



Waters

THE SCIENCE OF WHAT'S POSSIBLE.™



What happens in laboratories becomes part of our lives.

The development of new, ground-breaking medicines that make us healthier. Quality control for the food we eat, the beverages we drink and the water we depend on. Solutions for the safety of plastics, polymers and synthetics that become the clothes we wear, the toys our children play with. Early detection and treatment of diseases. Higher standards for a cleaner environment. It all begins with the analytical technologies from Waters—and the science of what's possible. [To discover what's possible in your world, visit waters.com.](http://waters.com)

Waters

THE SCIENCE OF WHAT'S POSSIBLE.™

Pharmaceutical & Life Sciences | Food | Environmental | Clinical | Chemical Materials

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Designed by
scientists for scientists

Waters solutions remove the guesswork in choosing the best way to achieve your goals.

■ Chemical
Materials

We offer comprehensive solutions for the characterization of chemical materials that help manufacturers cost-effectively accelerate the development of new products, improve the efficiency of manufacturing processes, and ensure final product quality.

■ Clinical

Waters® solutions provide improved accuracy and precision for all assays resulting in the highest quality results. Our MassTrak™ range of integrated system solutions meets the needs of clinical laboratories, transplant hospitals, and reference laboratories.

■ Environmental

We have a unique and thorough understanding of the specialized needs of environmental testing laboratories. Whatever the challenge – sample throughput, trace detection, complex matrices, data management, or regulatory compliance – Waters has a solution.

- *How do you stay at the forefront of your industry?*
- *Which analytical issues cause you the most concern?*
- *Whatever the industry, whatever the challenges, Waters' world-leading solutions will help drive you to the answer.*
- *Built on the shoulders of ground-breaking technology, Waters' unrivaled expertise encompasses the following industries:*

■ Food

A leader in developing food testing systems, Waters' comprehensive solutions enable food laboratories to identify diverse chemical compounds, meet compliance requirements, decrease operational costs, increase productivity, and, most importantly, help ensure public safety.

■ Pharmaceutical and Life Sciences

No company knows more about creating an innovative, commercially successful drug research and development pipeline than Waters. No matter your organization's role in the industry, Waters can show you how to manage costs, expand analytical capabilities, boost productivity, and drive scientific advancements.

We offer a comprehensive approach that includes instrumentation, columns and sample preparation, software, support services, and new for 2012, our Waters Analytical Standards and Reagents. Each solution is customized to your particular industry and your specific needs. The solutions others may promise are the solutions you can only get from a company like Waters.

2012 Featured Solutions



Xevo® G2-S QToF is designed for scientists who need to identify, quantify, and confirm the broadest range of compounds in the most complex and challenging samples. The Xevo G2-S QToF also incorporates StepWave™ ion optics for unsurpassed levels of durable sensitivity and proven quantitative time-of-flight (QToF™) technology.



ACQUITY UPC²™ System expands the boundaries of reversed phase LC and traditional GC separations with UltraPerformance Convergence Chromatography™ – providing not only the ultimate solution for routine analysis but also a dramatically streamlined laboratory workflow.



ACQUITY UPLC® I-Class System with significantly improved chromatographic performance gives you more confidence in your results. Setting the highest benchmark for MS inlet compatibility, discover answers to your most complex challenges with the highest performing UPLC® ever engineered.



NuGenesis® 8, featuring Laboratory Execution (LE) Technologies, is a comprehensive data management and workflow solution that supports the entire product life cycle, from research through manufacturing. The user-centric platform encompasses NuGenesis SDMS, a compliant-ready data repository, and NuGenesis ELN, a flexible analytical electronic laboratory notebook. Capabilities include sample management, laboratory inventories, data retention and legal hold, and electronic laboratory execution methods.

Biopharmaceutical Platform Solution with UNIFI™ integrates robust UPLC/MS characterization technology with UNIFI Scientific Information System. UNIFI is an industry-first comprehensive software solution that uniquely unites all aspects of biotherapeutic analyses and workflows, enabling organizations to apply high-resolution analytics across the development process continuum. This application-focused platform, featuring ACQUITY UPLC H-Class Bio and Xevo G2 ToF technologies, captures complex mass spectrometry and chromatography data, in conjunction with next-generation bioinformatics and GxP data management capabilities.

Regulated Bioanalysis Platform Solution with UNIFI is a revolution for the bioanalyst. It purposefully combines the new reduced dispersion ACQUITY UPLC I-Class System – the best-in-class inlet to MS – with the high sensitivity Xevo TQ-S, under new software control using the fully compliant-ready UNIFI Scientific Information System. When used in conjunction with our globally standard Oasis® and Ostro™ Sample Preparation Technologies, you'll never again have to compromise between data quality, laboratory productivity, or compliance in regulated bioanalysis.

Screening Platform Solution with UNIFI

comprised of world-class chromatography and mass spectrometry instruments, software, standards and reagents, and chemistries designed to work together seamlessly to produce accurate data and results. The solution enables all laboratory functions to work with a common backbone of analytical information comprised of successful methods, processed results, and historical data and reports.

Pesticide Screening Application Solution with UNIFI

delivers the ease-of-use, sensitivity, stability, reproducibility, and throughput scientists need to successfully and profitably perform pesticide residue screening in compliance with regulatory requirements. For the first time, you will be able to reliably report the presence and absence of pesticide residues, easily streamline workflows, and increase the speed of analysis of complex matrices.

Metabolite Identification Application Solution with UNIFI

is the world's most comprehensive metabolite identification system. In an unprecedented manner, it assists the biotransformation scientist with identifying and characterizing metabolites in both discovery and development environments. This application solution brings unparalleled ease and efficiency to routine Met ID processes. As a consequence, scientists can rapidly derive results from complex data sets, and focus their time and skill on efforts that fuel and accelerate the discovery and development process.

2012 Featured Solutions



Omics Research Platform Solution

combines our state-of-the-art UPLC/MS and UPLC/HDMS™ instruments with simple, scalable TransOmics™ Informatics in collaboration with our new partner, Nonlinear Dynamics. This powerful combination unlocks information utilizing a common, easy-to-use workflow across all applications – from Proteomics to Metabolomics to Lipidomics – delivering faster, more accurate results than ever before. Scientists now have a streamlined approach to conduct high-quality experiments in biomarker discovery and validation, perfect for pharmaceutical and life sciences research, as well as applied research in the food and clinical markets.



The SQ Detector 2 is a small, robust and reliable single quadrupole mass detector, ideal for a wide range of analytical and preparative chromatographic techniques. The SQ Detector 2 guarantees maximum system performance with minimum effort for set-up, sample runs, and data interpretation.

Whether your focus is on pharmaceuticals, biopharmaceuticals, food, the environment, or chemical materials, the SQ Detector 2 is your simplest route to reliable, versatile mass detection.



Xevo TQD is designed to reduce complexity by delivering maximum productivity in mass spectrometry with minimum effort. For ultimate consistency between analyses; instrument to instrument, lab to lab; both the advanced technology of the ACQUITY UPLC System and the robust universal ion source architecture of the Xevo TQD guarantee dependability, while providing a flexible platform to accommodate ever-changing sample types.



MV-10 ASFE™ System is the first multivessel analytical SFE system for “hands-free” sequential extraction, enabling fast SFE method development, efficient sample preparation, and isolation for trace analysis. And since it uses supercritical CO₂ as the main mobile phase, the result is an extract with little or no residual solvent, superior purity and yield, and lower operating costs, compared to traditional normal phase solvent extraction systems.

■ Analytical Standards and Reagents

Technical and regulatory requirements for preparation, documentation, and testing of analytical standards and reagents are becoming increasingly complex and time consuming. At Waters, we realize this is a vital component for achieving optimal performance and compliance when using analytical instrumentation. To address this critical need, Waters has developed a new business focused entirely on preparation, testing, documentation, and qualification of standards and reagents.

Waters is the first analytical instrumentation company to offer a comprehensive portfolio of reference materials, controls, calibrators, buffers, and other reagents created by analytical scientists for analytical scientists. Products available to you now include everyday solvents, additives and modifiers, instrument diagnostic standards, system performance standards, and application specific standards.

Confidence from Waters

- Analytical Standard and Reagents inspired, developed, and tested through Waters' expertise.
- All products are manufactured and traceable to exacting specifications and accompanied by the highest level of accreditation and documentation.
- Integral to true end-to-end platform and application solutions, offering Waters' fully integrated workflows for a wide range of laboratories.

Confidence in Your Results

- Controls, Calibrators, and Reagents for all chromatography and mass spectrometry needs.
- Certified product traceability through source, purity, and composition.
- Achieve productivity gains with ready-to-use, stable reagents and standards that optimize laboratory workflow.

Whether you are a commercial, research, or government laboratory; small business or multi-national corporation, you can count on Waters' experience, products, and services to simplify compliance and ensure quality.



Consumables

HPLC and SFC Column Solutions

Waters continues to be at the forefront of materials science as applied to chromatographic media. Ongoing particle substrate, bonded phase, and column hardware innovations empower separation scientists to realize the business and scientific benefits that Waters LC and SFC column technologies provide.

eXtended Performance [XP]

2.5 μ m Columns

XBridge™ and XSelect™ eXtended Performance [XP] 2.5 μ m Columns are high efficiency, low backpressure HPLC columns that can be easily utilized across all HPLC, UHPLC, and UPLC Technology platforms. **XP** 2.5 μ m Columns bridge the gap between HPLC and UPLC and provide equivalent backpressure and superior performance to superficially-porous HPLC columns. **XP** 2.5 μ m Columns offer unmatched selectivity choices with three fully-scalable particle substrates (high strength silica, ethylene bridged hybrid, and charged surface hybrid), 14 chemistries (C₁₈, Phenyl-Hexyl, C₈, Shield RP18, HILIC, Amide, Fluoro-Phenyl, Cyano, and PFP), and more than 180 column configurations.

XSelect Columns

The XSelect family of HPLC columns is designed and optimized for selectivity by utilizing a multi-particle strategy to solve the most complex reversed-phase separation challenges. XSelect Columns combine a carefully chosen selection of eight bonded phases (C₁₈, Phenyl-Hexyl, Fluoro-Phenyl, Cyano, and PFP) with two robust and fully-scalable particle substrates (Charged Surface Hybrid (CSH™) and High Strength Silica (HSS)). XSelect HPLC Column benefits include high analyte loading, enhanced compound retention, superior peak shape, wide selectivity range, and seamless scalability between UPLC, analytical HPLC, and preparative HPLC.

Order your 2012/2013 Waters Quality Parts, Chromatography Columns, and Supplies Catalog at www.waters.com/catalog.



XBridge Columns

XBridge HPLC Columns continue to set the industry standard for pH stability, efficiency and LC/MS performance. XBridge Columns offer superior pH stability over the widest range (pH 1-12) along with high efficiencies and symmetrical peak shapes. The XBridge Column chemistries (C_{18} , C_8 , Phenyl, Shield RP18, HILIC and Amide) provide the stability necessary for long, predictable column lifetimes under extreme conditions. XBridge HPLC Columns are based upon the same rugged BEH particle technology present in ACQUITY UPLC BEH Columns, and like XSelect Columns, XBridge Columns offer a seamless method migration path between UPLC, analytical HPLC and preparative HPLC.

Viridis Hybrid SFC Columns

Viridis® Hybrid SFC Columns, based on patented Ethylene Bridged Hybrid (BEH) particle technology and CSH (Charged Surface Hybrid) Technology, offer high sensitivity and resolution with excellent peak shape. The Viridis Hybrid Column family includes Viridis BEH 2-Ethylpyridine, Viridis BEH, and Viridis CSH Fluoro-Phenyl 5 μ m Columns which provide a wide range of selectivity for achiral separations. Purification scientists can scale up to Viridis Hybrid 5 μ m preparative Columns packed using patented Optimum Bed Density (OBD™) Technology for unmatched column lifetimes.

Consumables

UPLC Column Solutions

More and more organizations have realized the benefits of improved productivity, higher data quality, and lower cost per sample, as well as faster time-to-market, inherent in assays that utilize UPLC Technology. For these reasons, Waters continues to develop new and innovative UPLC Column chemistries.

ACQUITY UPLC Columns and VanGuard Pre-Columns

The ACQUITY UPLC Column family continues to evolve and expand and now includes six particle substrates (BEH 125Å, BEH 130Å, BEH 200Å, BEH 300Å, HSS, and CSH) with 22 chemistries including seven application-directed UPLC chemistries for SEC, amino acid analysis, proteins, peptides, oligonucleotides, and glycan analysis. With the number of UPLC Column selectivity choices for small molecule and biopharmaceutical applications continuing to grow, Waters has a UPLC Column solution to meet your application needs.

ACQUITY UPLC CSH (Charged Surface Hybrid) Columns are designed to maximize chromatographic selectivity and LC/MS mobile-phase performance and are available in C₁₈, Fluoro-Phenyl and Phenyl-Hexyl chemistries. The rugged and pH-stable ACQUITY UPLC BEH Columns include C₁₈,

C₈, Shield RP18, Phenyl, HILIC, Amide, SEC 125Å, SEC 200Å, 300Å C₁₈, and 300Å C₄ chemistries. ACQUITY UPLC HSS Columns (available in C₁₈, C₁₈ SB, T3, PFP, and CN chemistries) offer the highest retentivity and widest selectivity range. All Waters ACQUITY UPLC Columns are designed, tested, and guaranteed for routine use in applications up to 18,000 psi (1241 bar).

Available in more than 200 combinations of column configurations and chemistries, ACQUITY UPLC Columns combine faster separations with higher resolution and sensitivities by harnessing the full potential of small particles. For UPLC Column protection, VanGuard™ Pre-Columns feature an ultra-low volume pending design that efficiently prolongs ACQUITY UPLC Column lifetimes in demanding applications with challenging and variable sample quality.

Method Transfer Kits

Method Transfer Kits are designed to preserve the integrity of a separation as it is transferred between UPLC and HPLC platforms. Based on the concept of maintaining column length (L) to particle size (dp) ratio (L/dp), these kits provide an ACQUITY UPLC Column with an HPLC column of equivalent selectivity and resolving power. Using the ACQUITY UPLC Columns Calculator methods can be fully transferred from HPLC to UPLC or from UPLC to HPLC.

Method Development Kits

With a seemingly endless number of method parameters to try, developing a new chromatographic method can be an overwhelming and time-consuming experience. Waters Method Development Kits consist of several UPLC Columns, encompassing a broad range in selectivity to accommodate your method development approach and enable more efficient and effective method development.



ACQUITY UPLC Column, VanGuard Pre-Columns, and Method Transfer Kits.

Method Validation Kits

With exceptional batch-to-batch and column-to-column reproducibility, Waters well-established particle and column manufacturing process control provides confidence in the long-term reliability of your analytical method. ACQUITY UPLC Method Validation Kits include three batches of chromatographic media (derived from different base particles) to judge the quality, reliability, and consistency of your chromatographic method.

Learn about the techniques and technologies of analytical sciences.
View our Primers at www.waters.com/primers.

❖ Consumables

Bioseparations and Analyses Solutions

Waters is dedicated to providing innovative UPLC solutions as well as traditional HPLC-based offerings for the separation, analysis, and characterization of DNA/RNA, amino acids, peptides, proteins, and glycans. Beginning with a keen understanding of today's biomolecule-related challenges, Waters chemistry operations scientists and engineers continuously seek purposeful innovations that help deliver impactful solutions in applications, ranging from proteomics and biomarker discovery through the commercialization of advanced biopharmaceuticals.



SEC and IEX columns for analytical applications.

Biomolecule Separation Technologies

- Peptide Separation Technology Columns for nano, capillary, analytical, and preparative peptide applications
- Protein Separation Technology size-exclusion, ion-exchange, and reversed-phase columns for UPLC-based applications; and BioSuite™ SEC, IEX, RP, and HIC columns for HPLC-based applications
- AccQ•Tag™ Ultra chemistry specific for Waters UPLC Amino Acid Analysis Solution, as well as Pico•Tag® and AccQ•Tag for HPLC-based amino acid analyses
- Oligonucleotide Separation Technology columns for the analysis and lab-scale isolation of synthetic oligonucleotides and DNA/RNA fragments
- Glycan Separation Technology sample preparation offerings and columns for UPLC or UPLC/MS analysis of glycoprotein derived glycans
- MassPREP™ chemistry consumables and kits for MS and LC/MS applications of peptides, proteins, and other biomolecules





*Harness Waters technologies
for bioseparations and analyses.*

Consumables

Sample Preparation Solutions

Waters offers comprehensive solutions to solve all sample preparation challenges. As the stringent requirements for higher sensitivity, selectivity, accuracy, precision, and the number of samples to be processed continue to escalate, the corresponding increases in speed and sophistication of analysis and data collection have outpaced improvements in the many traditional techniques of sample collection and preparation. Waters efforts are focused on providing products to streamline sample preparation protocols.

Oasis SPE Products

Oasis products combine revolutionary sorbents with innovative hardware, and are the preeminent choice in solid-phase extraction (SPE). Chosen for their reliable, highly selective performance, Oasis products are used by separation scientists across the globe to solve their most difficult sample preparation challenges. Researchers rely on the superior technical performance of these products to achieve unmatched purity, consistency, and quality in their sample preparation methods.

Ostro Sample Preparation Products

A novel solution for the cleanup of phospholipids in plasma and serum. Requiring minimal to no method development and using a simple protocol, this technology can be quickly implemented in order to optimize your laboratory's workflow. Providing cleaner, more reproducible extracts than competitive phospholipid removal devices or techniques, the Ostro 96-well plate allows for more sensitive analyses, increased sample throughput, and reduced instrument downtime.



Sep-Pak SPE Products

Sep-Pak® cartridges and plates are recognized throughout the world and remain the most referenced solid-phase extraction (SPE) product for sample preparation. A diverse selection of formats and sorbents make Sep-Pak SPE products ideally suited for all types of samples for GC, HPLC, and UPLC analysis methods.

DisQuE Dispersive Sample Preparation (QuEChERS)

DisQuE™ dispersive sample preparation kits and extraction tubes are conveniently packed with pre-weighed sorbents and buffers and are fully compliant with QuEChERS regulatory methods.

PoraPak Rxn Products for Post Synthesis Cleanup

PoraPak™ Rxn is designed for reaction cleanup in drug discovery. The product comes pre-packed in a range of sizes and is offered in bulk for the scale of reaction needs.

Waters Certified Vials

Waters' vials are certified for cleanliness by HPLC and LC/MS testing. The new TruView™ LCMS Certified Vials are the only vials tested and certified for analyte recovery by UPLC/MS/MS and made by a proprietary manufacturing process that minimizes adsorption to the glass surface. These vials fit Waters ACQUITY UPLC and Alliance® HPLC systems as well as most other autosamplers on the market.

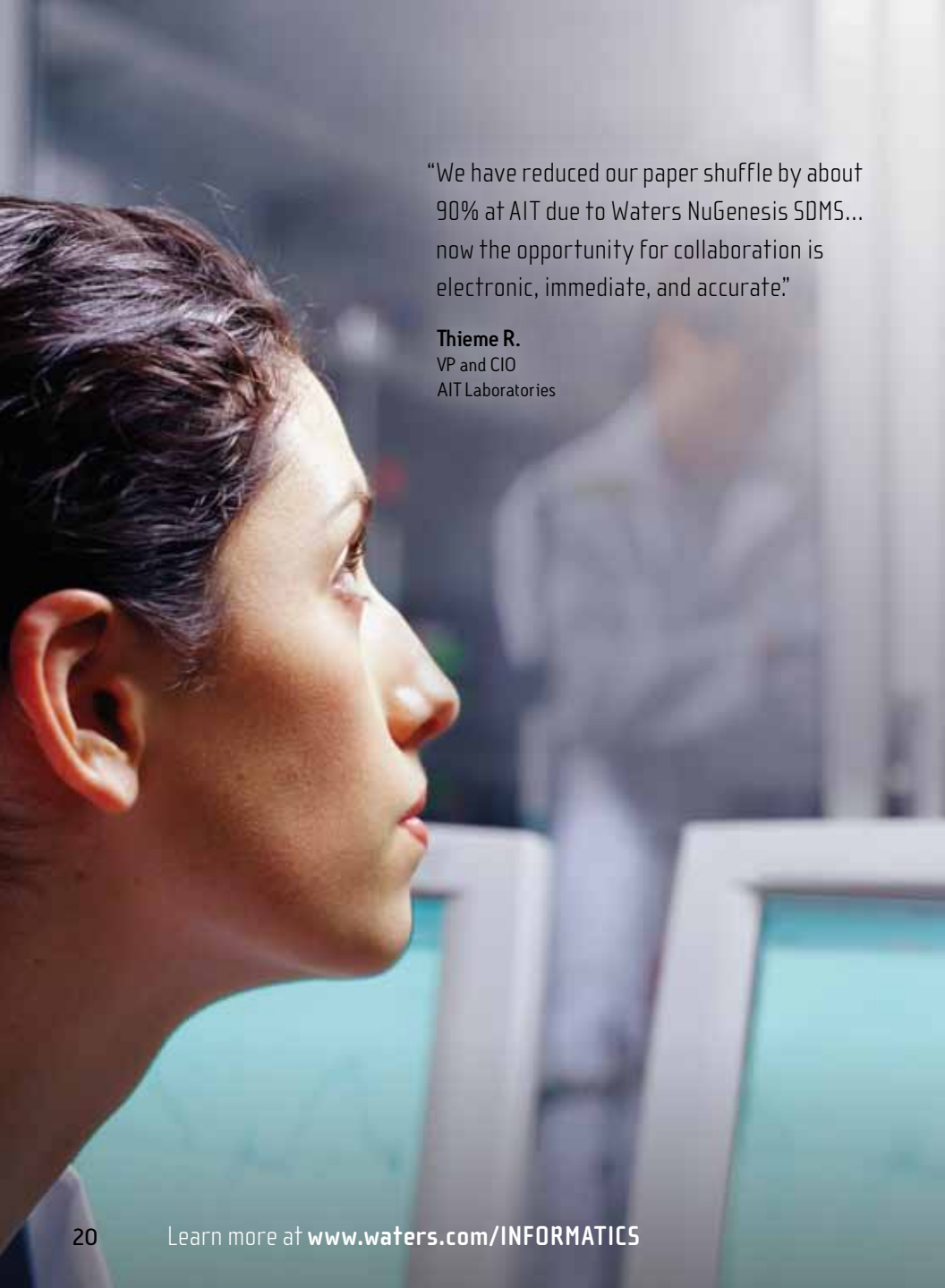
Pall Life Sciences Sample and Solvent Filtration Products

Waters offers a range of different membranes for solvent and sample compatibility. Filtration formats include apparatus for filtering solvents, and Acrodisc syringe filters for sample filtering needs.

Sirocco 96-Well Filtration Plates

Sirocco™ eliminates time-consuming, extra sample-handling steps traditionally done with classical protein precipitation. Providing efficient sample processing for clear filtrates from small sample volumes, these plates can be automated to process large numbers of samples efficiently.

To select the best vial, filter, or plate for your system and application, visit www.apps.waters.com.

A woman with dark hair is shown in profile, looking intently at a computer monitor. The background is a blurred laboratory or office environment with another person visible in the distance.

"We have reduced our paper shuffle by about 90% at AIT due to Waters NuGenesis SDMS... now the opportunity for collaboration is electronic, immediate, and accurate."

Thieme R.

VP and CIO
AIT Laboratories

Waters Laboratory Informatics solutions convert the scientific data generated in your lab into valuable information throughout your organization.

With the Waters Laboratory Informatics suite at the core of your lab, you bring together all of the information management solutions needed to compile, analyze, find, and share your data for faster and more effective decision-making. For an application-specific solution or a complete data management platform, rely on Waters Laboratory Informatics.

Applications

- Data management, electronic laboratory notebook (ELN), and laboratory execution
- Automatic information capture, cataloging, and archiving from a wide variety of data sources
- Document observations and control procedures
- Guide analysts through laboratory method standard operating procedures (SOPs)
- Manage and track samples
- Instrument and reagent inventories
- Manage the entire scientific data lifecycle, including data retention and legal hold
- Instrument control, data acquisition, and processing
- Improve data accessibility and scientific collaboration
- Automate and streamline laboratory workflow
- Compliance management, data security, and traceability

Key Technologies

- NuGenesis 8 featuring LE (Laboratory Execution) Technologies; includes NuGenesis SDMS and NuGenesis ELN
- Empower™ Chromatography Data Software (CDS), Method Validation Manager (MVM), and Enterprise Data Manager (EDM)
- MassLynx™ Mass Spectrometry Software and Application Managers
- Fusion Method Development™ Software from S-Matrix
- UNIFI Scientific Information System, available as part of complete platform and application solutions including Biopharmaceutical, Regulated Bioanalysis, Screening, Metabolite Identification, and Pesticide Screening
- TransOmics Informatics for Proteomics
- TransOmics Informatics for Metabolomics and Lipidomics

Introducing the newest member of the ACQUITY UPLC family – the ACQUITY UPLC I-Class System. ACQUITY UPLC I-Class provides the most powerful solution to the most critical need in separations science today – successfully analyzing compounds that are limited in amount or availability amid a complex matrix, more rapidly than ever before.

Developed to produce the most accurate and reproducible separations, you will get the most information possible and accelerate laboratory results. The system has dramatically decreased dispersion for the highest resolution, and features rapid injection cycles, and sample throughput with reduced carryover. These attributes make it a candidate to replace your current LC as the best-in-class inlet for any mass spectrometer, ultimately providing best-in-class UPLC performance.

Applications

- LC/MS analysis
- Qualitative and quantitative analyses
- Analysis of samples in complex matrices
- Trace impurity analysis
- High-throughput and open access separations
- Method development

Key Technologies

- ACQUITY UPLC I-Class System
- ACQUITY UPLC I-Class System with 2D Technology
- Binary Solvent Management
- Superior inlet to mass spectrometry independent of vendor
- ACQUITY UPLC Photodiode Array, Tunable UV, UPLC detectors
- ACQUITY UPLC single and tandem quadrupole mass detectors
- Empower or MassLynx software
- Local Console Controller for handheld remote operation
- Connections INSIGHT® Remote Services
- ACQUITY UPLC BEH, CSH, and HSS Columns



ACQUITY UPLC I-Class System.

Access the productivity and chromatographic performance of UPLC with the familiarity of HPLC using the Waters ACQUITY UPLC H-Class System. Laboratories can now achieve UPLC results with a system that combines the flexibility of ternary or quaternary solvent blending with the simplicity of flow-through needle injections. You can even continue running your existing HPLC methods with this forward-looking platform, and seamlessly transition to UPLC separations when you're ready.

Engineered with a bio-inert flow path, the ACQUITY UPLC H-Class Bio System is ideal for orthogonal RP, SEC, IEX, and HILIC quaternary bioseparations.

The ACQUITY UPLC H-Class Method Development System combines UPLC-quality chromatography with software that automates the development of an optimal Design of Experiment space to consistently produce rugged, robust LC methods in a fraction of the time.

Applications

- HPLC and UPLC analyses with easy method transferability
- Routine analysis
- Method development
- Quality assurance and quality control

Key Technologies

- ACQUITY UPLC H-Class System
- ACQUITY UPLC H-Class Bio System
- ACQUITY UPLC H-Class Method Development System
- ACQUITY UPLC H-Class System with 2D Technology
- Quaternary Solvent Management
- Auto•Blend Plus™ Technology
- ACQUITY UPLC Photodiode Array, Tunable UV, Fluorescence, and Evaporative Light Scattering detectors
- Single (SQD) and tandem (TQD) quadrupole detectors
- Empower or MassLynx software
- Local Console Controller for handheld remote operation
- Connections INSIGHT Remote Services
- ACQUITY UPLC BEH, CSH, and HSS Columns
- ACQUITY UPLC Method Development and Method Transfer kits



ACQUITY UPLC H-Class System.

For chromatographers who require additional capabilities to gain sensitivity and selectivity, perform orthogonal separations, and increase their speed of analysis. ACQUITY UPLC Systems can meet these needs by controlling multiple valves and pumps for 2D separations.

The resolution, sensitivity, and throughput benefits of UPLC Technology are even more important in 2D applications. Waters' 2D Technology solutions for the ACQUITY UPLC Family are purposefully built, from plumbing to software to valve control, providing reproducible and consistent results for various applications.

Applications

- Trapping with and without At-Column Dilution
- Heart cutting
- Parallel column regeneration

Key Technologies

- ACQUITY UPLC I-Class
- ACQUITY UPLC H-Class
- ACQUITY UPLC H-Class Bio
- ACQUITY UPLC
- MassLynx Software
- ACQUITY UPLC Columns



*ACQUITY UPLC I-Class System
with 2D Technology.*

❖ Separations Science

UPLC for Process Development and Manufacturing

The PATROL UPLC® Laboratory Analyzer System is designed for reaction monitoring and optimization experiments. It integrates sample preparation and Real-TIME LC™ analysis in an automated analyzer providing fast, and accurate quantitative results to define a process method.

Waters PATROL UPLC Process Analyzer System is a real-time Process Analytical Technology (PAT) system that detects and quantifies complex multiple component manufacturing samples and final product directly on the production floor.

The validated methods transferred from the PATROL UPLC Laboratory Analyzer to the PATROL UPLC Process Analyzer ensure regulatory compliance on the manufacturing floor as well as results that improve operational efficiency, deliver quantifiable ROI, and increase profits.

Applications

- Real-TIME LC analysis in manufacturing processes
- Quantitative measurement of Critical Quality Attributes
- Process development
- Process cleaning validation
- Process reaction monitoring
- Process/development cell culture
- Process purification fraction analysis
- Development reaction optimization and characterization
- Development forced degradation
- Development and process fermentation
- Pilot scale-up

Key Technologies

- PATROL UPLC Laboratory Analyzer System
- PATROL UPLC Process Analyzer System
- Online and atline configurations
- Empower Software
- NuGenesis SDMS Information Platform
- ACQUITY UPLC Columns
- Connections INSIGHT Remote Services



*PATROL UPLC Laboratory
Analyzer System.*

■ Separations Science

nanoscale UPLC

The nanoACQUITY UPLC® System has been designed for microbore to nanoscale separations to attain the highest sensitivity and chromatographic resolution for UPLC and UPLC/MS.

Achieve separations at nanoflow rates without flow-splitting. Offers significant improvements in robustness, reproducibility, and simplicity of operation over conventional nanoflow separations technologies. Also available with 2D capabilities for increased peak capacity and dynamic range.

The Optional TRIZAIC UPLC® nanoTile™ provides UPLC performance in a user-friendly platform for sample limited separations.

Applications

- Biomarker discovery
- Protein identification
- Protein characterization
- Metabolite identification

Key Technologies

- nanoACQUITY UPLC System
- nanoACQUITY UPLC System with 2D Technology
- nanoACQUITY System with HDX Technology
- Atlantis,® Symmetry,® HSS T3, and BEH chemistries
- Waters MS and HDMS™ technologies
- Superior mass spectrometry inlet
- nanoACQUITY UPLC Columns
- TRIZAIC UPLC with nanoTile Technology

"The nanoACQUITY [UPLC] System is a high-pressure nanoflow pump that can deliver flow rates down to hundreds of nanoliters per minute, and this is important because of the reproducibility requirements for the protein expression profiling. Another innovation that Waters has come forth with is small particle LC packing that delivers superior peptide separation. That truly is a step forward in our ability to see low-level proteins in this complex mixture."

Cavey G.

Special Program Investigator
Van Andel Institute



nanoACQUITY UPLC System.

❖ Separations Science

nanoscale UPLC with HDX Technology

The nanoACQUITY UPLC System with HDX Technology leverages nanoscale UPLC separations and high-resolution MS to answer important questions about changes in protein conformation with confidence by stringently controlling temperature sensitive parts of the HDX sample work up.

Based on Waters' proven UPLC Technology, the system delivers outstanding chromatographic resolution, superior reproducibility, and reliability while running industry leading DynamX Data Analysis Software, shortening time between experiment and answers. It's also available in a manual or automated format.

Applications

- Biopharmaceutical product development
- Drug binding to a protein target molecule
- Protein-protein interactions
- Structural biology research

Key Technologies

- nanoACQUITY UPLC System
nanoACQUITY UPLC HDX Manager (manual or automated)
- Atlantis, Symmetry, HSS T3, and BEH chemistries
- Waters MS and HDMS technologies
- nanoACQUITY UPLC Columns
- ProteinLynx Global SERVER™ Application Manager
- DynamX Software
- Superior mass spectrometry inlet



*nanoACQUITY UPLC System
with HDX Technology.*

❖ Separations Science

UPC²

Waters introduces a new category of separations science with the ACQUITY UPC² System.

UltraPerformance Convergence

Chromatography marries the unrealized potential of SFC with Waters' proven UPLC Technology and expertise in the management of fluids, temperature, and pressure. Scientists can now separate, analyze, and understand compounds that have challenged all other LC and GC technologies including:

- Hydrophobic and chiral compounds
- Lipids
- Thermally-labile samples
- Polymers

It's also the perfect complement to MS due to its low solvent load and high resolution, narrow peaks and fast separations.

By varying mobile phase strength, pressure, temperature, and stationary phase with UPC², one can separate, detect, and quantify structural analogs, isomers, and enantiomeric and diastereomeric mixtures – all compounds or samples that challenge today's laboratories. Because CO₂ is the primary mobile phase for UPC², the technique greatly reduces the use of toxic solvents.

Applications

- Normal phase applications
- Achiral analysis
- Chiral analysis
- Pharmaceutical
- Chemical materials
- Natural products
- Food safety
- Environmental
- Academia

Key Technologies

- ACQUITY UPC² System
- ACQUITY UPC² Binary Solvent Manager
- ACQUITY UPC² PDA Detector
- Single and tandem quadrupole mass detectors
- Empower or MassLynx software
- Connections INSIGHT Remote Services
- ACQUITY UPC² Column chemistries



ACQUITY UPC² System.

❖ Separations Science

HPLC

Whatever your application, the Alliance HPLC and Breeze™ 2 HPLC systems offer you proven solutions for all of your HPLC requirements – today and in the future. These systems are synonymous with dependable, routine performance, and versatility.

Applications

- Fine and specialty chemicals
- Food safety analysis
- Environmental analysis
- Quality control
- Clinical/diagnostics
- Pharmaceutical

Key Technologies

- Alliance HPLC and HPLC/MS systems
- Alliance HPLC Dissolution System
- Alliance HPLC Bioseparations System
- BioSuite Bioseparation Columns
- Breeze 2 HPLC systems
- Empower or MassLynx software
- UV/Visible, Photodiode Array, Evaporative Light Scattering detectors
- Scattering, Multi- λ Fluorescence, Refractive Index, Electrochemical, and Conductivity HPLC detectors

“... [Alliance HPLC] methods used in the present paper are reliable, easy and fast to perform... The large number of patients tested here demonstrates that the UV method has sufficient selectivity and accuracy for the analysis of patients' samples... Moreover, one major benefit of HPLC–UV is its availability in hospitals and small laboratories...”

Awidi A. *et al.*

Professor of Medicine,
Hematology and Oncology
Jordan University

Leuk Res.

2009 Sep 8.



Alliance HPLC System.

❖ Mass Spectrometry

Enabling Technologies

Unique MS Technology for Advanced Capabilities

Waters is dedicated to engineering robust technology platforms that provide tangible improvements in the performance, versatility, and simplicity of its mass spectrometers.

The unique Travelling Wave devices add capabilities that go beyond the boundaries of conventional mass spectrometry and you will find this differentiating technology within all of our mass spectrometers.

Key Technologies

- **T-Wave™** – This innovative device allows the precise manipulation of ions in a mass spectrometer in order to enhance sensitivity and analytical speed
- **ScanWave™** – This technology enhances the sensitivity of tandem quadrupole MS/MS scans
- **StepWave** – This ground-breaking technology increases the overall sensitivity of a mass spectrometer thirty-fold
- **TriWave®** – Allows ion mobility separations to take place inside a QToF instrument
- **MS^E** – Is the ultimate technology for comprehensive, reproducible profiling and characterization
- **QuanTof™** – Provides outstanding sensitivity and the highest levels of ToF performance
- **RADAR™** – Allows collection of highly specific quantitative data for target compounds while enabling the simultaneous visualization of all other components in the sample matrix
- **Universal Ion Source Architecture** – Provides the broadest range of experimental options

"This new LC/MS/MS system will allow our innovative method development team to improve methods and speed up method development for analytically complex compounds to help advance our clients' drug development programs."

Beyerlein D.

Vice President of Global Operations

MicroConstants

MicroConstants Press Release March 2, 2011



StepWave ultra-sensitive, robust ion optics with built-in noise reduction.

When compared to earlier generation mass spectrometer models, MicroConstants experienced a forty-fold increase in sensitivity with compounds tested internally in negative electrospray ionization mode. The significant increase in sensitivity can be attributed primarily to the system's new StepWave ion-transfer technology. This off-axis design dramatically increases the efficiency of ion transfer from the ion source to the quadrupole MS analyzer while, at the same time, actively eliminating undesirable neutral contaminants.

❖ Mass Spectrometry

Single Quadrupole MS

The SQ Detector 2 is the ultimate mass detector for chromatography. A simple, robust and versatile mass detector, which has been designed to be the perfect partner for UPLC, UPC², HPLC, and GC as well as preparative HPLC and SFC. Our Engineered Simplicity™ design philosophy ensures every analyst can consistently generate the highest quality data with minimal training.

The universal ion source architecture provides total flexibility and versatility to maximize experimental choices, enabling LC/MS, SFC/MS, GC/MS, and direct sample analysis on a single platform. This capability allows you to extract the maximum amount of data from the widest range of compounds, whatever your separation requirements.

Applications

- Open access mass confirmation
- Impurity analysis
- Cleaning validation
- Intact mass analysis of high molecular weight species
- Rapid screening with Atmospheric Solids Analysis Probe (ASAP)
- Mass directed purification
- Open access purification
- Polymer analysis
- Authenticity and origin studies
- Raw material conformity checking
- Adulteration studies

Key Technologies

- ACQUITY UPLC I-Class System
- ACQUITY UPLC H-Class System
- ACQUITY UPC² System
- AutoPurification™ System
- Alliance HPLC System
- IntelliStart™
- ESCi®
- Universal Ion Source Architecture
- ASAP
- Atmospheric Pressure GC (APGC) ion source for fast swapping between LC and GC Applications



*ACQUITY UPLC
I-Class System.*



*ACQUITY UPLC
H-Class System.*



ACQUITY UPC² System.



SQ Detector 2.



AutoPurification System.

Mass Spectrometry

Time of Flight MS

Xevo G2-S ToF is a time-of-flight mass spectrometer designed for the identification and quantification of the broadest range of compounds in the most complex and challenging samples.

The Xevo G2-S ToF incorporates StepWave ion optics for unsurpassed levels of durable sensitivity and uses proven quantitative time-of-flight (QuanToF) and UPLC/MS^E technologies to deliver superior UPLC-compatible mass resolution, matrix-tolerant dynamic range, quantitative performance, mass accuracy and speed of analysis – whilst completely cataloging your samples in a single analysis. Xevo G2-S ToF enables close integration with Ultra Performance LC to deliver the highest quality, most comprehensive information, to let you make the right decisions, quickly and confidently.

Applications

- Peptide mapping experiments
- Intact protein analysis
- Metabolite identification
- Discovery DMPK quantitation
- Food safety screening
- Environmental monitoring
- Accurate mass open access
- Toxicology screening

Key Technologies

- StepWave
- QuanToF Technology
- UPLC/MS^E
- Universal Ion Source Architecture
- IntelliStart Technology
- Workflow Specific Informatics

Featured Solution

- Biopharmaceutical Platform Solution with UNIFI

“... the capacity for conducting preliminary metabolite identification experiments has increased by almost an order of magnitude, and the turnaround time for metabolism data has been shortened to the point where the information has a much greater impact on decision making.”

Tiller PR. *et al.*

Drug Metabolism, Merck Research Laboratories
Rapid Commun. Mass Spectrom.
2008 Apr; 22(7):1053-61.



*ACQUITY UPLC I-Class System
with the Xevo G2-S ToF.*

Mass Spectrometry

Tandem Quadrupole MS/MS

Xevo TQ-S, Xevo TQ MS, and Xevo TQD are the analytical tools of choice for all of your quantitative UPLC/MS/MS applications, delivering the ultimate in versatility for a wide variety of applications – both quantitative and qualitative.

Xevo TQ-S features a revolutionary new off-axis ion-source technology, known as StepWave to allow you to quantify and confirm trace components at the lowest possible levels in the most complex samples.

Both Xevo TQ MS and Xevo TQ-S offer ScanWave Technology for enhanced product ion scanning, and Xevo TQ-S, Xevo TQ MS, and Xevo TQD all have RADAR – for collection of highly specific quantitative data for target compounds and simultaneous visualization of all other sample components.

With Xevo TQ-S, Xevo TQ MS, and Xevo TQD, you will develop methods that bring drugs to market faster, identify a broader array of food contaminants, and report reliable forensic data with complete confidence.

Applications

- Environmental and food safety analysis
- Pharmaceutical discovery and development
- Regulated bioanalysis, peptide and protein bioanalysis
- Clinical assays
- Metabolite screening
- Biomarker verification

Key Technologies

- Xevo TQ-S
- Xevo TQ MS
- Xevo TQD
- IntelliStart Technology
- TargetLynx™, Quanpedia™, QuanOptimize™, and OpenQuan™ application managers
- Universal Ion Source Architecture

Featured Solution

- Regulated Bioanalysis Platform Solution with UNIFI

“The Waters Xevo TQ-S has allowed us to greatly improve achievable sensitivity on a number of challenging assays, ranging from the analysis of very high potency small molecules to the quantification of therapeutic peptides.”

Abrar M.

Method Development Manager
Unilabs York Bioanalytical Solutions



*ACQUITY UPLC I-Class System
with Xevo TQ-S.*

❖ Mass Spectrometry

Quadrupole Time of Flight MS/MS

Xevo G2-S QToF is designed for scientists who need to identify, quantify, and confirm the broadest range of compounds in the most complex and challenging samples.

The Xevo G2-S QToF incorporates StepWave ion optics for unsurpassed levels of durable sensitivity and uses proven quantitative time-of-flight (QuanTof) technology to deliver superior UPLC-compatible mass resolution, matrix-tolerant dynamic range, quantitative performance, mass accuracy, and speed of analysis – simultaneously, to allow close integration with UltraPerformance LC® and deliver the highest quality, most comprehensive information. This enables you to make the right decisions, quickly and confidently.

Applications

- Biopharmaceutical characterization
- Metabolite identification
- Forensic toxicology
- Food analysis
- Environmental research
- Chemical industry research
- Proteomics studies

Key Technologies

- StepWave
- QuanTof Technology
- UPLC/MS^E
- UPLC/FastDDA
- Universal Ion Source Architecture
- IntelliStart Technology
- Workflow Specific Informatics

Featured Solutions

- Screening Platform Solution with UNIFI
- Metabolic Identification Application Solution with UNIFI
- Pesticide Screening Application Solution with UNIFI
- Biopharmaceutical Platform Solution with UNIFI

"The completeness of the UPLC/QToF MS^E data set is impressive. You can't fully appreciate it until you've solved a major problem with it. We simply didn't have access to these kinds of results before."

Johnson D.

Director of DMPK
MicroConstants



*ACQUITY UPLC I-Class System
with Xevo G2-S QToF.*

❖ Mass Spectrometry

T-Wave Ion Mobility QToF

To access the highest levels of information content from your most analytically challenging samples, or utilize analytical tools to make scientific discoveries not possible by any other means, look no further than SYNAPT® G2-S.

SYNAPT G2-S combines revolutionary StepWave (high sensitivity ion optics with in-built noise rejection), QuanTof (High resolution, Quantitative Time-of-flight) and High Definition MS™ (high-efficiency T-Wave ion mobility mass spectrometry) technologies to provide the highest sensitivity, selectivity and speed of analysis.

With High Definition MS (HDMS™) you will be able to dramatically improve results compared to the use of chromatographic and mass resolving power alone, afforded by the ability to differentiate samples by size, shape, charge, and mass.

Applications

- Life sciences and clinical biomarkers
- Pharmaceuticals and biopharmaceuticals
- Chemicals, polymers, and petrochemicals
- Food profiling
- Food R&D
- Environmental
- Fundamental MS research

Key Technologies

- StepWave, High Definition MS, and QuanTof
- Data dependant analysis (DDA)
- Data independent analysis (MS^E)
- CID (Collision induced dissociation) and ETD (electron transfer dissociation)
- High Definition Imaging (HDI™) MALDI
- MassLynx Software and “HDMS ready” application managers
- IntelliStart Technology

Featured Solution

- Omics Research Platform Solutions with TransOmics Informatics

"IMS/MS is starting to attract devotees among analytical scientists who recognize the decisive benefits that come from coupling mass analysis with shape-dependent ion separation... IMS/MS offers a platform for separating and visualizing all of these different types of compounds in one high-information-content experiment that is superior to other approaches."

Scrivens J.

University of Warwick UK
Doubling Up On Mass Analysis
Chemical & Engineering News
2010 Mar; 88, 13:35-37.



SYNAPT G2-S HDMS System.

❖ Mass Spectrometry

Universal Ion Source Architecture

When you need to extract the maximum amount of information from a diverse range of compounds, you require the ultimate in ionization flexibility and performance.

Waters Universal Ion Source Architecture enables the widest range of ionization techniques to be utilized universally across a single analytical platform. Providing the highest performance, without compromise, the ionization source options are quick and easy to interchange.

- **ESI/APCI/ESCI** – For the analysis of polar and semi-polar analytes.
- **APPI/APCI** – For the analysis of semi-polar and non-polar analytes.
- **Atmospheric pressure Solids Analysis Probe (ASAP)** – For the direct, rapid analysis of volatile and semi-volatile solid and liquid samples using atmospheric pressure ionization.
- **Atmospheric Pressure GC** – Enables rapid switching from LC/MS/MS to GC/MS/MS applications on a single instrument platform. For the analysis of volatile and semi-volatile compounds of low and intermediate polarity.
- **nanoFlow™ ESI** – For the analysis of minute sample amounts when coupled with the nanoACQUITY UPLC System.
- **TRIZAIC UPLC nanoTile** – Micro-fabricated nanofluidic UPLC technology, using sub-2- μ m particle chemistries to provide the very best chromatographic performance simply and without compromise.
- **MALDI** – Available on the SYNAPT G2-S only, see page 48.

"The chromatographic resolution and sensitivity of this novel GC/MS instrument [APGC] surpassed all expectations... every molecule we have thrown at the APGC ion source has responded well and the flexibility for optimizing the signal of choice has opened up a whole new avenue of opportunity for research."

Mosely J.

Senior Research Officer,
Department of Chemistry
Durham University



*nanoACQUITY UPLC System
with SYNAPT G2-S HDMS.*

Mass Spectrometry

GC/MS

Waters offers an extensive range of GC/MS platforms to support a diverse array of GC/MS applications.

Key to this flexibility is the Waters Atmospheric Pressure GC (APGC) source. APGC can be used on any Waters MS system with our universal source architecture (SYNAPT, Xevo, and SQ Detector 2).

The APGC source enables fast switch-over between LC/MS and GC/MS, utilizing soft ionization to deliver high sensitivity spectra, which are rich in molecular ion information. In combination with our other instrument capabilities – like ion mobility, MS^E, and MS/MS – the APGC provides a versatile tool that extends compound coverage in your laboratory without the need for an additional instrument.

For dedicated electron impact GC/MS application, Waters offers the AutoSpec Premier,[™] a double-focusing magnetic sector instrument for ultra-trace quantification of POPs.

Applications

- Comprehensive characterization
- Chemical materials research
- Analysis of volatiles and semi-volatiles
- Ultra trace quantification of POPs

Key Technologies

- Atmospheric Pressure GC (APGC)
- AutoSpec Premier



SYNAPT G2-S HDMS System with APGC.

■ Purification/SFE

SFE

Waters' MV-10 ASFE System

extracts chemical compounds using supercritical CO₂ in place of organic solvents. The result is an extract with little or no residual solvent, superior purity and yield, and lower operating costs compared to traditional normal phase solvent extraction systems.

Supercritical fluid extraction (SFE) is capable of extracting compounds from solid matrices, isolating the analyte of interest without altering the taste, aroma, or chemical composition of your product.

Applications

- Extraction and fractionation of edible fats and oils
- Separation of tocopherols and other antioxidants
- Detoxification of shellfish
- Production of flavors, spice extracts, herbs, dietary supplements, and more
- Precision parts cleaning
- Desolvation within tablets
- Steroids, polymer/monomer separation

Key Technologies

- High pressure CO₂ pump
- Multiple sequential extraction capability
- ChromScope™ Software for easy-to-use instrument control and data management



MV-10 ASFE System.

Purification

SFC

Purification scientists around the globe are excited by the latest advancements in supercritical fluid chromatography (SFC). SFC technology uses CO₂ as its main solvent, and has become a critically important solution for preparative laboratories that want to be greener – less normal phase solvent to buy; less to dispose of – and SFC means much less dry down time resulting in higher throughput. Waters offers a complete line of SFC purification solutions that are uniquely flexible and scalable, regardless of whether you are purifying samples in the milligram or kilogram range.

Applications

- Impurity isolation and purification
- Natural products and traditional Chinese medicines
- Pharmaceutical
- Chiral/achiral analysis
- Normal phase applications

Key Technologies

- Prep 100 SFC UV and MS systems
- Investigator SFC System
- Empower, MassLynx, or ChromScope software
- FractionLynx™ Application Manager
- Viridis SFC Column chemistries



Prep 100 SFC System with SQ Detector 2.

■ Purification

LC

Whether you are looking for high-throughput mass-directed fraction collection of hundreds of samples to routine UV-based systems for purifying just a handful of samples per day, Waters' advanced HPLC-based AutoPurification System provides the flexibility of using high-throughput parallel runs for selective, fully automated UV- or Mass-directed fraction collection. With the AutoPurification System, run samples around the clock with unprecedented versatility and consistency.

Applications

- Compound isolation and purification
- Natural products and traditional Chinese herbal medicines
- Pharmaceutical
- Biopharmaceutical

Key Technologies

- AutoPurification LC and LC/MS systems
- Empower or MassLynx software
- FractionLynx Application Manager
- OpenLynx™ Open Access Application Manager
- Optimum Bed Density (OBD) Columns



AutoPurification System with SQ Detector 2.

Be Assured. Choose Waters Global Services.

Waters Global Services focuses on optimizing Waters products with superior service, support, upgrades, training, and Waters Quality Parts®.

Only the Waters Service team has the most in-depth and up-to-date knowledge of the advanced science and technologies that provide the foundation for Waters systems. This enables Waters to help you maximize system uptime, increase laboratory productivity, and meet stringent compliance requirements.

With 94 offices in more than 50 countries, Waters maintains a strong global presence. Whether your company is a single-location lab or a large multinational organization, Waters Global Services provides you with the expertise and responsiveness you need.


Services and Products

- Instrument and software support plans
- Automated qualification for Waters and Agilent Systems
- Instrument and software upgrades
- Software services
- Empower Driven Services
- Performance Maintenance
- Education and training
- Application and technical support
- Remote monitoring and diagnostics
- Waters Quality Parts
- Relocation Services
- Asset Management

Choose Waters for Proven Satisfaction

For eleven consecutive years, an independent quality auditing firm has ranked Waters Global Services best-in-class in providing expert technical knowledge, quick resolution of system issues, and process support.¹

¹*Achievement in Customer Excellence Award, CustomerSat, Inc., 2007-2011; NorthFace ScoreBoard AwardSM Omega Management Group Corporation, 2001-2006.*

A man and a woman, both wearing white lab coats and blue safety glasses, are in a laboratory setting. The woman, on the right, is also wearing blue nitrile gloves and is pointing her right index finger towards a piece of scientific equipment. The man, on the left, is looking at the equipment. The equipment is a complex machine with various components, including a large black cylindrical part and a silver rectangular component. There are also some red wires visible. The background is a plain, light-colored wall.

“Six Waters ACQUITY TQD systems were delivered to the laboratory in very short order. We had three engineers on site. They got the instruments up and running in a rapid fashion. It was clear to me that Waters was investing in our company and partnering with us. Waters is dedicated to making us successful.”

Bourland J.

Research and Development Director
Ameritox

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Puerto Rico 1 787 747 8445

Russia/CIS 7 495 727 4490 / 290 9737

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Waters

THE SCIENCE OF WHAT'S POSSIBLE.™

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