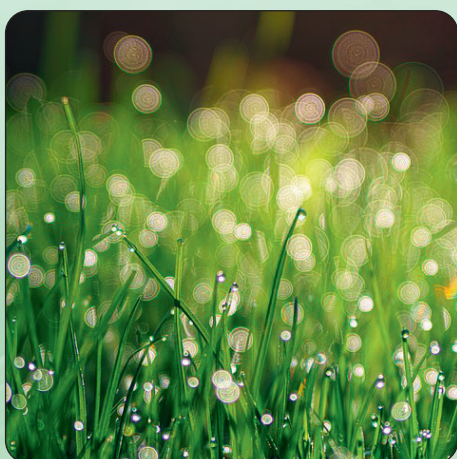


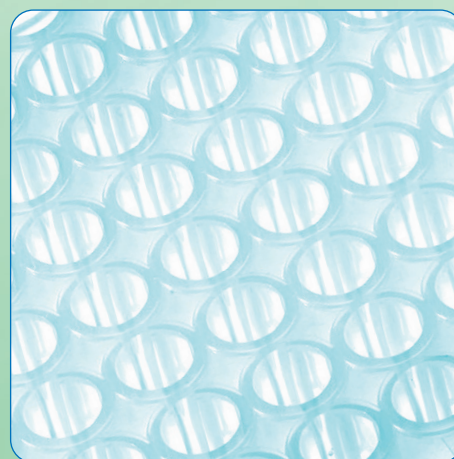


Sensitivity · Selectivity · Robustness

# YMC Capillary Columns for MicroLC and NanoLC



Drug Discovery  
Life Science  
Bioanalysis  
Food  
Environmental



# Introduction

Miniaturisation of liquid chromatography in combination with mass spectrometry has several advantages including improvements in sensitivity, especially at low concentration levels and dramatically reduced solvent consumption, compared to conventional HPLC or UHPLC.

With further method optimisation, run time can also be reduced and therefore more solvent or time can be saved. To meet the requirements of MicroLC/NanoLC YMC offers capillary columns especially designed for rapid high-resolution gradient chromatography.

## Selectivity:

- All fully porous YMC phases
- Phases for RP, NP, HILIC, chiral LC and SEC
- Variety of dimensions
- Particles from 1.9 to 5  $\mu\text{m}$

## Sensitivity:

- Extremely low sample volumes and flow rates
- Compatible with most Micro-/NanoLC/MS systems
- Guard columns, also for trapping/desalting

## Robustness:

- Long column lifetimes
- Exceptional column-to-column reproducibility
- Excellent lot-to-lot reproducibility



# Contents

|                                            | page  |
|--------------------------------------------|-------|
| <b>Capillary column efficiencies</b> ..... | 4–5   |
| <b>MicroLC applications</b> .....          | 6–17  |
| Clinical.....                              | 6–7   |
| Biopharma.....                             | 8–11  |
| Food.....                                  | 12–17 |
| <b>Solutions for small molecules</b> ..... | 18–19 |
| <b>Columns for biomolecules</b> .....      | 20–21 |
| <b>YMC capillary column hardware</b> ..... | 22–23 |
| <b>Ordering information</b> .....          | 24–26 |

## Columns in micro format

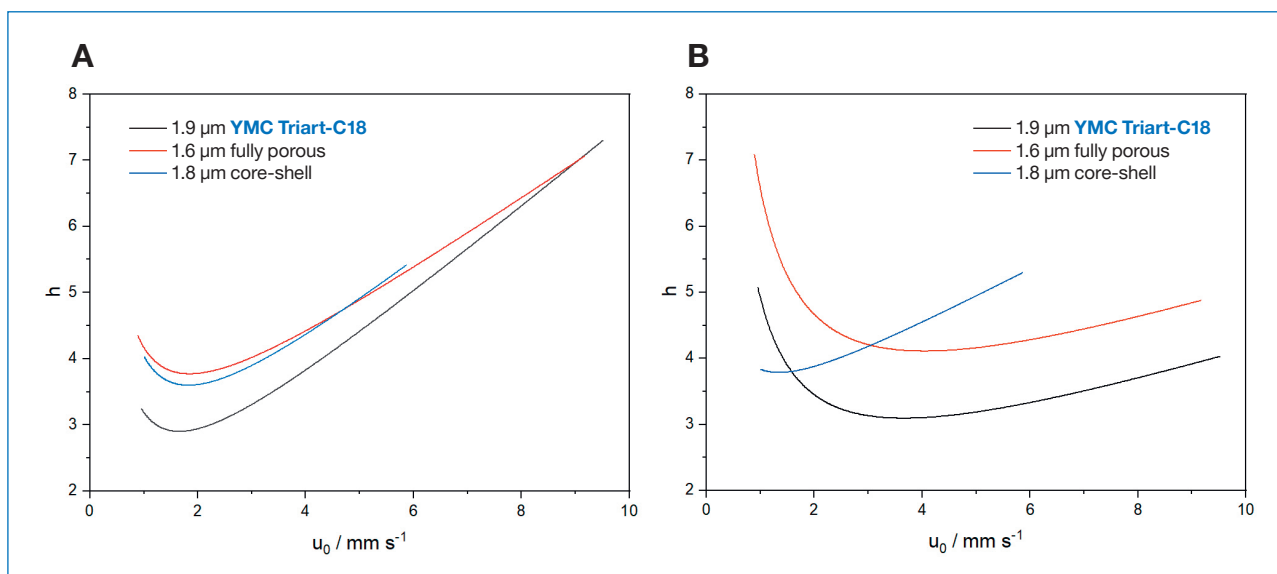
# YMC MicroLC columns: highest efficiency

YMC-Triart C18 MicroLC columns packed with 1.9  $\mu\text{m}$  particles show the highest column efficiency in an efficiency study using van Deemter analysis. Results for YMC MicroLC columns show:

- **increased resolution**
- **increased separation speed**
- **reduced solvent consumption**
- **reduced cycle times**

## Highest Efficiency: Van Deemter analysis

The diagrams show the reduced plate heights ( $h$ ) of a YMC-Triart C18 MicroLC column together with two other MicroLC columns as a function of the linear velocity at different %B. A low  $h$ -value means high column efficiency.



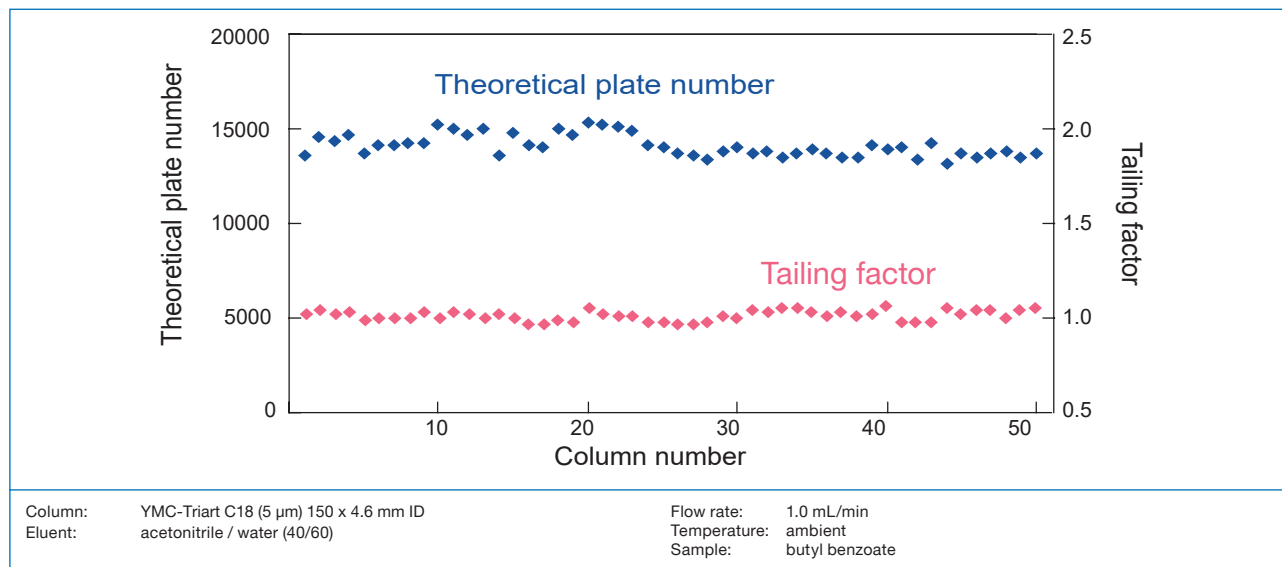
Van Deemter plots for naphthalene at retention factors of  $k' = 2$  [A] and  $k' = 11$  [B]. Experimental setup according to Hetzel et al. [1].

The YMC-Triart C18 MicroLC column shows the highest column efficiency for both retention factors of naphthalene. Neither the column packed with the nominally smaller fully porous particles, nor the one packed with the Core-Shell media show efficiencies approaching that of the YMC-Triart C18 column. Therefore, YMC-Triart MicroLC columns show higher efficiency.

Van Deemter plots by courtesy of: Tobias Werres, IUTA - Institut für Energie- und Umwelttechnik e. V., Duisburg, Germany.

[1] T. Hetzel, et al., Characterization of the efficiency of microbore liquid chromatography columns by van Deemter and kinetic plot analysis, *J.Sep.Sci.* (2016).

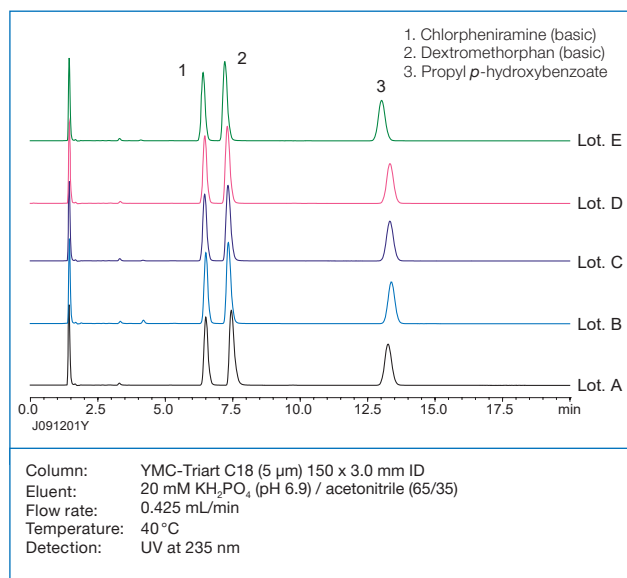
## Excellent column-to-column reproducibility



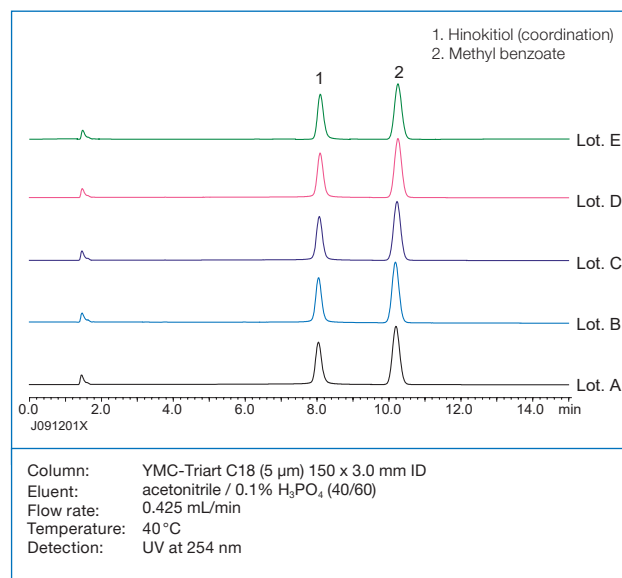
The reproducibility of packed columns is shown in terms of theoretical plate number (N) and tailing factor (Tf) for a number of different packed columns. The same is true for YMC capillary columns, which exhibit a very narrow range of variation, also due to the excellent lot-to-lot reproducibility of the packing material.

## Excellent batch-to-batch reproducibility

### Basic compounds



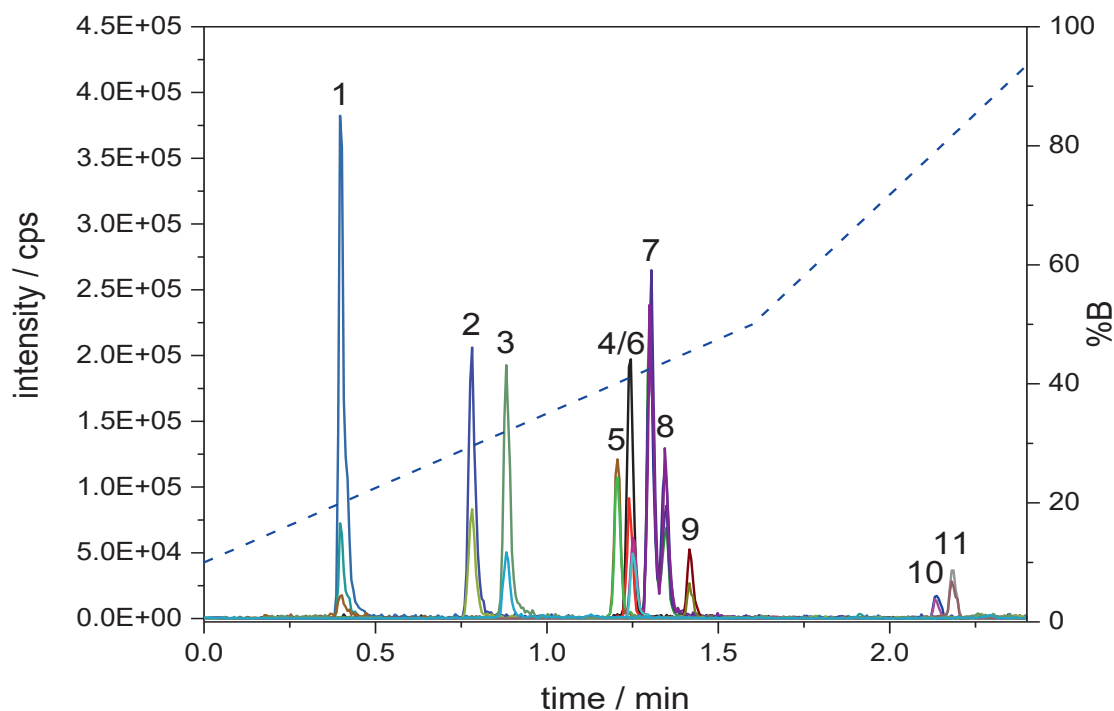
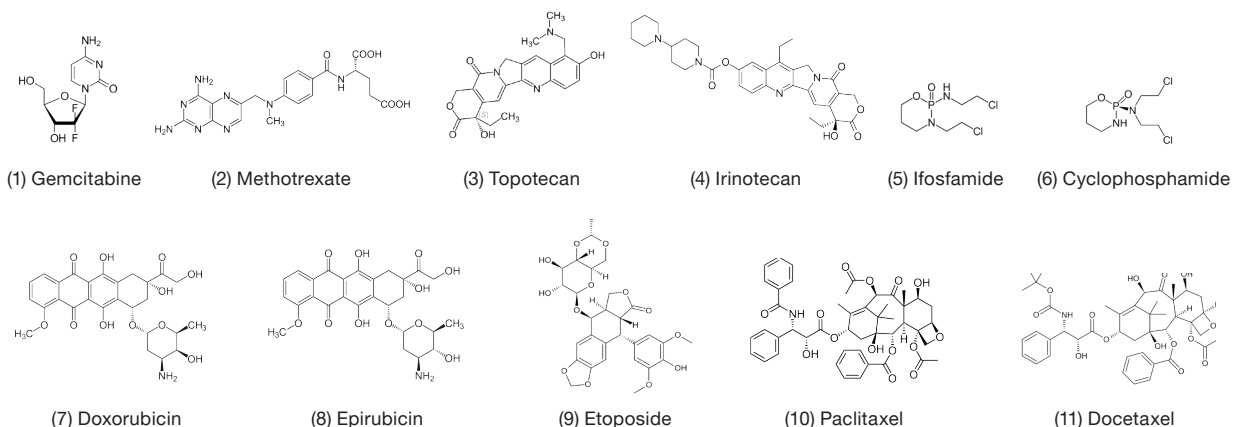
### Coordination compounds



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

# High sensitivity analysis of antineoplastic drugs from wipe samples

## Standards of 11 antineoplastic drugs

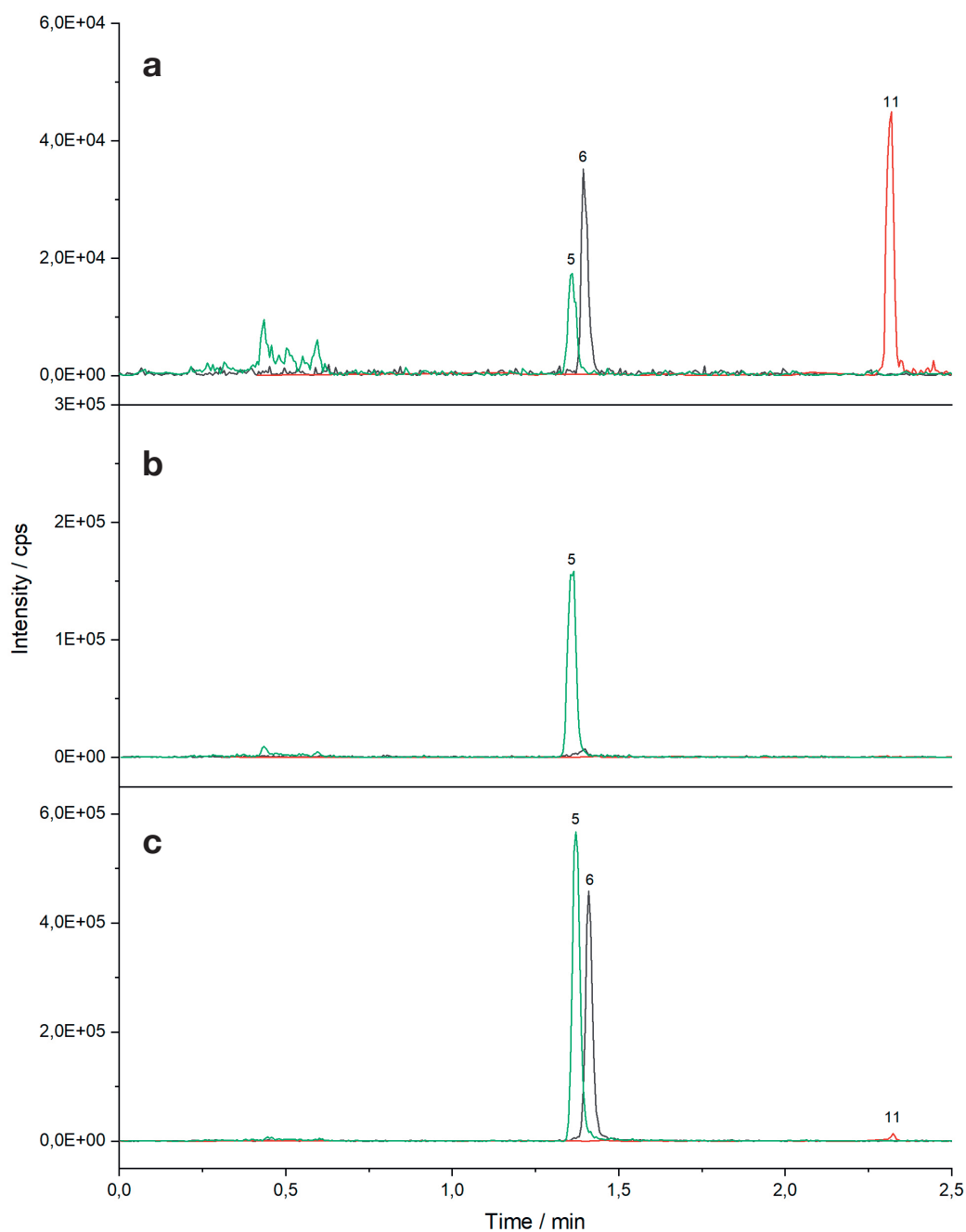


Column: YMC-Triart C18 (12 nm, 1.9  $\mu$ m) 50 x 0.3 mm ID, 1/32" end fittings  
 Eluent: A) H<sub>2</sub>O + 0.1% formic acid  
 B) acetonitrile + 0.1% formic acid  
 Gradient: 10%B (0 min), 50%B (1.6 min), 99%B (2.5 min)  
 Flow rate: 25  $\mu$ L/min  
 Temperature: 40 °C

Detection: SCIEX QTRAP 6500, ESI  
 Injection: 4.25  $\mu$ L  
 Sample: (1) gemcitabine, (2) methotrexate, (3) topotecan, (4) irinotecan, (5) ifosfamide, (6) cyclophosphamide, (7) doxorubicin, (8) epirubicin, (9) etoposide, (10) paclitaxel, (11) docetaxel (1  $\mu$ g/mL)  
 LC system: Eksigent ExpressLC ultra system

Separation of the standard samples containing 11 antineoplastic drugs. As the German substance-independent reference value for wipe samples is 0.1 ng/cm<sup>2</sup> the method was optimised to a LOQ of 0.01 ng/mL as described before by Hetzel et al [1].

## Wipe samples from different hospital locations



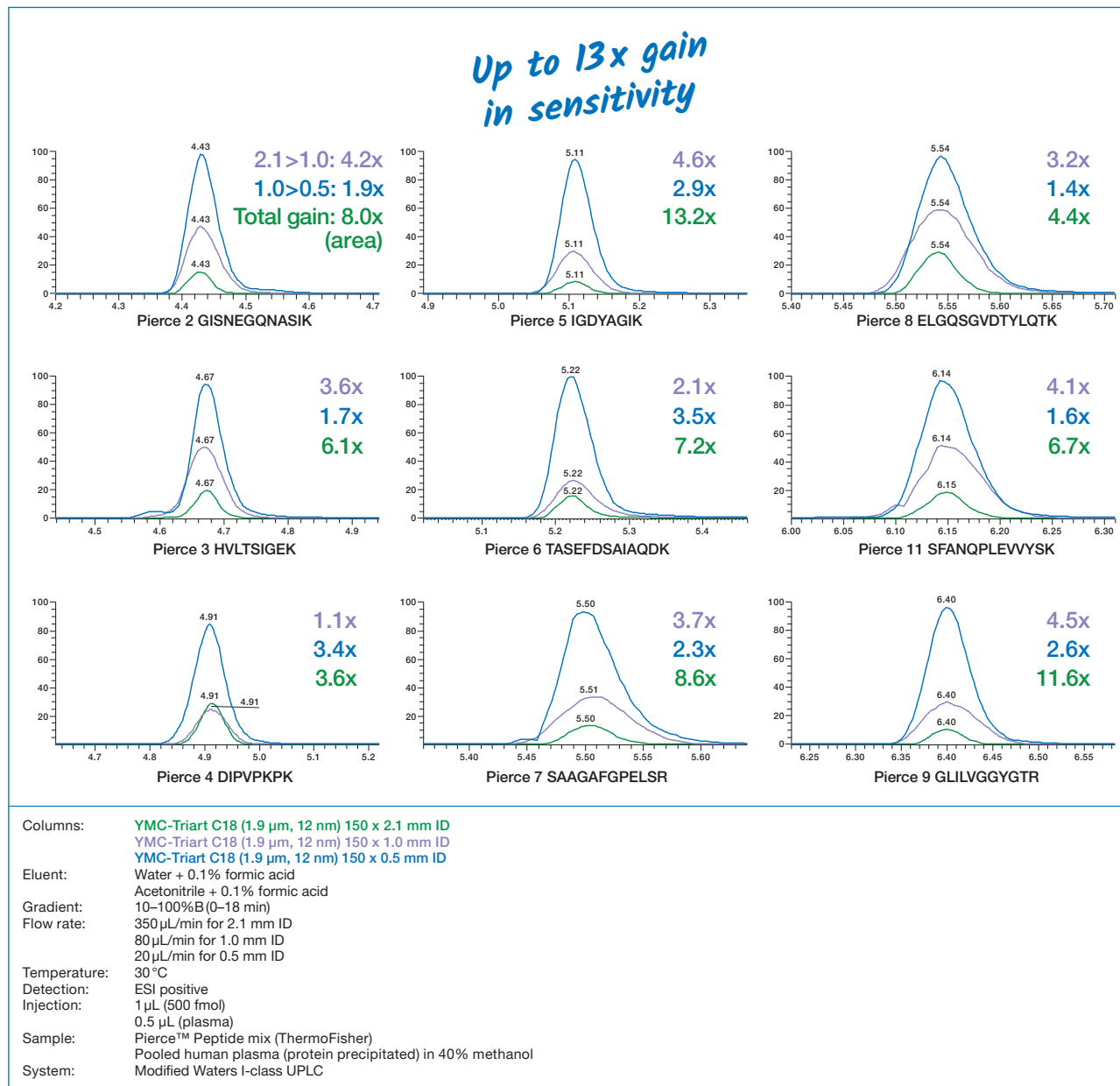
Chromatograms for 3 different real wipe samples taken from different locations in a hospital and application areas in hospital wards according to Hetzel et al. The applicability of the developed method according to Hetzel et al. for real samples and the possibility to use this method in the daily life of the pharmaceutical sector is shown [1].

Application data by courtesy of: Thorsten Teutenberg, IUTA - Institut für Energie- und Umwelttechnik e. V., Duisburg, Germany.

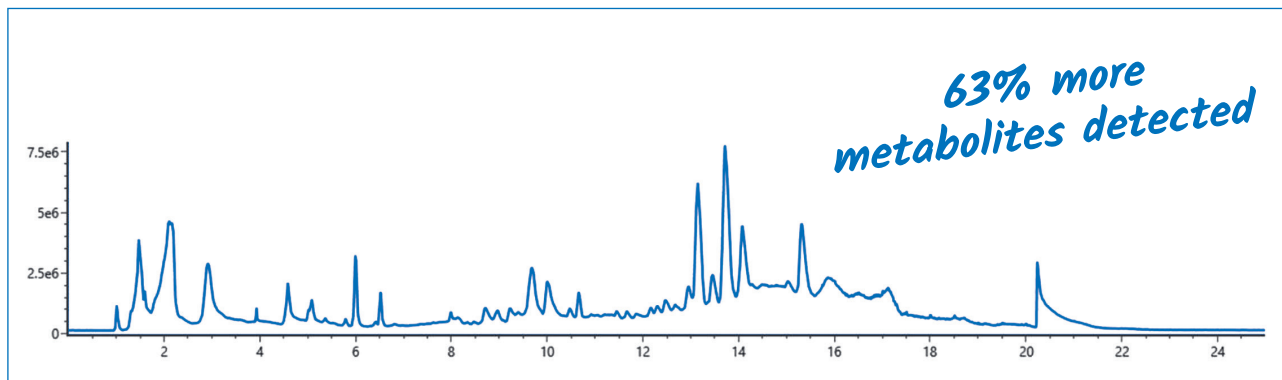
[1] T. Hetzel, et al., *Micro-liquid chromatography mass spectrometry for the analysis of antineoplastic drugs from wipe samples*, *Anal. Bioanal. Chem.* (2016).

# Increased sensitivity in peptide analysis

## Analysis of 9 different Pierce™ peptides by UHPLC and MicroLC



TIC chromatograms of a peptide mix using YMC-Triart C18 columns of different internal diameters: 2.1, 1.0 and 0.5 mm. A consequent sensitivity gain is achieved with the reduction of column internal diameter. Peak areas achieved with a 0.5 mm ID MicroLC column are up to 3.5 times higher compared to a 1.0 mm ID UHPLC column and even up to 13 times higher compared to a typical UHPLC column with 2.1 mm ID. The selectivity remains the same. Therefore, the optimum ID can easily be chosen dependent on the available sample amount and chromatographic setup in the lab [2].

**Untargeted screening of a protein precipitated plasma sample**

The increased sensitivity by the use of a MicroLC column is especially useful for untargeted profiling with limited sample amounts such as in human plasma. In this example, 63% more metabolites were detected than with the classical setup (not shown) [2].

Application data by courtesy of Sergey Girel, Institute of Pharmaceutical Sciences of Western Switzerland (University of Geneva), Geneva, Switzerland.

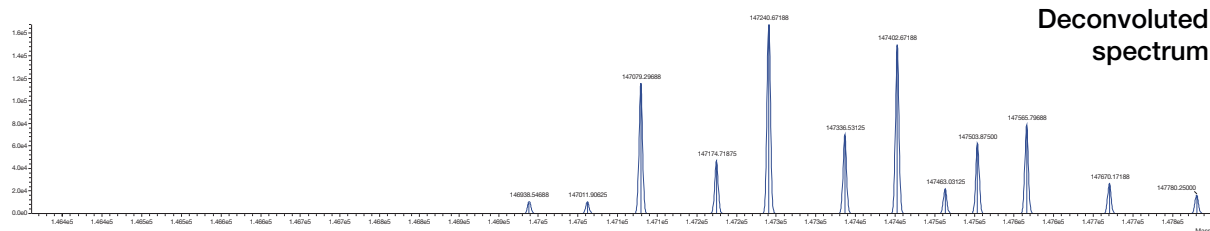
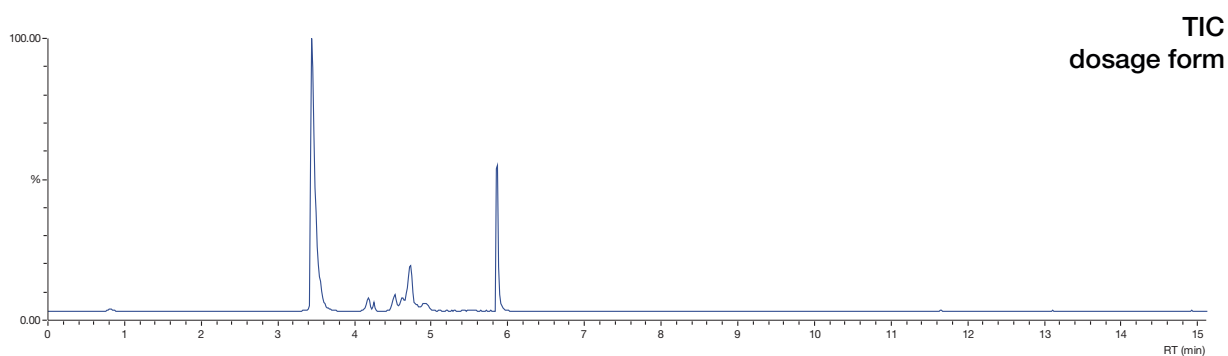
**2.1 mm ID****1.0 mm ID****0.5 mm ID**

[2] Sergey Girel, Víctor González-Ruiz, Serge Rudaz, Operating regular LC in microflow mode to enhance sensitivity and metabolome coverage, Poster (SGMS annual meeting), 2022.

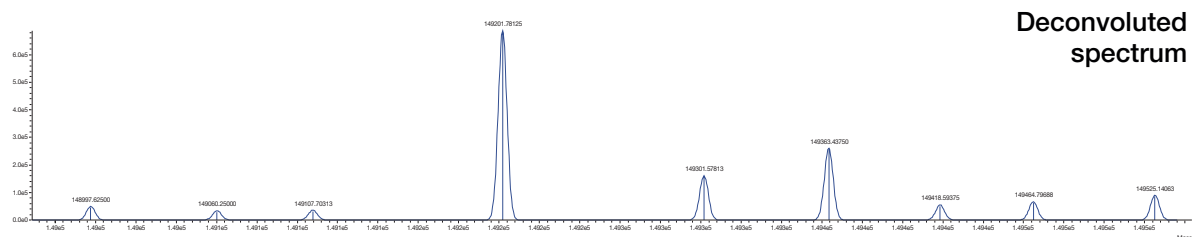
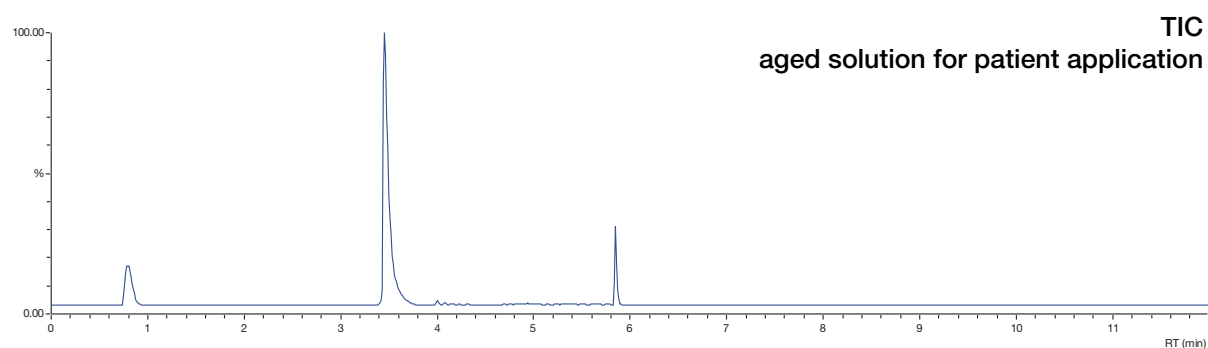
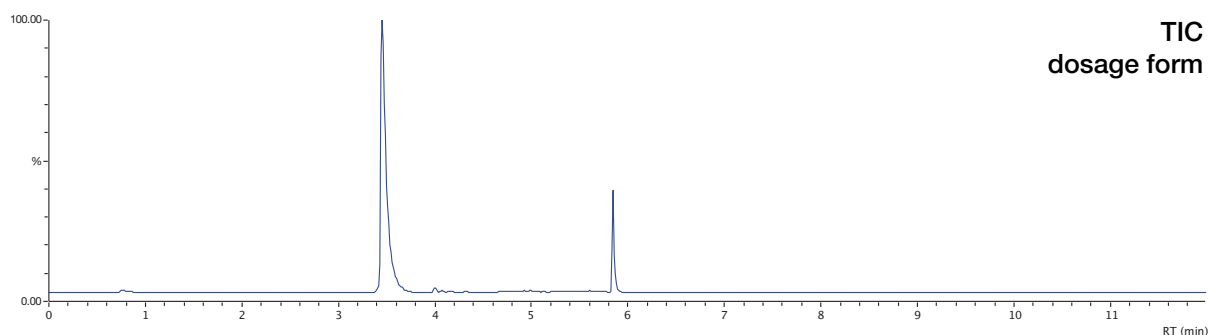
# Commercial monoclonal antibodies by MicroLC-MS

In cooperation with Shimadzu Europa

## Rituximab (MabThera®)



Column: YMC-Triart Bio C4 (30 nm, 3  $\mu$ m) 100 x 0.3 mm ID, 1/16" end fittings  
 Eluent: A) H<sub>2</sub>O + 0.1 % formic acid  
 B) acetonitrile + 0.1 % formic acid  
 Gradient: 20 %B (0–2.5 min), 20 %–100 %B (2.5–4 min), 100 %B (4–5 min), 20 %B (5–7 min)  
 Flow rate: 15  $\mu$ L/min  
 Temperature: 75 °C, 4 °C Autosampler  
 Detection: Shimadzu LCMS-9030 QTOF  
 Injection: 0.1  $\mu$ L  
 Sample: Rituximab dosage form (10 mg/mL, diluted to 0.1  $\mu$ g/mL)  
 LC system: Shimadzu Nexera Mikros

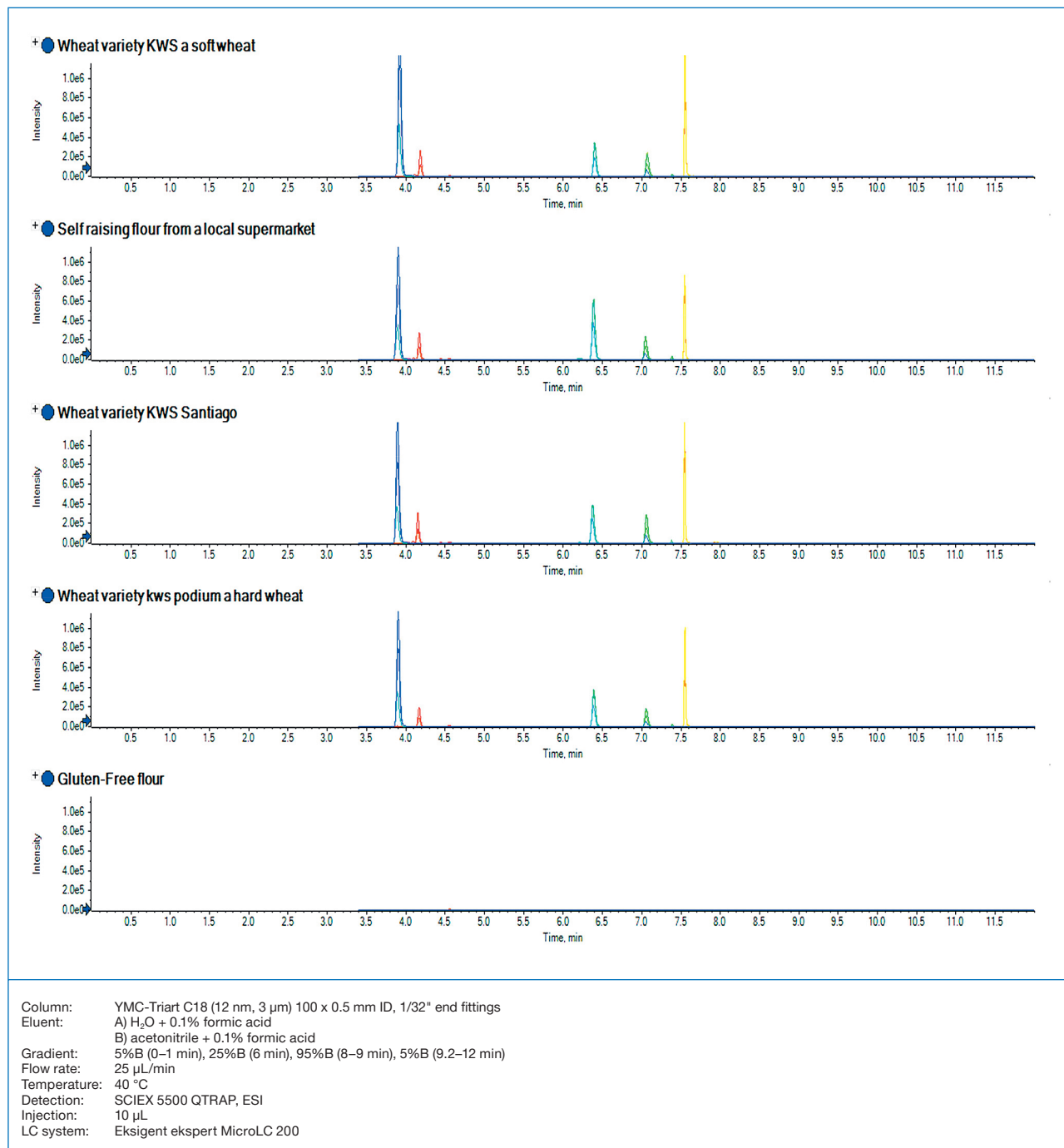
**Bevacizumab (Avastin®)**

Column: YMC-Triart Bio C4 (30 nm, 3  $\mu$ m) 100 x 0.3 mm ID, 1/16" end fittings  
 Eluent: A) H<sub>2</sub>O + 0.1% formic acid  
 B) acetonitrile + 0.1% formic acid  
 Gradient: 20 %B (0–2.5 min), 20 %–100 %B (2.5–4 min), 100 %B (4–5 min), 20 %B (5–7 min)  
 Flow rate: 15  $\mu$ L/min  
 Temperature: 75 °C, 4 °C Autosampler  
 Detection: Shimadzu LCMS-9030 QTOF  
 Injection: 0.1  $\mu$ L  
 Sample: Bevacizumab dosage form (10 mg/mL, diluted to 0.1  $\mu$ g/mL)  
 Bevacizumab solution for patient application (3 mg/mL, diluted to 0.03  $\mu$ g/mL)  
 LC system: Shimadzu Nexera Mikros

Chromatograms of intact monoclonal antibodies, Rituximab and Bevacizumab, both in dosage form. The aged solution (about 6 month old) for patient application showed an additional peak, but the mAb is still intact. This demonstrates that use of MicroLC-MS is possible to monitor amount and stability of, for example, patient solutions for injection.

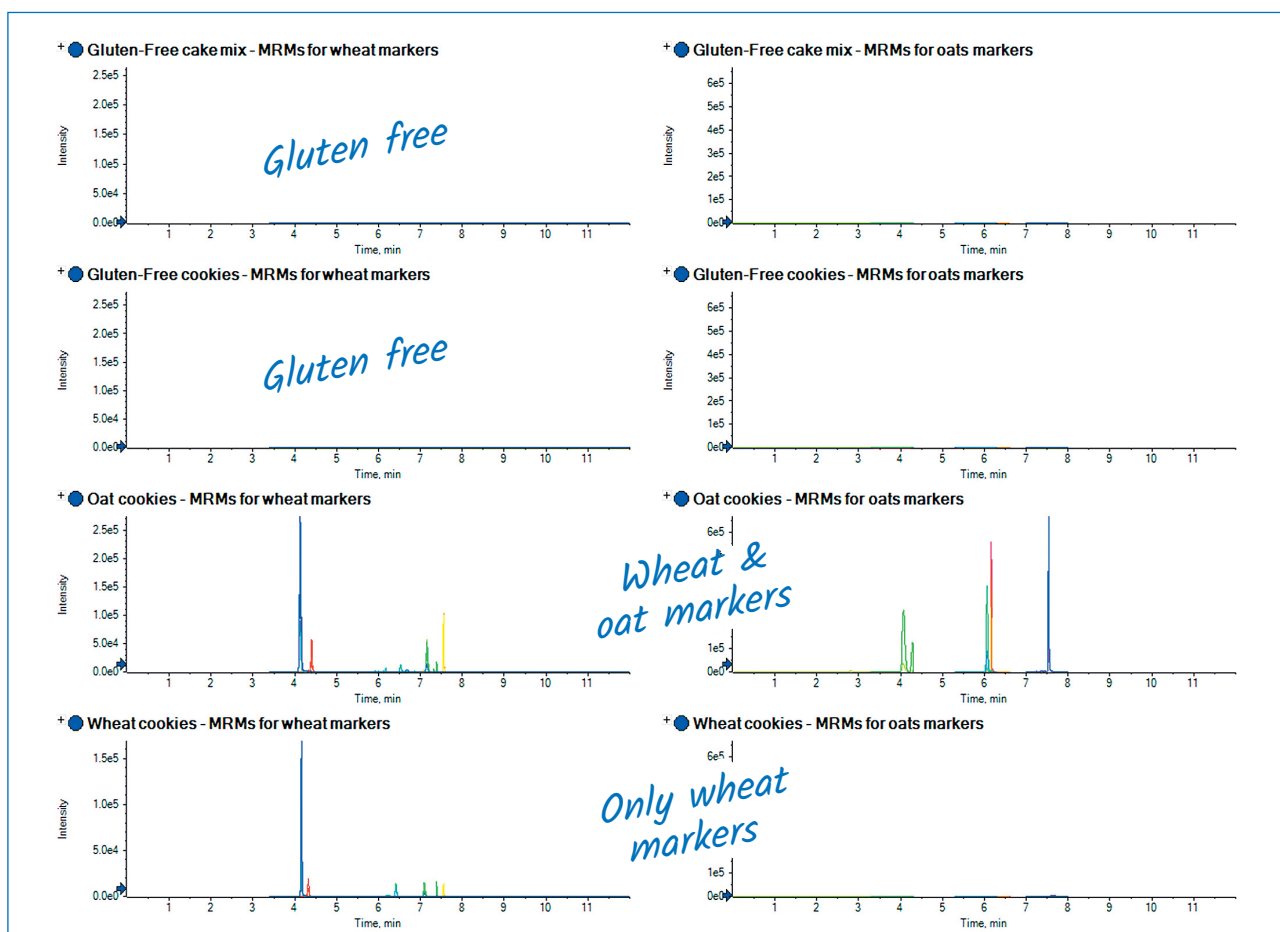
# Gluten markers in flour and cookies

## MicroLC-MS/MS analysis of gluten markers in flour



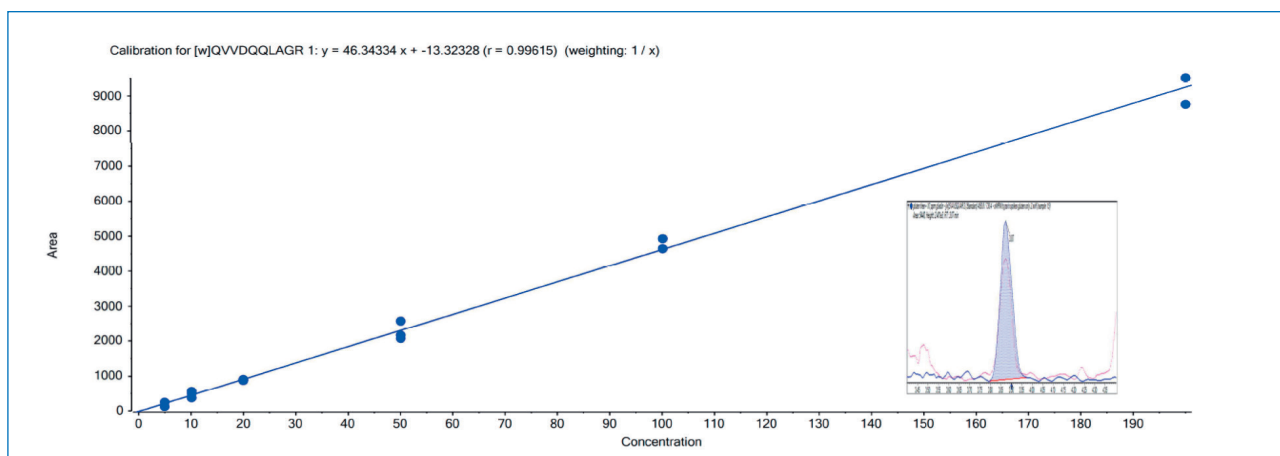
The comparison of separate extracts of several samples of wheat obtained from single variety grain samples, as well as a sample of gluten free flour and the self raising flour obtained from a local supermarket.

## MicroLC-MS/MS analysis of wheat or oat markers for gluten in cookies



It is possible to detect markers in processed food and also distinguish between varieties. In the oat cookies, wheat and oats markers were detected while in the wheat cookies only wheat peptide markers were found. The gluten free products were actually gluten free, as no markers were detectable.

## Calibration of gliadin

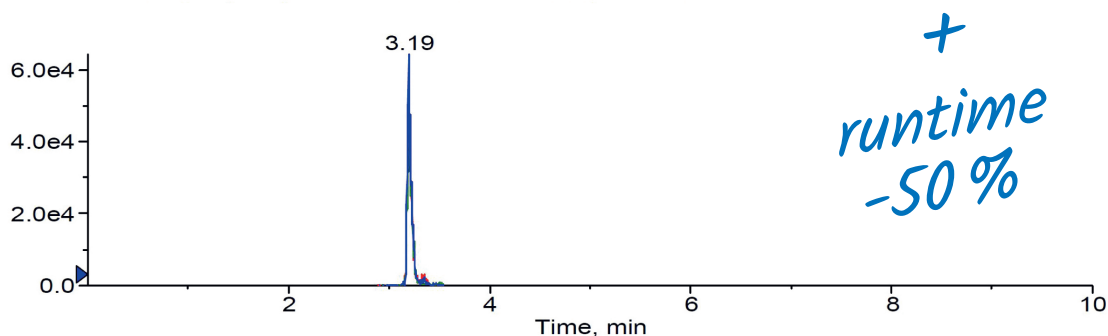
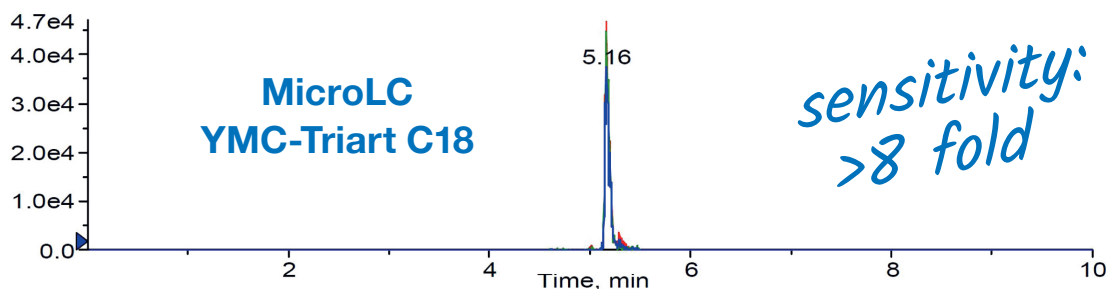
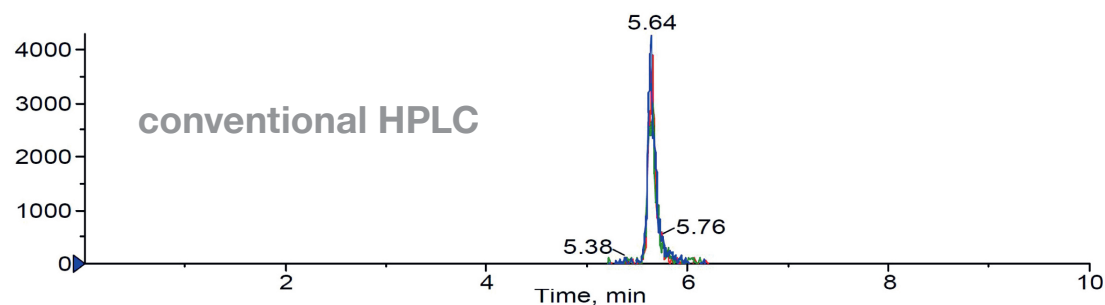


The calibration line obtained from the spiking of gliadin, a specific wheat protein, into gluten free wheat from the range of 5–200 ppm. Inlaid in the calibration line is the chromatogram for the 10 ppm spike of gliadin into gluten free flour.

Application data by courtesy of: Stephen Lock, SCIEX, Warrington (UK)

# Allergens in wine

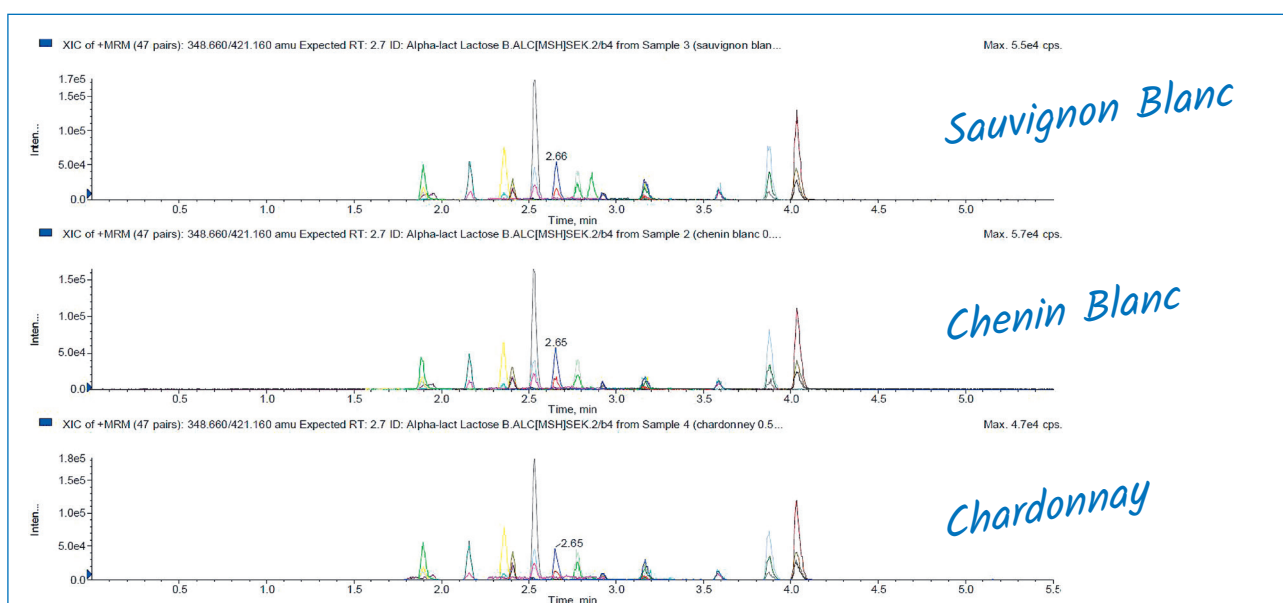
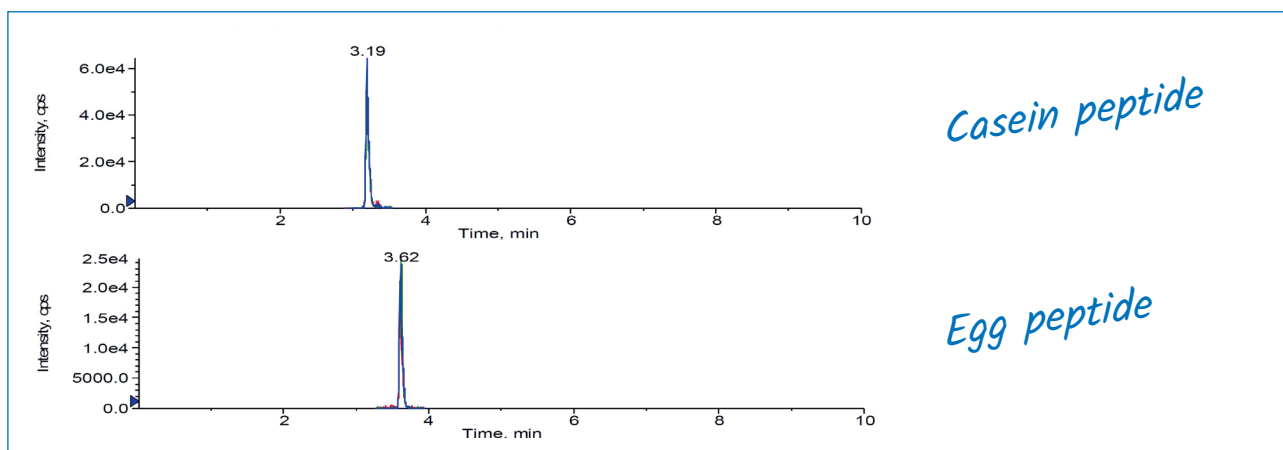
## Casein peptide analysis in white wine by HPLC and MicroLC



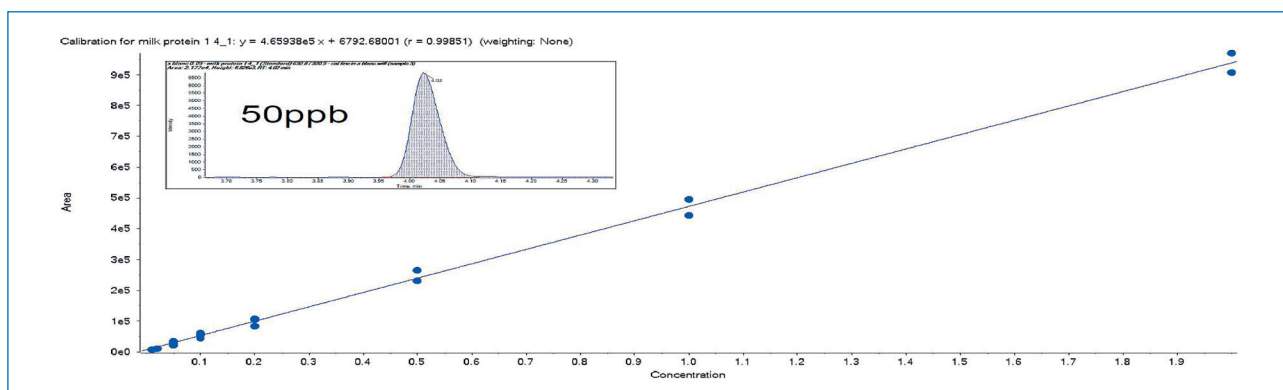
Columns: YMC-Triart C18 (12 nm, 3  $\mu$ m) 50 x 0.5 mm ID, 1/32" end fittings (MicroLC)  
Kinetex XB-C18 (10 nm, 2.6  $\mu$ m) 50 x 2.1 mm ID (HPLC)  
Eluent: A) H<sub>2</sub>O + 0.1% formic acid  
B) acetonitrile + 0.1% formic acid  
HPLC Gradient: 2%B (0–2 min), 60%B (8 min), 95%B (8.2–9 min), 2%B (9.1–10 min)  
MicroLC Gradient: 2%B (0–0.3 min), 40%B (4 min), 95%B (4.1–4.3 min), 2%B (4.4–5.5 min)  
Flow rate: 300  $\mu$ L/min (HPLC)  
25  $\mu$ L/min (MicroLC)  
Temperature: 40 °C  
Detection: SCIEX QTRAP 5500, ESI  
Injection: 10  $\mu$ L  
LC-System: Shimadzu Nexera XR (HPLC)  
Eksigent ekspert MicroLC 200

Comparison of HPLC vs. MicroLC using a white wine spiked with 1 ppm casein peptide. By using an optimised MicroLC method the sensitivity can be increased by >8 fold, while the runtime can be reduced by 50%.

## Screening of allergens in white wine by MicroLC-MS/MS



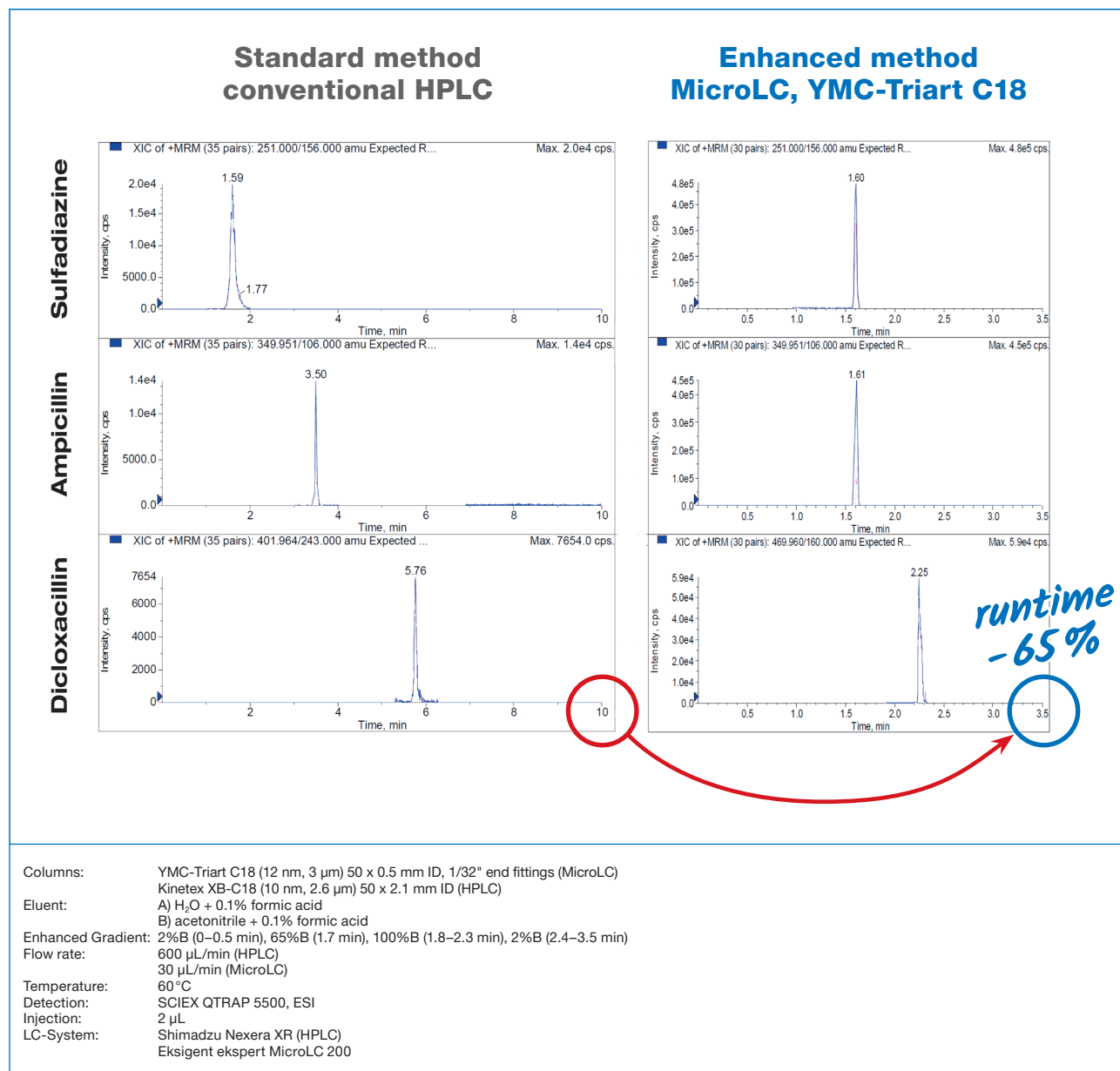
White wine samples spiked with 0.5ppm samples of milk and egg peptides were analysed. 3 different wines were analysed using the benefit of the MicroLC-MS/MS approach with the additional advantage of a multi allergen screening.



A casein peptide is spiked into a Sauvignon Blanc (0.05–2ppm) to demonstrate linearity and sensitivity. Linearity is provided without use of any internal standards. The inset chromatogram for 50ppb spiked sample demonstrates highest sensitivity.

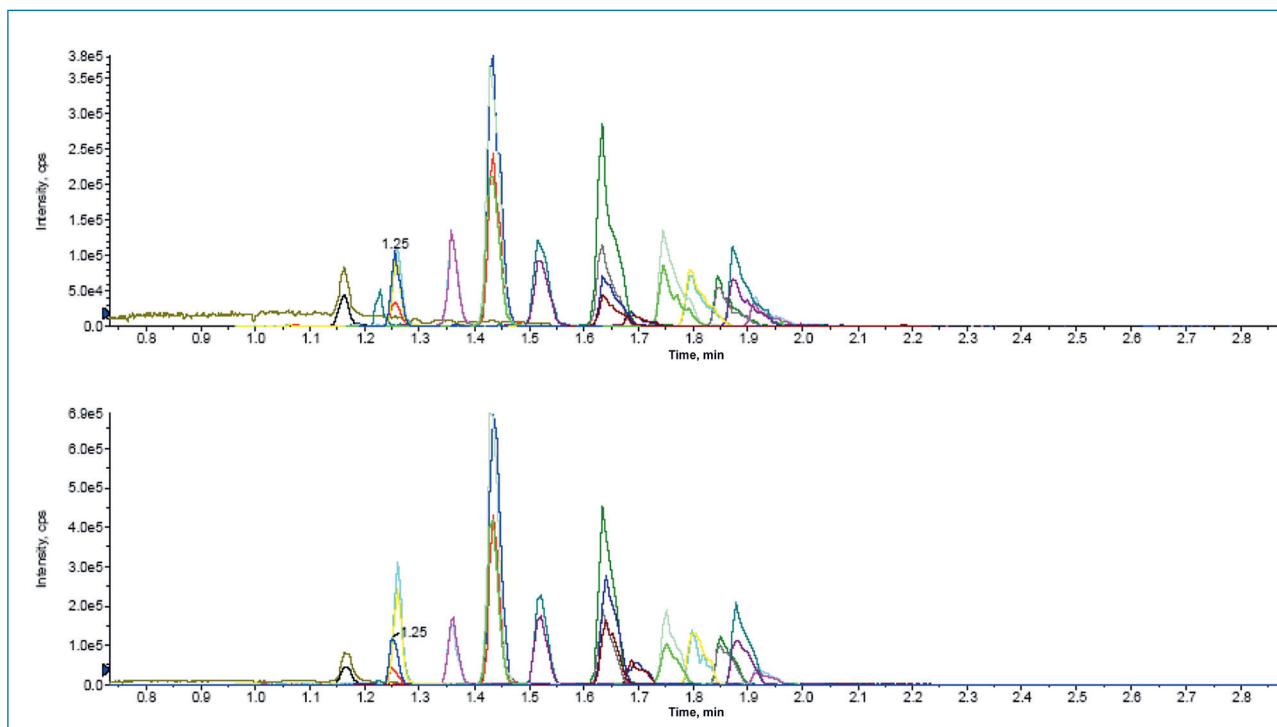
# Veterinary drug residues in food

## Veterinary drug standards analysed by HPLC and MicroLC



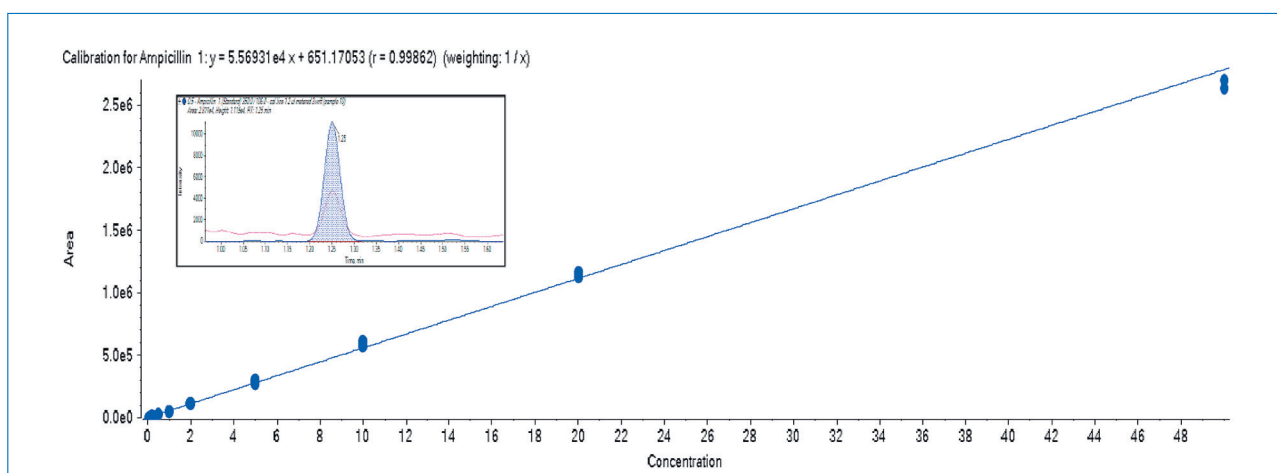
Comparison of 3 different 1 ppb standard solutions separated by a standard HPLC method using a Core-Shell C18 column (left) and the MicroLC method using a YMC-Triart C18 MicroLC column (right).

### MicroLC-MS/MS analysis of 15 different veterinary drugs in milk and meat



In the final analysis a total of 32 multiple reaction monitoring (MRM) transitions were evaluated for 15 veterinary drug residues over a 3.5 minute runtime on the YMC-Triart C18 column. Milk and meat samples have been spiked at a 10 ppb level with standard compounds. The recoveries from meat were generally higher and it shows that recoveries are affected by the matrix.

### Ampicillin calibration curve



Linearity and sensitivity of this method is demonstrated for Ampicillin from 0.05–50 ppb. Linearity is provided without use of any internal standards. The inset chromatogram for a 0.5 ppb spiked sample demonstrates the high level of sensitivity.

Application data by courtesy of: Stephen Lock, SCIEX, Warrington (UK)

Solutions for small molecules

## Phase overview YMC-Triart

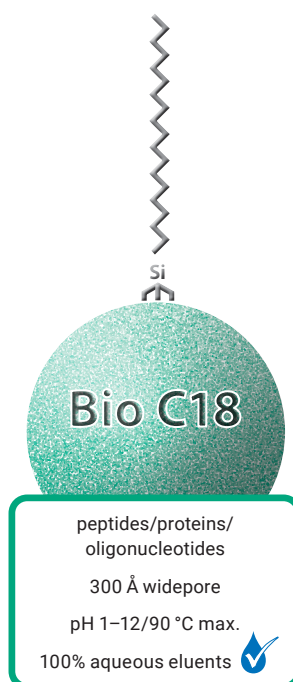
**YMC-Triart C18**



**YMC-Triart C18 ExRS**



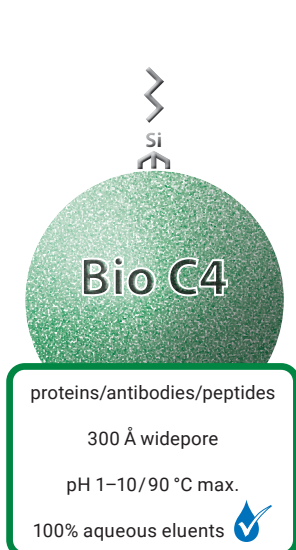
**YMC-Triart Bio C18**



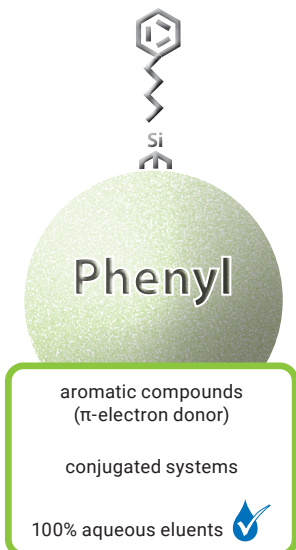
**YMC-Triart C8**



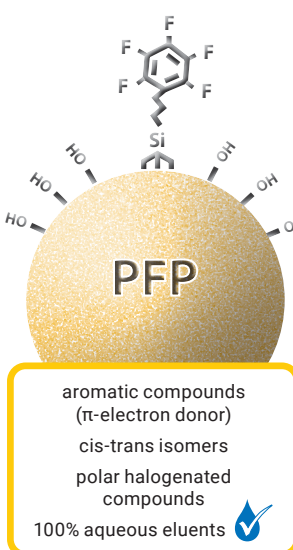
**YMC-Triart Bio C4**



**YMC-Triart Phenyl**



**YMC-Triart PFP**



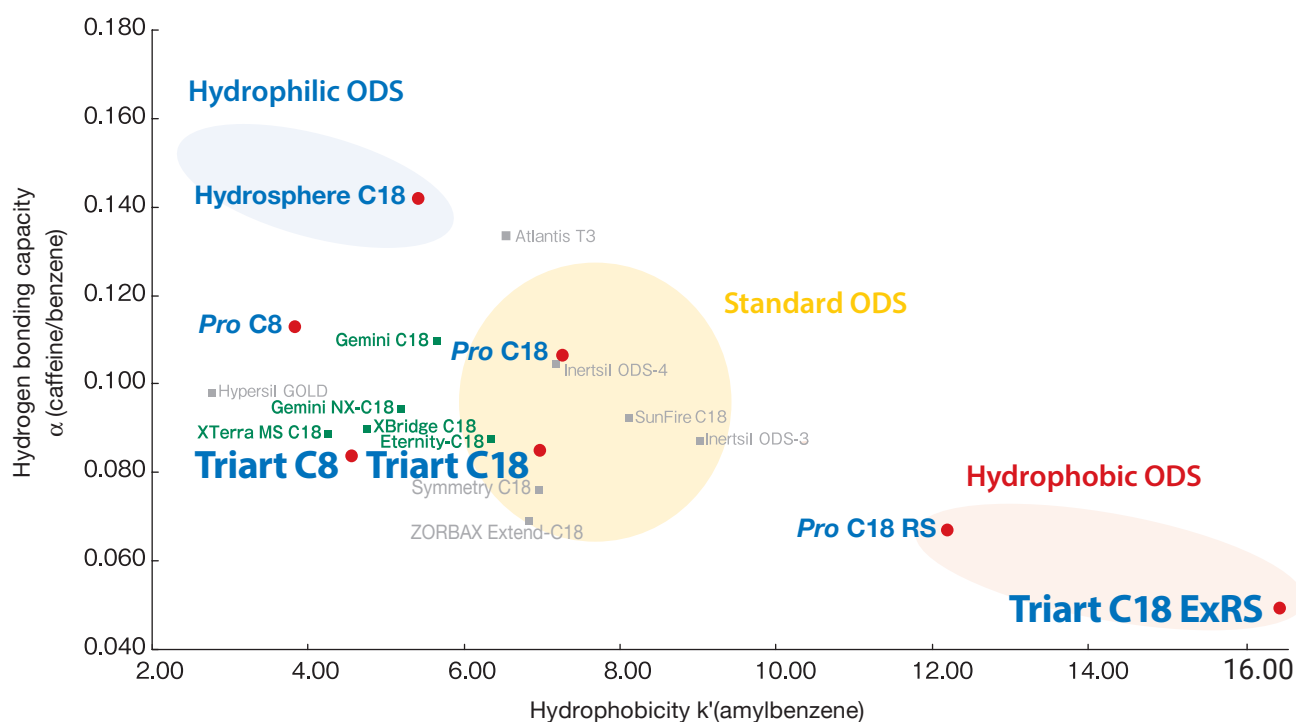
**YMC-Triart Diol-HILIC**



## Specification YMC-Triart

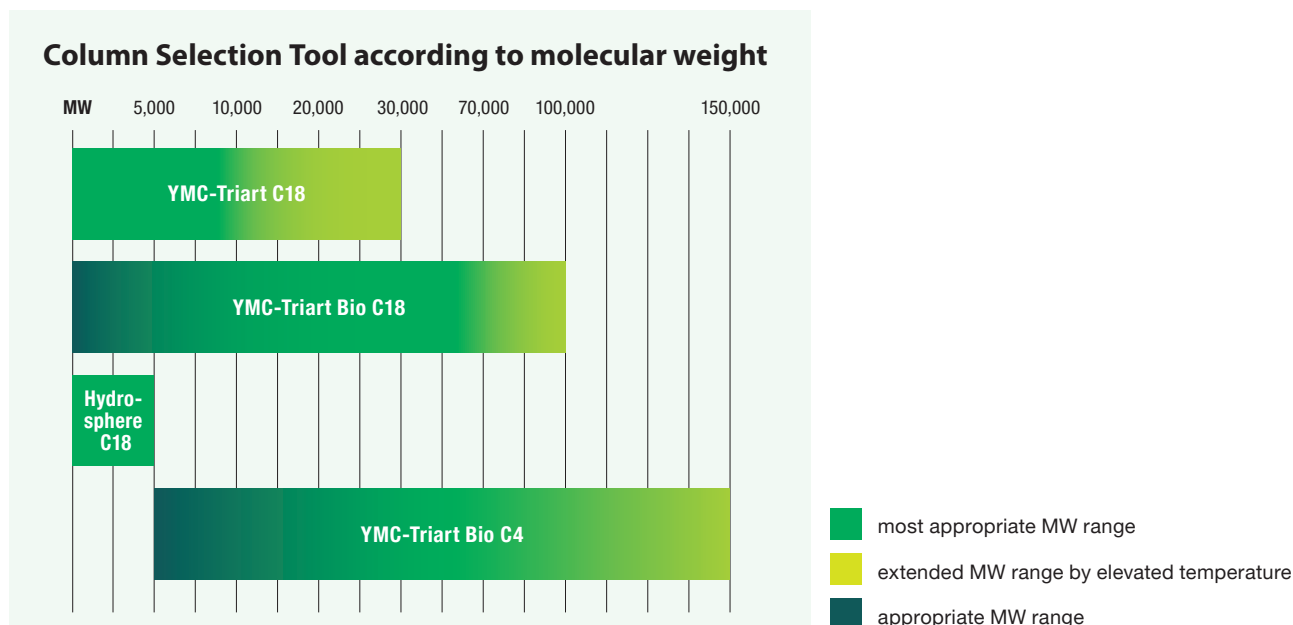
|                      | C18                             | C18 ExRS                       | Bio C18                        | C8                             | Bio C4                         | Phenyl                | PFP                          | Diol-HILIC            |
|----------------------|---------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|-----------------------|------------------------------|-----------------------|
| Base                 | organic/inorganic hybrid silica |                                |                                |                                |                                |                       |                              |                       |
| Stationary phase     | C18 (USP L1)                    | C18 (USP L1)                   | C18 (USP L1)                   | C8 (USP L7)                    | C4 (USP L26)                   | Phenyl (USP L11)      | Penta-fluorophenyl (USP L43) | Diol (USP L20)        |
| Particle size        | 1.9, 3 and 5 $\mu\text{m}$      |                                |                                |                                |                                |                       |                              |                       |
| Pore size            | 12 nm                           | 8 nm                           | 30 nm                          | 12 nm                          | 30 nm                          | 12 nm                 | 12 nm                        | 12 nm                 |
| Specific surface     | 360 m <sup>2</sup> /g           | 430 m <sup>2</sup> /g          | —                              | 360 m <sup>2</sup> /g          | —                              | 360 m <sup>2</sup> /g | 360 m <sup>2</sup> /g        | 360 m <sup>2</sup> /g |
| Carbon content       | 20%                             | 25%                            | —                              | 17%                            | —                              | 17%                   | 15%                          | —                     |
| Bonding              | trifunctional                   |                                |                                |                                |                                |                       |                              |                       |
| Endcapping           | multi-stage                     | multi-stage                    | multi-stage                    | multi-stage                    | multi-stage                    | multi-stage           | none                         | none                  |
| pH range             | 1 ~ 12                          | 1 ~ 12                         | 1 ~ 12                         | 1 ~ 12                         | 1 ~ 10                         | 1 ~ 10                | 1 ~ 8                        | 2 ~ 10                |
| Temperature range    | pH < 7: 90 °C<br>pH > 7: 50 °C  | pH < 7: 90 °C<br>pH > 7: 50 °C | pH < 9: 90 °C<br>pH > 9: 50 °C | pH < 7: 90 °C<br>pH > 7: 50 °C | pH < 7: 90 °C<br>pH > 7: 50 °C | 50 °C                 | 50 °C                        | 50 °C                 |
| 100% aqueous eluents | ✓                               | ✗                              | ✓                              | ✗                              | ✓                              | ✓                     | ✓                            | ✓                     |

## First choice for method development



## Columns for biomolecules

# BioLC phase selection



## Selectivities for proteins/peptides and antibodies

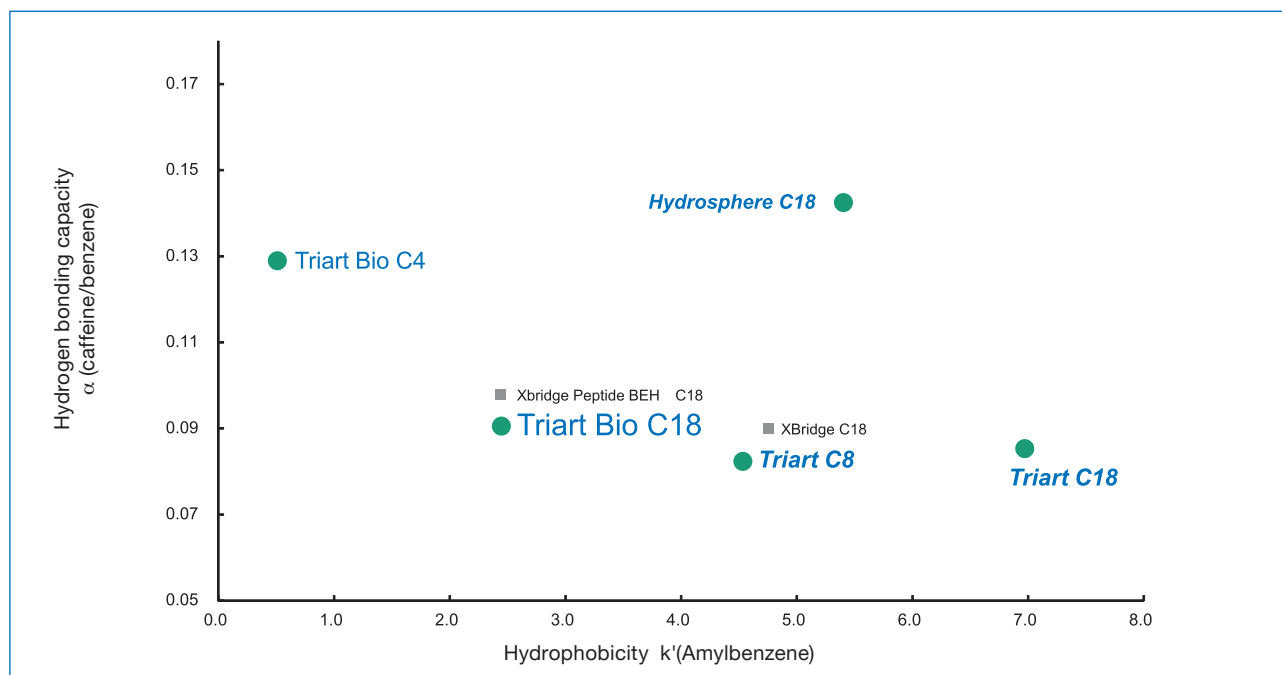
|                               | YMC-Triart Bio C4               | YMC-Triart C18                 | YMC-Triart Bio C18             |
|-------------------------------|---------------------------------|--------------------------------|--------------------------------|
| Base particle                 | organic/inorganic hybrid silica |                                |                                |
| Modification                  | C4 (USP L26)                    | C18 (USP L1)                   | C18 (USP L1)                   |
| Particle Size / $\mu\text{m}$ | 1.9, 3, 5                       | 1.9, 3, 5                      | 1.9, 3, 5                      |
| Pore Size / nm                | 30                              | 12                             | 30                             |
| pH range                      | 1.0–10.0                        | 1.0–12.0                       | 1.0–12.0                       |
| Temperature range             | pH < 7: 90 °C<br>pH > 7: 50 °C  | pH < 7: 90 °C<br>pH > 7: 50 °C | pH < 9: 90 °C<br>pH > 9: 50 °C |

## Selectivities for oligonucleotides

|                               | YMC-Triart C18                  | YMC-Triart Bio C18             | YMC-Triart C8                  | Hydrosphere C18 |
|-------------------------------|---------------------------------|--------------------------------|--------------------------------|-----------------|
| Base particle                 | organic/inorganic hybrid silica |                                |                                | silica          |
| Modification                  | C18 (USP L1)                    | C18 (USP L1)                   | C8 (USP L7)                    | C18 (USP L1)    |
| Particle Size / $\mu\text{m}$ | 1.9, 3, 5                       | 1.9, 3, 5                      | 1.9, 3, 5                      | 2, 3, 5         |
| Pore Size / nm                | 12                              | 30                             | 12                             | 12              |
| pH range                      | 1.0 – 12.0                      | 1.0–12.0                       | 1.0–12.0                       | 2.0–8.0         |
| Temperature range             | pH < 7: 90 °C<br>pH > 7: 50 °C  | pH < 9: 90 °C<br>pH > 9: 50 °C | pH < 7: 90 °C<br>pH > 7: 50 °C | 50 °C           |

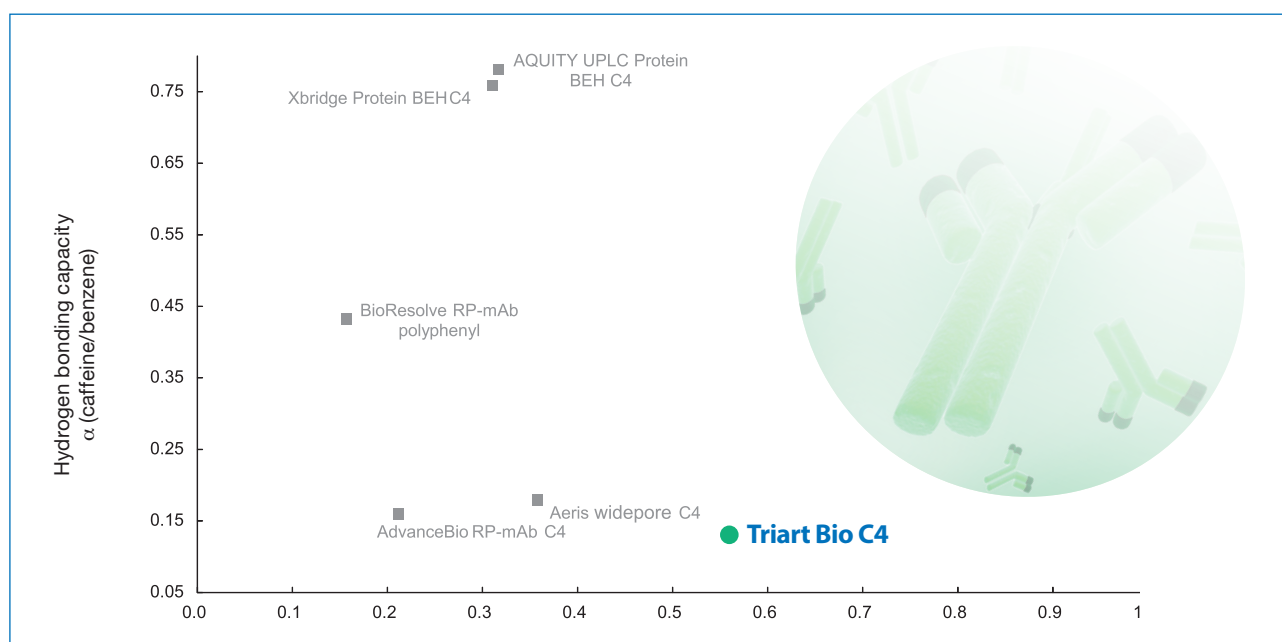
# BioLC selectivities

## Ideal selectivity for biomolecules



YMC-Triart Bio C18 shows a selectivity between that of YMC-Triart Bio C4 and regular YMC-Triart C18/C8 with 12nm pore. This feature perfectly supplements the existing products.

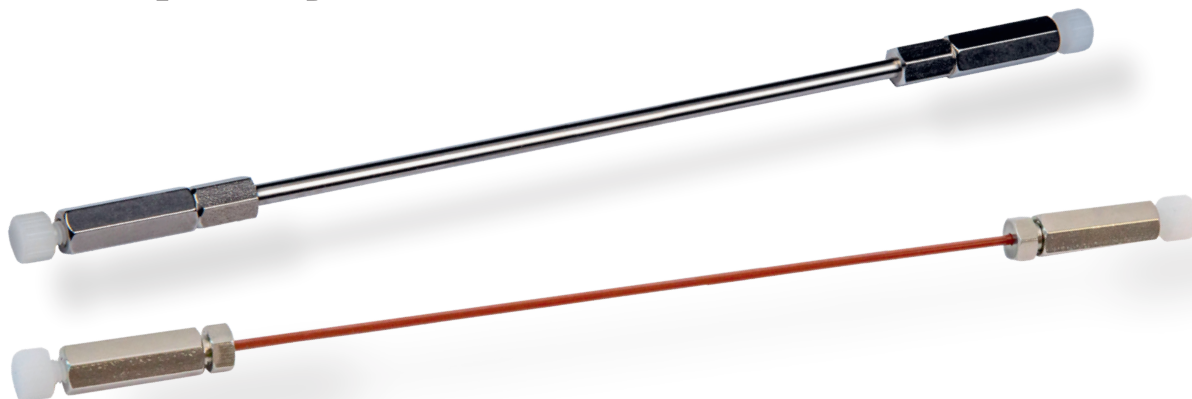
## Low hydrophobicity and hydrogen capacity



YMC-Triart Bio C4 is based on the robust, well-established organic/hybrid particle. It provides low hydrophobicity and lower hydrogen bonding capacity compared to other BioLC columns.

## Column hardware

# YMC capillary column hardware



- All fully porous YMC phases available
- Compatible with several Nano-/MicroLC/MS systems, e.g. from Eksigent/Sciex (M5/ExpressLC ultra/Ekspert MicroLC 200), Shimadzu (Nexera Mikros), Waters ACQUITY UPLC M-Class
- Suitable for extremely low sample volumes and low flow rates
- Fused silica inner body
- Stainless steel outer body used for MicroLC columns (0.3/0.5 mm ID)
- Polymer coating as outer body used for NanoLC columns (0.1/0.075 mm ID)
- Optionally fully bioinert microLC hardware available (0.3/0.5 mm ID)

### Dimensions

| IDs [ $\mu\text{m}$ ] |
|-----------------------|
| 500                   |
| 300                   |
| 100                   |
| 75                    |

| Lengths [mm] |
|--------------|
| 50           |
| 75           |
| 100          |
| 150          |

| Particle sizes [ $\mu\text{m}$ ]* |
|-----------------------------------|
| 1.9                               |
| 2.0                               |
| 3.0                               |
| 5.0                               |

\*Not all dimension/particle size combinations are possible. · Other dimensions are available on request.

### Connection options

All columns are available with 2 connection options:

- 1/16" connections (10–32 thread),**  
e.g. for Shimadzu Nexera Mikros or Waters ACQUITY UPLC M-Class
- 1/32" connections (6–40 thread) for Eksigent/Sciex**

### Pressure limits

Pressure stability of the column is dependent on particle size:

- 2–5  $\mu\text{m}$ : 55 MPa/7,975 psi (45 MPa/6,525 psi for 75/100  $\mu\text{m}$  ID)**
- 1.9  $\mu\text{m}$ : 60 MPa/8,700 psi.**

### Typical flow rates

| IDs [ $\mu\text{m}$ ] | Typical flow rates for RP*     |
|-----------------------|--------------------------------|
| 500                   | 10–30 $\mu\text{L}/\text{min}$ |
| 300                   | 3–10 $\mu\text{L}/\text{min}$  |
| 100                   | 300–500 $\text{nL}/\text{min}$ |
| 75                    | 100–300 $\text{nL}/\text{min}$ |

\*Depending on length and particle size. In HILIC mode it is recommended flow rates should be reduced by half.

### Guard/trap columns



Supplied in packs of 3 together with a column coupler.

Suitable for:

- ▶ guard columns for challenging matrices (with column coupler)
- ▶ trapping columns for use in desalting or trap and elute procedures (without a coupler)

### Column coupler



1/16" coupler (P/N XRCP1601E-1PK)



1/32" coupler (P/N XRCP3201E-1PK)

A custom-made stainless-steel column coupler is supplied with every pack of 3 capillary guard cartridges to guarantee the optimum connection with low dead volume. Every coupler can be purchased separately, if required.



1/32" guard column coupled to a 1/32" analytical column.

## Ordering information

# Part numbers for YMC-Triart columns

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

All column part numbers indicate the connection size by use of additional terminal letters:

columns with **1/16"** fittings end with **-AU**

columns with **1/32"** fittings end with **-RU**

bioinert columns with **1/16"** fitting end with **-AUC**

## Order codes YMC-Triart columns

### PLEASE NOTE:

Part numbers for 1/16" connections are shown.

To order 1/32" connections or bioinert 1/16" columns, simply exchange **AU** by **RU** or **AUC**, respectively.

Columns with 1/32" connection as well as bioinert columns are available with 300 µm or 500 µm ID.

## YMC-Triart 1.9 µm, 1/16" | 1/32" fitting, MicroLC capillary columns (max. pressure 60 MPa)

| Phase             | Column ID [µm] | Column length [mm] |                 |                 |                 | Guard columns* with 5 mm length |
|-------------------|----------------|--------------------|-----------------|-----------------|-----------------|---------------------------------|
|                   |                | 50                 | 75              | 100             | 150             | (pack of 3)                     |
| <b>C18</b>        | 300            | TA12SP9-05H0AU     | TA12SP9-L5H0AU  | TA12SP9-10H0AU  | TA12SP9-15H0AU  | TA12SP9-E5H0AU                  |
|                   | 500            | TA12SP9-05J0AU     | TA12SP9-L5J0AU  | TA12SP9-10J0AU  | TA12SP9-15J0AU  | TA12SP9-E5J0AU                  |
| <b>C18 ExRS</b>   | 300            | TAR08SP9-05H0AU    | TAR08SP9-L5H0AU | TAR08SP9-10H0AU | TAR08SP9-15H0AU | TAR08SP9-E5H0AU                 |
|                   | 500            | TAR08SP9-05J0AU    | TAR08SP9-L5J0AU | TAR08SP9-10J0AU | TAR08SP9-15J0AU | TAR08SP9-E5J0AU                 |
| <b>Bio C18</b>    | 300            | TA30SP9-05H0AU     | TA30SP9-L5H0AU  | TA30SP9-10H0AU  | TA30SP9-15H0AU  | TA30SP9-E5H0AU                  |
|                   | 500            | TA30SP9-05J0AU     | TA30SP9-L5J0AU  | TA30SP9-10J0AU  | TA30SP9-15J0AU  | TA30SP9-E5J0AU                  |
| <b>C8</b>         | 300            | T012SP9-05H0AU     | T012SP9-L5H0AU  | T012SP9-10H0AU  | T012SP9-15H0AU  | T012SP9-E5H0AU                  |
|                   | 500            | T012SP9-05J0AU     | T012SP9-L5J0AU  | T012SP9-10J0AU  | T012SP9-15J0AU  | T012SP9-E5J0AU                  |
| <b>Bio C4</b>     | 300            | TB30SP9-05H0AU     | TB30SP9-L5H0AU  | TB30SP9-10H0AU  | TB30SP9-15H0AU  | TB30SP9-E5H0AU                  |
|                   | 500            | TB30SP9-05J0AU     | TB30SP9-L5J0AU  | TB30SP9-10J0AU  | TB30SP9-15J0AU  | TB30SP9-E5J0AU                  |
| <b>Phenyl</b>     | 300            | TPH12SP9-05H0AU    | TPH12SP9-L5H0AU | TPH12SP9-10H0AU | TPH12SP9-15H0AU | TPH12SP9-E5H0AU                 |
|                   | 500            | TPH12SP9-05J0AU    | TPH12SP9-L5J0AU | TPH12SP9-10J0AU | TPH12SP9-15J0AU | TPH12SP9-E5J0AU                 |
| <b>PFP</b>        | 300            | TPF12SP9-05H0AU    | TPF12SP9-L5H0AU | TPF12SP9-10H0AU | TPF12SP9-15H0AU | TPF12SP9-E5H0AU                 |
|                   | 500            | TPF12SP9-05J0AU    | TPF12SP9-L5J0AU | TPF12SP9-10J0AU | TPF12SP9-15J0AU | TPF12SP9-E5J0AU                 |
| <b>Diol-HILIC</b> | 300            | TDH12SP9-05H0AU    | TDH12SP9-L5H0AU | TDH12SP9-10H0AU | TDH12SP9-15H0AU | TDH12SP9-E5H0AU                 |
|                   | 500            | TDH12SP9-05J0AU    | TDH12SP9-L5J0AU | TDH12SP9-10J0AU | TDH12SP9-15J0AU | TDH12SP9-E5J0AU                 |

\* no holder required, comes with a column coupler

**YMC-Triart 3µm, 1/16" | 1/32" fitting, MicroLC capillary columns (max. pressure 55/45 MPa)**

| Phase             | Column ID [µm] | Column length [mm] |                 |                 |                 | Guard columns* with 5 mm length |
|-------------------|----------------|--------------------|-----------------|-----------------|-----------------|---------------------------------|
|                   |                | 50                 | 75              | 100             | 150             | (pack of 3)                     |
| <b>C18</b>        | 75             | —                  | —               | TA12S03-10E8AU  | TA12S03-15E8AU  | —                               |
|                   | 100            | —                  | —               | TA12S03-10F0AU  | TA12S03-15F0AU  | —                               |
|                   | 300            | TA12S03-05H0AU     | TA12S03-L5H0AU  | TA12S03-10H0AU  | TA12S03-15H0AU  | TA12S03-E5H0AU                  |
|                   | 500            | TA12S03-05J0AU     | TA12S03-L5J0AU  | TA12S03-10J0AU  | TA12S03-15J0AU  | TA12S03-E5J0AU                  |
| <b>C18 ExRS</b>   | 75             | —                  | —               | TAR08S03-10E8AU | TAR08S03-15E8AU | —                               |
|                   | 100            | —                  | —               | TAR08S03-10F0AU | TAR08S03-15F0AU | —                               |
|                   | 300            | TAR08S03-05H0AU    | TAR08S03-L5H0AU | TAR08S03-10H0AU | TAR08S03-15H0AU | TAR08S03-E5H0AU                 |
|                   | 500            | TAR08S03-05J0AU    | TAR08S03-L5J0AU | TAR08S03-10J0AU | TAR08S03-15J0AU | TAR08S03-E5J0AU                 |
| <b>Bio C18</b>    | 75             | —                  | —               | TA30S03-10E8AU  | TA30S03-15E8AU  | —                               |
|                   | 100            | —                  | —               | TA30S03-10F0AU  | TA30S03-15F0AU  | —                               |
|                   | 300            | TA30S03-05H0AU     | TA30S03-L5H0AU  | TA30S03-10H0AU  | TA30S03-15H0AU  | TA30S03-E5H0AU                  |
|                   | 500            | TA30S03-05J0AU     | TA30S03-L5J0AU  | TA30S03-10J0AU  | TA30S03-15J0AU  | TA30S03-E5J0AU                  |
| <b>C8</b>         | 75             | —                  | —               | T012S03-10E8AU  | T012S03-15E8AU  | —                               |
|                   | 100            | —                  | —               | T012S03-10F0AU  | T012S03-15F0AU  | —                               |
|                   | 300            | T012S03-05H0AU     | T012S03-L5H0AU  | T012S03-10H0AU  | T012S03-15H0AU  | T012S03-E5H0AU                  |
|                   | 500            | T012S03-05J0AU     | T012S03-L5J0AU  | T012S03-10J0AU  | T012S03-15J0AU  | T012S03-E5J0AU                  |
| <b>Bio C4</b>     | 75             | —                  | —               | TB30S03-10E8AU  | TB30S03-15E8AU  | —                               |
|                   | 100            | —                  | —               | TB30S03-10F0AU  | TB30S03-15F0AU  | —                               |
|                   | 300            | TB30S03-05H0AU     | TB30S03-L5H0AU  | TB30S03-10H0AU  | TB30S03-15H0AU  | TB30S03-E5H0AU                  |
|                   | 500            | TB30S03-05J0AU     | TB30S03-L5J0AU  | TB30S03-10J0AU  | TB30S03-15J0AU  | TB30S03-E5J0AU                  |
| <b>Phenyl</b>     | 75             | —                  | —               | TPH12S03-10E8AU | TPH12S03-15E8AU | —                               |
|                   | 100            | —                  | —               | TPH12S03-10F0AU | TPH12S03-15F0AU | —                               |
|                   | 300            | TPH12S03-05H0AU    | TPH12S03-L5H0AU | TPH12S03-10H0AU | TPH12S03-15H0AU | TPH12S03-E5H0AU                 |
|                   | 500            | TPH12S03-05J0AU    | TPH12S03-L5J0AU | TPH12S03-10J0AU | TPH12S03-15J0AU | TPH12S03-E5J0AU                 |
| <b>PFP</b>        | 75             | —                  | —               | TPF12S03-10E8AU | TPF12S03-15E8AU | —                               |
|                   | 100            | —                  | —               | TPF12S03-10F0AU | TPF12S03-15F0AU | —                               |
|                   | 300            | TPF12S03-05H0AU    | TPF12S03-L5H0AU | TPF12S03-10H0AU | TPF12S03-15H0AU | TPF12S03-E5H0AU                 |
|                   | 500            | TPF12S03-05J0AU    | TPF12S03-L5J0AU | TPF12S03-10J0AU | TPF12S03-15J0AU | TPF12S03-E5J0AU                 |
| <b>Diol-HILIC</b> | 75             | —                  | —               | TDH12S03-10E8AU | TDH12S03-15E8AU | —                               |
|                   | 100            | —                  | —               | TDH12S03-10F0AU | TDH12S03-15F0AU | —                               |
|                   | 300            | TDH12S03-05H0AU    | TDH12S03-L5H0AU | TDH12S03-10H0AU | TDH12S03-15H0AU | TDH12S03-E5H0AU                 |
|                   | 500            | TDH12S03-05J0AU    | TDH12S03-L5J0AU | TDH12S03-10J0AU | TDH12S03-15J0AU | TDH12S03-E5J0AU                 |

\* no holder required, comes with a column coupler

**PLEASE NOTE:**

For use with Eksigent/Sciex MicroLC systems, order columns with 1/32" (6–40 thread) end-fittings. Use the following tube connectors, Eksigent 6/40 Fitting P/N 5019621 or VICI No Twist One-Piece Fitting P/N ZNF.5FPK(-5) or Optimize EXP®2 Fitting Kit P/N 15-19-04927.

# Part numbers for further YMC columns

The specific part number for a given column consists of two parts describing the phase and dimension/hardware details:

## Phase – Dimension/hardware

Both parts of the part number can be taken from the tables below:

### A selection of YMC RP phases (first part of part number)

| Phase                     | Particle size [μm] | Part number     |
|---------------------------|--------------------|-----------------|
| YMC-Pack Pro C18, 12 nm   | 2                  | AS12S02-        |
|                           | 3                  | <b>AS12S03-</b> |
| Hydrosphere C18, 12 nm    | 2                  | HS12S02-        |
|                           | 3                  | HS12S03-        |
| YMC-Pack Pro C18 RS, 8 nm | 3                  | RS08S03-        |
| YMC-Pack Pro C8, 12 nm    | 3                  | OS12S03-        |
| YMC-Pack Pro C4, 12 nm    | 3                  | BS12S03-        |

### A selection of YMC HILIC/NP phases (first part of part number)

| Phase                        | Particle size [μm] | Part number |
|------------------------------|--------------------|-------------|
| YMC-Pack SIL, 12 nm          | 3                  | SL12S03-    |
| YMC-Pack PVA-Sil, 12 nm      | 5                  | PV12S05-    |
| YMC-Pack Polyamine II, 12 nm | 5                  | PB12S05-    |
| YMC-Pack NH2, 12 nm          | 3                  | NH12S03-    |
| YMC-Pack Diol (NP), 12 nm    | 3                  | DN12S03-    |
| YMC-Pack CN, 12 nm           | 3                  | CN12S03-    |

### A selection of YMC SEC phases (first part of part number)

| Phase                    | Particle size [μm] | Part number |
|--------------------------|--------------------|-------------|
| YMC-SEC MAB, 25 nm       | 3                  | DLM25S03-   |
| YMC-Pack Diol-60, 6 nm   | 3                  | DL06S03-    |
|                          | 5                  | DL06S05-    |
| YMC-Pack Diol-120, 12 nm | 3                  | DL12S03-    |
|                          | 5                  | DL12S05-    |
| YMC-Pack Diol-200, 20 nm | 2                  | DL20S02-    |
|                          | 3                  | DL20S03-    |
|                          | 5                  | DL20S05-    |
| YMC-Pack Diol-300, 30 nm | 2                  | DL30S02-    |
|                          | 3                  | DL30S03-    |
|                          | 5                  | DL30S05-    |

### EXAMPLE:

YMC-Pack Pro C18, 12 nm, 3 μm  
100 mm x 300 μm  
1/16" end fittings

First part: AS12S03-

Second part: -10H0AU

**Part number: AS12S03 -10H0AU**

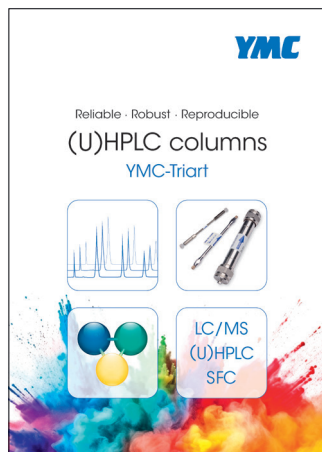
Further particle sizes (e.g. 5 μm) or stationary phases (e.g. CHIRALART) available on request.

### Dimension/hardware selection (second part of part number)\* (max. pressure 55/45 MPa)

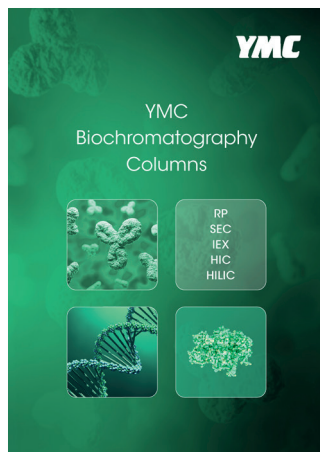
| Fitting | Column ID [μm] | Column length [mm] |         |                |         | Guard columns with 5 mm length |
|---------|----------------|--------------------|---------|----------------|---------|--------------------------------|
|         |                | 50                 | 75      | 100            | 150     | (pack of 3)                    |
| 1/16"   | 500            | -05J0AU            | -L5J0AU | -10J0AU        | -15J0AU | -E5J0AU                        |
|         | 300            | -05H0AU            | -L5H0AU | <b>-10H0AU</b> | -15H0AU | -E5H0AU                        |
|         | 100            | —                  | —       | -10F0AU        | -15F0AU | —                              |
|         | 75             | —                  | —       | -10E8AU        | -15E8AU | —                              |
| 1/32"   | 500            | -05J0RU            | -L5J0RU | -10J0RU        | -15J0RU | -E5J0RU                        |
|         | 300            | -05H0RU            | -L5H0RU | -10H0RU        | -15H0RU | -E5H0RU                        |

\*Not all phase and hardware combinations might be possible.

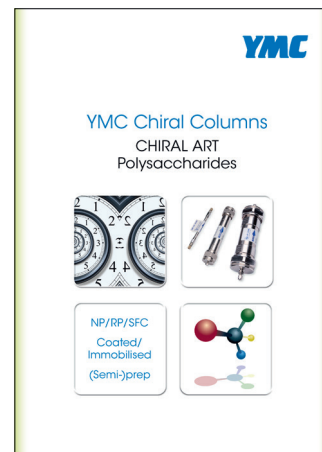
# Please request the following catalogues



(U)HPLC columns  
YMC-Triart



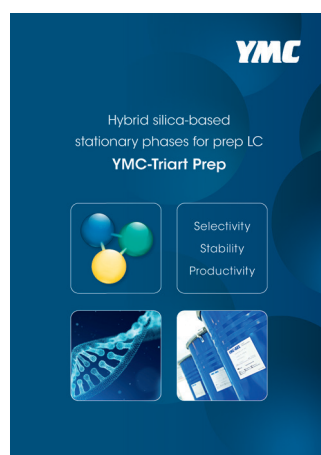
YMC Biochromatography  
Columns



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Columns



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YMC-Triart Prep

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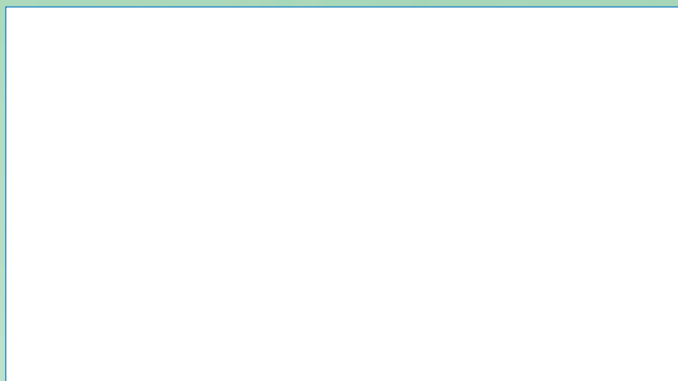
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