

[ MEDICINAL CHEMISTRY ]

FOR YOUR ANALYTICAL CHALLENGES,  
THE PRESCRIPTION IS **WATERS INNOVATION.**

Waters

THE SCIENCE OF WHAT'S POSSIBLE.®

# MEDICINAL CHEMISTRY SUCCEEDS THROUGH INNOVATION

Medicinal Chemistry departments within pharmaceutical organizations face relentless pressure to discover, characterize, confirm, purify, and manage new molecules. To succeed in today's fast-paced and extremely demanding environment, scientists and managers must explore and embrace innovative new approaches.

Medicinal Chemistry has advanced from isolating medical agents in plants to synthetic therapeutics to intelligent computer-aided targeted drug design. Continuing innovation in both science and informatics is essential.





## WATERS' MISSION IS CUSTOMER SUCCESS

We bring a history of innovation and collaborative success to working with Medicinal Chemistry and the entire pharmaceutical industry. No other company works more closely with you to create instrumentation and solutions that work the way your laboratory does.

This focus on your success results in new technologies, innovative approaches to characterization, smoother and faster processes to purify and manage promising results – all with the goal of helping you to more rapidly and cost-effectively identify, discover, and manage new chemical entities (NCEs).

## LEVERAGE YOUR WORKFLOW WITH INNOVATION

Waters is committed to understanding your laboratory needs, and to delivering advances that positively impact your business goals. UltraPerformance Convergence Chromatography™ (UPC<sup>2</sup>®), the ACQUITY® QDa® Detector, and Waters® Paradigm™ Scientific Search Software are new technologies that deliver meaningful impact to all synthesis-dependent organizations.



For more details about the power of Waters Paradigm Scientific Search Software, visit [waters.com/paradigm](https://waters.com/paradigm)

### A New Category of Separations Science for Medicinal Chemistry

UltraPerformance Convergence Chromatography (UPC<sup>2</sup>) is a broad-based, complementary analytical platform that is taking its place alongside LC and GC as one of the three essential separation technologies for modern laboratory analysis. ACQUITY UPC<sup>2</sup>™ provides:

- A robust analytical approach to simplify workflows that utilize SFC purification
- Chiral and achiral analyses on a single system with a simple switch of a column position
- Orthogonality to reversed-phase LC (RPLC), ensuring that nothing is overlooked during reaction monitoring and optimization

### Innovative MS Detection Enhancement for Open Access

The ACQUITY QDa Detector is the culmination of Waters' committed experience in mass spectrometry, resulting in an instrument that addresses size, ease of use, and affordability concerns that our customers have been asking us to attend to. Designed to be a synergistic element of a chromatographic separations systems, the ACQUITY QDa Detector provides:

- Robust and reliable operation requiring no sample-specific adjustments
- Compatible with all our ACQUITY UPLC®, ACQUITY UPC<sup>2</sup>, Alliance® HPLC, and purification LC and SFC systems
- Comprehensive open access characterization and quantification capabilities

*We partner with customers to solve specific challenges, to experience your needs at a deeper level, by stepping out of our laboratories and stepping into yours. This partnership, and the resulting innovation, is the core of Waters' culture.*

### Partnership Driven Technologies

At Waters, we have taken new approaches to R&D and application development by forming collaborative partnerships with customers and industry thought leaders, enabling on-site placements of our technology and our staff, so we can experience your challenges directly and develop technology to address your specific needs.

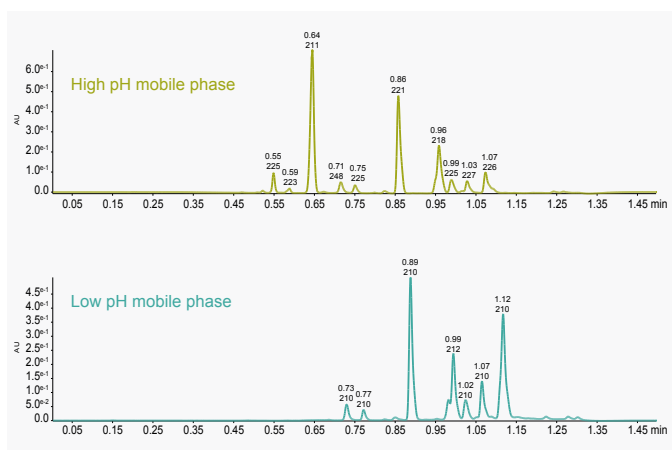


# CHARACTERIZE

- Compound Confirmation
- Reaction Monitoring
- Reaction Optimization

## CHARACTERIZE YOUR POTENTIAL AND YOUR PROCESS

The term “characterize” has a variety of meanings throughout the discovery process, including target identification, molecular design and synthesis, and functional studies. Often thousands of iterations are needed during the design and synthesis of new chemical entities (NCEs). Waters provides the tools necessary to characterize your compounds, allowing you to make informed decisions rapidly.



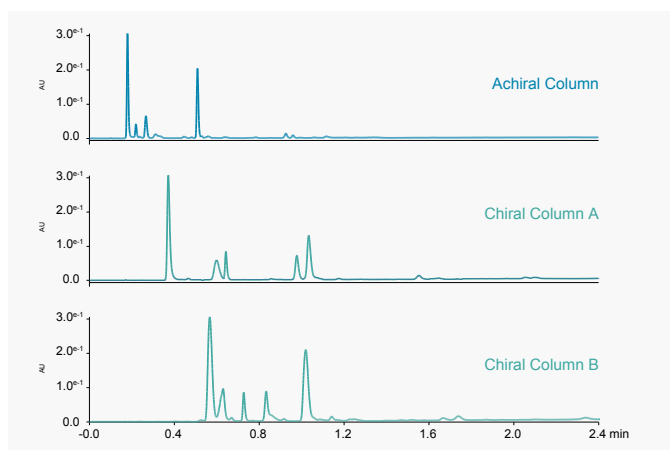
Reaction monitoring of the synthesis of rosuvastatin using ACQUITY UPLC and high/low pH screening.

### ACQUITY UPLC

LC/MS is the classic method for confirming the identity and purity of NCEs. Asset utilization is essential as more organizations are requested to provide analytical services from various disciplines in the pharmaceutical pipeline.

ACQUITY UPLC System Solutions will eliminate significant time and cost per sample from your analytical process while improving the quality of your results, and is an ideal solution for synthetic chemists.

- High throughput screening
- Selectivity explorations with high/low pH workflows
- Flexibility and versatility
- Common platform and column chemistries used in method development
- Proven performance since 2004



Reaction monitoring of clopidogrel synthesis using UPC<sup>2</sup> achiral/chiral screening.

### ACQUITY UPC<sup>2</sup>

Complementary to both GC and LC, convergence chromatography (CC) provides orthogonal and increased separation power that enables unparalleled selectivity through combinations of solvent and stationary phase that is simply not possible by any other chromatographic technique.

- Simplicity
  - Provides a robust analytical approach supporting scale-up to a cost-effective SFC purification workflow
- Similarity
  - Monitor chiral and achiral compounds
- Orthogonality
  - Examine the purity of your synthetic route with confidence where RPLC, GC, and traditional NPLC are challenged

*Discover more with information rich data via triple detection for HTS*

...our findings in this study illustrate that using automated LC-MS-UV-ELSD libraries that are compatible with current HTS bioassays significantly reduces the cycle times required to discover bioactive lead compounds and/or new molecular structures.

J NAT PROD. 2011 DEC 27;74(12):2545-55

### Flexible Detection Options

Whether you are performing reaction monitoring or optimizing the synthetic reaction to aid the transition to process development, options for single to triple detection configuration enable the detection and identification of all your starting materials, synthetic intermediates, and products.



#### ACQUITY UPLC PDA Detector

##### Photodiode Array UV Detection

- UV spectral comparisons
- Multiple UV channel acquisition
- Optimized performance for LC or UPC<sup>2</sup> configurations



#### ACQUITY QDa Detector

##### Mass Detection

- Mass detection with minimal bench space
- Easy to implement and easy to use
- Self-calibrating
- Compatible with ACQUITY UPLC, prep or analytical LC and SFC, and ACQUITY UPC<sup>2</sup>



#### ACQUITY UPLC ELS Detector

##### Evaporative Light Scattering Detection

- Ideal option for analytes lacking:
  - UV chromophores
  - MS ionization
- Bench space friendly

# PURIFY

- ▣ Starting Material Purity
- ▣ Compound QC
- ▣ Impurity Isolation

## STREAMLINE YOUR PURIFICATION PROCESS

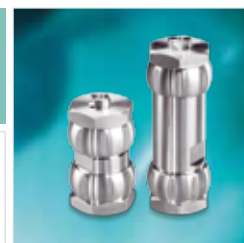
Waters' robust purification solutions are flexible, scalable, and easily integrated into your workflow. Whether you are purifying libraries with thousands of compounds or just a handful of therapeutic leads, Waters enhances your discovery workflow with complementary and orthogonal LC and SFC technologies providing you with a complete set of easy-to-use tools for speed, reliability, and confidence.

### Scalability Without Compromising Selectivity

Scalable column chemistries are a strength of Waters' total system solutions. ACQUITY UPLC and ACQUITY UPC<sup>2</sup> Columns can be scaled up to Optimum Bed Density (OBD™) Preparative Columns for LC and SFC. OBD Preparative Columns are designed to give reliable and consistent preparative column performance, high sample loading, and unmatched column stability and lifetimes.

Our ready-to-use tools and Quality Control Reference Materials help bridge the gap from analytical to preparative scale-up strategies. We have developed a range of downloadable tools to aid in scaling from analytical to preparative analysis, providing help with:

- Mass load scaling
- Gradient scaling
- Split flow calculations
- Focused gradient calculations



### OBD PREPARATIVE COLUMNS CALCULATOR:

Online tools at  
[waters.com/precalculator](https://waters.com/precalculator)

### *Columns designed for purification*

“Being able to load more compound per injection is valuable for saving time without sacrificing purity. Mass recoveries using the Prep OBD Columns are excellent and are higher than other columns I have used. Even after 1,000+ injections, the columns are still performing as they did fresh out of the box.”

MICHAEL J. MAYER, PH.D., SENIOR RESEARCH SCIENTIST II, DISCOVERY SCIENCES –  
MEDICINAL CHEMISTRY, AMRI, ALBANY, NY, U.S. (CONTRACT LABORATORY)

## Justifying the relevance of SFC technologies for compound libraries

...the incorporation of a preparative SFC/MS system in our purification platform has been driven by the need to enhance the diversity of purification technology and improve the overall process. Preparative SFC is particularly valuable in supporting lead optimization programs, in which libraries with extensive diversity are produced with a need for rapid turnaround times.

J. COMB. CHEM. 2006, 8, 705-714

### Flexible and Orthogonal Solutions

MS-directed purification is now easily attainable by all medicinal chemistry purification laboratories. The ACQUITY QDa Detector enables a cost-effective and seamless transition from traditional UV-directed purification to a more efficient MS-directed purification. While retaining the high specificity and detection sensitivity, the ACQUITY QDa is robust and easy to use. Its significantly reduced footprint is ideally suited for purification platforms and can be easily integrated into existing workflows or requirements.

Platforms provide:

- High-throughput purification of NCEs and compound libraries
- Greater efficiency and lower costs per sample

The Waters AutoPurification™ LC and the Prep 100q SFC Systems offer powerful yet flexible collection mechanisms in an open bed format. The choice of LC or SFC systems, built on a common software and hardware platform, provides a level of access and orthogonality, never before available, including:

- Suitable for chiral/achiral separations
- Increased throughput using stacked injections
- Workflow automation with Open Access (OA) and AutoPurify™



*AutoPurification LC System with ACQUITY QDa Detector.*



*Prep 100q SFC System with ACQUITY QDa Detector.*

# MANAGE

- ▣ Scientists
- ▣ Systems
- ▣ Information

## INTEGRATE WITH INTELLIGENT INFORMATICS

Our Open Access LC/MS systems have been the foundation of our enabling technologies for Medicinal Chemistry. Today our UPLC/MS and/or UPC<sup>2</sup>/MS installations range from single analytical stations in universities, to large networked multi-station platforms in many of the world's leading pharmaceutical companies.

### Managing Scientists to Systems with Open Access OpenLynx™

User-friendly interface features help you manage simple tasks such as solvents and samples, systems tasks such as manual or automated injections, or personnel use with login administration.

#### For Administration/Management

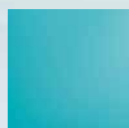
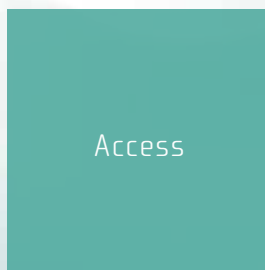
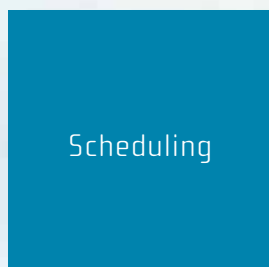
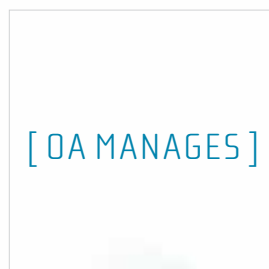
- Manage user list
- Define data and report locations
- Data acquisition/processing and reporting protocols
- Reporting formats to match your organizational preferences and workflow

#### For the User

- Ease of access to the system
- Ease of access to the results
- Minimal user training required

#### For Real-time System and Queue Status with OA ToolKit

- Minimal user training required
- Automated system QC to confirm system performance
- Simple visual status indicators



*At Waters, we create innovative technologies  
that result in business advantages for  
pharmaceutical laboratories.*

Those technologies cover the crucial points in your lab, from testing, characterizing, and purifying promising new substances to managing the vast amounts of data required to move a compound to commercialization. We understand the entire process of Medicinal Chemistry and our culture of innovation is ready to meet its evolving challenges.

Waters can help you manage costs, expand your analytical capabilities, boost productivity, and drive scientific advancements. We help you to succeed.

Contact Waters today to learn how we can help you make meaningful impact in your medicinal chemistry processes.

[www.waters.com/medchem](http://www.waters.com/medchem)

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# Waters

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