ULTRA PERFORMANCE

PERFORMANCE SO STRONG
IT MOVED THE INDUSTRY FORWARD
AND BROUGHT THE IMPACT OF SCIENCE BEYOND THE BENCH

The proven performance of the ACQUITY UPLC® System, used in thousands of laboratories for business-critical applications worldwide, has broken the bottleneck in chromatographic analysis.

With UPLC® Technology you’ll gain higher-quality information and reap benefits in optimized productivity. Experience how separations accomplished in your laboratory translate to the scientific discoveries that improve our lives, from more reliable and accessible medicines to dependable knowledge that our food supply and environment are safe.
ACQUITY UPLC

The most flexible platform for superior performance under any conditions. No other LC system on the market today can come close.

Measurable benefits throughout your organization.
Until Waters introduced UPLC Technology six years ago, results that depended on LC resolution and sensitivity were predictable and uninspiring. The ACQUITY UPLC System has broken through the barriers of HPLC analysis to dramatically accelerate the potential for scientific discoveries.

Since its launch, the ACQUITY UPLC System has convinced scientists in major laboratories around the world that UPLC redefines chromatographic technology.

Companies like yours seek opportunities in every corner of their organization to create competitive advantages that can increase revenues. UPLC is one such strategic technology that can simultaneously increase your laboratory productivity, decrease operational costs, and facilitate faster product development.
Waters introduced the technique onto the market under the name UPLC in 2004, using columns with 1.7 μm diameter spherical particles and a pumping capability of up to 15,000 psi. UPLC allowed industrial, commercial, and research laboratories to take full advantage of improved separation, and thus 2004 marked a new era of great steps forward in productivity, quality, sample throughput, and cost reduction.

Baltussen EA, Noij THM, NOTOX BV, European Pharmaceutical Contractor. 2009 Jun;36-40

Not only does UPLC make good scientific sense – it also makes good financial sense. Whether you work in the laboratory, manage laboratory activities and resources, manage finances, or are responsible for overall strategic direction, the tangible benefits of UPLC are clear:

- Improved chromatographic performance
- More accurate, better visualized results that are available earlier
- Increased productivity for each individual in your decision process
- More sustainable use of lab resources through reduced costs in energy and solvent
- Faster time to market
THE PROOF IS IN THE DATA

UPLC transforms the expectations of laboratories worldwide

When Waters introduced ACQUITY UPLC, we created a new category of performance. While UPLC applies the principles of separation science, the difference is our use of sub-2-µm particle columns in a system that is holistically designed to maximize the advantages of these columns.

The system’s unique, pressure-tolerant sub-2-µm ACQUITY UPLC Columns feature state-of-the-art particle design and quality control standards to provide unparalleled performance and reproducibility. The columns are stable across a wide pH and temperature range and are available in a variety of chemistries, making the ACQUITY UPLC System flexible to meet any lab’s requirements for high-efficiency separations with reduced cycle times, and improved resolution and sensitivity.

“The increase in throughput is accompanied by improvement in sensitivity and chromatographic resolution. ... [With UPLC], we completed the development process at about one-third of normal development time on HPLC. Difficult resolution studies that needed two HPLC runs could be transferred to UPLC with single-run methods with better quality of results.”

S.V. Gopalakrishnan, Senior General Manager, Analytical Development, Zydus Cadila
With reduced particle sizes, greater efficiencies can be achieved and separations can be optimized for your specific needs. Exploit the flexibility of this platform to solve the problem you are faced with today, whether throughput is your challenge or quality of data. Your lab benefits from a powerful, robust, and reliable solution that drives separation science capabilities far beyond traditional benchmarks.

UPLC resolution
ACQUITY UPLC provides more resolution, while maintaining throughput.

UPLC speed and sensitivity
ACQUITY UPLC provides increased throughput and sensitivity, while maintaining resolution.

Great chromatography – more than just fast LC
While UPLC delivers the ability to significantly increase your throughput as well as reduce solvent use, you’ll do this without compromising your analytical results. The increased performance of sub-2-µm columns used in conjunction with the ACQUITY UPLC System’s specialized ability to deliver mobile phase at high pressures preserves the chromatographic benefits of such small-particle chemistries, producing sharper and more concentrated peaks. No other LC system on the market today can come close.
High-efficiency UPLC separations

The holistically-designed ACQUITY UPLC System allows you to select column length and column particle size to meet your application’s analytical needs, without compromising performance and resulting in perfect scalability. BEH particle technology allows you to maintain chromatographic selectivity and resolution, regardless of the scale of your separation. Results will never be compromised by system performance; selectivity and chromatographic fidelity are retained across scaled separations.

Columns built for high efficiency. Using unique 1.7-µm BEH (130Å and 300Å) and 1.8-µm HSS (100Å) material, we created scalable, pure particle columns with superior mechanical strength over wide temperature and pH ranges specifically for the high-efficiency separations of UPLC. Refer to the ACQUITY UPLC Reversed-Phase Column Selectivity Chart to choose the best column for your application.

Stability and robustness. Waters’ state-of-the-art manufacturing processes set the standard for column-to-column and batch-to-batch reproducibility for guaranteed performance over the life of the column, every time.

Transferability from HPLC to UPLC and back. ACQUITY UPLC BEH Columns offer a wide range of complementary chemistries, including C18, C8, C4, Shield RP18, Phenyl, HILIC and Amide, along with ACQUITY UPLC HSS C18 SB, and T3 columns. Transfer from HPLC to UPLC couldn’t be easier with the ACQUITY UPLC Columns Calculator. Simply input your current HPLC conditions for full transfer parameters.

Direct scalability. Waters XBridge™ and HSS HPLC columns extend the power of Waters particle technology to larger particle sizes for superior preparative HPLC separations and hassle-free scale-up and optimization.

Traceability. The ACQUITY UPLC Columns also feature eCord™ Technology that electronically stores all of the information you need to track your experiments: the certificate of analysis, dates of installation and usage, number of injections, number of sample sets, maximum temperature, and pressure.

Method development. ACQUITY UPLC Method Development Kits offer combinations of different column chemistries to accommodate your method development approach, enabling methods to be developed efficiently and effectively.

### Ultra-resolution separations with 150-mm length ACQUITY UPLC Columns

150-mm length ACQUITY UPLC Columns provide high resolution in less time.

<table>
<thead>
<tr>
<th>UPLC Column Length</th>
<th>L/dp*</th>
<th>Efficiency (N)</th>
<th>Separation Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 mm</td>
<td>17,600</td>
<td>5,875</td>
<td>Easy</td>
</tr>
<tr>
<td>50 mm</td>
<td>29,400</td>
<td>11,750</td>
<td>Moderately Challenging</td>
</tr>
<tr>
<td>100 mm</td>
<td>58,800</td>
<td>23,500</td>
<td>Difficult</td>
</tr>
<tr>
<td>150 mm</td>
<td>88,200</td>
<td>35,000</td>
<td>Extremely Difficult</td>
</tr>
</tbody>
</table>

* dp = 1.7 µm

Choosing a UPLC column based upon the relationship between UPLC column length, length to particle size ratio (L/dp), efficiency (N), and separation type.

**Columns:**
- ACQUITY UPLC BEH C18, 1.7 µm

**Mobile phase A:** 0.2% HCOOH in H2O
**Mobile phase B:** 0.2% HCOOH in MeCN

**Isocratic:** 95% A: 5% B

**Flow rate:** 0.5 mL/min

**Injection volume:**
- 1.5 µL (30 mm)
- 2.5 µL (50 mm)
- 5.0 µL (100 mm)
- 7.5 µL (150 mm)

**Compounds:**
1. 1-methylxanthene
2. 1,3-dimethyluric acid
3. theobromine
4. 1,7-dimethylxanthene

**Sample diluent:** 95:5 H2O: MeCN with 0.2% HCOOH

**Sample conc.:** 25 µg/mL

**Temperature:** 50 °C

**Detection:** UV @ 280 nm

**Sampling rate:** 40 pts/sec

**Time constant:** 0.1

**Instrument:** ACQUITY UPLC with ACQUITY UPLC TUV Detector
Beyond the analysis: Solvent savings for more efficient operations

The ACQUITY UPLC System improves chromatographic results while consuming up to 95% less solvent than traditional HPLC – for more efficient and environmentally-sustainable laboratory operations. UPLC consumes significantly less solvent than HPLC, “fast LC” operated at elevated flow rates with 4.6-mm columns, or monolithic stationary phases. The minimized delay volume and dispersion of the ACQUITY UPLC System allows for the use of 1.0-mm columns packed with sub-2-µm material.

- For example, by moving a method from HPLC to UPLC at the 2.1-mm scale, you’ll achieve a solvent savings of 82%
- By further moving to a UPLC method at the 1.0-mm scale, you’ll achieve a solvent savings of 95% – which can turn into tens of thousands of dollars per year in savings.

Go to www.waters.com/green to calculate your solvent and environmental savings with ACQUITY UPLC.

In this UPLC reversed-phase separation of quetiapine and its impurities, the method is transferred from a 2.1 mm x 100 mm, 1.7 µm column to 1.0 mm. Resolution is maintained under the same gradient conditions, while solvent use drops by 77%.

ACQUITY UPLC Community
Learn, share, and advance your chromatography skills. Once you own an ACQUITY UPLC System, you’ll be able to join our exclusive community and connect with thousands of your peers.

www.waters.com/myuplc
THE PERFORMANCE YOU WANT, IN THE CONFIGURATION YOU NEED

Engineered for demanding laboratories

At Waters, we’re serious about our customers’ success. The ACQUITY UPLC System provides you with a comprehensive set of system components that address a range of analytical challenges, from the simplest to the most complex. We configured the system for flexibility, to enable laboratories to select the most appropriate components that meet your application needs. With this modular design, you can add-on features as necessary to build a system that addresses your evolving goals for analytical productivity and efficiency as well as your day-to-day requirements for rigorous operation.

“We’re always looking to improve quality and efficiency in our group, and UPLC answered this for us. Waters has a reputation for being the gold standard of high-pressure chromatography.”

Kendall Powell, Ph.D., Scientist, Enthalpy Analytical, Inc.
Versatility

Column and sample format options enable you to meet your lab’s throughput needs.

- With three UPLC particle substrates in 11 chemistries, Waters has the necessary selectivities to support your application needs
- ACQUITY UPLC BEH Column chemistries: C₁₈, C₆, C₄, Shield RP18, Phenyl, HILIC, Amide
- ACQUITY UPLC HSS Column chemistries: C₁₈, C₈ SB, and T3
- ACQUITY UPLC VanGuard Pre-Columns

Performance

Sensitivity to meet multiple detection requirements.

- Photodiode Array Detector, 190 to 500 nm
- Photodiode Array Detector, extended wavelength, 190 to 800 nm
- Tunable UV Detector
- Fluorescence Detector
- Evaporative Light Scattering Detector
- Single Quadrupole Detector
- Tandem Quadrupole Detector
- Xevo™ TQ MS and Xevo QTof MS
- SYNAPT™ G2 MS and SYNAPT G2 HDMS™

Flexibility

System configurations can be easily modified to match your methodology.

- Column management options offer the lowest possible dispersion performance and precise temperature management up to 90 °C
- Active solvent pre-heaters ensure effective consistent thermal performance from system to system without additional volume and dispersion that are typical of passive-style heat exchangers. The pre-heaters are integral to the column compartment with fit-for-purpose, robust, pressure-tolerant reusable fittings
- The multi-position Column Manager can be stacked, offers thermal flexibility, fast heating and cool-down times, and has an extended temperature range of 4 to 90 °C for optimal method development performance
- Column switching can be automated among multiple columns, with both a column bypass and waste channel, for simple, fast solvent changeover and rapid re-equilibration
- Convenient, reusable high pressure fittings
- Optional Sample Organizer for high sample capacity processing
- Optional flat-bed Sample Manager for walk-up sample analysis in open access labs
- Adjustable FLEXcart for convenient installation and easy movement between workstations, whether you’re right- or left-handed
- Third-party vendor mass spectrometer adaptability

Intelligence

Software, services, and tools to help you optimize system performance.

- Empower™ or MassLynx™ software for control and data management
- ACQUITY Columns Calculator for method conversion
- Seamless integration with S-Matrix and Empower 2 Software’s Method Validation Manager for method development. A solution that provides a customer-proven QbD solution for automation of workflow, to deliver robust methods development and validation from a single vendor
- Connections INSIGHT® Remote Services for predictive system support
- IVDD Certification
The industry-preferred inlet for mass spectrometry increases productivity for MS-based workflows

Laboratories worldwide have confirmed that the ACQUITY UPLC System is the technology of choice as an inlet to MS – repeatedly demonstrating improved sensitivity, spectral quality, and productivity. The sharper peaks and improved chromatographic resolution provided by the ACQUITY UPLC System produces spectra of the highest quality and sensitivity, making the Waters system the best inlet available – without flow splitting – for MS and MS/MS analyses.

- From Waters’ easy-to-use, high-performance single quadrupole mass detectors, to advanced tandem, time-of-flight, and ion mobility mass spectrometers, the ACQUITY UPLC System is the only inlet you’ll need for MS, MS/MS, MS², and IMS-MS analyses, regardless of your analytical goal.

- UPLC’s dramatic peak resolution results in greatly enhanced detection sensitivity, allowing you to see more quality information in less time.

- The ACQUITY UPLC System is also easily compatible with third-party MS solutions via expanded software control options, maximizing any investment your lab has made in MS. Replacing HPLC with UPLC improves sensitivity, efficiency, and performance of your existing technologies.

- Unattended, high throughput analyses for MS are supported by the ACQUITY UPLC Sample Organizer, which provides cold storage for multiple sample trays and plates, with minimal expansion of the system’s footprint.

With the ACQUITY UPLC System, your laboratories will thrive with the definitive platform for high throughput, high sensitivity, qualitative and quantitative analysis.
“We got some phenomenal results which we could just not do with HPLC... It was a logical solution that we had to look then to putting UPLC on the front end of our mass spec systems. It would increase our throughput, up our instrument utilization, and make much more efficient use of the equipment that we have.”

Philip Grace, Ph.D., Principal Scientist, Quotient BioResearch

Due to the high peak capacity available with UPLC, fewer compounds co-elute at a particular mass resolution. The advantages of this are clearer, higher quality spectra and reduced ion suppression.
Do more with your results

Waters software solutions enable you to capitalize on the results generated by the ACQUITY UPLC System. The Waters Laboratory Informatics Suite includes proven information management solutions that integrate all your lab resources in a consistent, scalable, and seamless application environment.

Empower Software provides control of the ACQUITY UPLC System, including data acquisition, management, processing, and reporting, all in the market-leading chromatography data software (CDS) platform. Empower is scalable from a single workstation to an enterprise-wide CDS solution, and offers advanced features for method development, reporting, and custom calculations. The software also offers a web-based dashboard module that provides flexible analyses of critical chromatography performance data, and enterprise options for advanced data management and automated method validation management.

MassLynx Software for advanced mass spectrometry applications enables researchers to acquire, analyze, manage, and distribute information. MassLynx offers flexible control over complex instrument configurations, along with optional Application Managers that are tailored for specific MS analyses.

NuGenesis® SDMS is a customizable scientific information management platform that captures and stores data in a centralized data warehouse. SDMS gives laboratories the ability to automatically collect, catalog, archive, and retrieve critical scientific information. SDMS Vision Publisher is an Electronic Laboratory Notebook (ELN) that optimizes your ability to process, interpret and report SDMS information. The SDMS Intelligent Procedure Manager is an electronic form and documentation workflow system that guides laboratory analysts through a routine method standard operating procedure (SOP), thereby reducing cycle times and errors.

“ I think in the last year or two, Waters UPLC has really revolutionized chromatography, and it’s made possible things we thought a year ago would never be possible…”

John R. Engen, Ph.D., Associate Professor, Northeastern University, The Barnett Institute

Maximize system uptime

Connections INSIGHT Remote Services provide secure, web-based system monitoring, instant alert notification, and a direct link to Waters technical experts. These services help you maximize ACQUITY UPLC System uptime, increase laboratory productivity, and allow Waters to continually monitor your system’s performance to anticipate potential performance issues.

In the event system issues occur, the service automatically alerts Waters and provides information for analysis. Issues can be immediately addressed by Waters personnel with authorized temporary system access.

Connections INSIGHT Remote Services also provide monthly performance status reports that summarize overall system operation and use of consumables, enabling you to better manage your laboratory resources.

Be assured. Chose Waters Global Services.
Waters Global Services focuses on optimizing Waters products with superior service, support, upgrades, training, and Waters Quality Parts.
www.waters.com/services
ACQUITY UPLC is just one of a comprehensive family of UPLC systems from Waters that can transform your organization’s capabilities. The quality and throughput of UPLC methods can seamlessly transition from sample-limited nano-scale research with nanoACQUITY UPLC® to research and development with the ACQUITY UPLC or UPLC Open Architecture, to routine analysis and method development with the ACQUITY UPLC H-Class, and on to quality control and manufacturing with the PATROL™ UPLC.

ACQUITY UPLC represents the continuation of six years of proven performance.

Features an ever-evolving set of enhancements that are driven by customer feedback.

Decreases run times by up to a factor of 10.

Uses up to 95% less solvent.

Adopted by thousands of major laboratories across industries.

Versatility to improve every LC and LC/MS experiment.

Saves energy and space in your laboratory.

Demonstrated success with over 500 peer-reviewed papers.
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