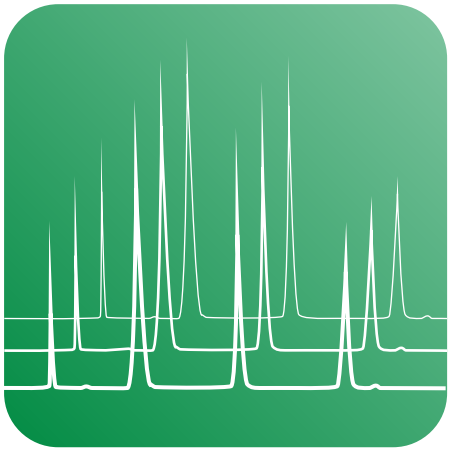
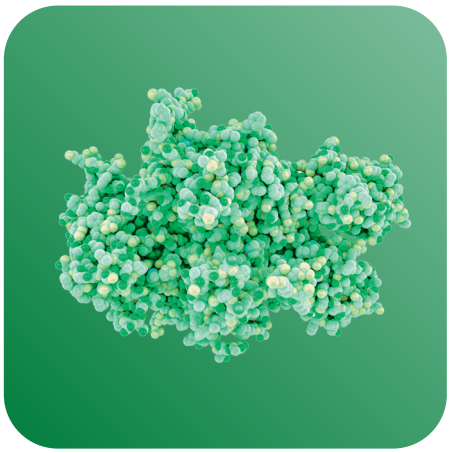


(Bioinert)
RP



RP – UHPLC / HPLC selectivities

- **Applicable to proteins, antibodies, peptides and oligonucleotides**
- **Selection of C18, C8 and C4 columns**
- **For UHPLC and HPLC**
- **pH- and temperature stable phases**
- **Superior reproducibility**

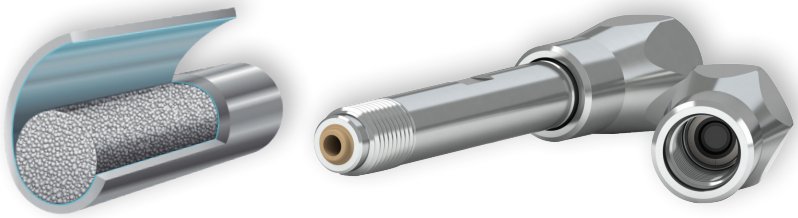
Selectivities for proteins / peptides and antibodies

	YMC-Triart Bio C4	YMC-Triart C18	YMC-Triart Bio C18	Meteoric Core C18 BIO
Base particle	organic/inorganic hybrid silica			core-shell type silica
Modification	C4 (USP L26)	C18 (USP L1)	C18 (USP L1)	C18 (USP L1)
Particle Size / µm	1.9, 3, 5	1.9, 3, 5	1.9, 3, 5	2.7
Pore Size / nm	30	12	30	16
pH range	1.0–10.0	1.0–12.0	1.0–12.0	1.5–10.0
Temperature range	pH < 7: 90 °C pH > 7: 50 °C	pH < 7: 90 °C pH > 7: 50 °C	pH < 9: 90 °C pH > 9: 50 °C	pH < 7: 70 °C pH > 7: 50 °C

Selectivities for oligonucleotides

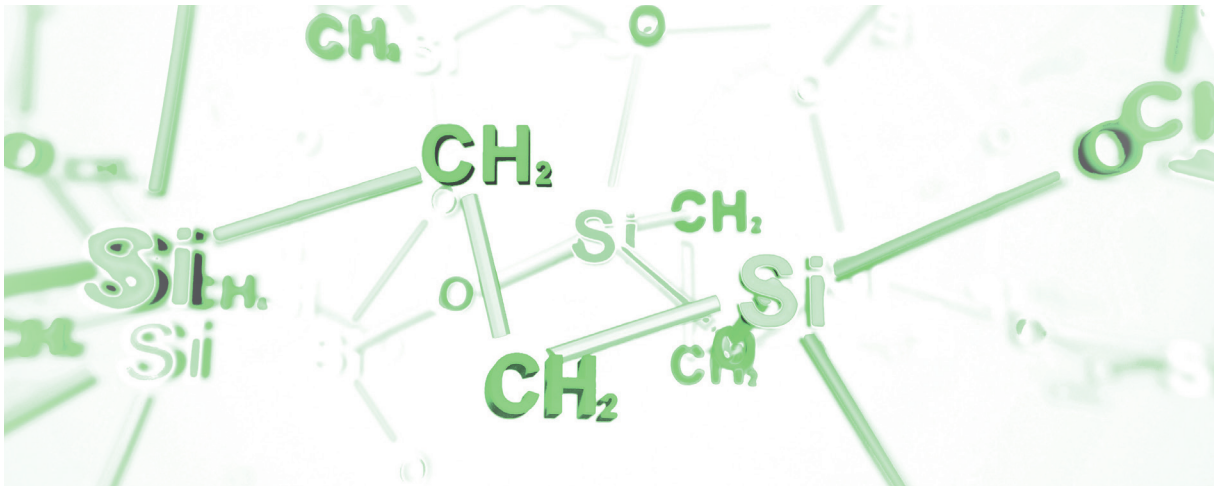
	YMC-Triart C18	YMC-Triart Bio C18	YMC-Triart C8	YMC-Triart Bio C4	Hydrosphere C18
Base particle	organic/inorganic hybrid silica				silica
Modification	C18 (USP L1)	C18 (USP L1)	C8 (USP L7)	C4 (USP L26)	C18 (USP L1)
Particle Size / µm	1.9, 3, 5	1.9, 3, 5	1.9, 3, 5	1.9, 3, 5	2, 3, 5
Pore Size / nm	12	30	12	30	12
pH range	1.0 – 12.0	1.0–12.0	1.0–12.0	1.0–10.0	2.0–8.0
Temperature range	pH < 7: 90 °C pH > 7: 50 °C	pH < 9: 90 °C pH > 9: 50 °C	pH < 7: 90 °C pH > 7: 50 °C	pH < 7: 90 °C pH > 7: 50 °C	50 °C

Bioinert hardware available!



Bioinert YMC-Triart columns are available for improved sensitivity, peak shape and recovery of coordinating compounds such as nucleotides, oligonucleotides or phosphorylated proteins / peptides.

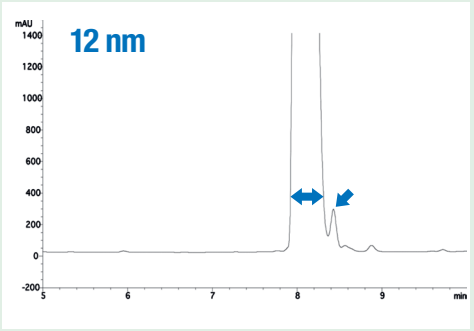
Organic / inorganic hybrid silica base particle

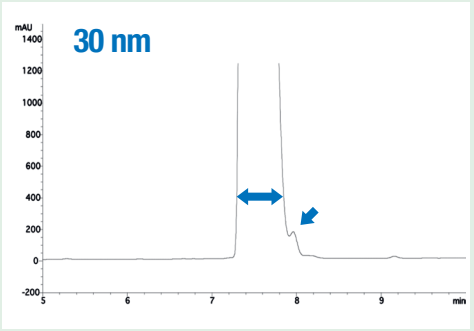


YMC-Triart is a versatile material prepared using tightly controlled particle formation technology. This production process developed by YMC results in exceptionally narrow particle and pore size distributions.
With YMC-Triart, challenging pH and high temperature conditions are no longer a limitation to the day-to-day work in laboratories.

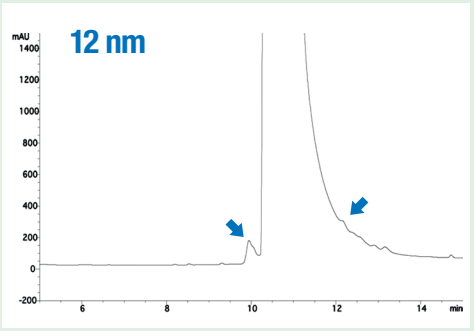
Influence of pore size

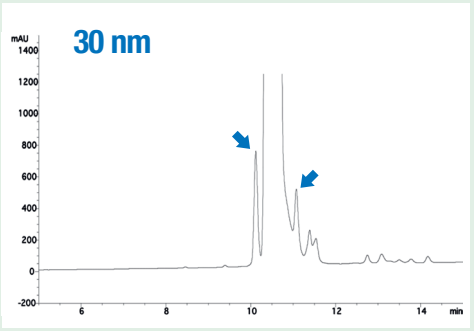
Angiotensin II
(MW 1,046)





BSA
(MW 67,000)

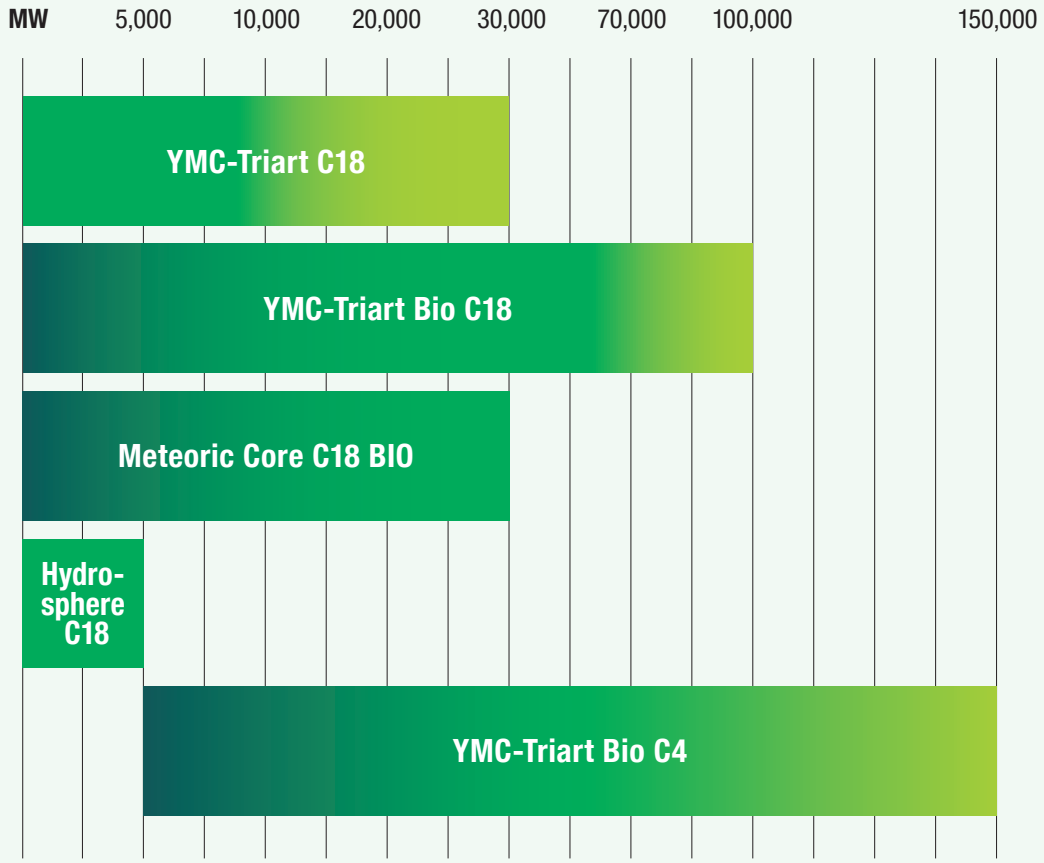




For smaller peptides a small pore size is more successful. Larger molecules are separated much better with larger pore sizes!

RP – Columns for bioseparations

Column Selection Tool according to molecular weight



most appropriate MW range

extended MW range by elevated temperature

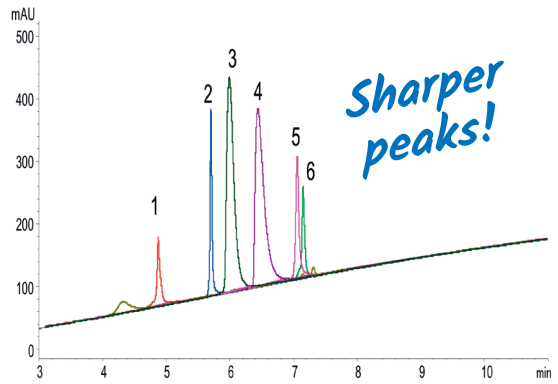
appropriate MW range

For the separation of proteins, peptides or antibodies columns are selected on the basis of the molecular weight of the target compounds. YMC-Triart C18 with a pore size of 12 nm provides good separation at high temperatures of compounds with molecular weights up to 30,000 Da. Widepore columns are effective for the separation of compounds with larger molecules. YMC-Triart Bio C4 with a pore size of 30 nm can even separate compounds with molecular weights up to 150,000 Da at high temperatures. Elevated temperature can improve efficiency and peak shape by reducing mobile phase viscosity and improving mass transfer. The appropriate molecular weight range for a given pore size of YMC-Triart can be extended compared to using the same pore size at a lower temperature.

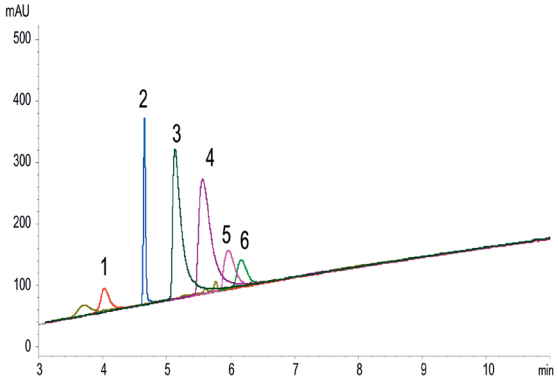
Better performance using YMC-Triart Bio C4

High sensitivity and sharp peaks under LC/MS compatible conditions

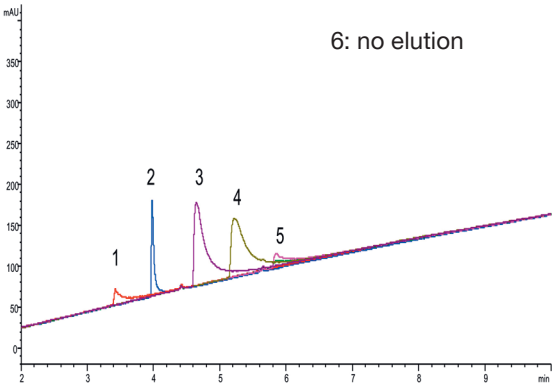
YMC-Triart Bio C4 (3 µm, 30 nm)



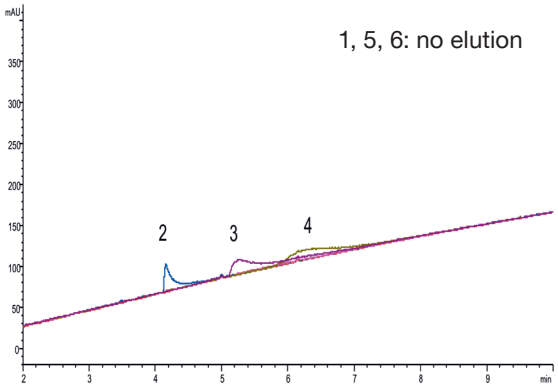
XBridge Protein BEH C4 (3.5 µm, 30 nm)



AdvanceBio RP-mAb C4 (3.5 µm, 45 nm)



Aeris widepore C4 (3.6 µm, 20 nm)



Column:	150 x 3.0 mm ID
Part No.:	TB30S03-1503PTH
Eluent:	A) water/formic acid (100/0.1)
	B) acetonitrile/formic acid (100/0.1)
Gradient:	10–95%B (0–15 min)
Flow rate:	0.4 mL/min (for 3.0 mm ID)
	1.0 mL/min (for 4.6 mm ID)
Temperature:	40 °C
Detection:	UV at 220 nm
Sample:	1. Cytochrome c (Horse heart)
	2. Insulin (Bovine pancreas)
	3. Transferrin (Human)
	4. BSA
	5. β-Lactoglobulin (Bovine)
	6. α-Chymotrypsinogen A (Bovine pancreas)

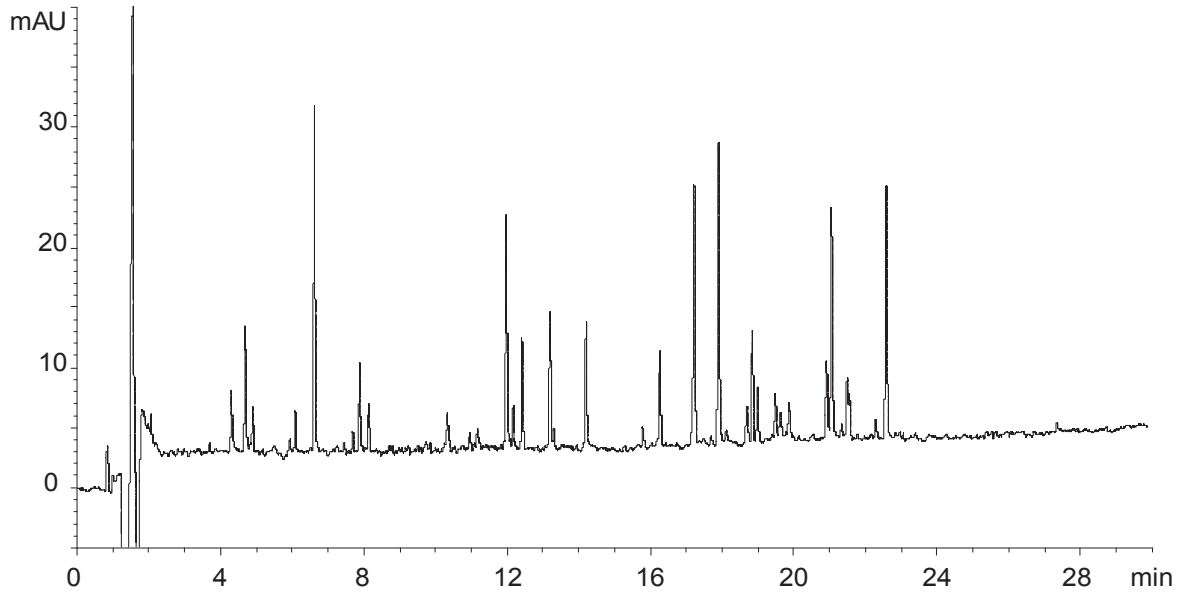
YMC-Triart Bio C4 shows better peak shape and recovery with a mobile phase containing formic acid, which is commonly used for LC/MS analysis. Therefore, YMC-Triart Bio C4 is ideal for high sensitivity analysis of proteins.

RP – YMC-Triart Bio C4: No column adsorption

Petide mapping with increased resolution

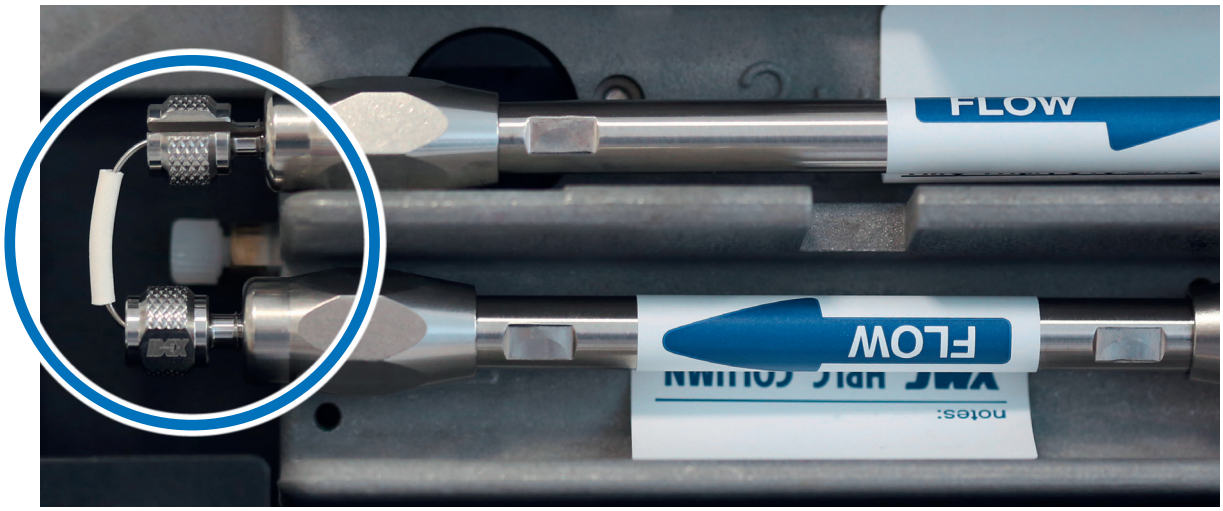
Coupling of 2 UHPLC columns

Peptide mapping



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

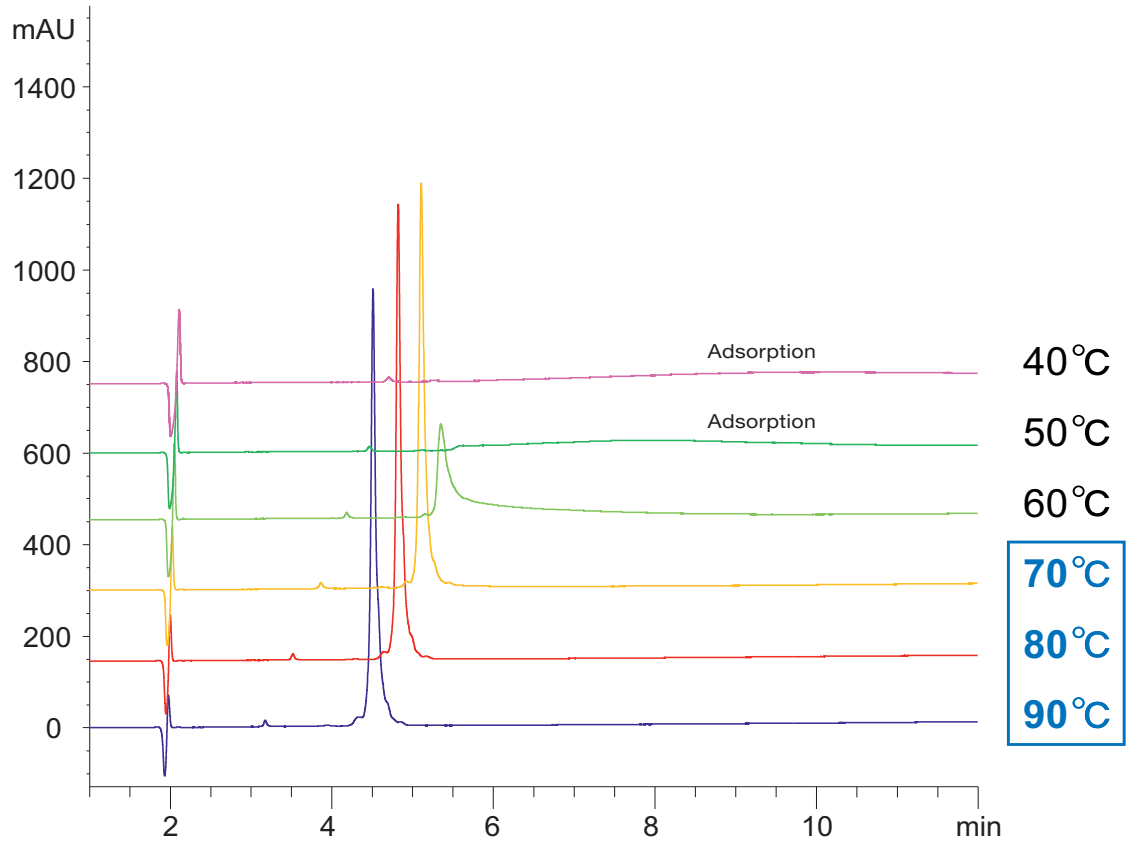
Column:	YMC-Triart C18 (1.9 µm, 12 nm) 200 x 2.0 mm ID (Two coupled 100 x 2.0 mm ID)
Part No.:	TA12SP9-1002PT (2x)
Eluent:	A) water/TFA (100/0.1)
	B) acetonitrile/TFA (100/0.08)
Gradient:	5–40%B (0–30 min)
Flow rate:	0.4 mL/min
Temperature:	70 °C
Detection:	UV at 220 nm
Injection:	20 µL
Sample:	Triptic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



Coupling of two YMC-Triart UHPLC columns using the dead volume free MarvelX™ connector.

High temperature tolerance allows antibody analysis

Bevacizumab (Avastin®, MW: ca. 148 kDa)



Column:	YMC-Triart Bio C4 (3 µm, 30 nm) 150 x 3.0 mm ID
Part No.:	TB30S03-1503PTH
Eluent:	A) water/TFA (100/0.1) B) acetonitrile/TFA (100/0.1)
Gradient:	30–60%B (0–15 min), 90%B (15–30min)
Flow rate:	0.4 mL/min
Detection:	UV at 220 nm
Injection:	4 µL
Sample:	Bevacizumab (0.5 mg/mL)

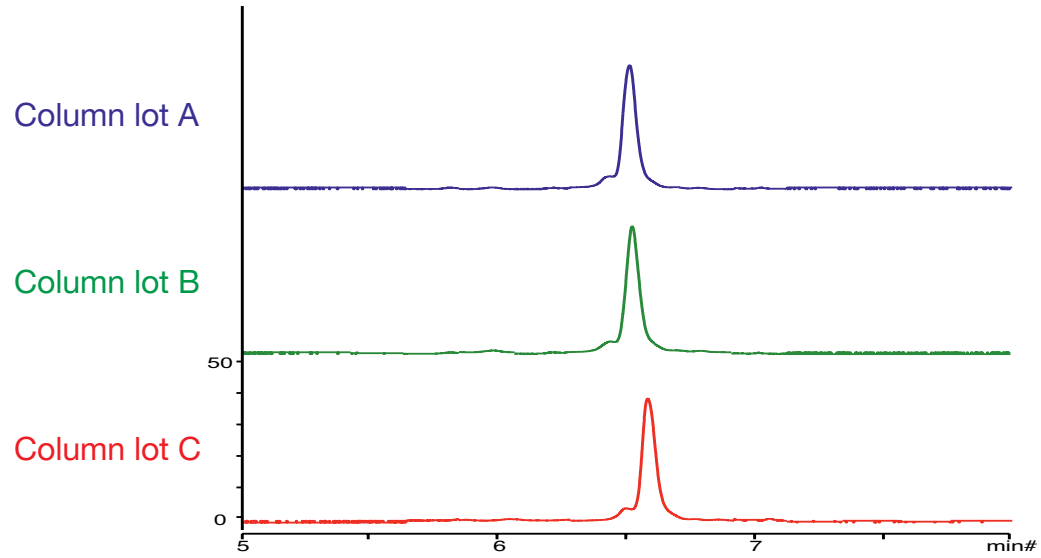
"The possibility to use temperatures up to 90 °C with YMC-Triart Bio C4 simplifies the development of analytical methods. Furthermore, a good peak shape can be obtained without the addition of TFA, which means that I have fewer problems when using it for MS."

Lars M. H. Reinders, Institute for Energy and Environmental Technology e. V. (IUTA, DE)

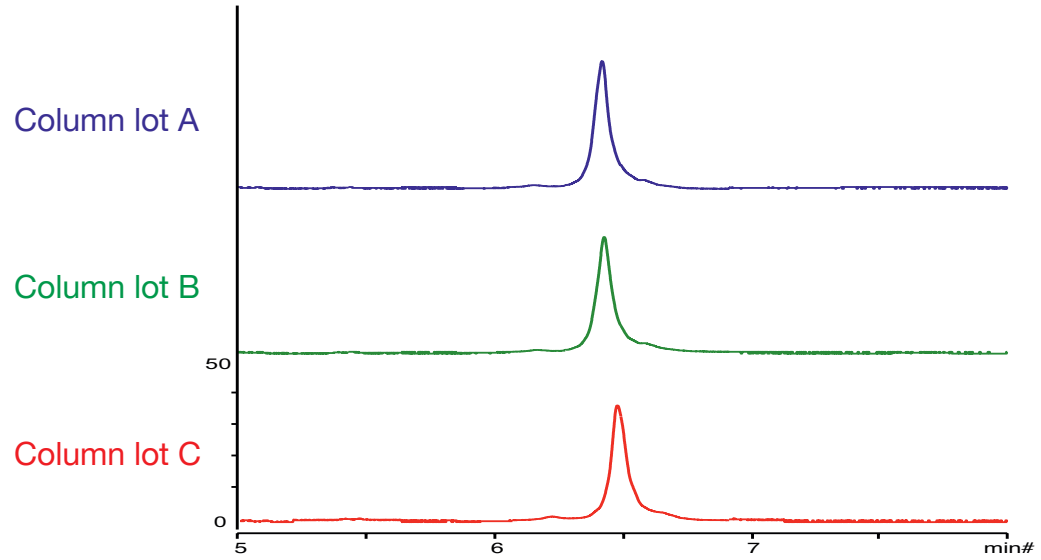
RP – YMC-Triart Bio C4: Reproducibility

Excellent Batch-to-batch reproducibility for antibody analysis

NISTmAb, 8671



Bevacizumab (Avastin®)



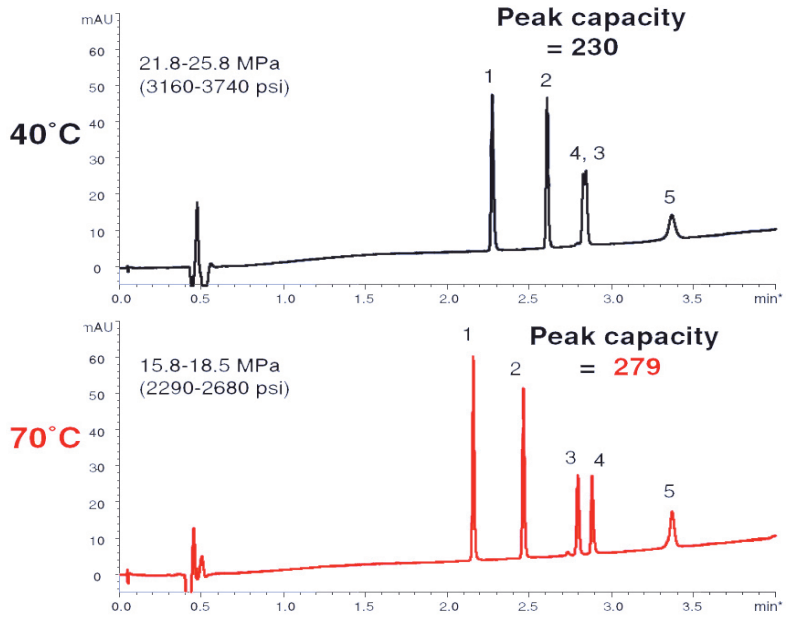
Column:	YMC-Triart Bio C4 (1.9 µm, 30 nm) 50 x 2.1 mm ID
Part No.:	TB30SP9-05Q1PT
Eluent:	A) water/TFA (100/0.1), B) acetonitrile/TFA (100/0.1)
Gradient:	25–45%B (0–10 min)
Flow rate:	0.4 mL/min
Temperature:	80 °C
Detection:	UV at 280 nm
Injection:	2 µL (0.5 mg/mL)

YMC-Triart Bio C4 shows excellent lot-to-lot reproducibility for antibodies. Not only is retention time highly reproducible, but also the resolution of minor impurity peaks. This makes YMC-Triart Bio C4 ideal for quality control of biopharmaceuticals.

More temperature flexiblity using YMC-Triart

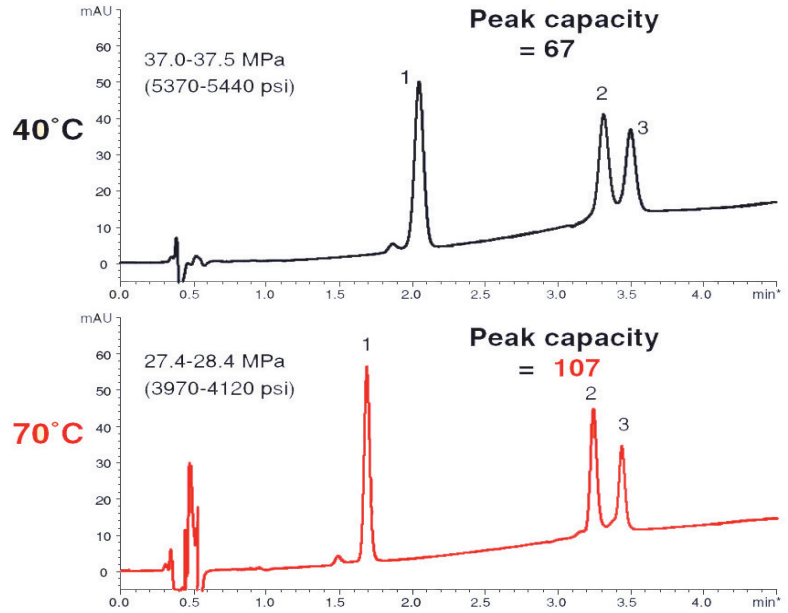
Highly efficient RP-HPLC separation of proteins

Mixture A (MW 500–18,400)



Analytes	MW	Peak width ½h (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)



High temperatures only possible with YMC-Triart

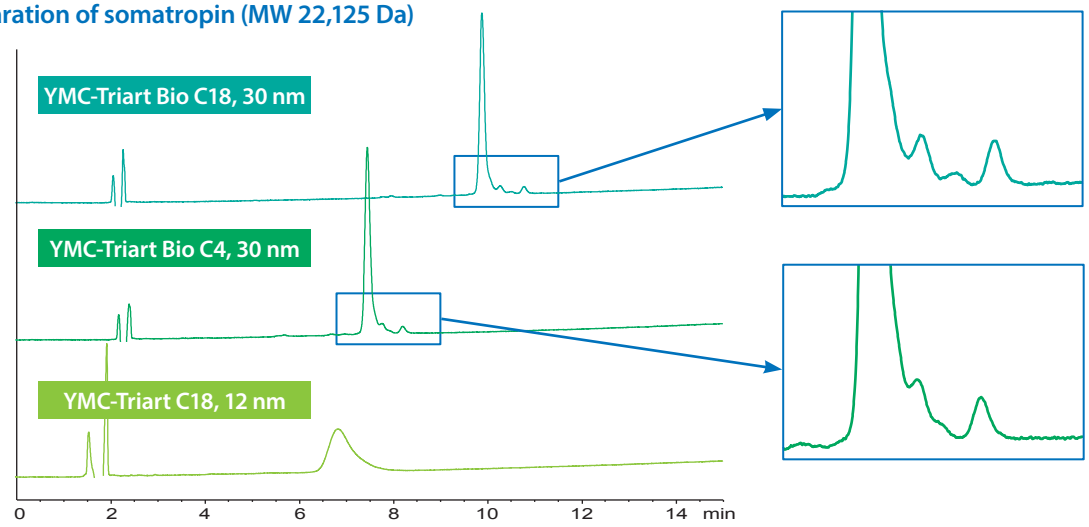
Column:	YMC-Triart C18 (1.9 µm, 12 nm) 50 x 2.0 mm ID	Flow rate:	0.4 mL/min
Part-No.:	TA12SP9-0502WT	Detection:	UV at 220 nm
Eluent:	A) water/TFA (100/0.1)	Injection:	1 µL (50 µg/mL) - condition A
	B) acetonitrile/TFA (100/0.1) - mixture A		1 µl (250 µg/mL) - condition B
	B) acetonitrile/2-propanol/TFA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

RP – YMC-Triart Bio C18: Great peak shapes

Ideal solutions for any kind of biomolecule

Separation of somatropin (MW 22,125 Da)

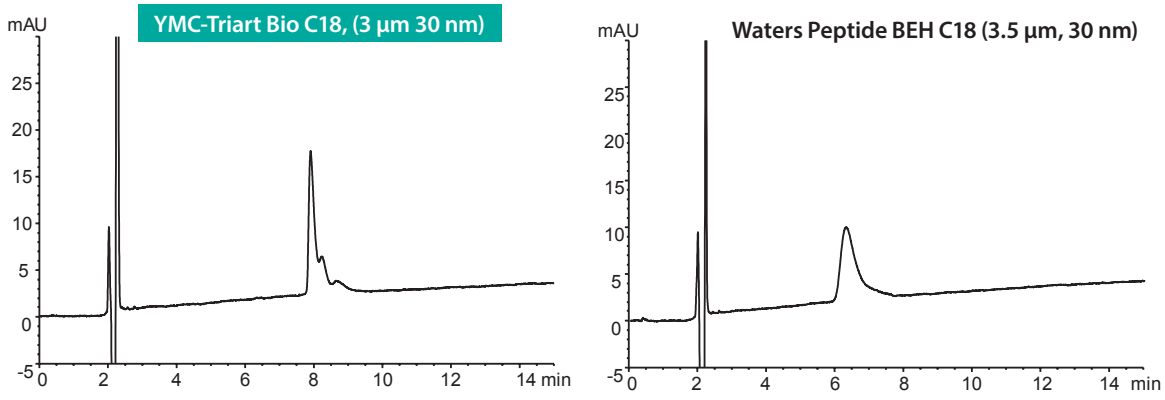


Columns:	150 x 3.0 mm ID (3 µm)	Gradient:	50–70%B (0–15 min)
Part Nos.:	TA30S03-1503PTH TB30S03-1503PTH TA12S03-1503PTH	Flow rate:	0.425 mL/min
		Temperature:	40 °C
		Detection:	UV at 220 nm
Eluent:	A) water/TFA (100/0.1) B) acetonitrile/TFA (100/0.08)	Injection:	4 µL
		Sample:	Somatropin (0.1 mg/mL)

In this example of somatropin, a peptide of 22,125 Da, good peak shape can be obtained with the widepore columns YMC-Triart Bio C18 and YMC-Triart Bio C4. Excellent separation was achieved using YMC-Triart Bio C18 with longer alkyl chains in its bonded phase.

Ideal for MS conditions

Good peak shape with mobile phase containing formic acid



Column:	150 x 3.0 mm ID; 150 x 4.6 mm ID	Flow rate:	0.425 mL/min for 3.0 mm ID; 1.0 mL/min for 4.6 mm ID
Part No.:	TA30S03-1503PTH	Temperature:	40 °C
Eluent:	A) water/formic acid (100/0.1) B) acetonitrile/formic acid (100/0.08)	Detection:	UV at 220 nm
		Sample:	Somatropin (0.1 mg/mL)
Gradient:	45–65%B (0–15 min)		

YMC-Triart Bio C18 is suitable for highly sensitive analysis and structural analysis of proteins using LC/MS since good peak shapes in mobile phase containing formic acid can be achieved.

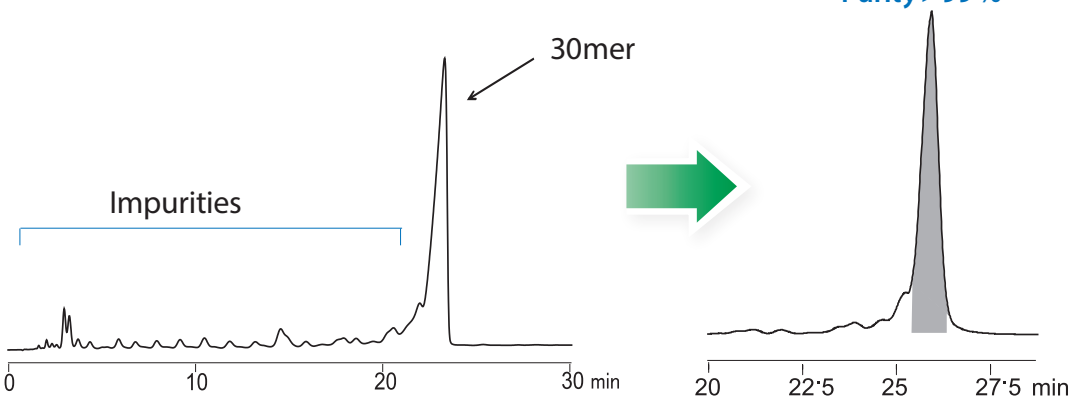
Easy purification of oligonucleotides with YMC-Actus semiprep columns

Purification of synthetic 30mer oligonucleotide

Analysis 1.0 mL/min, 5 µL injection
Hydrosphere C18
50 x 4.6 mm ID, 5 µm

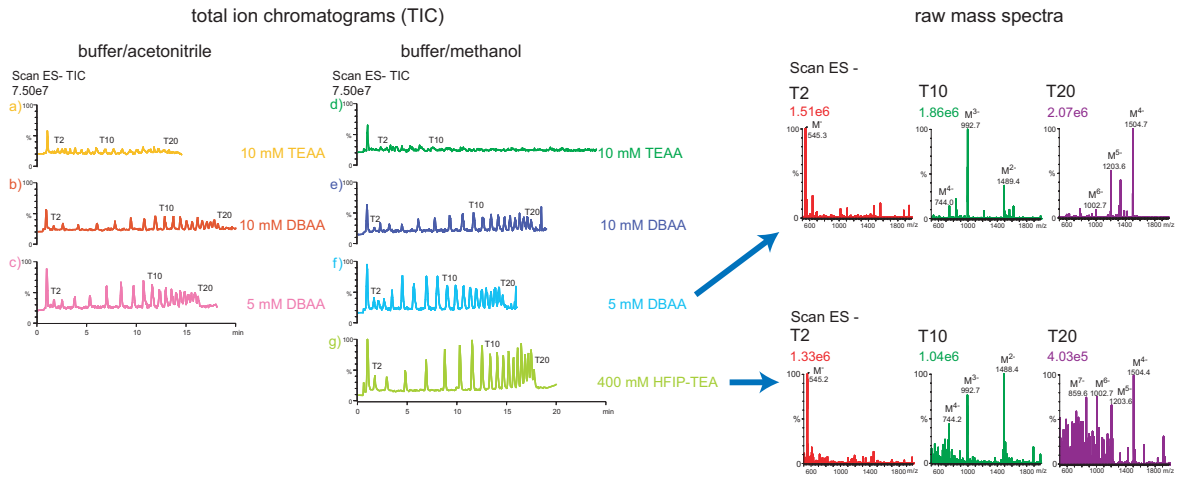
Purification 19 mL/min, 100 µL injection
YMC-Actus Hydrosphere C18
50 x 20 mm ID, 5 µm

Recovery 56 %
Purity > 99 %



Part Nos.:	HS12S05-0546WT HS12S05-0520WX
Eluent:	A) 10 mM DBA-acetic acid (pH 6.0) / methanol (60/40) B) 10 mM DBA-acetic acid (pH 6.0) / methanol (20/80)
Gradient:	10%–35%B (0–30 min.)
Temperature:	ambient
Detection:	UV at 269 nm
Sample:	synthetic oligonucleotide (100 µM)

Influences of mobile phase conditions on intensity of ESI-MS

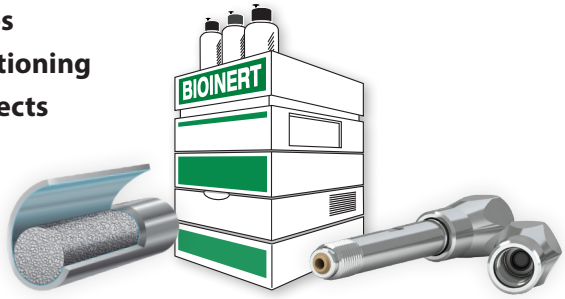


Column:	Hydrosphere C18 (3 µm, 12 nm) 50 x 2.0 mm ID	
Part No.:	HS12S03-0502WT	
Flow rate:	0.2 mL/min	
Temperature:	35°C	
Detection:	ESI negative mode	
Injection:	5 µL (25 pmol/component)	
a)	Eluent:	A) 10 mM TEAA buffer (pH 6.0) B) eluent A/acetonitrile (80/20)
	Gradient:	50–65%B (0–20 min)
b/c)	Eluent:	A) 10/5 mM DBAA buffer (pH 6.0) B) eluent A/acetonitrile (50/50)
	Gradient:	30–75%B (0–20 min)
d)	Eluent:	A) 10 mM TEAA buffer (pH 6.0) B) eluent A/methanol (50/50)
	Gradient:	44–50%B (0–25 min)
e/f)	Eluent:	A) 10/5 mM DBAA buffer (pH 6.0) B) eluent A/methanol (20/80)
	Gradient:	42–70%B (0–20 min)
g)	Eluent:	A) 400 mM HFIP-TEA buffer (pH 7.0) B) methanol
	Gradient:	7–35%B (0–20 min)
Sample:	Oligodeoxythymidylic acid $[d(pT)_{2\text{-}20}]$	

RP – YMC-Triart: Bioinert hardware

Bioinert columns for bioseparations and coordinating compounds

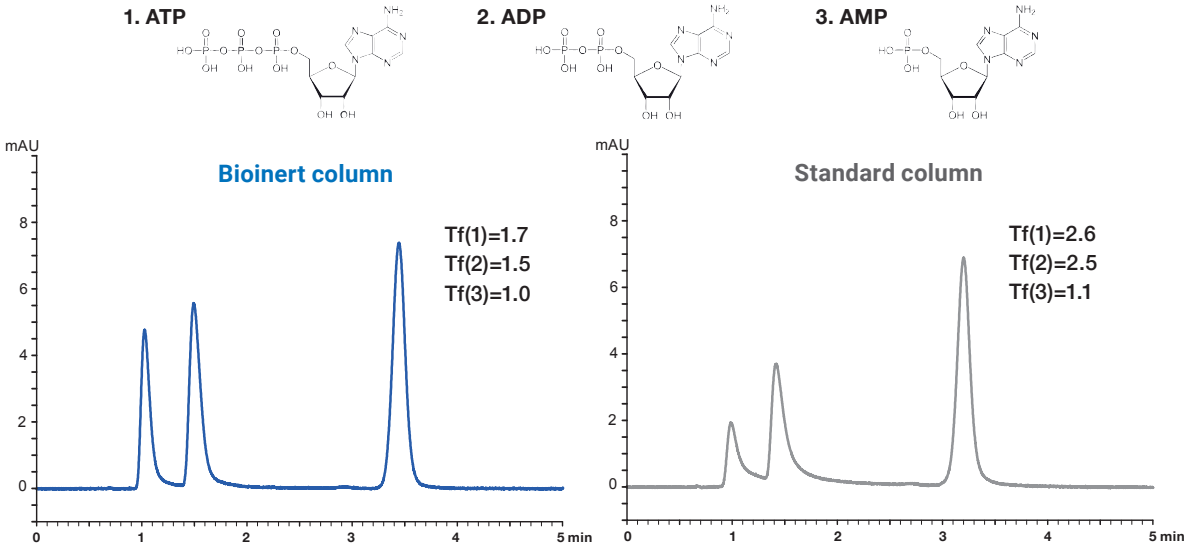
- **Exceptional peak shapes with high sensitivities**
- **Excellent recoveries without column preconditioning**
- **Superior reproducibility and no carry-over effects**
- **Ideal for highly sensitive LC/MS analyses**
- **Different bioinert hardware options**



Specification

	YMC-Accura Triart	YMC-Triart metal-free PEEK-lined
YMC-Triart modifications	C18, C18 ExRS, Bio C18, C8, Bio C4, Phenyl, PFP, Diol-HILIC	
Particle Size	1.9, 3 and 5 µm	
Column hardware	Bioinert coated stainless steel	PEEK-lined stainless steel
Frit hardware	Bioinert coated stainless steel	PEEK
Hardware properties	Less hydrophobic	More hydrophobic
Pressure limit	1.9 µm: 100 MPa (15,000 psi) 3/5 µm: 45 MPa (6,525 psi)	
Column connection	No special connections required	Selected universal connectors such as MarvelXACT™

Improved sensitivity for coordination compounds



Column: YMC-Triart C18 (3 µm, 12 nm) 50 x 2.1 mm ID
Part Nos.: TA12S03-05Q1PTP (metal-free PEEK-lined) or TA12S03-05Q1PTH (standard hardware)
Eluent: 5 mM $HCOONH_4$
Flow rate: 0.21 mL/min
Temperature: 25 °C
Detection: UV at 265 nm
Injection: 1 µL (10 µg/mL)
System: bioinert/"metal-free" HPLC system

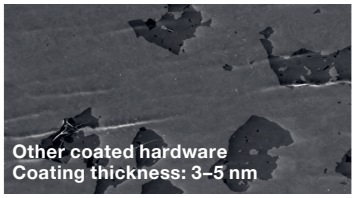
Metal coordinating compounds, which have a phosphate group in their structure, tend to show poor peak shape due to interactions with metals, such as the stainless steel in column bodies and frits. By using a bioinert column hardware, better peak shapes can be expected.
Nucleotides with phosphate groups also show better peak shapes when compared to the regular column hardware.
The applied YMC-Triart metal-free PEEK-lined as well as the YMC-Accura Triart column hardware are ideal for highly sensitive analyses using LC/MS.

YMC-Accura Triart: durable bioinert coating

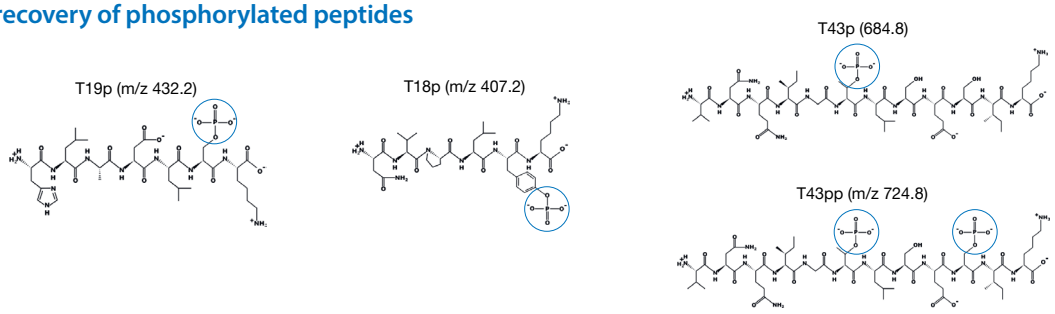
The robust bioinert coating used on YMC-Accura hardware is 130 to 320-fold thicker making it more durable than other similar hardware concepts. A long-term inertness against sensitive substances is ensured. In order to demonstrate its robustness, a YMC-Accura column was packed multiple times. Even though this is quite a challenge for the column surface, the coating remains unaffected (SEM* picture: top area is bare steel for comparison).

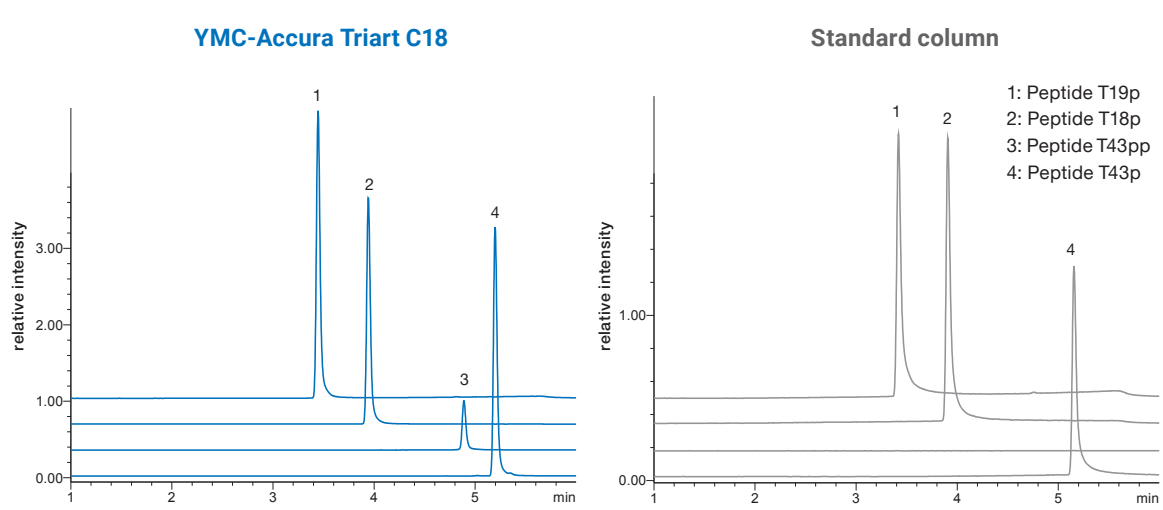
*Scanning Electron Microscope

Other coated columns can lose their inertness over time. This will again lead to adsorption of sensitive compounds on the uncovered metallic surfaces. Peak tailing, loss of recovery and sample carry-over are typical results of the delamination of the coating. After only unpacking a coated competitor column most of the coating is already delaminated (dark spots: remaining coating).



Full recovery of phosphorylated peptides





Columns:	YMC-Accura Triart C18 (1.9 µm, 30 nm) 100 x 2.1 mm ID (bioinert hardware) YMC-Triart C18 (1.9 µm, 30 nm) 100 x 2.1 mm ID (standard hardware)	Gradient:	0.7%–25%B (0–5 min), 25%B (5–6.6 min), 0.7%B (6.6–8 min)
Part Nos.:	TA12SP9-10Q1PTC TA12SP9-10Q1PT	Flow rate:	0.6 ml/min
Eluent:	A) water + 0.1% formic acid B) acetonitrile + 0.1% formic acid	Temperature:	60 °C
		Detection:	ESI-MS
		Injection:	2 µl (10 pmol/µl)
		Sample:	Massprep phosphopeptide enolase standard (Waters)
		System:	Shimadzu Nexera XS inert Shimadzu LCMS-2020

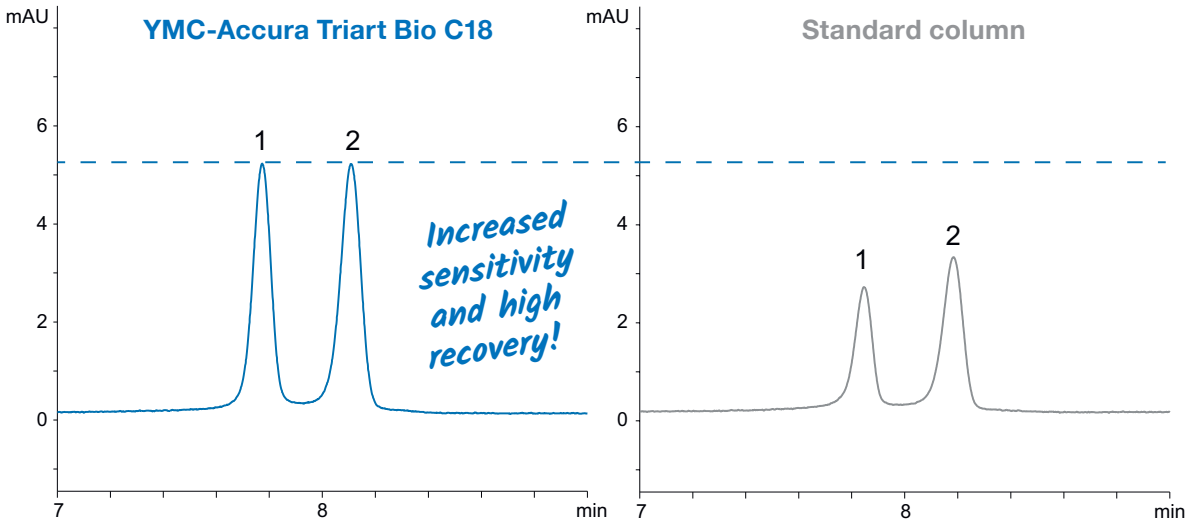
By courtesy of Shimadzu Europa.

The use of a bioinert coated YMC-Accura Triart C18 column led to higher intensities and peak areas of four phosphopeptides, compared to the stainless steel column. The high recovery rate of the YMC-Accura Triart C18 column also enabled the detection of the challenging phosphopeptide T43pp, which contains two phosphate residues. In contrast, detection of peptide T43pp was unsuccessful with the standard column, even after ten injections no signal was observed.

RP – YMC-Triart: Bioinert hardware

Significantly higher sensitivity and recovery

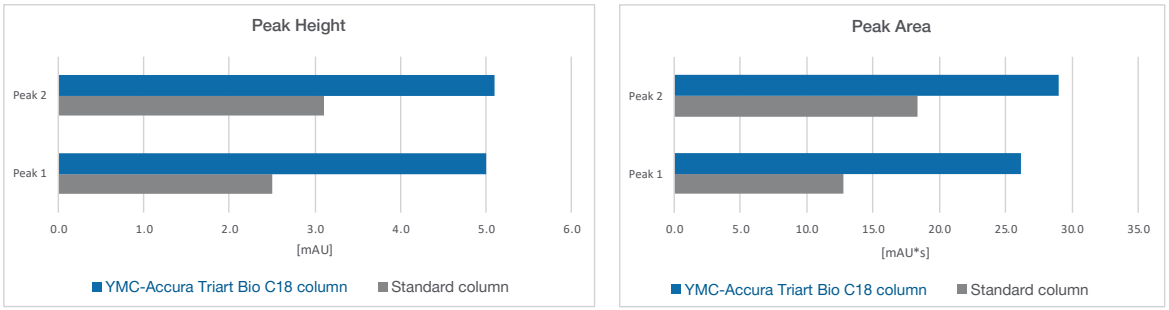
Ideal choice for challenging analytes such as phosphorothioate oligonucleotides



Column: YMC-Accura Triart Bio C18 (1.9 µm, 30 nm) 50 x 2.1 mm ID
Part No.: TA30SP9-05Q1PTC
Eluent: A) 15 mM triethylamine - 400 mM HFIP*
B) methanol
Gradient: 8–18%B (0–10 min)
Flow rate: 0.42 mL/min
Temperature: 65 °C
Detection: UV at 260 nm
Injection: 1 µL
Sample: All PS RNA 20mer (1) (5'-U^C^A^U^C^A^C^A^C^U^G^A^A^U^A^C^C^A^A^U-3')
All PS RNA 21mer (2) (5'-G^U^C^A^U^C^A^C^A^C^U^G^A^A^U^A^C^C^A^A^U-3')
^=Phosphorothioate

*1,1,1,3,3,3-hexafluoro-2-propanol

High sensitivity and recovery

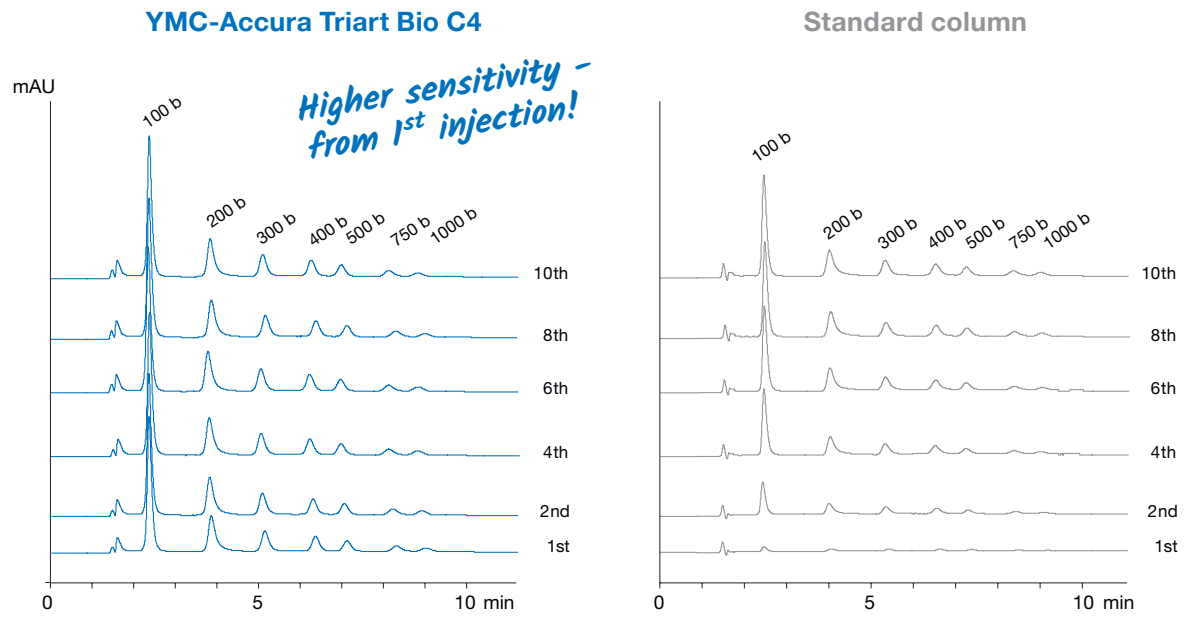


Doubled peak height and area!

The YMC-Accura Triart Bio C18 column provides double peak heights and peak areas for the oligonucleotides compared to those for regular stainless-steel columns. YMC-Accura Triart columns enhance the sensitivity significantly and help to save precious samples without any loss.

Reliable results from the first injection

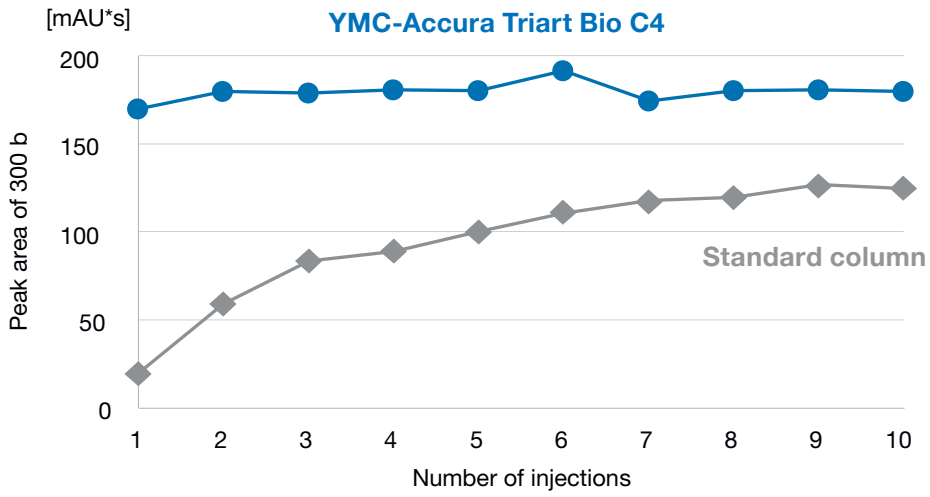
No preconditioning required for reliable results



Column:	YMC-Accura Triart Bio C4 (3 µm, 30 nm) 100 x 2.1 mm ID	Flow rate:	0.2 mL/min
Part No.:	TA30S03-10Q1PTC	Temperature:	80 °C
Eluent:	A) 50 mM TEAA* (pH 7.0)/acetonitrile (95/5)	Detection:	UV at 254 nm
	B) 50 mM TEAA (pH 7.0)/acetonitrile (50/50)	Injection:	1 µL (0.25 mg/mL)
Gradient:	9–14%B (0–10 min), 80%B (10–15 min)	Sample:	100–1,000 bases (Century™-Plus RNA Markers)

* triethylammonium acetate

Constantly higher peak areas and therefore recoveries

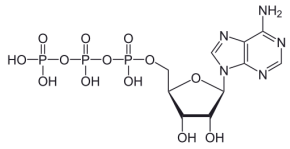


The YMC-Accura Triart Bio C4 column shows stable peak areas from the first injection, while the standard stainless-steel column provides only 10% of the peak area (for the 300 base marker) with the first injection. Even after the tenth injection, the peak areas of the stainless-steel column are considerably less than those of the YMC-Accura Triart column.

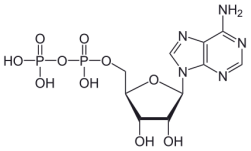
RP – Expert Tips: (Oligo)nucleotides

Influence of system and column hardware on the analysis of nucleotides

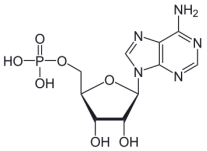
1 ATP



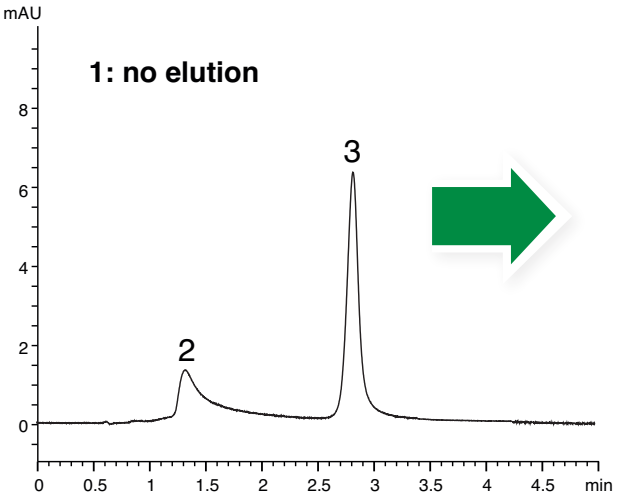
2 ADP



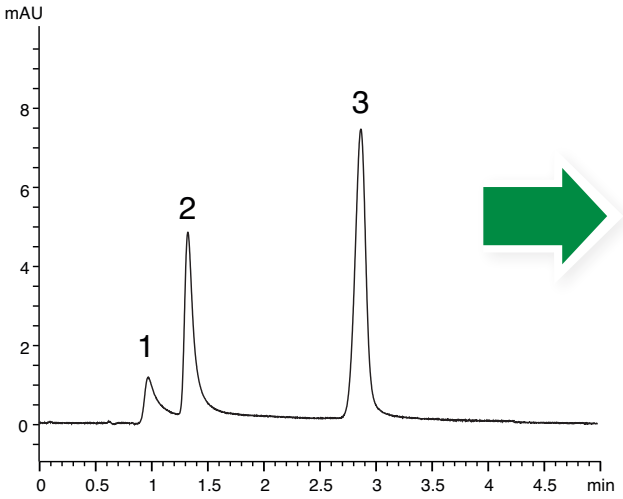
3 AMP

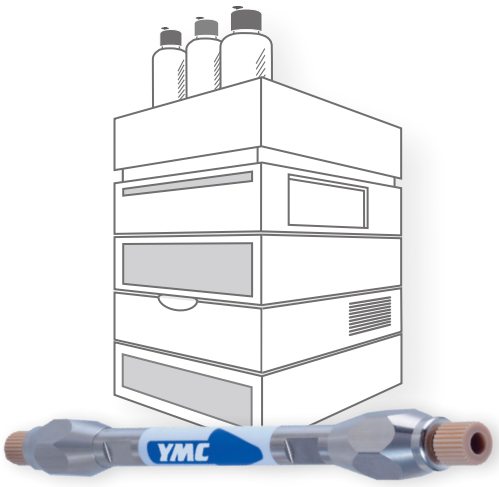


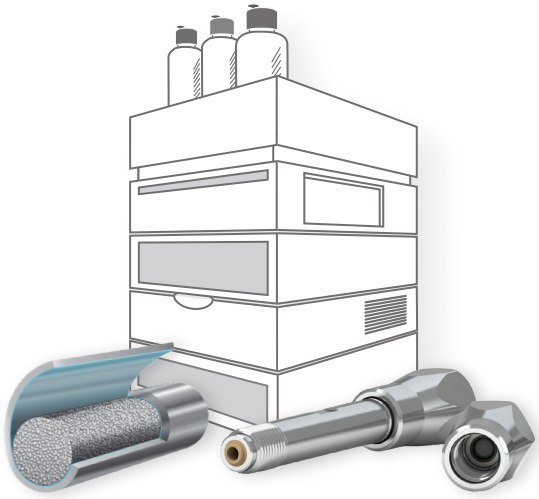
Ordinary HPLC system with standard column



Ordinary HPLC system with bioinert column





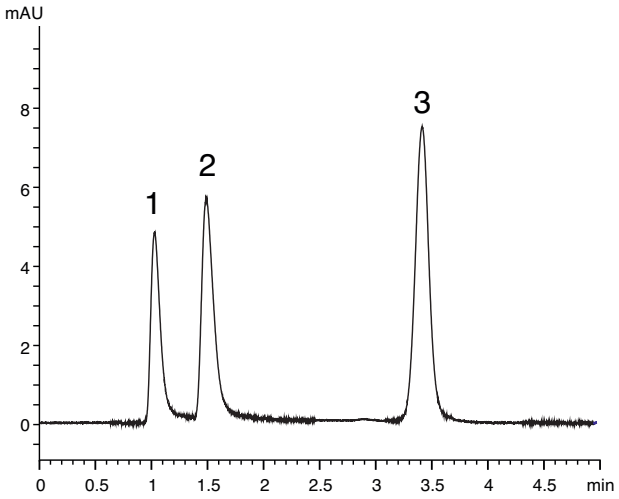


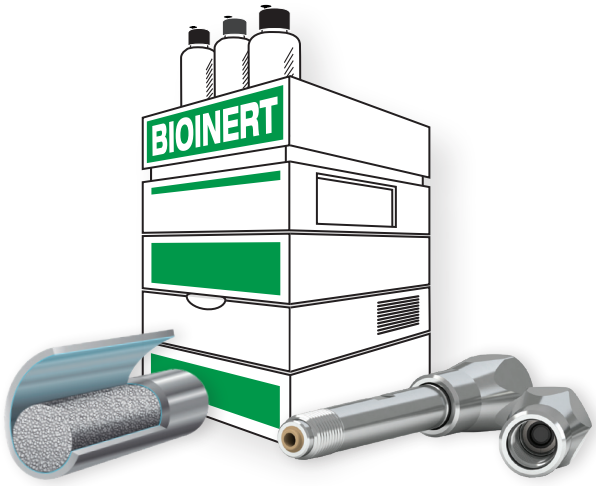
Column:	YMC-Triart C18 (3 µm, 12 nm) 50 x 2.1 mm ID
Part Nos:	TA12S03-05Q1PT (standard hardware)
	TA12S03-05Q1PTP (**bioinert** hardware)
Eluent:	5 mM $HCOONH_4$
Flow rate:	0.21 mL/min
Temperature:	25°C
Detection:	UV at 265 nm
Injection:	1 µL (10 µg/mL)

*Bioinert HPLC system: PEEK sample loop, PEEK injector port, and PEEK tubing are used.

ATP peak is detected, and peak shape of ADP is improved as a result of using a bioinert column.

Bioinert HPLC system* with bioinert column





"Metal-free YMC columns significantly reduce non-specific adsorption phenomena"

"YMC-Triart C18 metal-free columns significantly reduce non-specific adsorption phenomena during peptides analysis. We use these columns in our laboratory for a specific application. We obtain very good chromatographic resolution and excellent robustness, which is very appreciable during routine analysis."

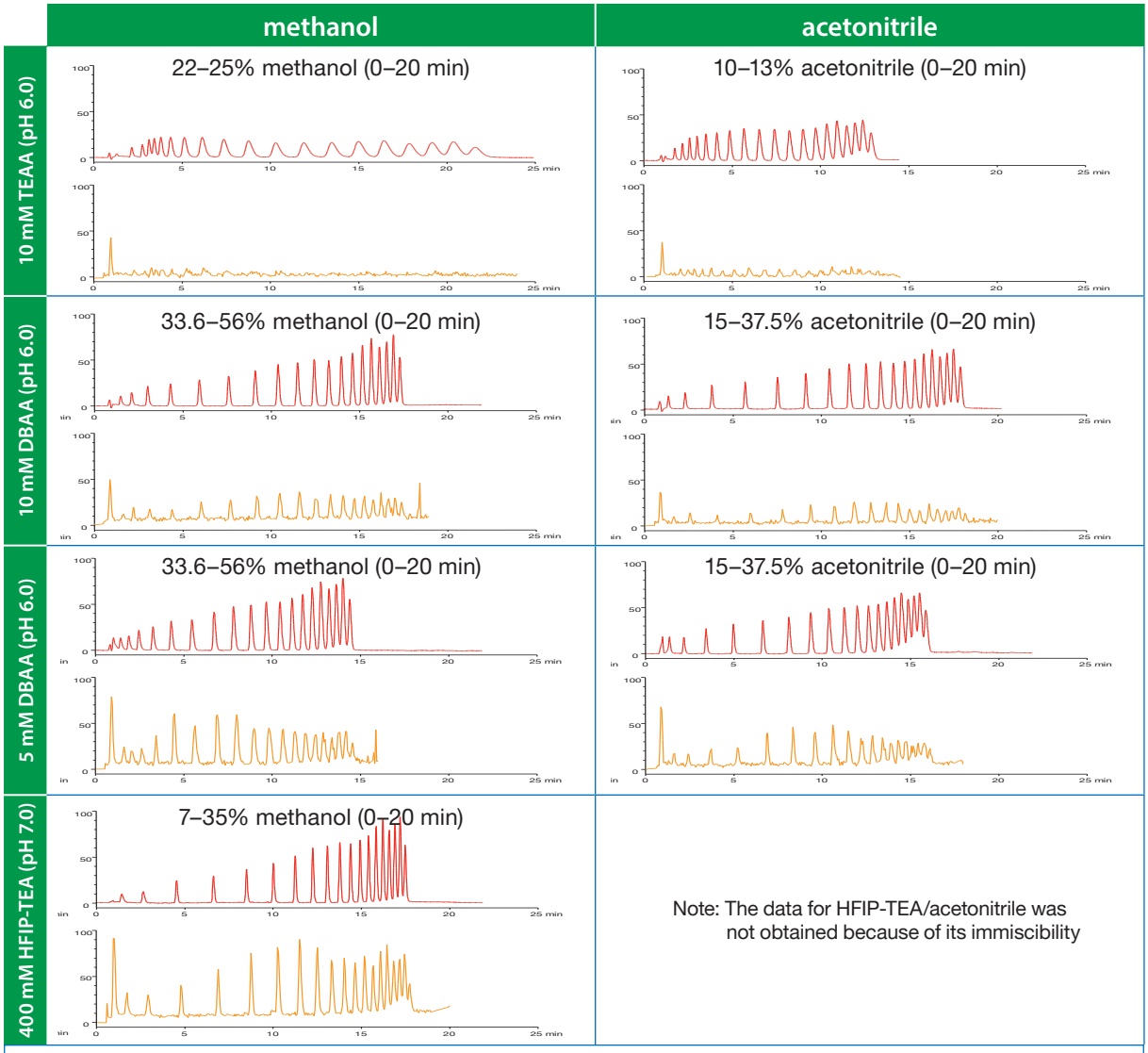
Cynthia Mongongu, LADF, Laboratoire AntiDopage Français, Université Paris-Saclay (FR)

Peak shape is greatly improved as a result of using a bioinert HPLC system.

RP – Expert Tips: Oligonucleotides

Effect of composition and salt concentration of ion-pairing mobile phase on the separation and signal intensity

Comparison of separation and ESI-MS signal intensity using different ion-pairing buffers and organic solvents



Column:	Hydrosphere C18 (3.0 µm, 12 nm) 50 x 2.0 mm ID
Part No.:	HS12S03-0502WT
Flow rate:	0.2 mL/min
Temperature:	35 °C
Detection:	UV at 269 nm (red), ESI negative mode (orange)
Injection:	5 µl (25 pmol/mL)
Sample:	Oligo(deoxythymidylic acid) [dp (dT) 2-20]

eluent abbreviations

TEAA:	triethylammonium acetate
DBAA:	di-n-butylammonium acetate
HFIP:	1,1,1,3,3,3-hexafluoro-2-propanol
TEA:	triethylamine

The mobile phase composition has different effects on the separation and signal intensity in electrospray ionisation mass spectrometry (ESI-MS) of oligonucleotides. Using different gradient conditions, acceptable retention and resolution can be achieved (upper UV chromatograms; red trace) for each separation by optimising the gradient slope of the organic solvent regardless of the type of mobile phase. The ESI-MS intensity is significantly influenced by the type and concentration of ion-pairing buffer as shown in the lower MS chromatograms (orange trace). HFIP-TEA buffer/methanol systems provide the maximum MS intensity. Enhanced retention and MS intensity are obtained using 10 mM DBAA buffer compared to 10 mM TEAA buffer, and the lower DBAA concentration results in approximately 1.5–3 times increase in the intensity without any change in the concentration of organic solvent.

1.9 µm UHPLC columns (max. pressure 100 MPa)

Phase	Column ID [mm]	Column length [mm]					Guard cartridges* with 5 mm length
		30	50	75	100	150	(pack of 3)
YMC-Triart C18	1.0	—	TA12SP9-0501WT	—	TA12SP9-1001WT	TA12SP9-1501WT	TA12SP9-E5Q1CC**
	2.0	TA12SP9-0302PT	TA12SP9-0502PT	TA12SP9-L502PT	TA12SP9-1002PT	TA12SP9-1502PT	TA12SP9-E5Q1CC**
	2.1	TA12SP9-03Q1PT	TA12SP9-05Q1PT	TA12SP9-L5Q1PT	TA12SP9-10Q1PT	TA12SP9-15Q1PT	TA12SP9-E5Q1CC**
	3.0	—	TA12SP9-0503PT	TA12SP9-L503PT	TA12SP9-1003PT	TA12SP9-1503PT	TA12SP9-E503CC
YMC-Triart Bio C18	2.0	TA30SP9-0302PT	TA30SP9-0502PT	TA30SP9-L502PT	TA30SP9-1002PT	TA30SP9-1502PT	TA30SP9-E5Q1CC**
	2.1	TA30SP9-03Q1PT	TA30SP9-05Q1PT	TA30SP9-L5Q1PT	TA30SP9-10Q1PT	TA30SP9-15Q1PT	TA30SP9-E5Q1CC**
	3.0	—	TA30SP9-0503PT	TA30SP9-L503PT	TA30SP9-1003PT	TA30SP9-1503PT	TA30SP9-E503CC
YMC-Triart C8	2.0	TO12SP9-0302PT	TO12SP9-0502PT	TO12SP9-L502PT	TO12SP9-1002PT	TO12SP9-1502PT	TO12SP9-E5Q1CC**
	2.1	TO12SP9-03Q1PT	TO12SP9-05Q1PT	TO12SP9-L5Q1PT	TO12SP9-10Q1PT	TO12SP9-15Q1PT	TO12SP9-E5Q1CC**
	3.0	—	TO12SP9-0503PT	TO12SP9-L503PT	TO12SP9-1003PT	TO12SP9-1503PT	TO12SP9-E503CC
YMC-Triart Bio C4	2.0	TB30SP9-0302PT	TB30SP9-0502PT	TB30SP9-L502PT	TB30SP9-1002PT	TB30SP9-1502PT	TB30SP9-E5Q1CC**
	2.1	TB30SP9-03Q1PT	TB30SP9-05Q1PT	TB30SP9-L5Q1PT	TB30SP9-10Q1PT	TB30SP9-15Q1PT	TB30SP9-E5Q1CC**
	3.0	—	TB30SP9-0503PT	TB30SP9-L503PT	TB30SP9-1003PT	TB30SP9-1503PT	TB30SP9-E503CC

*Guard cartridge holder required, part no. XPCHUHP
**Guard cartridge: 2.1 mm ID

1.9 µm bioinert coated UHPLC columns (max. pressure 100 MPa)

Phase	Column ID [mm]	Column length [mm]		
		50	100	150
YMC-Accura Triart C18	2.1	TA12SP9-05Q1PTC	TA12SP9-100Q1PTC	TA12SP9-15Q1PTC
YMC-Accura Triart Bio C18	2.1	TA30SP9-05Q1PTC	TA30SP9-10Q1PTC	TA30SP9-15Q1PTC
YMC-Accura Triart C8	2.1	TO30SP9-05Q1PTC	TO12SP9-10Q1PTC	TO12SP9-15Q1PTC
YMC-Accura Triart Bio C4	2.1	TB30SP9-05Q1PTC	TB30SP9-10Q1PTC	TB30SP9-15Q1PTC

1.9 µm PEEK-lined UHPLC columns (max. pressure 100 MPa)

Phase	Column ID [mm]	Column length [mm]		
		50	100	150
YMC-Triart C18 metal-free	2.1	TA12SP9-05Q1PTP	TA12SP9-10Q1PTP	TA12SP9-15Q1PTP
YMC-Triart Bio C18 metal-free	2.1	TA30SP9-05Q1PTP	TA30SP9-10Q1PTP	TA30SP9-15Q1PTP
YMC-Triart C8 metal-free	2.1	TO12SP9-05Q1PTP	TO12SP9-10Q1PTP	TO12SP9-15Q1PTP
YMC-Triart Bio C4 metal-free	2.1	TB30SP9-05Q1PTP	TB30SP9-10Q1PTP	TB30SP9-15Q1PTP

Special column connectors required.

RP – Ordering information

3 µm HPLC columns (max. pressure 25–45 MPa)

Phase	Column ID [mm]	Column length [mm]					Guard cartridges* with 10 mm length
		50	75	100	150	250	(pack of 5)
YMC-Triart C18	2.0	TA12S03-0502WT	TA12S03-L502WT	TA12S03-1002WT	TA12S03-1502WT	TA12S03-2502WT	TA12S03-01Q1GC
	2.1	TA12S03-05Q1PTH	TA12S03-L5Q1PTH	TA12S03-10Q1PTH	TA12S03-15Q1PTH	TA12S03-25Q1PTH	TA12S03-01Q1GC
	3.0	TA12S03-0503WT	TA12S03-L503WT	TA12S03-1003WT	TA12S03-1503WT	TA12S03-2503WT	TA12S03-0103GC
	4.6	TA12S03-0546WT	TA12S03-L546WT	TA12S03-1046WT	TA12S03-1546WT	TA12S03-2546WT	TA12S03-0104GC
YMC-Triart Bio C18	2.0	TA30S03-0502WT	TA30S03-L502WT	TA30S03-1002WT	TA30S03-1502WT	TA30S03-2502WT	TA30S03-01Q1GC
	2.1	TA30S03-05Q1PTH	TA30S03-L5Q1PTH	TA30S03-10Q1PTH	TA30S03-15Q1PTH	TA30S03-25Q1PTH	TA30S03-01Q1GC
	3.0	TA30S03-0503WT	TA30S03-L503WT	TA30S03-1003WT	TA30S03-1503WT	TA30S03-2503WT	TA30S03-0103GC
	4.6	TA30S03-0546WT	TA30S03-L546WT	TA30S03-1046WT	TA30S03-1546WT	TA30S03-2546WT	TA30S03-0104GC
YMC-Triart C8	2.0	TO12S03-0502WT	TO12S03-L502WT	TO12S03-1002WT	TO12S03-1502WT	TO12S03-2502WT	TO12S03-01Q1GC
	2.1	TO12S03-05Q1PTH	TO12S03-L5Q1PTH	TO12S03-10Q1PTH	TO12S03-15Q1PTH	TO12S03-25Q1PTH	TO12S03-01Q1GC
	3.0	TO12S03-0503WT	TO12S03-L503WT	TO12S03-1003WT	TO12S03-1503WT	TO12S03-2503WT	TO12S03-0103GC
	4.6	TO12S03-0546WT	TO12S03-L546WT	TO12S03-1046WT	TO12S03-1546WT	TO12S03-2546WT	TO12S03-0104GC
YMC-Triart Bio C4	2.0	TB30S03-0502WT	TB30S03-L502WT	TB30S03-1002WT	TB30S03-1502WT	TB30S03-2502WT	TB30S03-01Q1GC
	2.1	TB30S03-05Q1PTH	TB30S03-L5Q1PTH	TB30S03-10Q1PTH	TB30S03-15Q1PTH	TB30S03-25Q1PTH	TB30S03-01Q1GC
	3.0	TB30S03-0503WT	TB30S03-L503WT	TB30S03-1003WT	TB30S03-1503WT	TB30S03-2503WT	TB30S03-0103GC
	4.6	TB30S03-0546WT	TB30S03-L546WT	TB30S03-1046WT	TB30S03-1546WT	TB30S03-2546WT	TB30S03-0104GC
Hydrosphere C18	2.0	HS12S03-0502WT	HS12S03-L502WT	HS12S03-1002WT	HS12S03-1502WT	HS12S03-2502WT	HS12S03-01Q1GC
	2.1	HS12S03-05Q1WT	HS12S03-L5Q1WT	HS12S03-10Q1WT	HS12S03-15Q1WT	HS12S03-25Q1WT	HS12S03-01Q1GC
	3.0	HS12S03-0503WT	HS12S03-L503WT	HS12S03-1003WT	HS12S03-1503WT	HS12S03-2503WT	HS12S03-0103GC
	4.6	HS12S03-0546WT	HS12S03-L546WT	HS12S03-1046WT	HS12S03-1546WT	HS12S03-2546WT	HS12S03-0104GC

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

3 µm bioinert coated HPLC columns (max. pressure 45 MPa)

Phase	Column ID [mm]	Column length [mm]		
		50	100	150
YMC-Accura Triart C18	2.1	TA12S03-05Q1PTC	TA12S03-10Q1PTC	TA12S03-15Q1PTC
	4.6	TA12S03-0546PTC	TA12S03-1046PTC	TA12S03-1546PTC
YMC-Accura Triart Bio C18	2.1	TA30S03-05Q1PTC	TA30S03-10Q1PTC	TA30S03-15Q1PTC
	4.6	TA30S03-0546PTC	TA30S03-1046PTC	TA30S03-1546PTC
YMC-Accura Triart C8	2.1	TO12S03-05Q1PTC	TO12S03-10Q1PTC	TO12S03-15Q1PTC
	4.6	TO12S03-0546PTC	TO12S03-1046PTC	TO12S03-1546PTC
YMC-Accura Triart Bio C4	2.1	TB30S03-05Q1PTC	TB30S03-10Q1PTC	TB30S03-15Q1PTC
	4.6	TB30S03-0546PTC	TB30S03-1046PTC	TB30S03-1546PTC

3 µm PEEK-lined HPLC columns (max. pressure 45 MPa)

Phase	Column ID [mm]	Column length [mm]		
		50	100	150
YMC-Triart C18 metal-free	2.1	TA12S03-05Q1PTP	TA12S03-10Q1PTP	TA12S03-15Q1PTP
	4.6	TA12S03-0546PTP	TA12S03-1046PTP	TA12S03-1546PTP
YMC-Triart Bio C18 metal-free	2.1	TA30S03-05Q1PTP	TA30S03-10Q1PTP	TA30S03-15Q1PTP
	4.6	TA30S03-0546PTP	TA30S03-1046PTP	TA30S03-1546PTP
YMC-Triart C8 metal-free	2.1	TO12S03-05Q1PTP	TO12S03-10Q1PTP	TO12S03-15Q1PTP
	4.6	TO12S03-0546PTP	TO12S03-1046PTP	TO12S03-1546PTP
YMC-Triart Bio C4 metal-free	2.1	TB30S03-05Q1PTP	TB30S03-10Q1PTP	TB30S03-15Q1PTP
	4.6	TB30S03-0546PTP	TB30S03-1046PTP	TB30S03-1546PTP

Special column connectors required.

2.7 µm Core-Shell columns (max. pressure 60 MPa)

Phase	Column ID [mm]	Column length [mm]					Precolumn filter 0.5 µm*
		30	50	75	100	150	(pack of 5)
Meteoric Core C18 BIO	2.1	CAW16SQ7-03Q1PT	CAW16SQ7-05Q1PT	CAW16SQ7-L5Q1PT	CAW16SQ7-10Q1PT	CAW16SQ7-15Q1PT	XRPRCS35
	3.0	CAW16SQ7-0303PT	CAW16SQ7-0503PT	CAW16SQ7-L503PT	CAW16SQ7-1003PT	CAW16SQ7-1503PT	
	4.6	CAW16SQ7-0346PT	CAW16SQ7-0546PT	CAW16SQ7-L546PT	CAW16SQ7-1046PT	CAW16SQ7-1546PT	

*Holder required, part no. XRPRCS03

5 µm HPLC columns (max. pressure 25-45 MPa, 10 MPa (10 mm ID))

Phase	Column ID [mm]	Column length [mm]					Guard cartridges* with 10 mm length
		50	75	100	150	250	(pack of 5/2)
YMC-Triart C18	2.0	TA12S05-0502WT	TA12S05-L502WT	TA12S05-1002WT	TA12S05-1502WT	TA12S05-2502WT	TA12S05-01Q1GC
	2.1	TA12S05-05Q1PTH	TA12S05-L5Q1PTH	TA12S05-10Q1PTH	TA12S05-15Q1PTH	TA12S05-25Q1PTH	TA12S05-01Q1GC
	3.0	TA12S05-0503WT	TA12S05-L503WT	TA12S05-1003WT	TA12S05-1503WT	TA12S05-2503WT	TA12S05-0103GC
	4.6	TA12S05-0546WT	TA12S05-L546WT	TA12S05-1046WT	TA12S05-1546WT	TA12S05-2546WT	TA12S05-0104GC
	10	TA12S05-0510WT	–	TA12S05-1010WT	TA12S05-1510WT	TA12S05-2510WT	TA12S05-0110CC
YMC-Triart Bio C18	2.0	TA30S05-0502WT	TA30S05-L502WT	TA30S05-1002WT	TA30S05-1502WT	TA30S05-2502WT	TA30S05-01Q1GC
	2.1	TA30S05-05Q1PTH	TA30S05-L5Q1PTH	TA30S05-10Q1PTH	TA30S05-15Q1PTH	TA30S05-25Q1PTH	TA30S05-01Q1GC
	3.0	TA30S05-0503WT	TA30S05-L503WT	TA30S05-1003WT	TA30S05-1503WT	TA30S05-2503WT	TA30S05-0103GC
	4.6	TA30S05-0546WT	TA30S05-L546WT	TA30S05-1046WT	TA30S05-1546WT	TA30S05-2546WT	TA30S05-0104GC
	10	TA30S05-0510WT	–	–	TA3S05-1510WT	TA30S05-2510WT	TA30S05-0110CC
YMC-Triart C8	2.0	TO12S05-0502WT	TO12S05-L502WT	TO12S05-1002WT	TO12S05-1502WT	TO12S05-2502WT	TO12S05-01Q1GC
	2.1	TO12S05-05Q1PTH	TO12S05-L5Q1PTH	TO12S05-10Q1PTH	TO12S05-15Q1PTH	TO12S05-25Q1PTH	TO12S05-01Q1GC
	3.0	TO12S05-0503WT	TO12S05-L503WT	TO12S05-1003WT	TO12S05-1503WT	TO12S05-2503WT	TO12S05-0103GC
	4.6	TO12S05-0546WT	TO12S05-L546WT	TO12S05-1046WT	TO12S05-1546WT	TO12S05-2546WT	TO12S05-0104GC
	10	TO12S05-0510WT	–	–	TO12S05-1510WT	TO12S05-2510WT	TO12S05-0110CC
YMC-Triart Bio C4	2.0	TB30S05-0502WT	TB30S05-L502WT	TB30S05-1002WT	TB30S05-1502WT	TB30S05-2502WT	TB30S05-01Q1GC
	2.1	TB30S05-05Q1PTH	TB30S05-L5Q1PTH	TB30S05-10Q1PTH	TB30S05-15Q1PTH	TB30S05-25Q1PTH	TB30S05-01Q1GC
	3.0	TB30S05-0503WT	TB30S05-L503WT	TB30S05-1003WT	TB30S05-1503WT	TB30S05-2503WT	TB30S05-0103GC
	4.6	TB30S05-0546WT	TB30S05-L546WT	TB30S05-1046WT	TB30S05-1546WT	TB30S05-2546WT	TB30S05-0104GC
	10	TB30S05-0510WT	–	–	TB30S05-1510WT	TB30S05-2510WT	TB30S05-0110CC
Hydrosphere C18	2.0	HS12S05-0502WT	HS12S05-L502WT	HS12S05-1002WT	HS12S05-1502WT	HS12S05-2502WT	HS12S05-01Q1GC
	2.1	HS12S05-05Q1WT	HS12S05-L5Q1WT	HS12S05-10Q1WT	HS12S05-15Q1WT	HS12S05-25Q1WT	HS12S05-01Q1GC
	3.0	HS12S05-0503WT	HS12S05-L503WT	HS12S05-1003WT	HS12S05-1503WT	HS12S05-2503WT	HS12S05-0103GC
	4.6	HS12S05-0546WT	HS12S05-L546WT	HS12S05-1046WT	HS12S05-1546WT	HS12S05-2546WT	HS12S05-0104GC
	10	HS12S05-0510WT	–	–	HS12S05-1510WT	HS12S05-2510WT	HS12S05-0110CC

*Guard cartridge holder required, part no. XPGCH-Q1
XPCHSPW1 (10 mm ID)

5 µm bioinert coated HPLC columns (max. pressure 45 MPa)

Phase	Column ID [mm]	Column length [mm]		
		50	100	150
YMC-Accura Triart C18	2.1	TA12S05-05Q1PTC	TA12S05-10Q1PTC	TA12S05-15Q1PTC
	4.6	TA12S05-0546PTC	TA12S05-1046PTC	TA12S05-1546PTC
YMC-Accura Triart Bio C18	2.1	TA30S05-05Q1PTC	TA30S05-10Q1PTC	TA30S05-15Q1PTC
	4.6	TA30S05-0546PTC	TA30S05-1046PTC	TA30S05-1546PTC
YMC-Accura Triart C8	2.1	TO12S05-05Q1PTC	TO12S05-10Q1PTC	TO12S05-15Q1PTC
	4.6	TO12S05-0546PTC	TO12S05-1046PTC	TO12S05-1546PTC
YMC-Accura Triart Bio C4	2.1	TB30S05-05Q1PTC	TB30S05-10Q1PTC	TB30S05-15Q1PTC
	4.6	TB30S05-0546PTC	TB30S05-1046PTC	TB30S05-1546PTC

RP – Ordering information

5 µm PEEK-lined HPLC columns (max. pressure 45 MPa)

Phase	Column ID [mm]	Column length [mm]		
		50	100	150
YMC-Triart C18 metal-free	2.1	TA12S05-05Q1PTP	TA12S05-10Q1PTP	TA12S05-15Q1PTP
	4.6	TA12S05-0546PTP	TA12S05-1046PTP	TA12S05-1546PTP
YMC-Triart Bio C18 metal-free	2.1	TA30S05-05Q1PTP	TA30S05-10Q1PTP	TA30S05-15Q1PTP
	4.6	TA30S05-0546PTP	TA30S05-1046PTP	TA30S05-1546PTP
YMC-Triart C8 metal-free	2.1	TO12S05-05Q1PTP	TO12S05-10Q1PTP	TO12S05-15Q1PTP
	4.6	TO12S05-0546PTP	TO12S05-1046PTP	TO12S05-1546PTP
YMC-Triart Bio C4 metal-free	2.1	TB30S05-05Q1PTP	TB30S05-10Q1PTP	TB30S05-15Q1PTP
	4.6	TB30S05-0546PTP	TB30S05-1046PTP	TB30S05-1546PTP

Special column connectors required.

5 µm YMC-Actus high-throughput (semi)preparative columns (max. pressure 20–30 MPa)

Phase	Column ID [mm]	Column length [mm]					Guard cartridges* with 10 mm length
		50	75	100	150	250	(pack of 2)
YMC-Triart C18	20	TA12S05-0520WX	TA12S05-L520WX	TA12S05-1020WX	TA12S05-1520WX	TA12S05-2520WX	TA12S05-0120CCN
	30	TA12S05-0530WX	TA12S05-L530WX	TA12S05-1030WX	TA12S05-1530WX	TA12S05-2530WX	TA12S05-0130CCN
	50	TA12S05-0553DX	–	TA12S05-1053DX	TA12S05-1553DX	TA12S05-2553DX	TA12S05-0553DXG**
YMC-Triart Bio C18	20	TA30S05-0520WX	TA30S05-L520WX	TA30S05-1020WX	TA30S05-1520WX	TA30S05-2520WX	TA30S05-0120CCN
	30	TA30S05-0530WX	TA30S05-L530WX	TA30S05-1030WX	TA30S05-1530WX	TA30S05-2530WX	TA30S05-0130CCN
	50	TA30S05-0553DX	–	TA30S05-1053DX	TA30S05-1553DX	TA30S05-2553DX	TA30S05-0553DXG**
YMC-Triart C8	20	TO12S05-0520WX	TO12S05-L520WX	TO12S05-1020WX	TO12S05-1520WX	TO12S05-2520WX	TO12S05-0120CCN
	30	TO12S05-0530WX	TO12S05-L530WX	TO12S05-1030WX	TO12S05-1530WX	TO12S05-2530WX	TO12S05-0130CCN
	50	TO12S05-0553DX	–	TO12S05-1053DX	TO12S05-1553DX	TO12S05-2553DX	TO12S05-0553DXG**
YMC-Triart Bio C4	20	TB30S05-0520WX	TB30S05-L520WX	TB30S05-1020WX	TB30S05-1520WX	TB30S05-2520WX	TB30S05-0120CCN
	30	TB30S05-0530WX	TB30S05-L530WX	TB30S05-1030WX	TB30S05-1530WX	TB30S05-2530WX	TB30S05-0130CCN
	50	TB30S05-0553DX	–	TB30S05-1053DX	TB30S05-1553DX	TB30S05-2553DX	TB30S05-0553DXG**
Hydrosphere C18	20	HS12S05-0520WX	HS12S05-L520WX	HS12S05-1020WX	HS12S05-1520WX	HS12S05-2520WX	HS12S05-0120CCN
	30	HS12S05-0530WX	HS12S05-L530WX	HS12S05-1030WX	HS12S05-1530WX	HS12S05-2530WX	HS12S05-0130CCN

*Guard cartridge holder required, part no. XPGHF2P20ID (20 mm ID)
XPGHF2P30ID (30 mm ID)
no holder required for 50 mm