[ACQUITY UPLC M-CLASS SYSTEM]

LET YOUR LC INLET **DO THE WORK**
FOR YOUR **NANO- TO MICROSCALE** SEPARATIONS

Waters

THE SCIENCE OF WHAT'S POSSIBLE.®

the analyses you always

desired

IF YOU'RE NOT TRYING TO INCREASE SENSITIVITY BY UPGRADING YOUR LC INLET, YOU HAVE NO IDEA WHAT YOU'VE BEEN MISSING

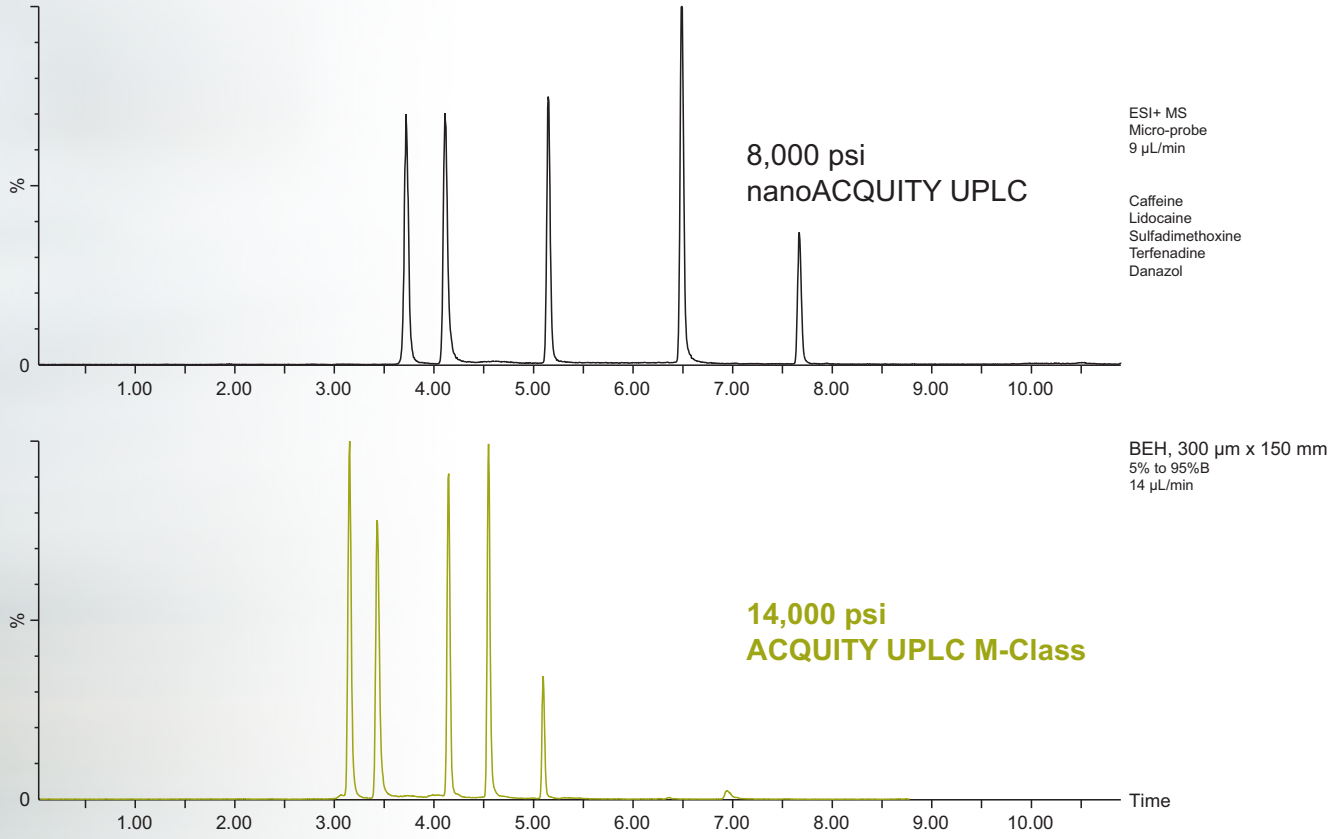
Analytical scientists are constantly challenged to increase the sensitivity of their LC/MS analyses to meet the demanding goals of their laboratories.

In order to achieve this, focus is typically directed toward improving the sensitivity of the mass spectrometer or decreasing the diameter of the LC column. Adapting conventional separations instruments can cause problems with reproducibility and reliability. These questions of usability prevent many scientists from taking full advantage of nano- to microscale separations in their methods.

Over the past 10 years UPLC® Technology has continued to provide improved chromatographic performance.

Now, with Waters' newest addition, the holistically designed ACQUITY UPLC® M-Class System, nano- to microscale separations will never be the same.

The ACQUITY UPLC M-Class System is the most flexible nano- to microscale instrument available to deliver UPLC-quality separations across a wide range of column dimensions, providing the sensitivity required for an array of applications. The system provides excellent performance over the range of column sizes, from 75 µm to 1.0 mm, delivering outstanding results over a 170-fold range of column volumes.



Achieve faster separations using higher flow rates.

In this small molecule analysis the ACQUITY UPLC M-Class System provides a faster separation by approximately 30% when compared to the nanoACQUITY UPLC System.

As a member of the ACQUITY UPLC family, holistic design and intuitive diagnostics make the ACQUITY UPLC M-Class System the most robust, reliable, and flexible UPLC system for nano- to microscale separations.

With unprecedented usability, the ACQUITY UPLC M-Class System enables laboratories to analyze compounds in low concentrations amid complex matrices.

Confidently achieve your laboratory goals with high-efficiency ACQUITY UPLC M-Class Columns ranging from 75 µm to 1.0 mm I.D. Use complementary mass spectrometry to support our full range of column I.D.'s, or run 300 µm to 1.0 mm columns with optical detection.

THE MOST ROBUST, RELIABLE, HIGHEST PERFORMING UPLC SYSTEM FOR NANO- TO MICROSCALE SEPARATIONS

- Higher sensitivity for any MS
- Maximum amount of data from any sample
- Potential for less sample preparation volume and cost
- Reduced solvent consumption
- Measure small amounts of analyte in complex matrices with 2D
- Flexible configurations, scalability, and confidence for your laboratory

Run a wider range of column dimensions for wide-ranging applications

confidently see more with less

The ACQUITY UPLC M-Class System is the product of years of Waters' resolute commitment to providing a reliable nano- to microscale system. The low system volume and newly redesigned fluidics minimize dispersive and adsorptive losses, ensuring superior chromatographic resolution through efficient use of sub-2-µm particles.

The system features improved robust fittings, columns, and valves to ensure that your analyte is resolved and delivered to your mass spectrometer or optical detector for characterization and quantification experiments.

The ACQUITY UPLC M-Class System features a microscale ESI probe in the ZSpray™ API interface to deliver superior sensitivity. As column I.D. is decreased, this micro-MS probe reduces band-broadening to maintain chromatographic integrity.

THE ACQUITY UPLC M-CLASS SYSTEM DELIVERS:

- **Highest sensitivity**
  UPLC separations yield increased analyte concentration for higher UV and MS signal responses
- **Maximum chromatographic resolution**
  New 15k psi-capable ACQUITY UPLC M-Class Columns deliver sub-2-µm particle performance
- **Faster nano- and microscale separations**
  Increased operating pressures yield maximum flexibility for higher throughput analyses
- **Higher resolution with longer columns**
  Increased pressure enables more separation power
- **Confidence in sample analysis**
  New non-reactive wetted surfaces throughout the fluidic path minimize absorptive losses
- **Increased solvent compatibility**
  Improved range of solvent blends precisely metered for gradient fidelity
- **Increased sample capacity**
  Sample organizer compatibility allows you to store a wide variety of plates and vials in the system for longer, unattended operation
- **UV compatibility**
  UV flow cells compatible with 300 µm to 1.0 mm I.D. columns to augment your UPLC/MS analysis
- **Scalability**
  With flow rates from 200 nL/min to 100 µL/min, achieve the best chromatographic performance, from 75 µm to 1.0 mm I.D. columns covering a 170-fold range of column volumes
- **Increased flexibility**
  More valve configurations enable a variety of applications, increased throughput, and maximized peak capacity

The most reliable and highest performing nano- to microscale instrument available to deliver true UPLC separations across the widest range of sample and column sizes.

ACQUITY UPLC M-Class System with ACQUITY TUV Detector.

- **Maximum reproducibility**
  Direct flow control
- **Interactive on-board diagnostics**
  Effectively monitor system performance
- **MassLynx® Software**
  Fully compatible with the system and the suite of data processing Application Managers

Acquity M UPLC® CLASS

innovations that provide *flexibility*

The ACQUITY UPLC M-Class System maximizes peak capacity, extending the dynamic range of your analysis. The ACQUITY UPLC M-Class System can be easily combined with all types of mass spectrometers, whether analyzing complex samples in wide-ranging matrices with a high resolution MS, or quantifying peptides, metabolites, or other targeted experiments with tandem MS.

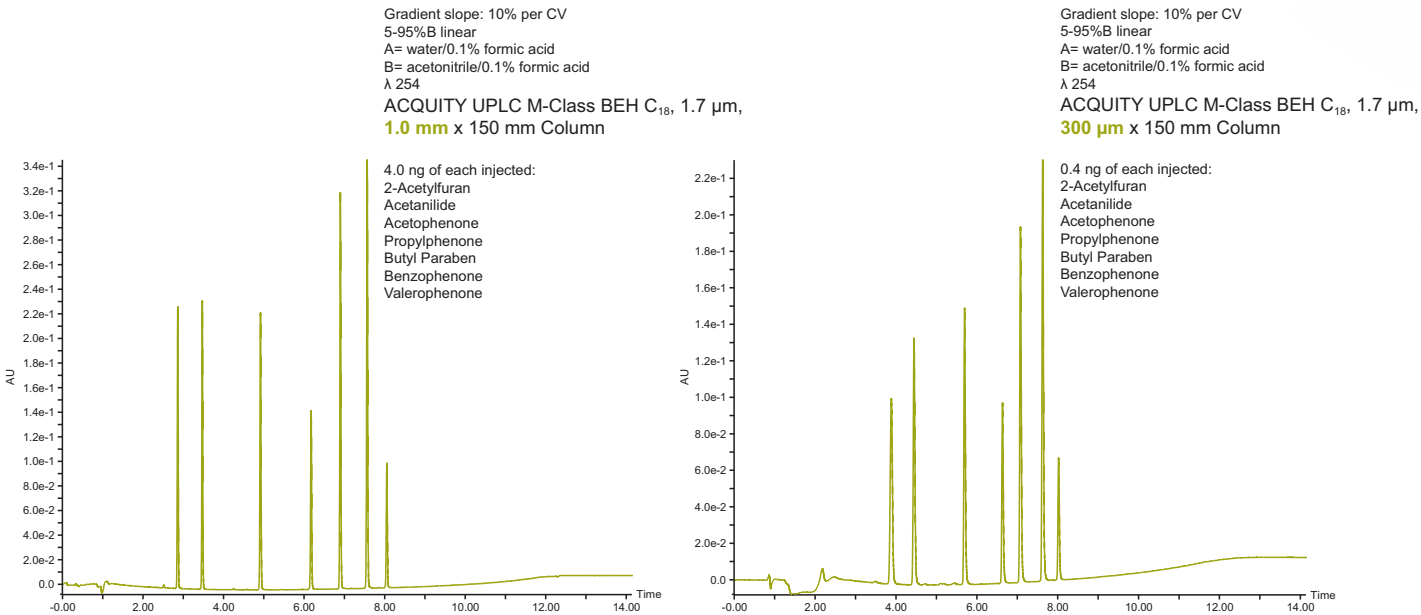
Engineered for the lowest dispersion – including an improved ESI micro-probe design – and with an extended pressure envelope, complex separations can be accelerated without compromising chromatographic fidelity.

The ACQUITY UPLC M-Class System is the result of years of Waters' experience and research and delivers the promise of robust nano- to microscale separations.

It was designed to meet the expanding needs of researchers – every aspect of the system is directed toward increasing information.

Optical and MS detection

Optical detection grants an additional identification and quantification tool orthogonal to mass spectrometry.

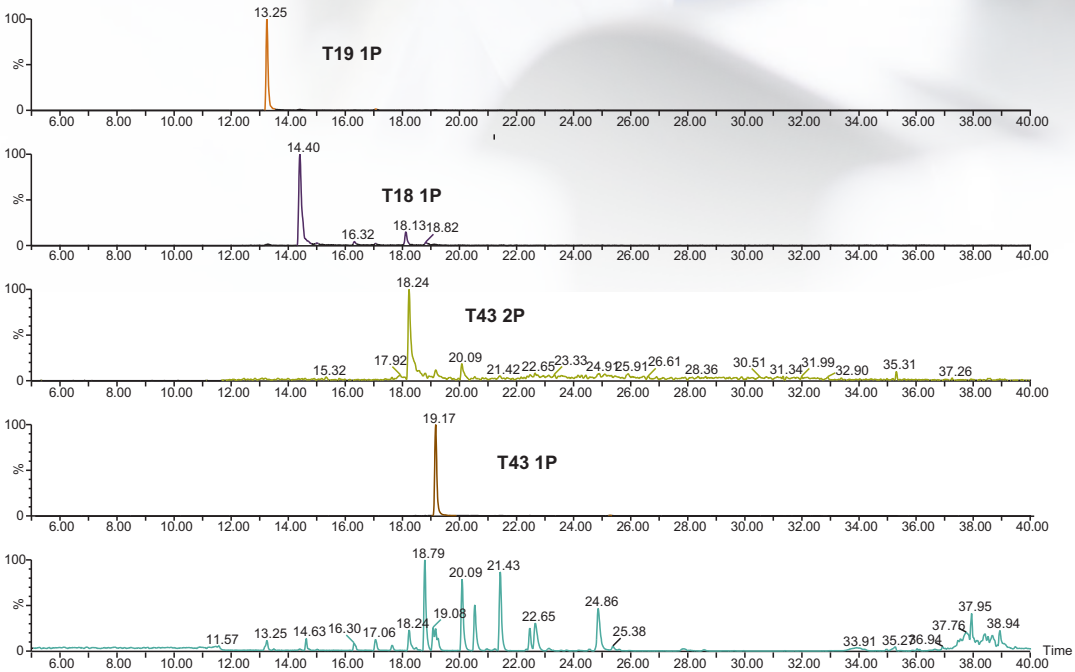


Separation of small molecule standards on 1.0 mm I.D. (left) and 300 µm I.D. (right) columns with the ACQUITY TUV Detector, 100 nL flow cell. The 1.0 mm and the 300 µm I.D. columns provide comparable chromatographic resolution with a scaled sample load.

Because of its advanced fluidic pathways, the ACQUITY UPLC M-Class System delivers highly concentrated analyte to the MS.

Maximize recovery

The non-reactive flowpath, unique to the ACQUITY UPLC M-Class System, ensures recovery of biologically important molecules.



Sample integrity.

Changes in phosphorylation can correlate to physiological changes and disease states. The recovery of multiple phosphorylated peptides, demonstrated here, addresses concerns of researchers who fear missed data could lead to poor quality decisions.

Sample: The MassPREP™ Enolase Digestion (p/n 186002325) with four added yeast enolase phosphopeptides (three are singly phosphorylated and one is doubly phosphorylated) – T18p, T19p, T43p, T43pp. The system design is verified with the appropriate standard to demonstrate successful resolution.

THE FLEXIBLE DESIGN OF THE ACQUITY UPLC M-CLASS SYSTEM OFFERS:

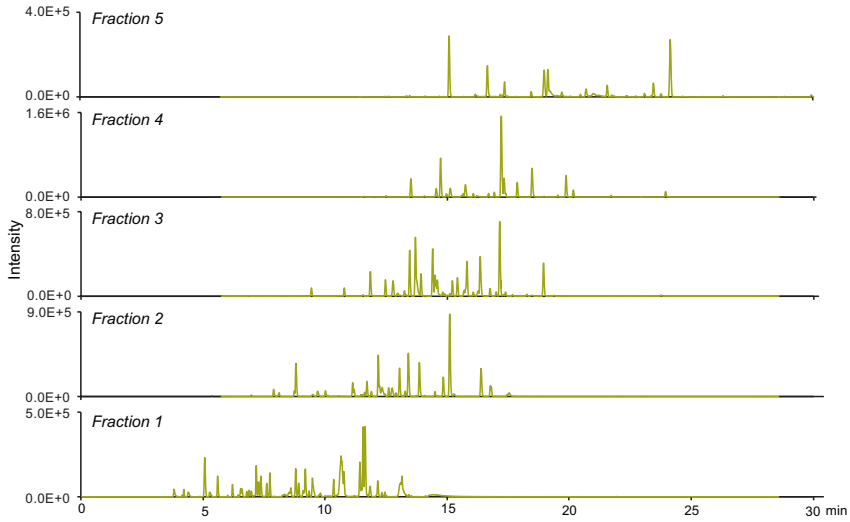
- Smaller I.D. columns for increased sensitivity with minimal sample use
- Optical detection with ACQUITY® TUV and PDA Detectors
- Optional non-reactive flow paths
- Microscale electrospray (ESI) probe for a ZSpray API interface
- Comprehensive 2D analysis
- HDX capability

COMPREHENSIVE 2D – EXPANDING THE IMPACT

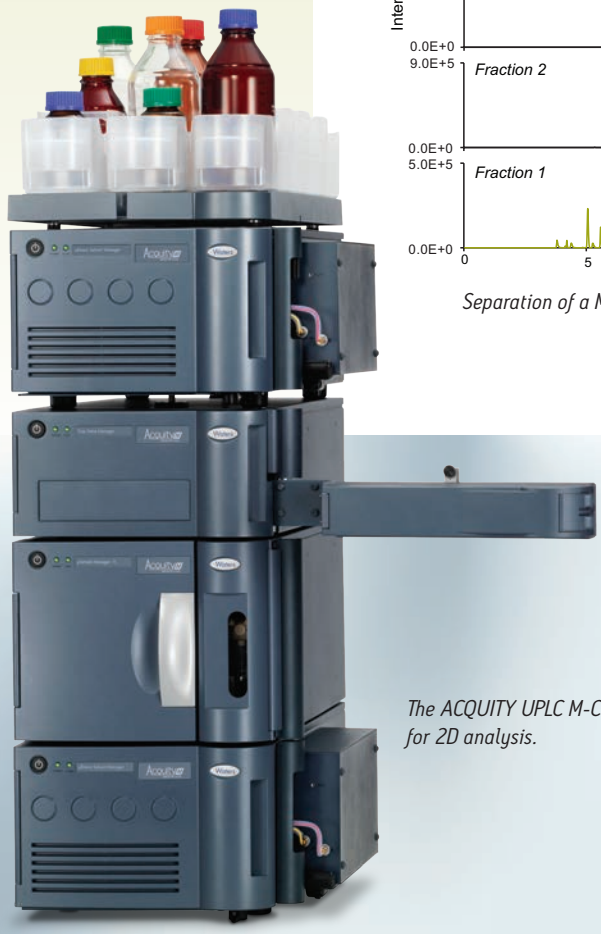
Until recently, 2D-LC was considered both time-consuming and difficult to accomplish. The ACQUITY UPLC M-Class System has streamlined the 2D-LC separation process with highly intuitive menu-driven method setup, standardized separation chemistries, and intelligent valve operation.

Expanding on the use of a novel 2D reversed phase/reversed phase (RP/RP) approach, where the 1st dimension is run at pH 10 and the 2nd at pH 2, grants the ability to robustly increase sample throughput.

The 2D configuration extends the dynamic range of the analysis and yields itself to host cell protein (HCP) analysis – removing the need for cumbersome ELISA analysis.



Separation of a MassPREP Digest Standard Mix 1 using a five step elution profile.



The ACQUITY UPLC M-Class System for 2D analysis.

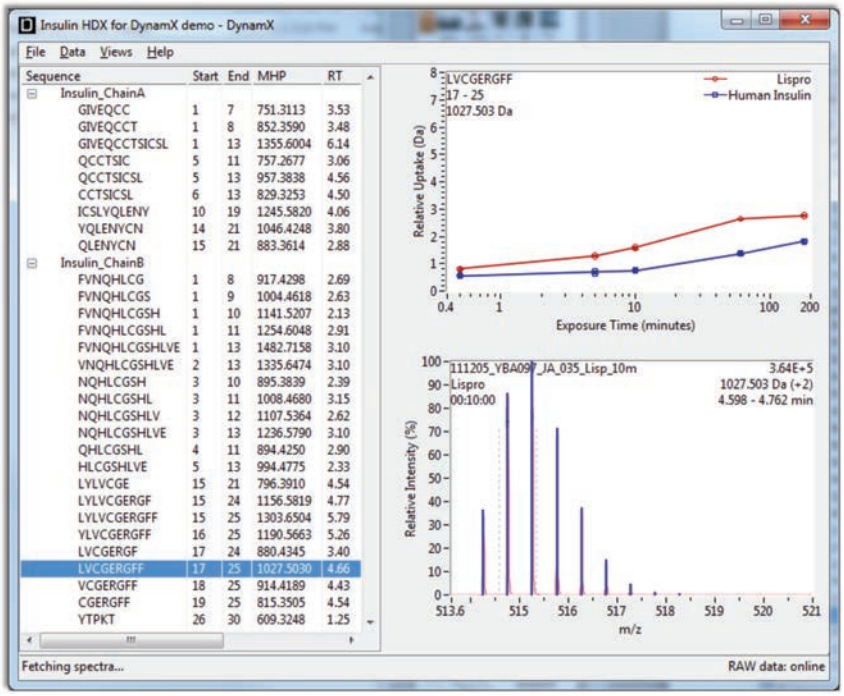
MONITOR PROTEIN CONFORMATION WITH HDX TECHNOLOGY

Expanding on the initial collaboration with thought leaders worldwide, Waters has extended the HDX capabilities of the ACQUITY UPLC M-Class System. The higher pressure envelope enables even faster chromatographic resolution of peptic peptides.

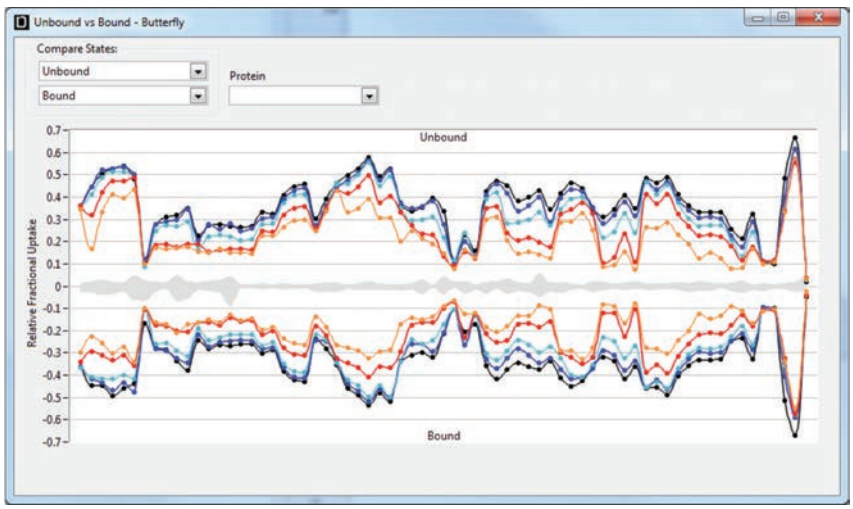
The system integrates all the steps of HDX from sample prep to actual sequence determination, deuterium uptake curves, and heat maps with the innovative DynamX™ HDX Data Analysis Software.

Maximum chromatographic resolution

The ACQUITY UPLC M-Class System enables columns packed with sub-2-µm particles to improve nano- to microscale separations. The Enzymate™ BEH Pepsin Column adds a new level of control to the entire HDX experiment.



With the increase in data quantity and quality along with improvements in DynamX HDX Data Analysis Software, researchers are in the best position to unlock the meaning of their data and improve decisions.



Butterfly plot comparing the deuterium uptake between two different states: bound (bottom) vs. unbound (top).

full range

of nano- to microscale chemistries

The ACQUITY UPLC M-Class System is designed for any nano- to microscale separation you need to run. In addition Waters offers 75 µm fused silica capillary columns, 150 µm iKeys, 300 µm stainless steel columns, and access to traditional 1.0 mm I.D. columns. Depending on your laboratory needs, we have an option for you.

ACQUITY UPLC M-CLASS COLUMNS

ACQUITY UPLC M-Class Columns are specifically engineered for use with the ACQUITY UPLC M-Class System and are designed for the high peak capacity required for sample-limited applications. With 10 years of UPLC sub-2-µm column design, these new columns continue a tradition of reliability and performance.

iKEY SEPARATION DEVICE

Ongoing collaboration with customers uncovered a need for simplified microscale analysis.

The iKey™ Separation Device, with its ionKey™ Source, is specifically designed to address this need, providing high sensitivity separations to users doing routine analysis. Its 150 µm I.D. provides optimum sensitivity and instrument duty cycle.

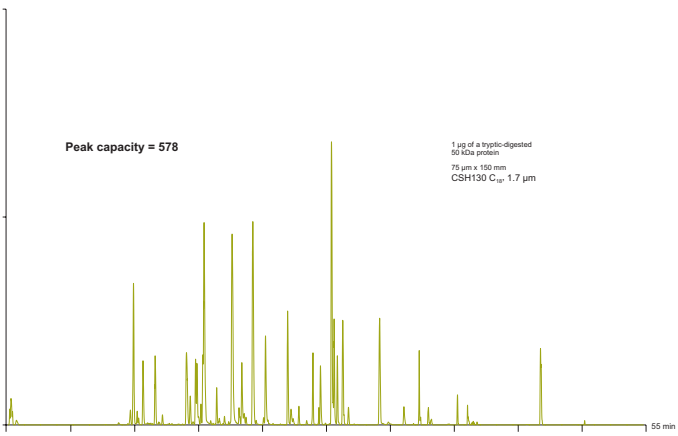
your *inlet to MS*

The ACQUITY UPLC M-Class System expands the performance of any nano- to microscale MS analysis. It increases the linear dynamic range of your analysis, resulting in better MS analyses by DDA or MS^E.

The direct (non split) automatic solvent flow control algorithms of the ACQUITY UPLC M-Class System provide pulse-less flow for increased retention time reproducibility.

Sample integrity is maintained due to the ACQUITY UPLC M-Class System's non-reactive surfaces. New drivers for MassLynx Software integrate the system seamlessly into your existing workflows.

ACQUITY UPLC M-Class System with SYNAPT® G2-Si.



The ACQUITY UPLC M-Class System and SYNAPT G2-Si delivers high peak capacity separations with exceptional LC/MS data quality.

Intuitive system-level diagnostics

Enables interactive display of system fluidic status to ensure system integrity and maximum performance – especially when changing columns, tubings, and fittings.

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