/2f]
1.Uracil (0.02 mg/mL)	1.49		7335	1.49
2.Methyl benzoate (0.7 uL/mL)	3.95	1.65	16542	1.14
3.Naphthalene (0.24 mg/mL)	8.05	4.39	17630	1.04

[System No.104] [Inspected by R.OTERA]

YMC CO., LTD.

Individual Lot Test



INSPECTION REPORT

Product Name : *Pro*C18 S-5μm 12nm
Product Code : AS12S05 Lot # 13516

		Specification	Result
Base silicagel material			
Average particle size (D50)	[μm]	4.5～5.0	4.9
Average pore size	[nm]	11.0～13.3	12.4
Specific surface area	[m²/g]	290～350	310
Pore volume	[mL/g]	0.93～1.03	0.96
Metal impurities			
Al	[ppm]	< 10.0	0.3
Fe	[ppm]	< 10.0	2.6
Na	[ppm]	< 10.0	0.2
Ti	[ppm]	< 0.5	0.1
Carbon content	[%]	15.5～17.0	15.5
HPLC Test A			
k'(Ethylbenzene)/k'(*n*-Propylbenzene)		0.629～0.653	0.635
k'(4-*n*-Butoxybenzoic acid) /k'(*n*-Propylbenzene)		0.238～0.263	0.247
HPLC Test B			
k'(Pyridine)/k'(Phenol)		0.313～0.385	0.317
k'(Caffeine)/k'(Phenol)		0.168～0.194	0.177

Chromatograms

HPLC Test A HPLC Test B

Approved : Quality Assurance Dept.

T. Kamada Date: June 1, 2015

YMC Co., Ltd. Kyoto, Japan

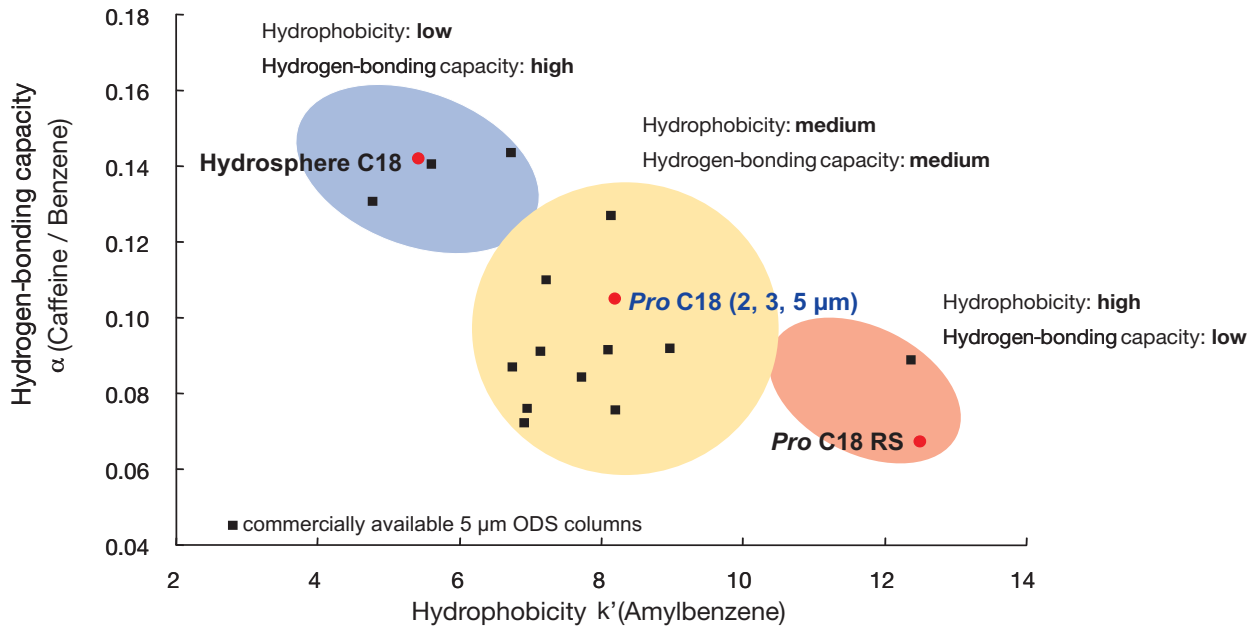
Indicates the efficiency of the column retention characteristics and symmetry of the test peaks.

To give our customers an insight into the strict criteria with regard to the silica base, the bonded final product and the reproducible chromatographic behaviour, each column of the ProFamily is supplied with a lot inspection report and an individual column test chromatogram. The first report illustrates the narrow window for physical parameters such as particle size distribution or surface area and the reproducibility of chemical properties. The test chromatogram illustrates the efficiency of the column with a guaranteed minimum performance of 100,000 theoretical plates for 150 and 250 x 4.6 mm ID and a tailing factor of 0.90 to 1.15 (at 5% peak height for 5 µm particle size).

YMC *Pro*Family

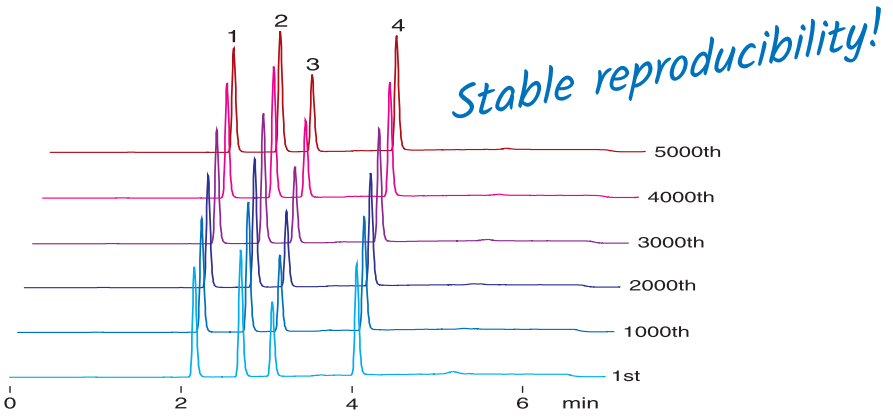
Comparison of separative selectivity

The selectivity characteristics of each column are shown using hydrophobicity and hydrogen-bonding ability as indicators. The *Pro*Family series of ODS phases is designed to make Hydrosphere C18 and YMC-Pack *Pro* C18 RS have contrasting separation characteristics, with standard YMC-Pack *Pro* C18 in between. Also, *Pro* C8 and C4 have different selectivity from the ODS phases. By choosing one from these 5 types of columns, one can easily optimise the separation of polar and non-polar compounds.

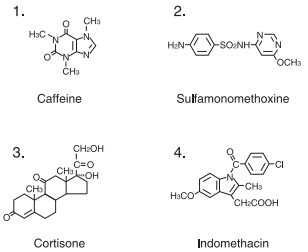


Stability for repetitive analysis

The long-term stability of a YMC-Pack *Pro* C18 (3 µm) short column used in repeated analysis is shown below. There is no change found in the separation of all compounds after 5000 injections (8 hours/day for 5 months) during gradient analysis.



	tR(4)	N(4)	Rs(4-3)
1st	4.06	37700	11.86
1000th	4.05	37600	11.85
2000th	4.05	37600	11.84
3000th	4.05	37600	11.84
4000th	4.06	37800	11.84
5000th	4.06	37800	11.86



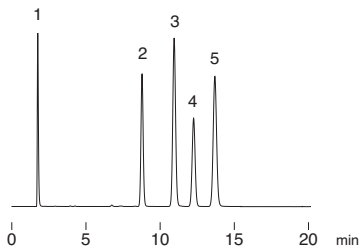
Column: YMC-Pack *Pro* C18 (3 µm, 12 nm) 50 x 4.6 mm ID
Eluent: A) water / formic acid /100/0.05)
B) acetonitrile / formic acid (100/0.05)
10-90% B (0-3 min, linear), 90% B (3-5 min), 10% B (5-9 min)
Flow rate: 1.0 mL/min
Temperature: 37 °C
Detection: UV at 254 nm

YMC *Pro*Family

Hydrophobicity and steric selectivity

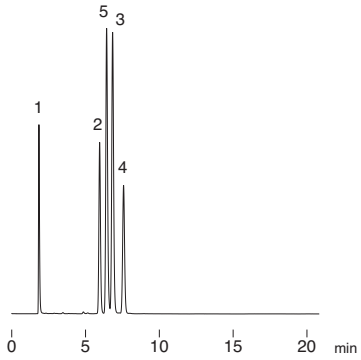
This comparison shows the different properties of the *Pro*Family members giving a good indication on their potential for method development. The compounds 1. uracil (dead volume marker) 2. n-butylbenzene 3. o-terphenyl 4. n-amylbenzene and 5. triphenylene are used to determine the hydrophobicity (2. and 4.) and the steric selectivity (3. and. 5.) of each *Pro*Family member under unbuffered chromatographic conditions.

YMC-Pack Pro C18



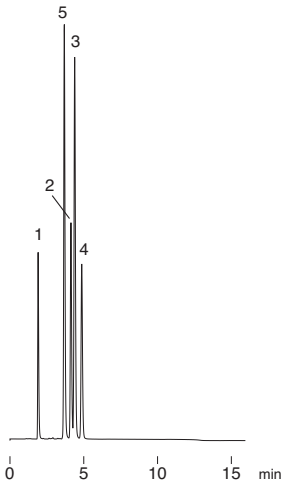
balanced hydrogen bonding, capacity and hydrophobicity

YMC-Pack Pro C8



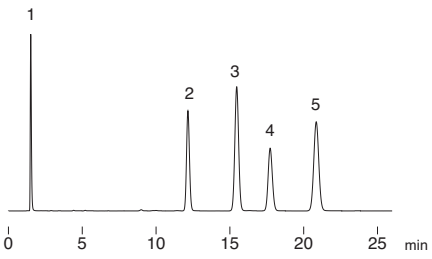
lower hydrophobicity

YMC-Pack Pro C4



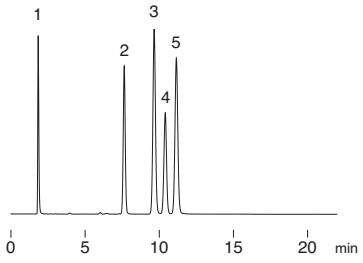
lowest hydrophobicity

YMC-Pack Pro C18 RS



highest carbon load

Hydrosphere C18



high polar recognition

Column:	150 x 4.6 mm ID
Eluent:	methanol / water (80/20)
Flow rate:	1.0 mL/min
Temperature:	37° C
Detection:	UV at 254 nm

1. Uracil
2. *n*-Butylbenzene
3. *o*-Terphenyl
4. *n*-Amylbenzene
5. Triphenylene

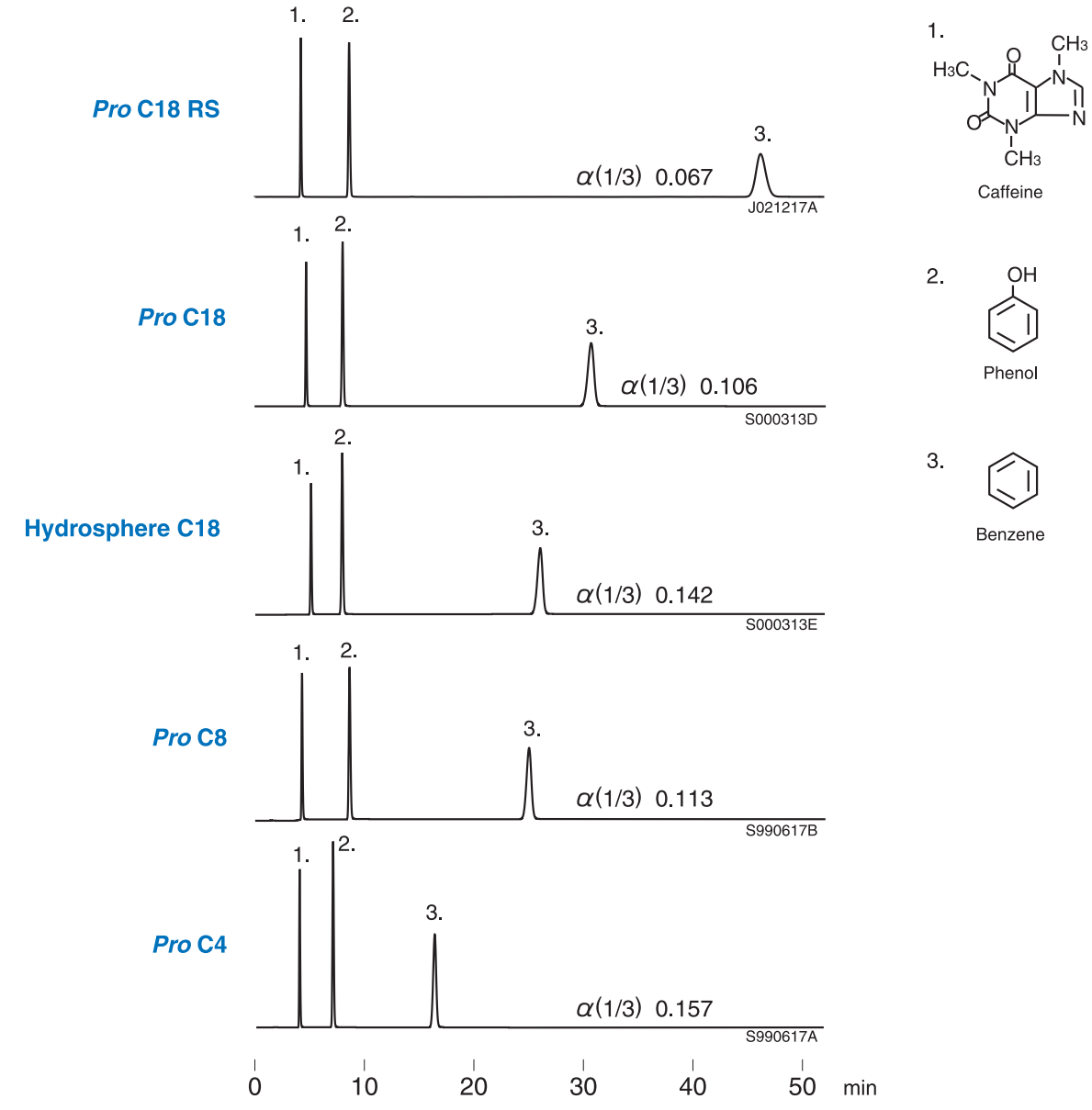
The whole *Pro*Family covers a large area of hydrophobicity and steric selectivity, as presented in this comparison, which offers the opportunity to accomplish optimisation of chromatographic methods even for complicated separation problems.

YMC *Pro*Family

Hydrogen bonding capacity

Hydrogen bonding capacity is evaluated by examining the relative retention coefficient as a (caffeine/benzene). Among the *Pro*Family series both Hydrosphere C18, with low density of C18, and YMC-Pack *Pro* C4, with short alkyl chain, have high hydrogen-bonding capacity. Benzene with non-polar groups is retained according to hydrophobicity of the packing, while retention of caffeine and phenol (hydrophilic compounds), is greatly affected by hydrogen-bonding capacity, and these packings have similar retention time, but show different selectivity.

Hydrogen bonding capacity



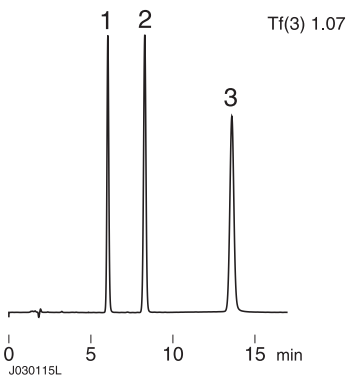
Column: 150 x 4.6 mm ID
Eluent: methanol / water (30/70)
Flow rate: 1.0 mL/min
Temperature: 37° C
Detection: UV at 254 nm

YMC *Pro*Family

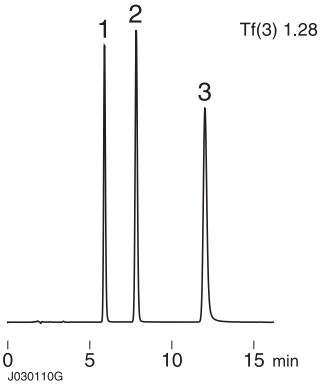
Acidic and basic compounds

Acidic compounds

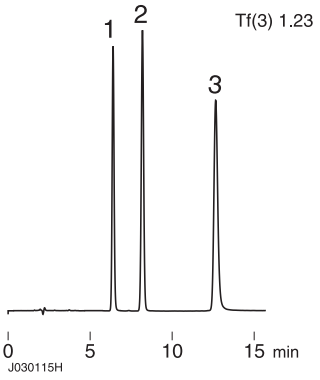
Pro C18 RS



Pro C18



Hydrosphere C18

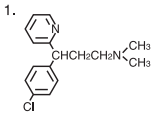


Column: 150 x 4.6 mm ID
Eluent: 20 mM CH_3COONa-CH_3COOH (pH 4.4) / acetonitrile (80/20)
Flow rate: 1.0 mL/min
Temperature: 37° C
Detection: UV at 230 nm

1. p-Hydroxyacetophenone (I.S.)
2. Sorbic acid
3. Dehydroacetic acid

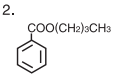
Basic compounds

1.



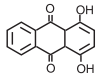
Chlorpheniramine

2.



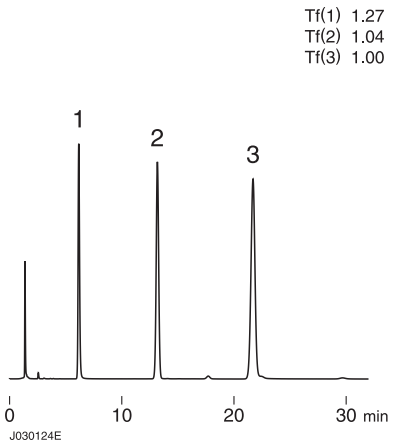
n-Butylbenzoate (I.S.)

3.

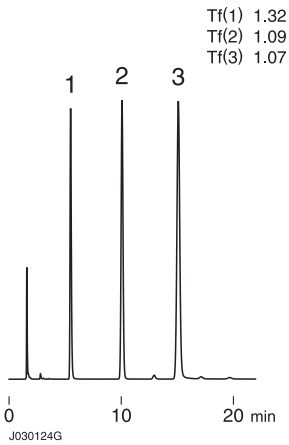


Quinizarin

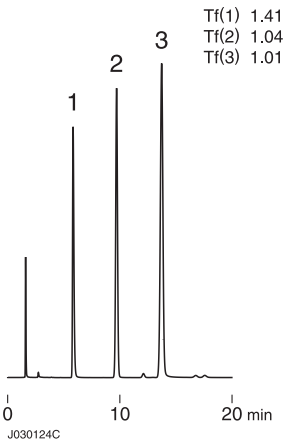
Pro C18 RS



Pro C18



Hydrosphere C18



Column: 150 x 4.6 mm ID
Eluent: 20 mM KH_2PO_4-K_2HPO_4 (pH 6.9) / methanol (30/70)
Flow rate: 1.0 mL/min
Temperature: 37° C
Detection: UV at 254 nm

YMC-Pack *Pro* C18

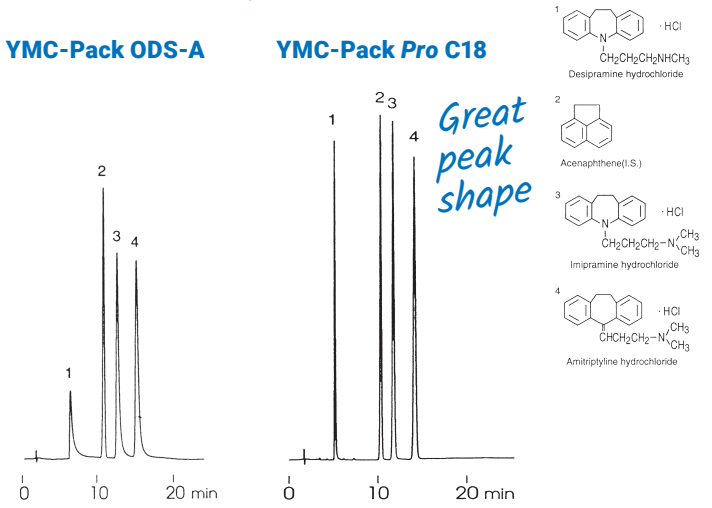
- ***specifically designed for pharmaceutical and biotechnical R&D***
- ***extreme narrow specifications***
- ***high lot-to-lot reproducibility***
- ***high column-to-column reproducibility***
- ***ideal for basic, acidic and polar compounds***

Specifications	YMC-Pack *Pro* C18
Particle size / µm	2; 3; 5
Pore size / nm	12
Surface area / m^2g^{-1}	330
Carbon content / %	16
Recommended pH range	2.0 – 8.0

Properties

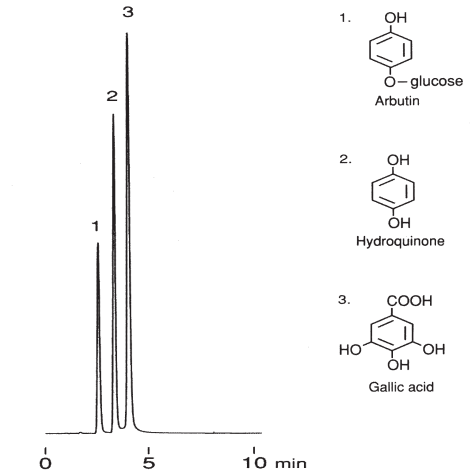
YMC-Pack *Pro* C18 is based on an ultra pure silica support, which is used for the whole *Pro*Family. Due to a proprietary endcapping process especially designed for this type of silica, YMC-Pack *Pro* C18 is perfectly suitable for the separation of acidic and basic molecules. The inertness of the silica makes it an excellent choice for the analysis of drugs or metabolites, compounds that are susceptible to polar interactions with residual silanol groups and metal impurities as demonstrated in the following comparison. The extreme basic substances are selected to prove the very good performance of YMC-Pack *Pro* C18 in regard to their separation and the peak performance that cannot be achieved with classical materials.

Basic compounds: Tricyclic antidepressants



Column:	YMC-Pack *Pro* C18 (5 µm, 12 nm) 150 x 4.6 mm ID
Eluent:	20 mM potassium phosphate buffer (pH 6.9) / methanol (25/75)
Flow rate:	1.0 mL/min
Temperature:	37°C
Detection:	UV at 254 nm

LC-MS compatible separations



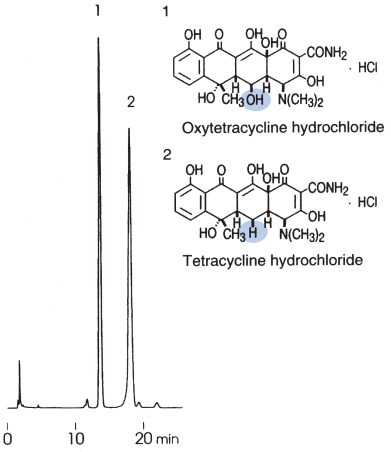
Column:	YMC-Pack *Pro* C18 (3 µm, 12 nm) 50 x 2.0 mm ID
Eluent:	10 mM CH_3COONH_4 / methanol (45/55)
Flow rate:	0.2 mL/min
Temperature:	37° C
Detection:	UV at 254 nm

YMC-Pack *Pro* C18

Applications

This small collection of applications can only give a brief insight into the multiple applications for *Pro* C18.

Tetracycline antibiotics



1

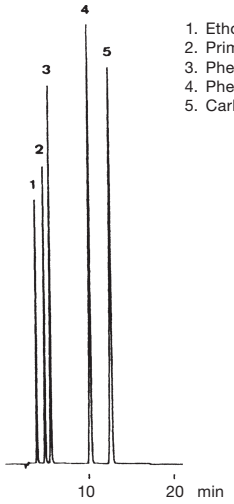
Oxytetracycline hydrochloride

2

Tetracycline hydrochloride

Column:	YMC-Pack *Pro* C18 (5 µm, 12 nm) 150 x 4.6 mm ID
Part No.:	AS12S05-1546WT
Eluent:	acetonitrile / 10 mM oxalic acid (10/90)
Flow:	1.0 mL/min
Detection:	UV at 280 nm, 0.13 AUFS
Temperature:	37 °C
Injection:	6 µL (0.2 mg/mL)

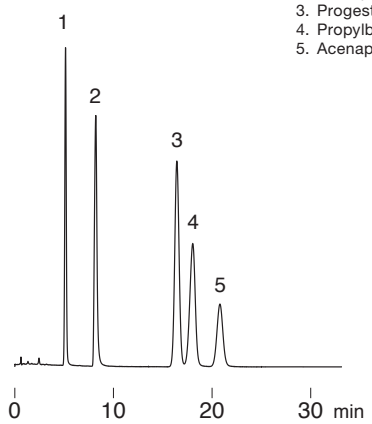
Antiepileptics



1. Ethosuximide
2. Primidone
3. Phenobarbital sodium salt
4. Phenytoin
5. Carbamazepine

Column:	YMC-Pack *Pro* C18 (5 µm, 12 nm) 150 x 4.6 mm ID
Part No.:	AS12S05-1546WT
Eluent:	50 mM $NH_4H_2PO_4$-$(NH_4)_2HPO_4$ (pH 6.7) / methanol (50/50)
Flow:	0.7 mL/min
Detection:	UV at 215 nm, 0.32 AUFS
Temperature:	37 °C
Injection:	8 µL (0.035 p 0.7 mg/mL)

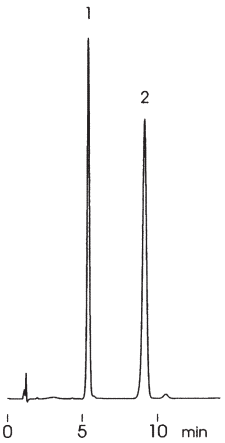
Baseline separation of compounds with different polarity

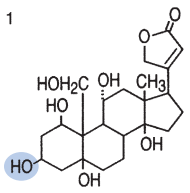


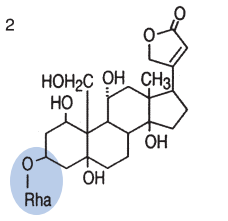
1. Toluene
2. Amitriptyline HCl
3. Progesterone
4. Propylbenzene
5. Acenaphthene

Column:	YMC-Pack *Pro* C18 (3 µm, 12 nm) 75 x 2.0 mm ID
Part No.:	AS12S03-L502WT
Eluent:	methanol / water / TFA (5/95/0.5)
Flow:	0.2 mL/min
Detection:	UV at 280 nm, 0.16 AUFS
Temperature:	30 °C
Injection:	1 µL (0.2 – 0.5 mg/mL)

Cardiac glycosides



1

Ouabagenin

2

G-Strophanthin(Ouabain)

Column:	YMC-Pack *Pro* C18 (5 µm, 12 nm) 75 x 4.6 mm ID
Part No.:	AS12S05-L546WT
Eluent:	acetonitrile / water (10/90)
Flow:	1.0 mL/min
Detection:	UV at 220 nm, 0.26 AUFS
Temperature:	37 °C
Injection:	5 µL (0.2, 0.4 mg/mL)

For more applications please refer to our "Application Data Collections" or contact us directly.

Column Care

YMC Pack *Pro* C18 is stable towards hydrolysis between pH 2.0-8.0. Remove acid and buffer salts before storage. Store the column in methanol / water = 70/30. For detailed information please refer to the "Column Care and Use Instructions" which can be downloaded from www.ymc.de/support-documentation.html.

YMC-Pack *Pro* C8

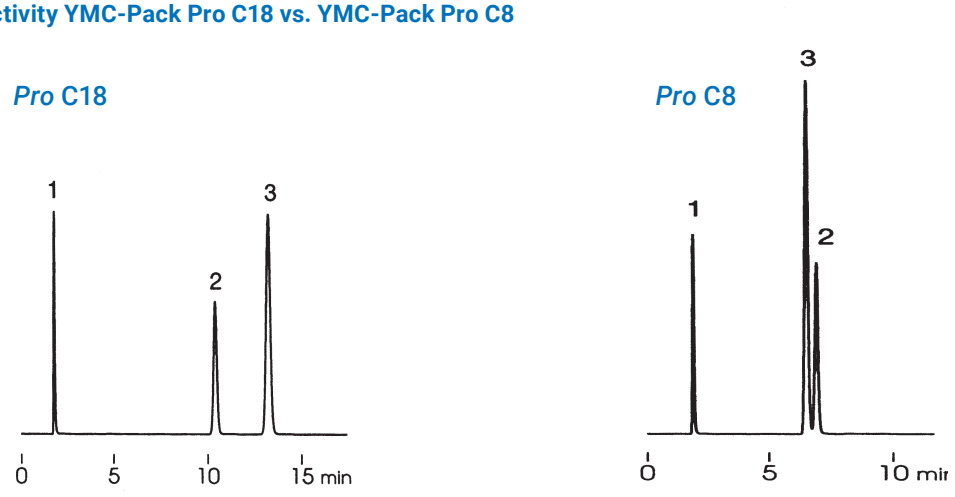
- ***extremely broad selectivity pattern***
- ***good alternative to C18 phases***
- ***suitable for all types of organic molecules, especially basic pharmaceuticals***

Specifications	YMC-Pack *Pro* C8
Particle size / µm	3; 5
Pore size / nm	12
Surface area / m^2g^{-1}	330
Carbon content / %	10
Recommended pH range	2.0 – 7.5

General

Within the *Pro*Family, the YMC-Pack *Pro* C8 provides an additional, less hydrophobic stationary phase for all types of compounds, but especially for basic and metal chelating substances. For many applications regarding the separation of peptides, nucleic acids and similar compounds with LC-MS detection, conventional C8-stationary phases require ion pair reagents and ion-suppression to obtain satisfactory separation and low detection limits. In contrast, *Pro* C8 with its ultra pure silica allows the analysis without these modifiers but still generates excellent chromatograms. In addition to the reduced hydrophobicity of YMC-Pack *Pro* C8 compared with YMC-Pack *Pro* C18, the different steric selectivity offers new possibilities in method optimisation as demonstrated in the figure below:

Steric selectivity YMC-Pack Pro C18 vs. YMC-Pack Pro C8



Column: 150 x 4.6 mm ID
Eluent: methanol / water (80/20)
Flow rate: 1.0 mL/min
Temperature: 37° C
Detection: UV at 254 nm

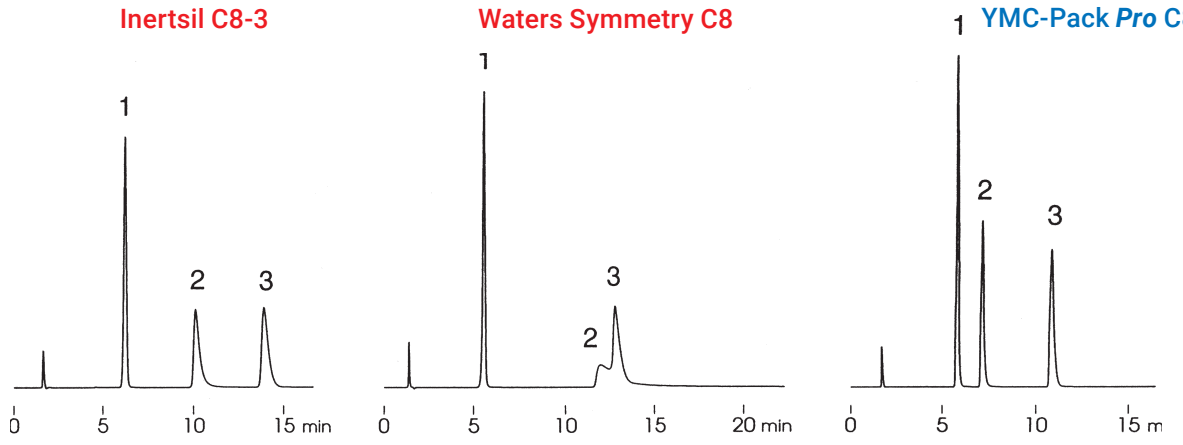
The reversed elution order of triphenylene and o-terphenyl for the shorter C8 chains of YMC-Pack *Pro* C8 illustrates the different steric recognition for steric-demanding substances.

YMC-Pack *Pro* C8

YMC-Pack *Pro* C8 is a member of the *Pro*Family and as a result gives excellent peak shapes even for basic substances, due to its low metal content and the endcapping procedure, which is identical to that used for YMC-Pack *Pro* C18. This shall be demonstrated in the comparison below where YMC-Pack *Pro* C8 outperforms competitive state of the art products.

Peak performance of YMC-Pack Pro C8 for basic substances, Histamine antagonists

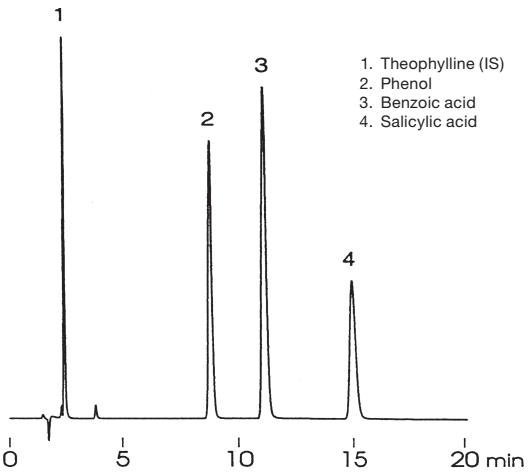
1. Butyl *p*-hydrosybenzoate (I.S.)
2. Chlorpheniramine maleate
3. Diphenhydramine hydrochloride



Column:	150 x 4.6 mm ID
Eluent:	20 mM KH_2PO_4-K_2HPO_4 (pH 6.9) / methanol (35/65)
Flow rate:	1.0 mL/min
Temperature:	37° C
Detection:	UV at 260 nm, 0.26 AUFS

No need for ion pair reagents, Disinfectants

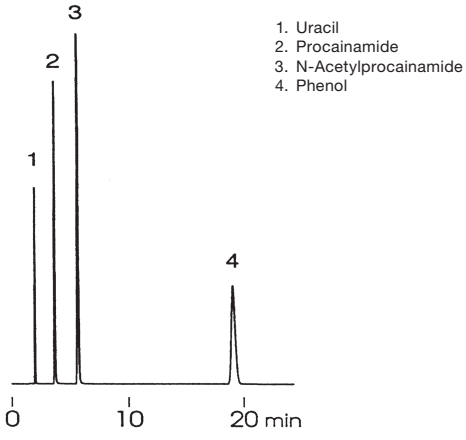
1. Theophylline (IS)
2. Phenol
3. Benzoic acid
4. Salicylic acid



Column:	YMC-Pack *Pro* C8 (5 µm, 12 nm) 150 x 4.6 mm ID
Part No.:	OS12S05-1546WT
Eluent:	acetonitrile / 20 mM H_3PO_4 (20/80)
Flow rate:	1.0 mL/min
Temperature:	37° C
Detection:	UV at 270 nm, 0.32 AUFS

Good peak performance for acidic and basic compounds

1. Uracil
2. Procainamide
3. N-Acetylprocainamide
4. Phenol



Column:	YMC-Pack *Pro* C8 (5 µm, 12 nm) 150 x 4.6 mm ID
Part No.:	OS12S05-1546WT
Eluent:	20 mM KH_2PO_4-K_2HPO_4 (pH 6.9) / acetonitrile (90/10)
Flow rate:	1.0 mL/min
Temperature:	37° C
Detection:	UV at 254 nm, 0.32 AUFS

Column Care

YMC-Pack *Pro* C8 is stable towards hydrolysis between pH 2.0-7.5. Remove acid and buffer salts before storage. Store the column in methanol / water = 70/30.
For detailed information please refer to the "Column Care and Use Instructions" which can be downloaded from www.ymc.de/support-documentation.html.

YMC-Pack *Pro* C4

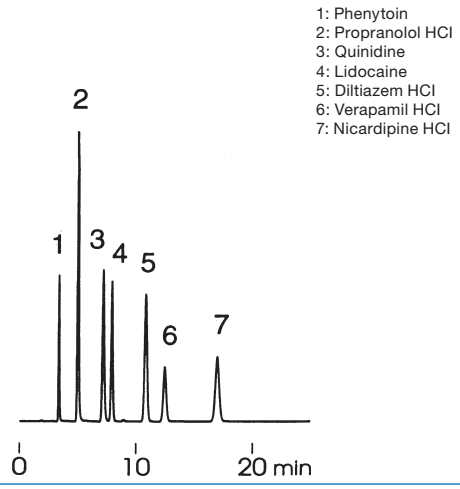
- ***proprietary endcapping in order to minimise the effect of residual silanols***
- ***for polar organic molecules, especially basic pharmaceuticals and peptides***
- ***ideal for fast chromatography***

Specifications	YMC-Pack *Pro* C4
Particle size / µm	3; 5
Pore size / nm	12
Surface area / m^2g^{-1}	330
Carbon content / %	7
Recommended pH range	2.0 – 7.5

General

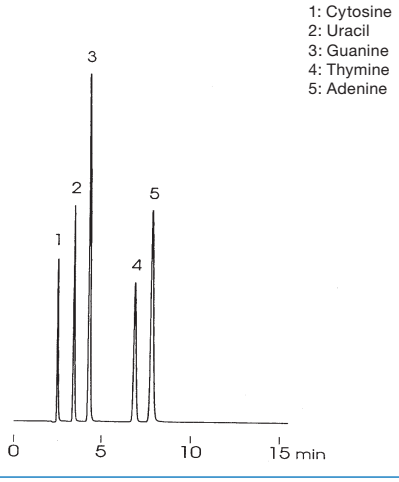
More than 80% of the reversed phase analyses are accomplished on octyl or octadecyl phases. Because of this overwhelming majority, many chromatographers neglect other selectivities that might be better suited to their separation, such as butyl phases. With *Pro* C4, YMC offers a stationary phase based on the well-known ultra pure silica of the *Pro*Family. Compared to a C18 phase with the same eluent, this less hydrophobic material gives shorter retention times for non-polar compounds while the retention time of polar analytes are virtually unaffected. This makes the *Pro* C4 an interesting alternative especially when short analysis times are required. For this reason, mixtures with a wide range of component polarity are best analysed by short chains, such as YMC-Pack *Pro* C4. Within the *Pro*Family, YMC-Pack *Pro* C4 is the selectivity of choice to reduce time of analysis in combination with the given advantages of the *Pro*Family, namely the high purity silica support and the low metal content, which result in excellent peak performance as below.

Efficient separation of pharmaceutical drugs, Antiarrhythmic drugs



Column: YMC-Pack *Pro* C4 (5 µm, 12 nm) 150 x 4.6 mm ID
Part No.: BS12S05-1546WT
Eluent: 20 mM KH_2PO_4-K_2HPO_4 (pH 6.9) / methanol (40/60)
Flow rate: 1.0 mL/min
Temperature: 37° C
Detection: UV at 220 nm

Fast separation of nucleic acid bases, Nucleic acid bases

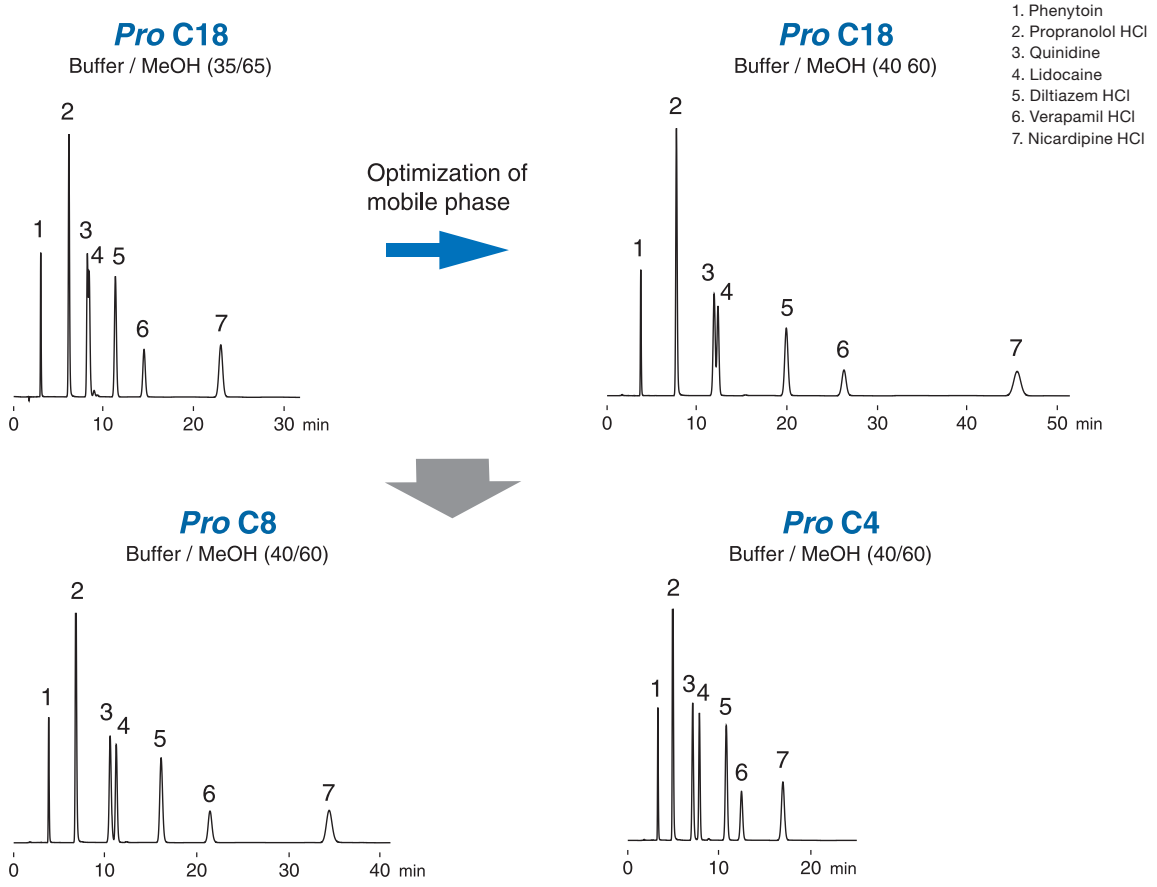


Column: YMC-Pack *Pro* C4 (5 µm, 12 nm) 150 x 4.6 mm ID
Part No.: BS12S05-1546WT
Eluent: 20 mM KH_2PO_4
Flow rate: 1.0 mL/min
Temperature: 37° C
Detection: UV at 254 nm

YMC-Pack *Pro* C4

The comparison shown below demonstrates that YMC-Pack *Pro* C4 is the column of choice when fast HPLC is required. There is almost no difference in retention times for the first three compounds whilst Nicardipine HCl elutes faster on YMC-Pack *Pro* C4 due to its lower polarity.

Optimisation of separation using Pro C8 and Pro C4



Column: 150 x 4.6 mm ID
Eluent: 20 mM KH_2PO_4 -K_2HPO_4 (pH 6.9) / methanol
Flow rate: 1.0 mL/min
Temperature: 37° C
Detection: UV at 220 nm

For more applications please refer to our "Application Data Collections" or contact us directly.

Column Care

YMC-Pack Pro C4 is stable towards hydrolysis between pH 2.0-7.5. Remove acid and buffer salts before storage. Store the column in methanol / water = 70/30. Clogged inlet frits often can be cleaned by changing the flow direction or replacement. For detailed information please refer to the "Column Care and Use Instructions" which can be downloaded from www.ymc.de/support-documentation.html.

YMC-Pack *Pro* C18 RS

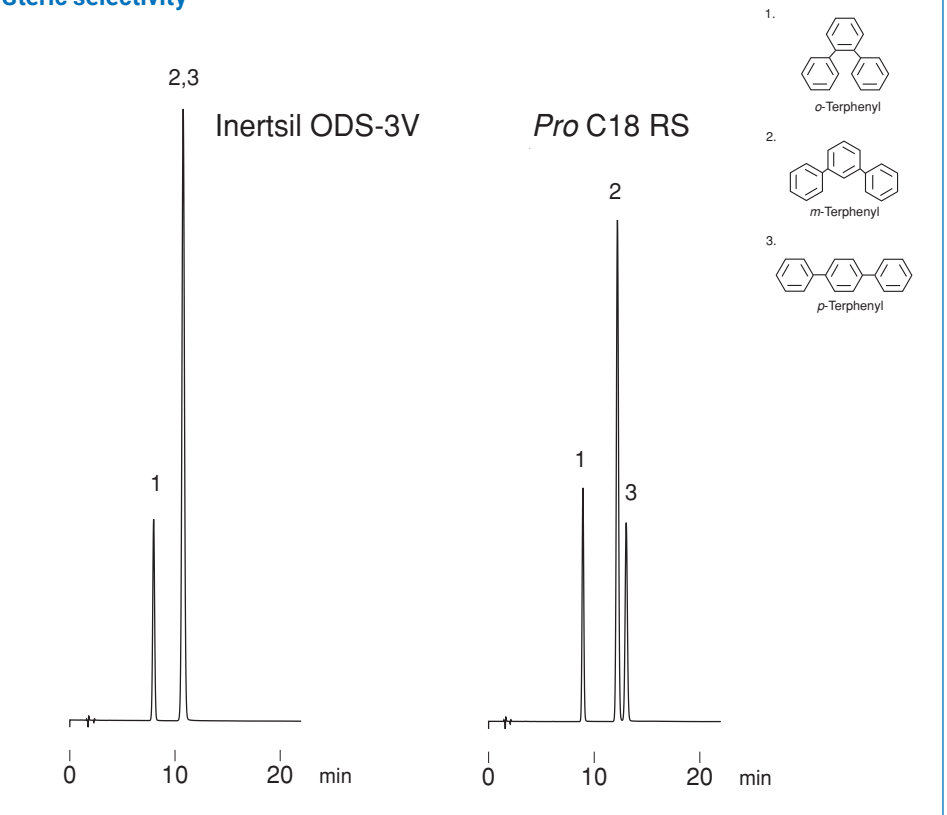
- ***strongly hydrophobic due to carbon content of 22%***
- ***exhibits extraordinary steric selectivity***
- ***extended pH and temperature stability***
- ***for the separation of hydrophobic, acidic and basic molecules***

Specifications	YMC-Pack *Pro* C18 RS
Particle size / µm	3; 5
Pore size / nm	8
Surface area / m^2g^{-1}	510
Carbon content / %	22
Recommended pH range	1.0 – 10.0*

General

The relatively high carbon load of YMC-Pack *Pro* C18 RS with 22% amplifies the selectivity's ability to discriminate between closely related compounds such as positional or steric isomers. A good system to test this steric selectivity is a mixture of o-, m- and p-terphenyl separated under methanol/water conditions. These three compounds differ only in their three-dimensional structure and not in their hydrophobicity or polarity. YMC-Pack *Pro* C18 RS recognizes even slight steric differences as shown in the chromatogram on the right, whilst a more conventional carbon load (15%) C18 chemistry does not.

Steric selectivity



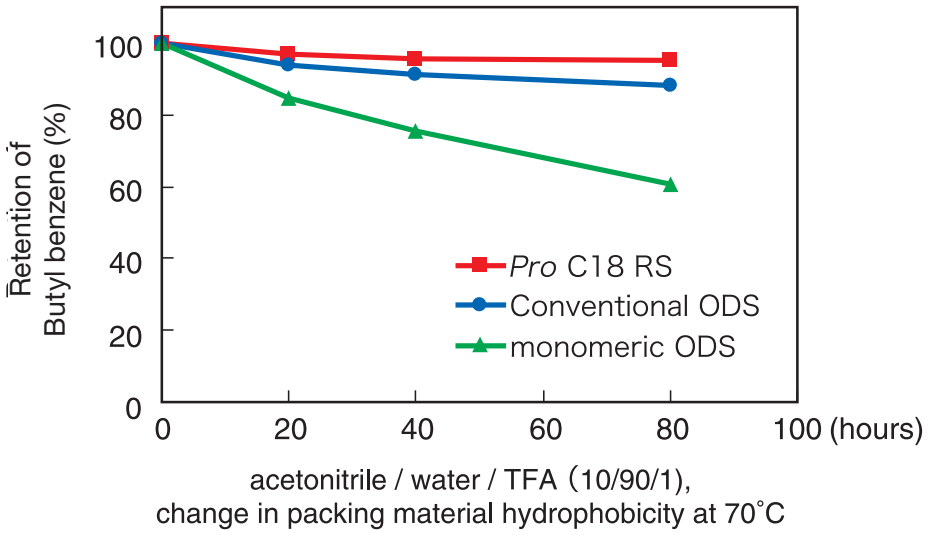
Column: 150 x 4.6 mm ID
Eluent: methanol / water (85/15)
Flow rate: 1.0 mL/min
Temperature: 37° C
Detection: UV at 254 nm

YMC-Pack *Pro* C18 RS

Stability under acidic conditions

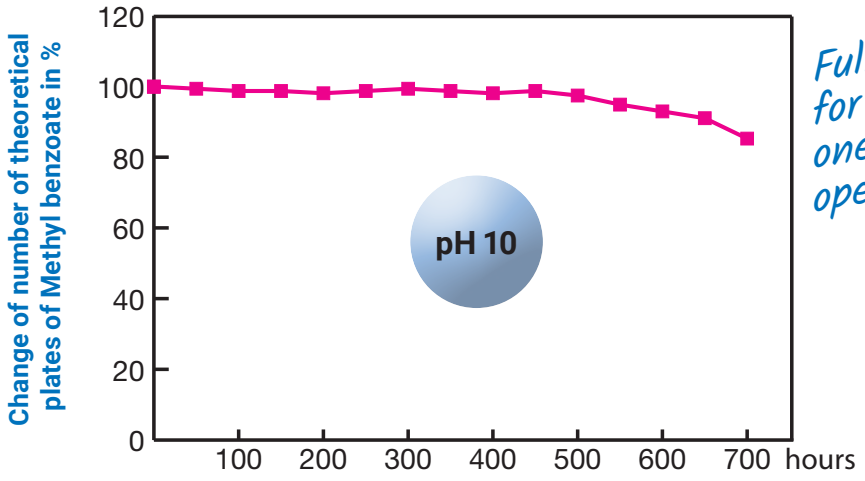
pH 1

The hydrophobicity of *Pro* C18 RS is hardly changed under the harsh condition (pH: 1, temp.: 70 °C).



Note: When assessing pH stability data, please take care to certify that complete chromatographic conditions are presented.

Stability under basic conditions



Full stability for 3 month one shift operation!

For pH 10, a borate buffer system (20 mM H_3BO_3-NaOH (pH 9.8) / methanol 50/50 at 30 °C) was selected to be continuously pumped through the column, while checking the number of theoretical plates for methyl benzoate every 50 hours.

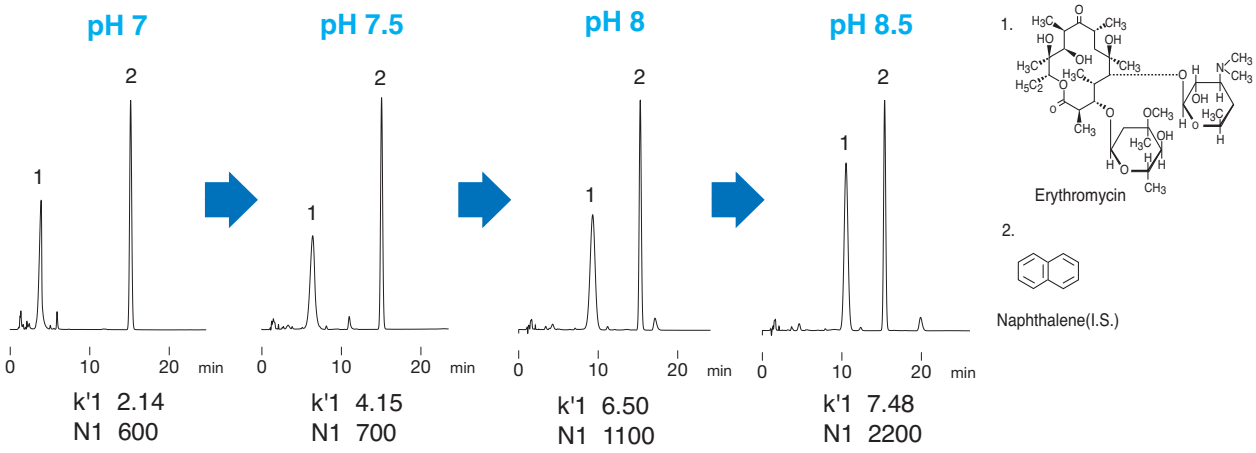
Basic eluents may significantly affect silicas and traditional bonding chemistries. Therefore, stability data should be considered only after verifying that the buffer system used maintains the selected pH during preparation and use. Furthermore, it must be verified that the eluent is not recycled, since the "active" basic sites may equilibrate to a saturation level with time, resulting in no further interactions taking place. Consequently, only continuous flow of "fresh" and thoroughly buffered eluent will provide accurate and meaningful performance data.

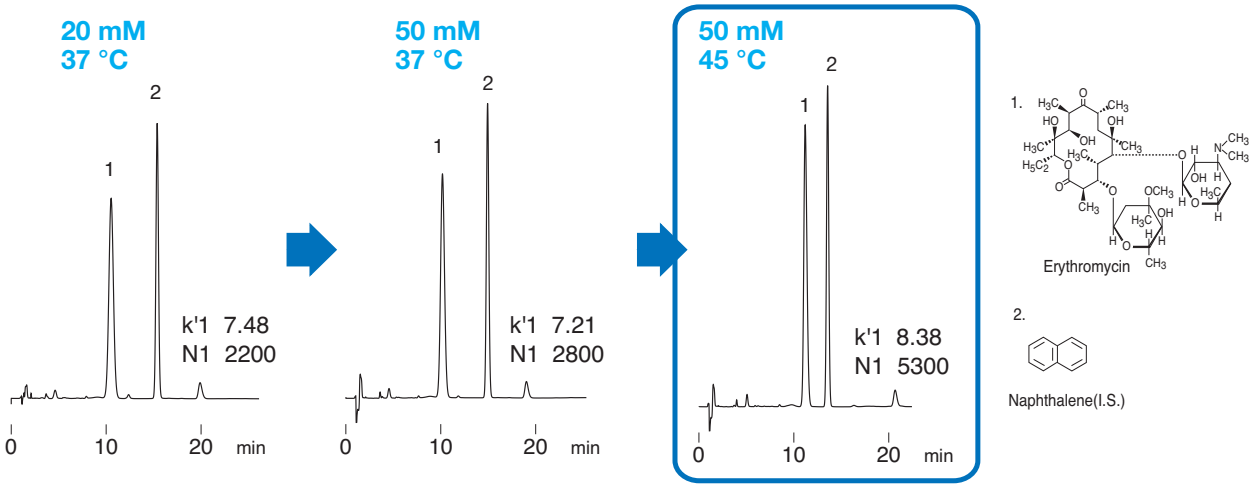
YMC-Pack *Pro* C18 RS

YMC-Pack *Pro* C18 RS:

Ideal for the separation of steric demanding compounds and/or for use under broader pH conditions!

Method optimization





Column: YMC-Pack *Pro* C18 RS (5 µm, 8 nm) 150 x 4.6 mm ID
Part No.: RS08S05-1546WT
Eluent: potassium phosphate buffer (pH 8.5) / acetronitrile (50/50)
Flow rate: 1.0 mL/min
Temperature: 37° C
Detection: UV at 210 nm

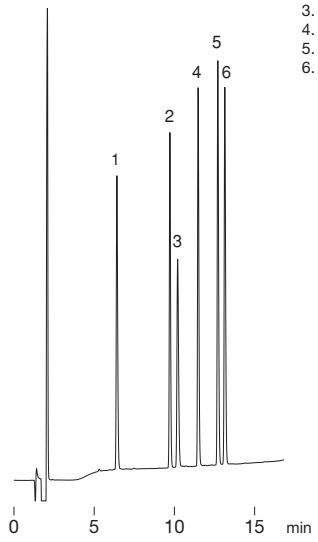
YMC-Pack *Pro* C18 RS

Applications

The specific properties of YMC-Pack *Pro* C18 RS make it an excellent choice for the separation of non-polar structurally related analytes. The extended resistance towards acidic and basic conditions not only widens the possibilities in method development but also provides further selectivities for demanding separations such as LC-MS or combinatorial chemistry of: **positional isomers, large hydrophobic molecules, basic and acidic compounds, peptides.**

Peptides: LC-MS conditions

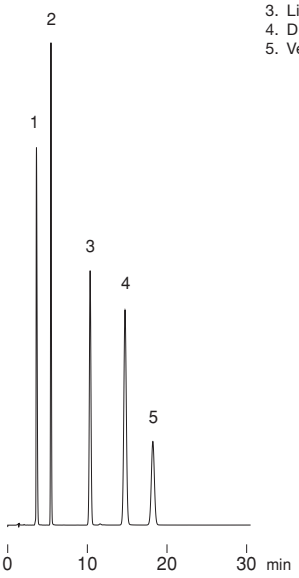
1. [Arg^8]-Vasopressin
2. Oxytocin
3. Bradykinin
4. Angiotensin II
5. Leu-Enkephalin
6. Angiotensin I



Column:	YMC-Pack *Pro* C18 RS (5 µm, 8 nm) 150 x 4.6 mm ID
Part No.:	RS08S05-1546WT
Eluent:	A: water / TFA (100/0.1) B: acetonitrile / TFA (100/0.1)
Gradient:	15-35% B (0-15 min)
Flow:	1.0 mL/min
Detection:	UV, 220 nm, 0.32 AUFS
Temperature:	37 °C
Injection:	20 µL (0.05 mg/mL)

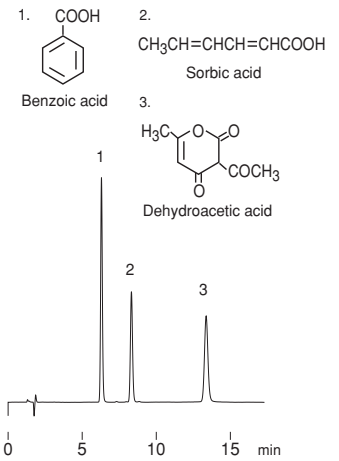
Drugs: LC-MS conditions

1. Flurbiprofen
2. Methyl benzoate
3. Lidocaine
4. Diltiazem HCl
5. Verapamil HCl



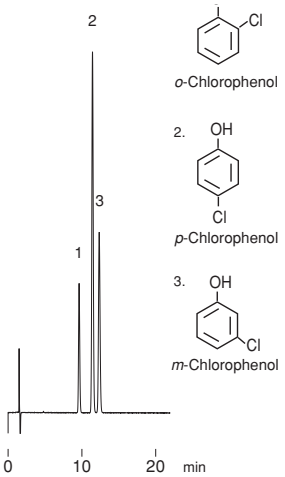
Column:	YMC-Pack *Pro* C18 RS (5 µm, 8 nm) 150 x 4.6 mm ID
Part No:	RS08S05-1546WT
Eluent:	20 mM CH_3COONH_4-NH_3 (pH 8.9) / methanol (35/65)
Flow:	1.0 mL/min
Detection:	UV, 220 nm, 0.64 AUFS
Temperature:	30 °C
Injection:	10 µL (0.1 mg/mL, 0.036 µL/mL)

Food preservatives



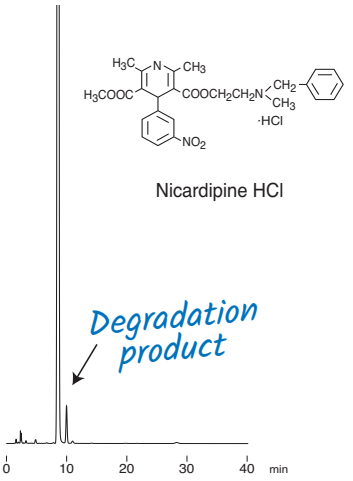
Column:	YMC-Pack *Pro* C18 RS (5 µm, 8 nm) 150 x 4.6 mm ID
Part No.:	RS08S05-1546WT
Eluent:	20 mM CH_3COONa - CH_3COOH (pH 4.3) / acetonitrile (80/20)
Flow:	1.0 mL/min
Detection:	UV at 230 nm, 0.26 AUFS
Temperature:	37 °C
Injection:	10 µL (0.02 mg/mL)

Chlorophenol isomers



Column:	YMC-Pack *Pro* C18 RS (5 µm, 8 nm) 150 x 4.6 mm ID
Part No.:	RS08S05-1546WT
Eluent:	acetonitrile / water / acetic acid (30/70/1)
Flow:	1.0 mL/min
Detection:	UV at 230 nm, 0.32 AUFS
Temperature:	37 °C
Injection:	10 µL (0.1 - 0.2 mg/mL)

Nicardipine hydrochloride



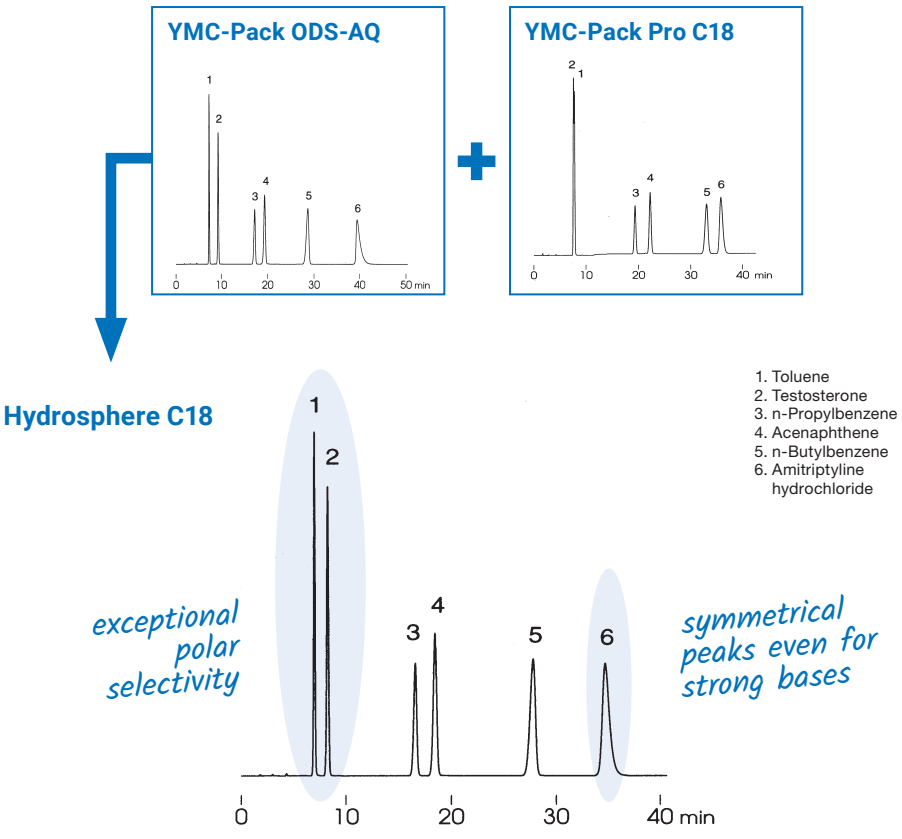
Column:	YMC-Pack *Pro* C18 RS (5 µm, 8 nm) 150 x 4.6 mm ID
Part No.:	RS08S05-1546WT
Eluent:	20 mM KH_2PO_4-K_2HPO_4 (pH 6.9) / methanol (25/75)
Flow:	1.0 mL/min
Detection:	UV at 254 nm, 0.32 AUFS
Temperature:	37 °C
Injection:	10 µL

For more applications please refer to our "Application Data Collections" or contact us directly.

Hydrosphere C18

- ***stable under the use of 100% aqueous eluent***
- ***"hydrophilic" C18 surface for enhanced polar recognition***
- ***no need for ion pair reagents***
- ***based on highly inert, ultrapure, pH neutral silica***
- ***specifically designed for pharmaceutical and biotechnology R&D***

Specifications	Hydrosphere C18
Particle size / µm	2; 3; 5
Pore size / nm	12
Surface area / m^2g^{-1}	330
Carbon content / %	12
Recommended pH range	2.0 – 8.0



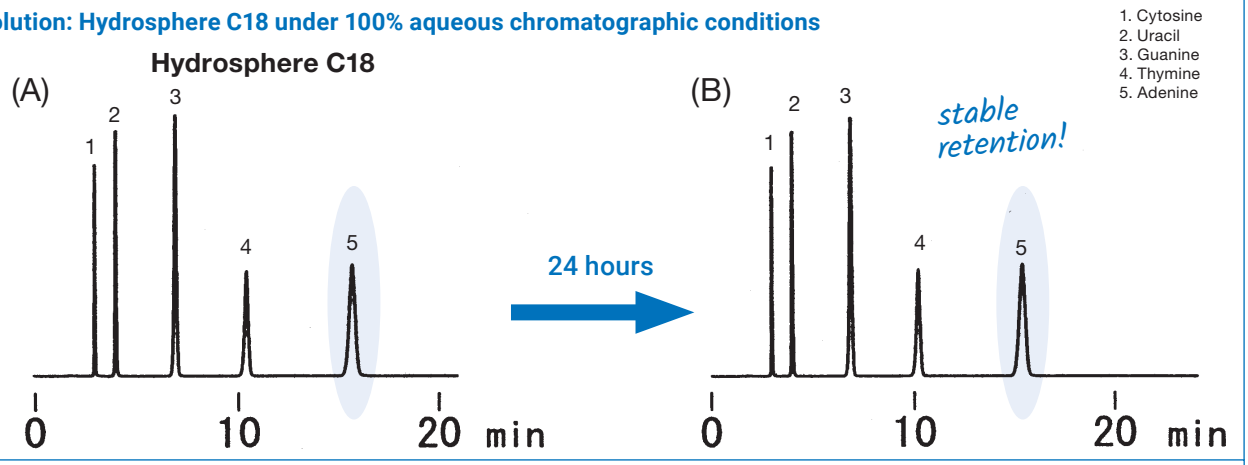
Column: Hydrosphere C18 (5 µm, 12 nm) 150 x 4.6 mm ID
Part No.: HS12S05-1546WT
Eluent: 20 mM KH_2PO_4-K_2HPO_4 (pH 6.9) / methanol (35/65)
Flow rate: 1.0 mL/min
Temperature: 37 °C
Detection: UV at 254 nm

General

The separation of polar compounds in many cases requires highly aqueous mobile phase conditions to achieve sufficient retention on the stationary phase. Conventional reversed phase selectivities do not give reproducible results under these conditions due mainly to the collapse of the C18 chains, Hydrosphere C18 has been developed, on the ultra pure silica support of the *Pro*Family, as the next generation of speciality phases following the well known YMC-Pack ODS-AQ, which was developed in 1987 and is still a very interesting selectivity option for these purposes.

Hydrosphere C18

Solution: Hydrosphere C18 under 100% aqueous chromatographic conditions

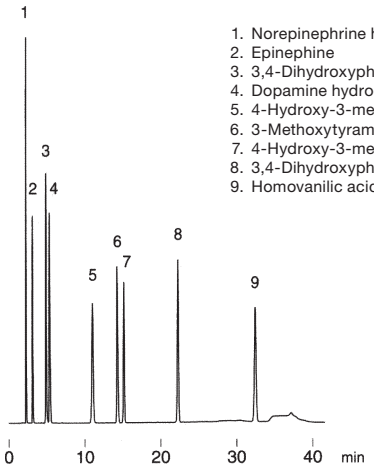


Column: Hydrosphere C18 (5 µm, 12 nm) 150 x 4.6 mm ID
Part No.: HS12S05-1546WT
Eluent: 20 mM KH_2PO_4-K_2HPO_2 (pH 6.9)
Flow rate: 1.0 mL/min
Temperature: 37 °C
Detection: UV at 254 nm

After use, the column was stored overnight without any washing procedure. The next day, the application was continued.

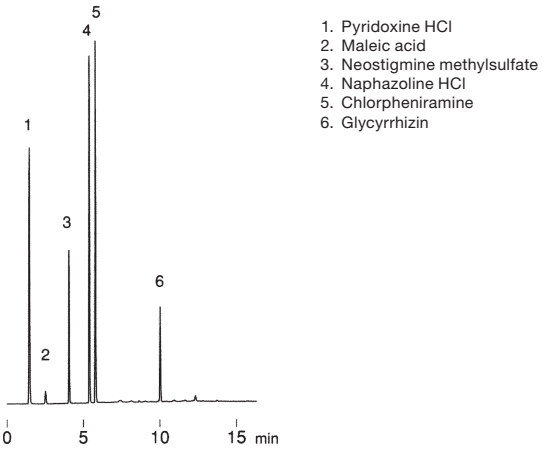
Its "hydrophilic" C18 surface gives Hydrosphere C18 the capability to show stable retention times even after 24 hours under these chromatographic conditions.

No ion pair reagent required



Catecholamines
Column: Hydrosphere C18 (5 µm, 12 nm) 150 x 4.6 mm ID
Part No.: HS12S05-1546WT
Eluent: A) 50 mM KH_2PO_4 - H_3PO_4 (pH 3.1)
B) 50 mM KH_2PO_4 - H_3PO_4 (pH 3.1) / acetonitrile (90/10)
0% B (0-5 min), 0-100% B (5-25 min, linear), 100% B (25-35 min)
Flow rate: 1.0 mL/min
Temperature: 30 °C
Detection: UV at 280 nm, 0.64 AUFS
Injection: 10 µL (0.15 - 0.25 mg/mL)

Efficient separation of complex substance mixtures



Ingredients in an eye drop
Column: Hydrosphere C18 (3 µm, 12 nm) 50 x 4.6 mm ID
Part No.: HS12S03-0546WT
Eluent: A) 20 mM KH_2PO_4 - H_3PO_4 (pH 2.5)
B) acetonitrile
0-60% B (0-10 min), 60% B (10-15 min)
Flow rate: 1.0 mL/min
Temperature: 37 °C
Detection: UV at 265 nm, 0.128 AUFS
Injection: 5 µL (0.03 - 0.3 mg/mL)

For more applications please refer to our "Application Data Collections" or contact us directly.

Column Care

Hydrosphere C18 is stable towards hydrolysis between pH 2.0-8.0 in up to 100% aqueous systems and a maximum of 50 °C. Remove acid and buffer salts before storage. Store the column in methanol / water = 70/30.
For detailed information please refer to the "Column Care and Use Instructions" which can be downloaded from www.ymc.de/support-documentation.html.

Ultra Fast LC Columns

- ***YMC Pack ProFamily chemistries, based on ultra high purity silica, provide excellent resolution for a wide range of analytes***
- ***YMC-UltraHT LC columns provide considerable time saving without resort to ultra high pressures***
- ***YMC-UltraHT LC columns achiev ultra fast separations even with conventional HPLC equipment***
- ***fully up- and down-scalable selectivity***

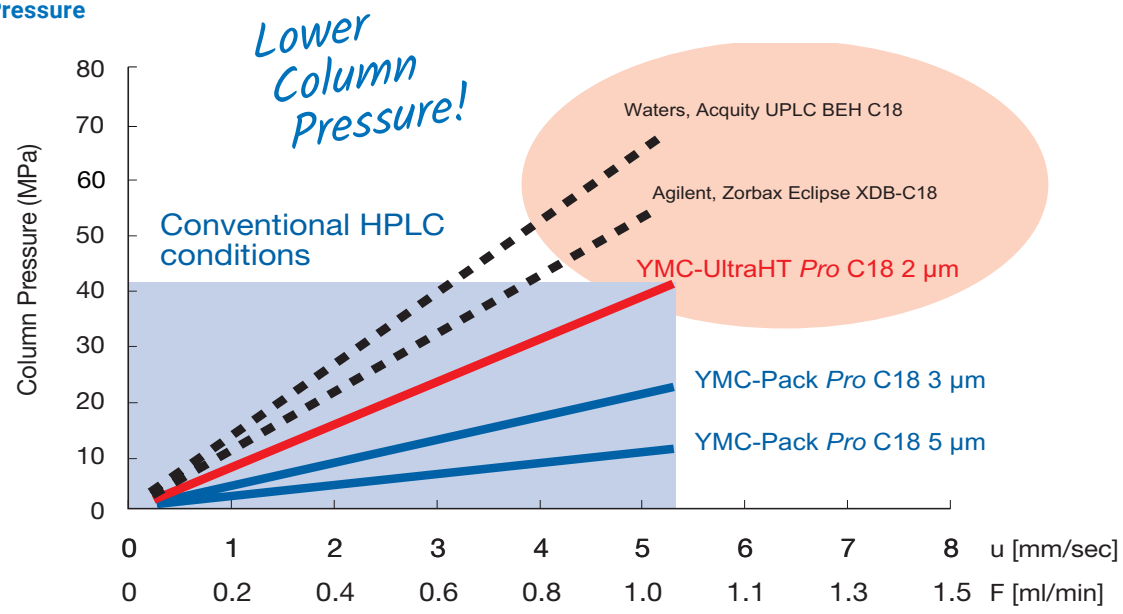
Specifications	YMC-UltraHT *Pro* C18	YMC-UltraHT Hydrosphere C18
Particle size / µm	2	2
Pore size / nm	12	12
Surface area / m^2g^{-1}	330	330
Carbon content / %	16	12
Recommended pH range	2.0 – 8.0	2.0 – 8.0

Features of Packing Material

When starting to focus on Ultra Fast LC through the use of small particles, very high back pressures have to be considered and a balance sought. The extensive experience in silica production enables YMC to provide small particles with an extremely narrow particle size distribution which results in low back pressures.

YMC's UltraHT *Pro* C18 columns offer outstanding efficiency for Fast LC without exhibiting extremely high back pressure values which can be obtained with sub-2 µm particles from other manufacturers. Therefore YMC's UltraHT *Pro* C18 may not require dedicated HPLC equipment for providing outstanding column performances.

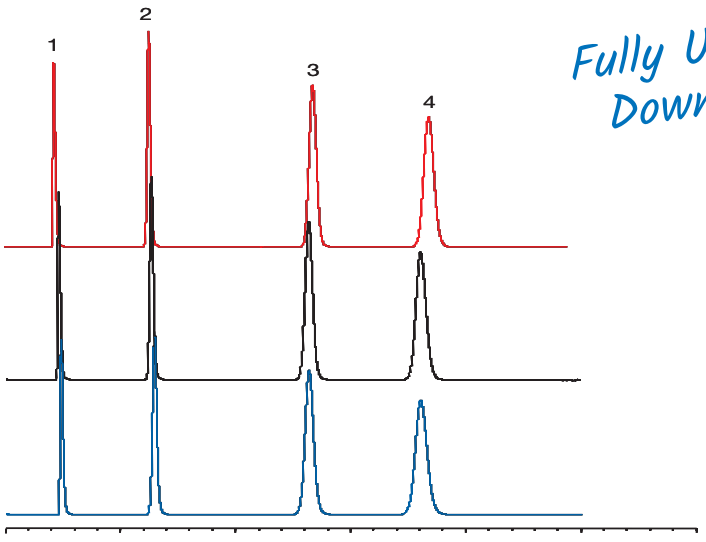
Column Pressure



Columns: 50 x 2.0 or 2.1 mm ID
Eluent: acetonitrile / water (60/40)
Temperature: 25 °C
Sample: Butyl benzoate

The introduction of YMC-UltraHT *Pro* C18 2 µm allows easy downscaling of existing methods which use YMC-Pack *Pro* C18 3 µm and 5 µm.

Reproducibility Comparison



1. Uracil
2. Methyl benzoate
3. Naphthalene
4. Butyl benzoate

Fully Up- and Downscalable!

YMC-UltraHT *Pro* C18 2 µm

YMC-Pack *Pro* C18 3 µm

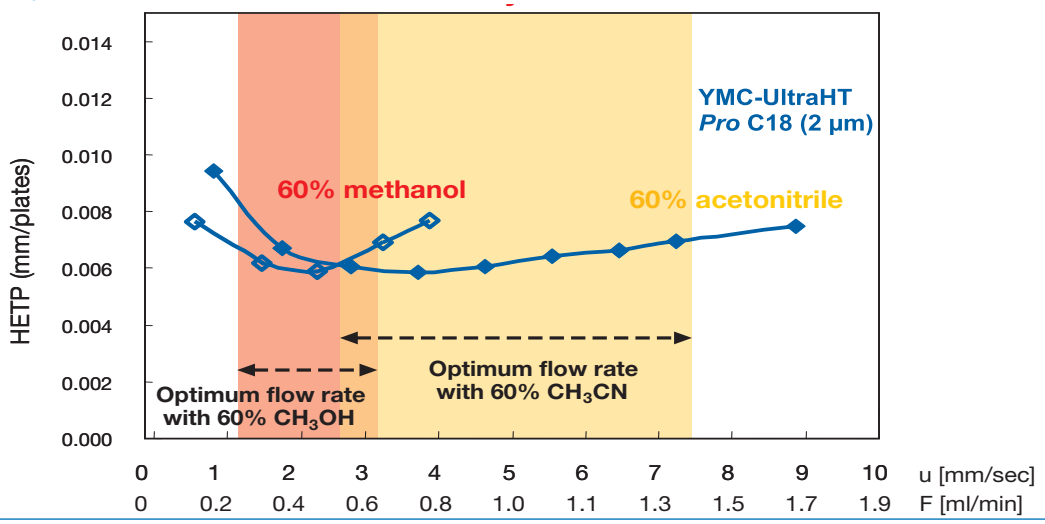
YMC-Pack *Pro* C18 5 µm

Column: 50 x 2.0 or 2.1 mm ID
Eluent: acetonitrile / water (60/40)
Temperature: 25 °C
Detection: UV at 270 nm

Features of Packing Material

The graph below shows the dependency of "Height Equivalent of the Theoretical Plate" (HETP) and the linear velocity in the presence of different organic solvents. When methanol is used, the optimum HETP is achieved within a different range of velocity compared to when acetonitrile is used due to their different viscosities. Therefore the optimum range of flow rate changes with the organic solvent. The maximum resolution is obtained by optimising flow rate, temperature, and organic solvent in order to achieve the optimum back pressure.

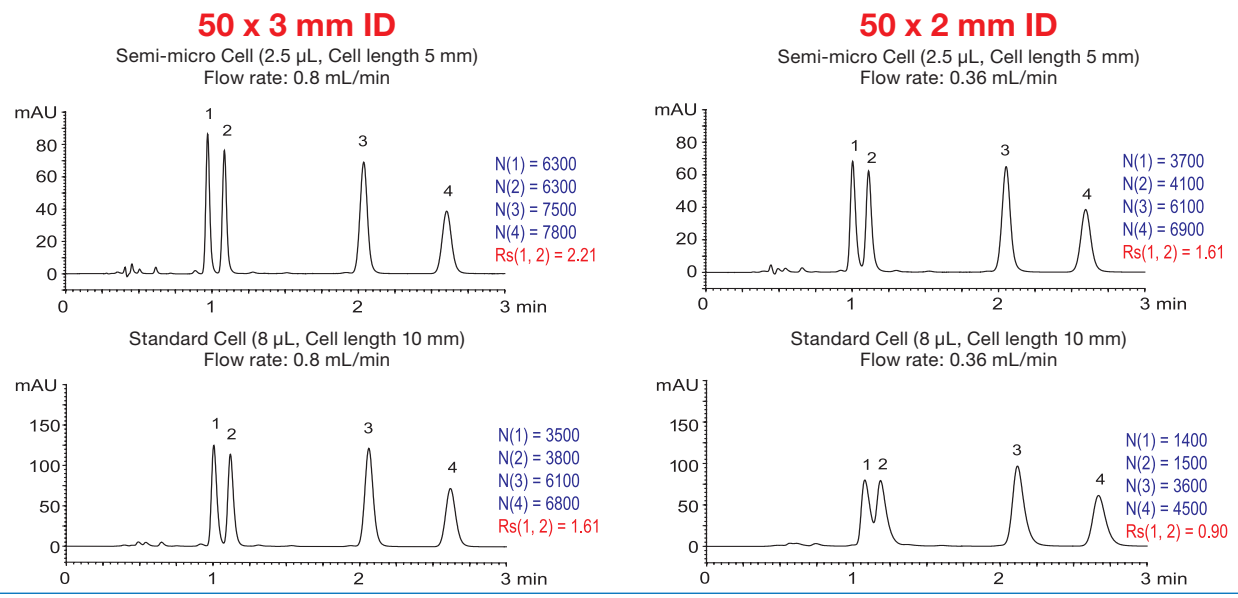
Linear velocity versus HETP



Column: YMC-UltraHT *Pro* C18 (2 µm) 50 x 2.0 mm ID
Temperature: 25 °C
Sample: Butyl benzoate

Since YMC-UltraHT columns provide substantially lower pressure drop than most competitive 2 µm or sub-2 µm media, high flow rates can be achieved without generating excessive back pressure and without the need for specialised equipment. Nevertheless, 3 mm ID columns are less affected by the diffusion volume than 2 mm ID columns. Therefore, it is necessary to reduce the system "dead" volume in order to obtain outstanding chromatographic performances with 2 mm ID columns.

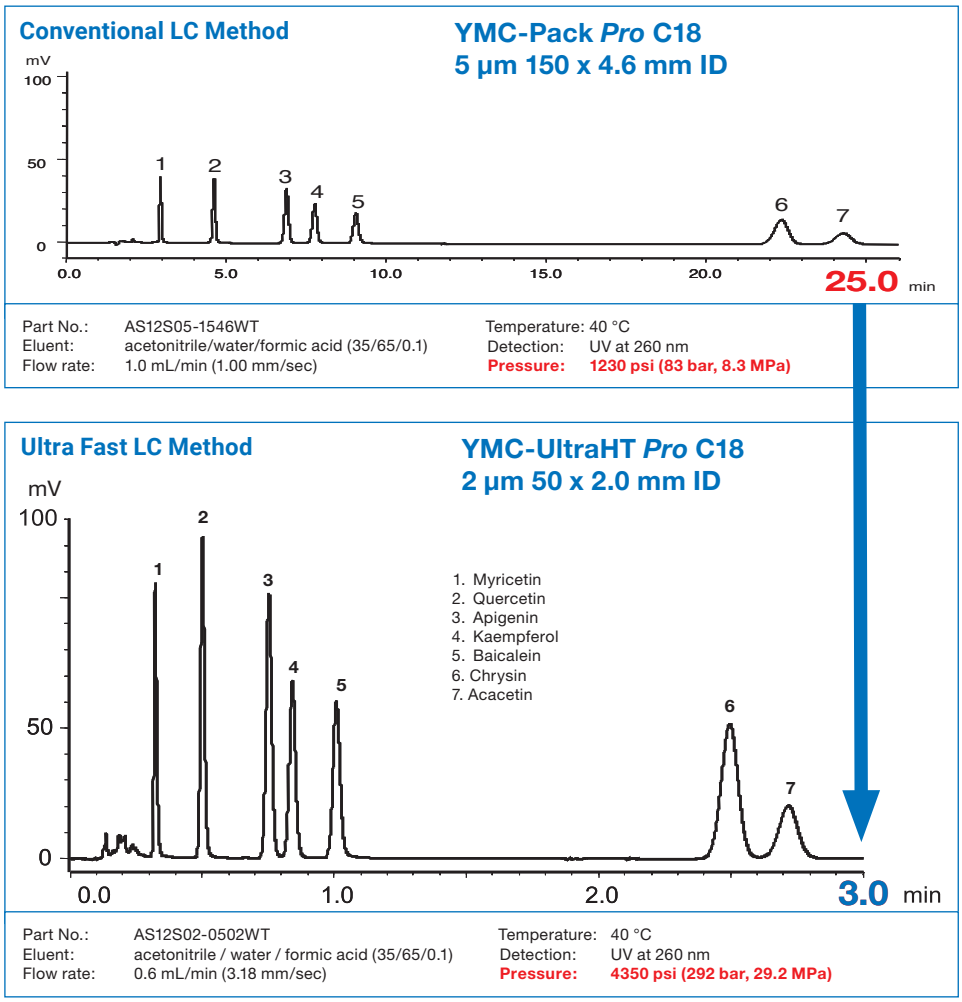
Fast LC analysis with conventional LC equipment



Column: YMC-UltraHT *Pro* C18
Eluent: acetonitrile / 20 mM KH_2PO_4 (10/90)
Temperature: 37 °C
Detection: UV at 260 nm

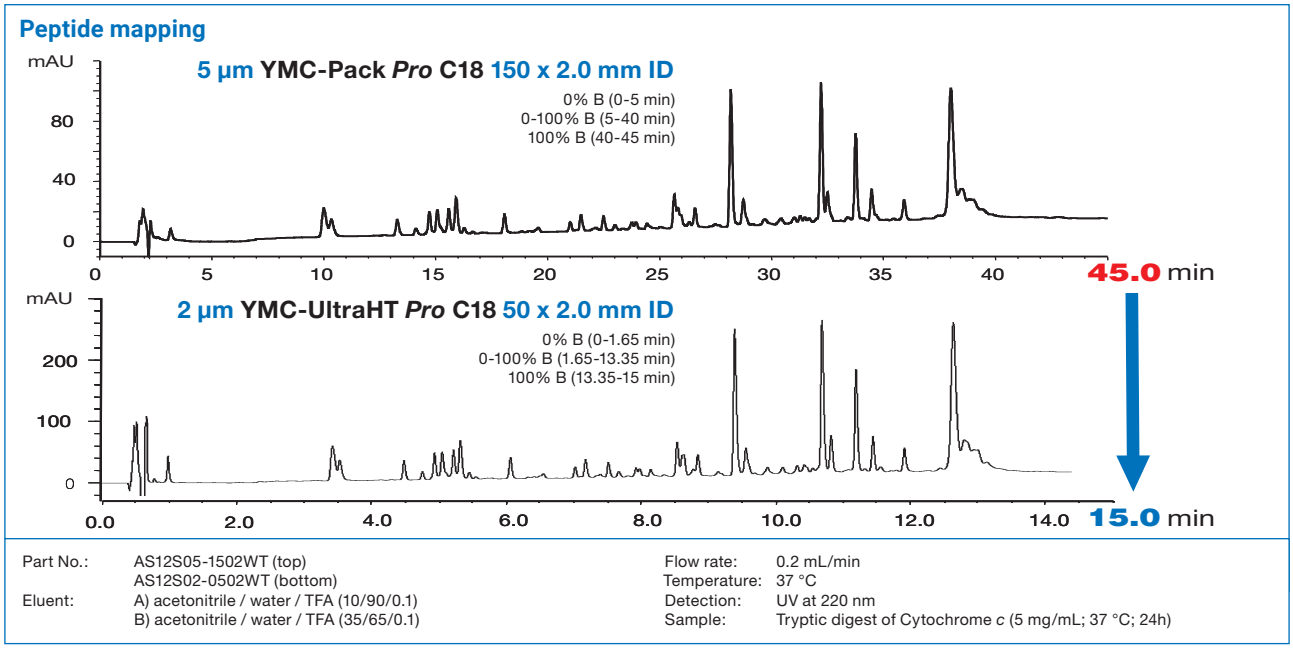
1. Uracil
2. Methyl benzoate
3. Naphthalene
4. Butyl benzoate

Downscale of Methods



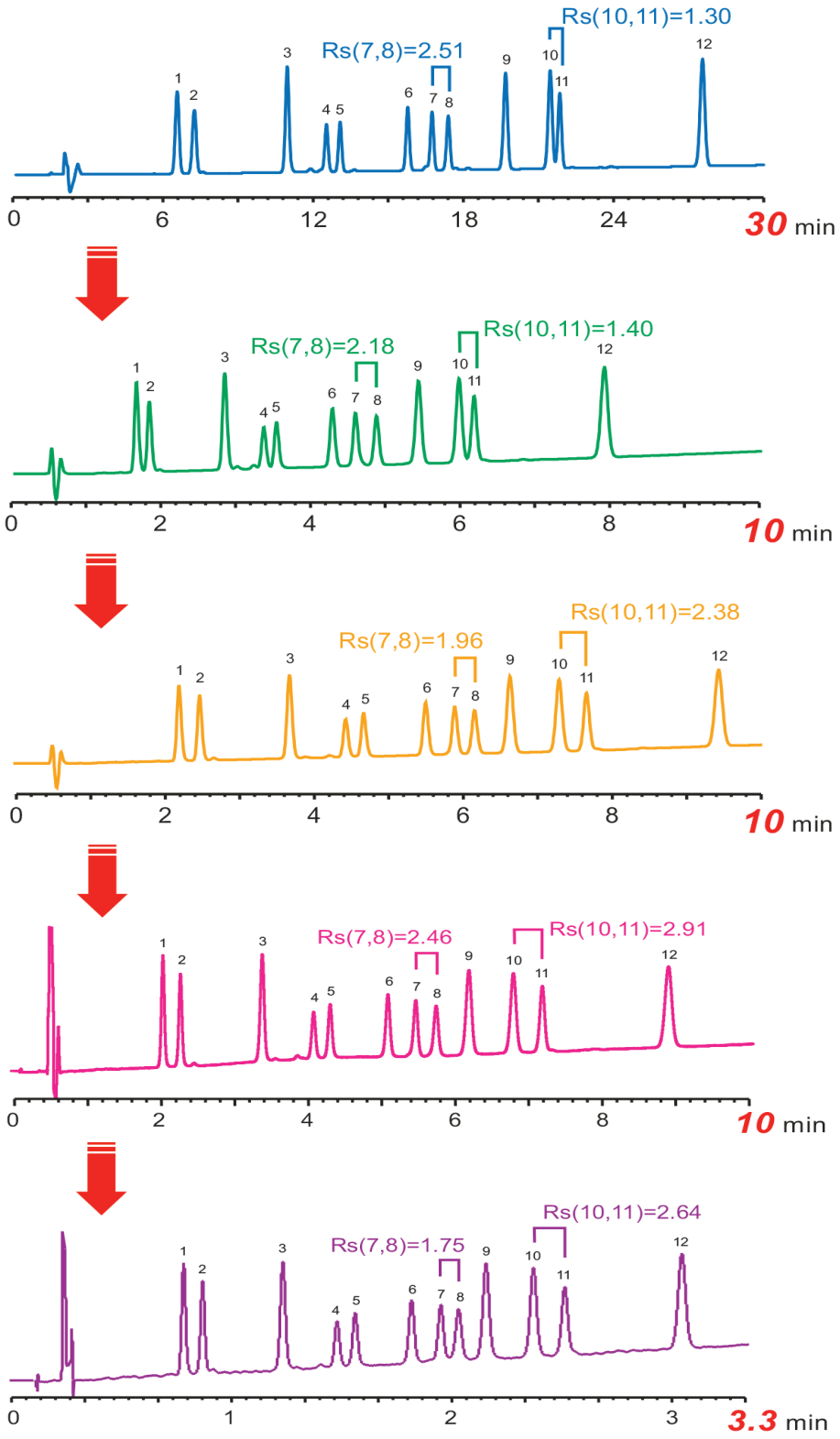
Due to the production processes used to manufacture YMC-Pack *Pro*-Family, methods can be easily downscaled with unchanged selectivity.
As the examples shown demonstrate, conventional HPLC methods can be transferred easily to Ultra Fast LC methods by choosing YMC-UltraHT columns to gain efficiency and significantly reduce analysis time.

The application of HPLC to biologically relevant separations is an existing and rapidly growing field. YMC-UltraHT *Pro* C18 provides outstanding chromatographic performance, which is more than capable of meeting the challenge of peptide mapping, where a large number of peptide fragments are generated from enzymatic digestion.



Downscale of Methods

Method transfer from conventional LC to Ultra Fast LC



150 x 4.6 mm ID, 5 µm
15-35% ACN (0-30 min)
1.0 mL/min
10 µL Inj.

50 x 4.6 mm ID, 3 µm
15-35% ACN (0-10 min)
1.5 mL/min
3 µL Inj.

50 x 4.6 mm ID, 3 µm
12.5-35% ACN (0-10 min)
1.5 mL/min
3 µL Inj.

50 x 2.0 mm ID, 2 µm
12.5-35% ACN (0-10 min)
0.3 mL/min
0.6 µL Inj.

50 x 2.0 mm ID, 2 µm
12.5-35% ACN (0-3.3 min)
0.9 mL/min
0.6 µL Inj.

Columns: Hydrosphere C18
Eluent: A: water / acetic acid (100/3)
B: acetonitrile / acetic acid (100/3)
Temperature: 35 °C
Detection: UV at 254 nm

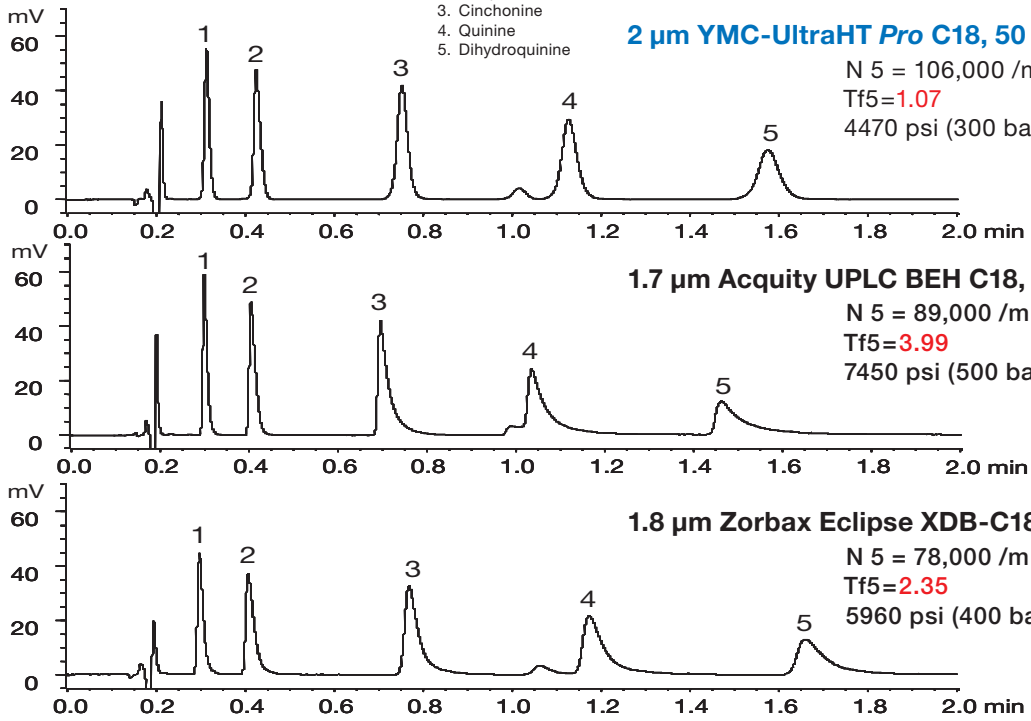
1. Daidzin
2. Glycitin
3. Genistin
4. 6'-O-Malonyldaidzin
5. 6'-O-Malonylglycitin
6. 6'-O-Acetyldaidzin
7. 6'-O-Acetylglycitin
8. 6'-O-Malonylgenistin
9. Daidzein
10. Glycitein
11. 6'-O-Acetylgenistin
12. Genistein

Downscale of Methods

Why not take the pressure out of Fast LC!

Peak performance

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



2 µm YMC-UltraHT *Pro* C18, 50 x 2.0 mm ID
N 5 = 106,000 /m
Tf5=1.07
4470 psi (300 bar, 30 MPa)

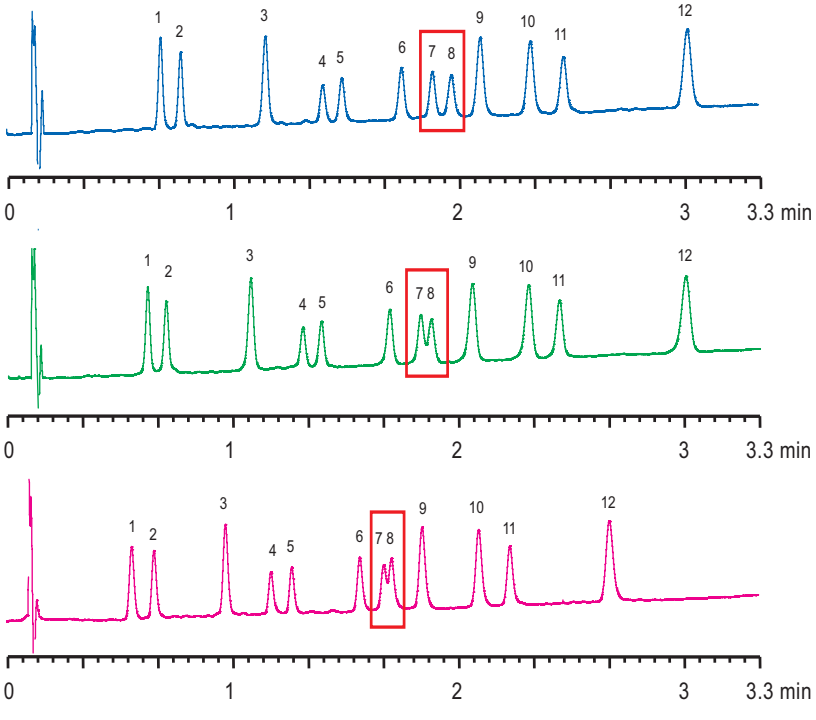
1.7 µm Acquity UPLC BEH C18, 50 x 2.1 mm ID
N 5 = 89,000 /m
Tf5=3.99
7450 psi (500 bar, 50 MPa)

1.8 µm Zorbax Eclipse XDB-C18, 50 x 2.1 mm ID
N 5 = 78,000 /m
Tf5=2.35
5960 psi (400 bar, 40 MPa)

With YMC-UltraHT *Pro* C18 you have all the efficiency you need to develop your Fast LC methods with none of the pressure or heat some would have you believe is essential!

Peak performance

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



2 µm YMC-UltraHT Hydrosphere C18, 50 x 2.0 mm ID
7449 psi (500 bar, 50 MPa)

2 µm YMC-UltraHT *Pro* C18, 50 x 2.0 mm ID
8044 psi (540 bar, 54 MPa)

1.8 µm Zorbax SB-C18, 50 x 2.1 mm ID
11,470 psi (770 bar, 77 MPa)

Ordering Information

2 µm UltraHT Fast LC columns

Phase	Column ID [mm]	Column length [mm]				Guard cartridges* with 10 mm length
		50	100	150	250	(pack of 5)
YMC-Pack *Pro* C18	2.0	AS12S02-0302WT	AS12S02-0502WT	AS12S02-1002WT	AS12S02-1502WT	AS12S02-01Q1GC
	3.0	–	AS12S02-0503WT	AS12S02-1003WT	AS12S02-1503WT	AS12S02-0103GC
Hydrosphere C18	2.1	HS12S02-0302WT	HS12S02-0502WT	HS12S02-1002WT	HS12S02-1502WT	HS12S02-01Q1GC
	3.0	–	HS12S02-0503WT	HS12S02-1003WT	HS12S02-1503WT	HS12S02-0103GC

3 µm HPLC columns (Waters type hardware, WT)

Phase	Column ID [mm]	Column length [mm]				Guard cartridges* with 10 mm length
		50	100	150	250	(pack of 5)
YMC-Pack *Pro* C18	2.0	AS12S03-0502WT	AS12S03-1002WT	AS12S03-1502WT	AS12S03-2502WT	AS12S03-01Q1GC
	2.1	AS12S03-05Q1WT	AS12S03-10Q1WT	AS12S03-15Q1WT	AS12S03-25Q1WT	AS12S03-01Q1GC
	3.0	AS12S03-0503WT	AS12S03-1003WT	AS12S03-1503WT	AS12S03-2503WT	AS12S03-0103GC
	4.0	AS12S03-0504WT	AS12S03-1004WT	AS12S03-1504WT	AS12S03-2504WT	AS12S03-0104GC
	4.6	AS12S03-0546WT	AS12S03-1046WT	AS12S03-1546WT	AS12S03-2546WT	AS12S03-0104GC
YMC-Pack *Pro* C18 RS	2.0	RS08S03-0502WT	RS08S03-1002WT	RS08S03-1502WT	RS08S03-2502WT	RS08S03-01Q1GC
	2.1	RS08S03-05Q1WT	RS08S03-10Q1WT	RS08S03-15Q1WT	RS08S03-25Q1WT	RS08S03-01Q1GC
	3.0	RS08S03-0503WT	RS08S03-1003WT	RS08S03-1503WT	RS08S03-2503WT	RS08S03-0103GC
	4.0	RS08S03-0504WT	RS08S03-1004WT	RS08S03-1504WT	RS08S03-2504WT	RS08S03-0104GC
	4.6	RS08S03-0546WT	RS08S03-1046WT	RS08S03-1546WT	RS08S03-2546WT	RS08S03-0104GC
Hydrosphere C18	2.0	HS12S03-0502WT	HS12S03-1002WT	HS12S03-1502WT	HS12S03-2502WT	HS12S03-01Q1GC
	2.1	HS12S03-05Q1WT	HS12S03-10Q1WT	HS12S03-15Q1WT	HS12S03-25Q1WT	HS12S03-01Q1GC
	3.0	HS12S03-0503WT	HS12S03w-1003WT	HS12S03-1503WT	HS12S03-2503WT	HS12S03-0103GC
	4.0	HS12S03-0504WT	HS12S03-1004WT	HS12S03-1504WT	HS12S03-2504WT	HS12S03-0104GC
	4.6	HS12S03-0546WT	HS12S03-1046WT	HS12S03-1546WT	HS12S03-2546WT	HS12S03-0104GC
YMC-Pack *Pro* C8	2.0	OS12S03-0502WT	OS12S03-1002WT	OS12S03-1502WT	OS12S03-2502WT	OS12S03-01Q1GC
	2.1	OS12S03-05Q1WT	OS12S03-10Q1WT	OS12S03-15Q1WT	OS12S03-25Q1WT	OS12S03-01Q1GC
	3.0	OS12S03-0503WT	OS12S03-1003WT	OS12S03-1503WT	OS12S03-2503WT	OS12S03-0103GC
	4.0	OS12S03-0504WT	OS12S03-1004WT	OS12S03-1504WT	OS12S03-2504WT	OS12S03-0104GC
	4.6	OS12S03-0546WT	OS12S03-1046WT	OS12S03-1546WT	OS12S03-2546WT	OS12S03-0104GC
YMC-Pack *Pro* C4	2.0	BS12S03-0502WT	BS12S03-1002WT	BS12S03-1502WT	BS12S03-2502WT	BS12S03-01Q1GC
	2.1	BS12S03-05Q1WT	BS12S03-10Q1WT	BS12S03-15Q1WT	BS12S03-25Q1WT	BS12S03-01Q1GC
	3.0	BS12S03-0503WT	BS12S03-1003WT	BS12S03-1503WT	BS12S03-2503WT	BS12S03-0103GC
	4.0	BS12S03-0504WT	BS12S03-1004WT	BS12S03-1504WT	BS12S03-2504WT	BS12S03-0104GC
	4.6	BS12S03-0546WT	BS12S03-1046WT	BS12S03-1546WT	BS12S03-2546WT	BS12S03-0104GC

3 µm HPLC *cartridge* columns (Quick type hardware, QT)

Phase	Column ID [mm]	Column length [mm]				Guard cartridges* with 10 mm length
		50	100	150	250	(pack of 5)
YMC-Pack *Pro* C18	2.1	AS12S03-05Q1QT	AS12S03-10Q1QT	AS12S03-15Q1QT	AS12S03-25Q1QT	AS12S03-01Q1GC
	3.0	AS12S03-0503QT	AS12S03-1003QT	AS12S03-1503QT	AS12S03-2503QT	AS12S03-0103GC
	4.0	AS12S03-0504QT	AS12S03-1004QT	AS12S03-1504QT	AS12S03-2504QT	AS12S03-0104GC
YMC-Pack *Pro* C18 RS	2.1	RS08S03-05Q1QT	RS08S03-10Q1QT	RS08S03-15Q1QT	RS08S03-25Q1QT	RS08S03-01Q1GC
	3.0	RS08S03-0503QT	RS08S03-1003QT	RS08S03-1503QT	RS08S03-2503QT	RS08S03-0103GC
	4.0	RS08S03-0504QT	RS08S03-1004QT	RS08S03-1504QT	RS08S03-2504QT	RS08S03-0104GC
Hydrosphere C18	2.1	HS12S03-05Q1QT	HS12S03-10Q1QT	HS12S03-15Q1QT	HS12S03-25Q1QT	HS12S03-01Q1GC
	3.0	HS12S03-0503QT	HS12S03-1003QT	HS12S03-1503QT	HS12S03-2503QT	HS12S03-0103GC
	4.0	HS12S03-0504QT	HS12S03-1004QT	HS12S03-1504QT	HS12S03-2504QT	HS12S03-0104GC
YMC-Pack *Pro* C8	2.1	OS12S03-05Q1QT	OS12S03-10Q1QT	OS12S03-15Q1QT	OS12S03-25Q1QT	OS12S03-01Q1GC
	3.0	OS12S03-0503QT	OS12S03-1003QT	OS12S03-1503QT	OS12S03-2503QT	OS12S03-0103GC
	4.0	OS12S03-0504QT	OS12S03-1004QT	OS12S03-1504QT	OS12S03-2504QT	OS12S03-0104GC
YMC-Pack *Pro* C4	2.1	BS12S03-05Q1QT	BS12S03-10Q1QT	BS12S03-15Q1QT	BS12S03-25Q1QT	BS12S03-01Q1GC
	3.0	BS12S03-0503QT	BS12S03-1003QT	BS12S03-1503QT	BS12S03-2503QT	BS12S03-0103GC
	4.0	BS12S03-0504QT	BS12S03-1004QT	BS12S03-1504QT	BS12S03-2504QT	BS12S03-0104GC

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

Ordering Information

5 µm HPLC columns (Waters type hardware, WT)

Phase	Column ID [mm]	Column length [mm]				Guard cartridges* with 10 mm length
		50	100	150	250	(pack of 5)
YMC-Pack *Pro* C18	2.0 2.1 3.0 4.0 4.6	AS12S05-0502WT AS12S05-05Q1WT AS12S05-0503WT AS12S05-0504WT AS12S05-0546WT	AS12S05-1002WT AS12S05-10Q1WT AS12S05-1003WT AS12S05-1004WT AS12S05-1046WT	AS12S05-1502WT AS12S05-15Q1WT AS12S05-1503WT AS12S05-1504WT AS12S05-1546WT	AS12S05-2502WT AS12S05-25Q1WT AS12S05-2503WT AS12S05-2504WT AS12S05-2546WT	AS12S05-01Q1GC AS12S05-01Q1GC AS12S05-0103GC AS12S05-0104GC AS12S05-0104GC
YMC-Pack *Pro* C18 RS	2.0 2.1 3.0 4.0 4.6	RS08S05-0502WT RS08S05-05Q1WT RS08S05-0503WT RS08S05-0504WT RS08S05-0546WT	RS08S05-1002WT RS08S05-10Q1WT RS08S05-1003WT RS08S05-1004WT RS08S05-1046WT	RS08S05-1502WT RS08S05-15Q1WT RS08S05-1503WT RS08S05-1504WT RS08S05-1546WT	RS08S05-2502WT RS08S05-25Q1WT RS08S05-2503WT RS08S05-2504WT RS08S05-2546WT	RS08S05-01Q1GC RS08S05-01Q1GC RS08S05-0103GC RS08S05-0104GC RS08S05-0104GC
Hydrosphere C18	2.0 2.1 3.0 4.0 4.6	HS12S05-0502WT HS12S05-05Q1WT HS12S05-0503WT HS12S05-0504WT HS12S05-0546WT	HS12S05-1002WT HS12S05-10Q1WT HS12S05-1003WT HS12S05-1004WT HS12S05-1046WT	HS12S05-1502WT HS12S05-15Q1WT HS12S05-1503WT HS12S05-1504WT HS12S05-1546WT	HS12S05-2502WT HS12S05-25Q1WT HS12S05-2503WT HS12S05-2504WT HS12S05-2546WT	HS12S05-01Q1GC HS12S05-01Q1GC HS12S05-0103GC HS12S05-0104GC HS12S05-0104GC
YMC-Pack *Pro* C8	2.0 2.1 3.0 4.0 4.6	OS12S05-0502WT OS12S05-05Q1WT OS12S05-0503WT OS12S05-0504WT OS12S05-0546WT	OS12S05-1002WT OS12S05-10Q1WT OS12S05-1003WT OS12S05-1004WT OS12S05-1046WT	OS12S05-1502WT OS12S05-15Q1WT OS12S05-1503WT OS12S05-1504WT OS12S05-1546WT	OS12S05-2502WT OS12S05-25Q1WT OS12S05-2503WT OS12S05-2504WT OS12S05-2546WT	OS12S05-01Q1GC OS12S05-01Q1GC OS12S05-0103GC OS12S05-0104GC OS12S05-0104GC
YMC-Pack *Pro* C4	2.0 2.1 3.0 4.0 4.6	BS12S05-0502WT BS12S05-05Q1WT BS12S05-0503WT BS12S05-0504WT BS12S05-0546WT	BS12S05-1002WT BS12S05-10Q1WT BS12S05-1003WT BS12S05-1004WT BS12S05-1046WT	BS12S05-1502WT BS12S05-15Q1WT BS12S05-1503WT BS12S05-1504WT BS12S05-1546WT	BS12S05-2502WT BS12S05-25Q1WT BS12S05-2503WT BS12S05-2504WT BS12S05-2546WT	BS12S05-01Q1GC BS12S05-01Q1GC BS12S05-0103GC BS12S05-0104GC BS12S05-0104GC

5 µm HPLC *cartridge* columns (Quick type hardware, QT)

Phase	Column ID [mm]	Column length [mm]				Guard cartridges* with 10 mm length
		50	100	150	250	(pack of 5)
YMC-Pack *Pro* C18	2.1 3.0 4.0	AS12S05-05Q1QT AS12S05-0503QT AS12S05-0504QT	AS12S05-10Q1QT AS12S05-1003QT AS12S05-1004QT	AS12S05-15Q1QT AS12S05-1503QT AS12S05-1504QT	AS12S05-25Q1QT AS12S05-2503QT AS12S05-2504QT	AS12S05-01Q1GC AS12S05-0103GC AS12S05-0104GC
YMC-Pack *Pro* C18 RS	2.1 3.0 4.0	RS08S05-05Q1QT RS08S05-0503QT RS08S05-0504QT	RS08S05-10Q1QT RS08S05-1003QT RS08S05-1004QT	RS08S05-15Q1QT RS08S05-1503QT RS08S05-1504QT	RS08S05-25Q1QT RS08S05-2503QT RS08S05-2504QT	RS08S05-01Q1GC RS08S05-0103GC RS08S05-0104GC
Hydrosphere C18	2.1 3.0 4.0	HS12S05-05Q1QT HS12S05-0503QT HS12S05-0504QT	HS12S05-10Q1QT HS12S05-1003QT HS12S05-1004QT	HS12S05-15Q1QT HS12S05-1503QT HS12S05-1504QT	HS12S05-25Q1QT HS12S05-2503QT HS12S05-2504QT	HS12S05-01Q1GC HS12S05-0103GC HS12S05-0104GC
YMC-Pack *Pro* C8	2.1 3.0 4.0	OS12S05-05Q1QT OS12S05-0503QT OS12S05-0504QT	OS12S05-10Q1QT OS12S05-1003QT OS12S05-1004QT	OS12S05-15Q1QT OS12S05-1503QT OS12S05-1504QT	OS12S05-25Q1QT OS12S05-2503QT OS12S05-2504QT	OS12S05-01Q1GC OS12S05-0103GC OS12S05-0104GC
YMC-Pack *Pro* C4	2.1 3.0 4.0	BS12S05-05Q1QT BS12S05-0503QT BS12S05-0504QT	BS12S05-10Q1QT BS12S05-1003QT BS12S05-1004QT	BS12S05-15Q1QT BS12S05-1503QT BS12S05-1504QT	BS12S05-25Q1QT BS12S05-2503QT BS12S05-2504QT	BS12S05-01Q1GC BS12S05-0103GC BS12S05-0104GC

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

For other dimensions, please contact your YMC representative or YMC directly by phone (+49 (0)2064 427-0), by mail (info@ymc.de) or use our online chat on our homepage (www.ymc.de).