



# ACQUITY™ Advanced Polymer Chromatography™ (APC™) System

**SMARTER, FASTER INSIGHT INTO  
YOUR MATERIALS STRUCTURES**



**Waters**  
THE SCIENCE OF WHAT'S POSSIBLE™

# SMARTER, FASTER INSIGHT INTO YOUR MATERIALS RESEARCH

Advances in materials sciences have led to a growing demand for instrumentation that delivers faster, more detailed analytical information about your materials. Current GPC-LC methods are limited by a lack of resolution for complex polymer blends and additives, the time required to achieve needed separation, lengthy method development cycles, and the volume of solvent consumed per analysis.

Waters™ ACQUITY™ Advanced Polymer Chromatography™ (APC™) System is at the forefront of separation technology, defining the ultimate in high resolution chromatographic separations, delivering more information about your materials samples faster than ever before. This means better characterization, improved asset utilization, greater analytical flexibility, and a superior solution for achieving your corporate innovation and sustainability goals.

## THE ACQUITY APC SYSTEM

- Increase sample throughput and laboratory operations by obtaining accurate and repeatable sample separation up to 20 times faster than before.
- High-performance Refractive Index (RI) Detector is designed specifically to operate with low dispersion chromatographic systems and interface with a range of advanced third party detectors.
- Polymer Quaternary Solvent Manager (p-QSM) technology offers ultimate flexibility to analyze the most complex polymer blends and additives using standard polymer chromatography, GPEC, and reverse phase LC with a single system.
- Innovative sub-3- $\mu\text{m}$  hybrid-polymer column chemistries are optimized for the analysis of aqueous and organic polymer separations.
- Comprehensive 2D chromatography provides enhanced multi-dimensional resolution.

# Advanced Chromatography

## DESIGNED TO HELP YOU SECURE A COMPETITIVE ADVANTAGE

### Smarter, faster insight into your materials research

A wide range of polymers form part of our everyday world, yielding materials with critical properties such as strength, durability, electrical conductivity, heat, and chemical resistance. With so many different types of materials, the ability of a system to analyze the chemical characteristics and composition of your samples molecular structure in less time, with greater detail, and with increased efficiency is paramount in gaining a competitive advantage.

#### Negligible Carryover

Advanced flow-through needle design minimizes carryover by continuously cleansing the needle during run. User configurable wash settings provide flexibility to address even the most complex sample matrices.

#### Gradient SmartStart

Automatically manage gradient start time and pre-injection steps to maximize sample throughput. Automatically counteract differences in system dwell volume without the need to alter gradient table inputs.

#### Quaternary solvent Management

Precise and accurate blending of up to four solvents with automated solvent compressibility compensation.

Increase solvent flexibility with an optional, integrated solvent select valve, providing access to six additional solvents.

#### Comprehensive detection options

Robust portfolio of detectors for method development, method transfer, and routine use. Refractive index, Photodiode array, UV/Vis, differential viscometry, and evaporative light scattering.

#### Inlet to Mass Spectrometry

UPLC Technology instantly improves results from your mass spectrometer with improved sensitivity, spectral quality, and productivity.

With sharper peaks and improved chromatographic resolution, UPLC enhances the performance – and productivity – of virtually any LC-MS or LC-MS/MS experiment.

#### Versatile column management

Optional column management hardware houses single or banked columns of up to 15 columns ranging in length from 50 mm to 300 mm, with a controllable temperature range of 5 °C to 90 °C. Integrated column selection valve options provide unattended, fast column changeover.

#### Comprehensive detection options

Polymer Quaternary Solvent Manager (p-QSM) technology offers compatibility with harsh solvents required for gradient analysis.

Combining p-QSM with WinGPC software enables comprehensive multi-dimensional chromatography for more thorough insight into complex polymers and additives.



# Advanced Chromatography

## MULTIPLE APPLICATIONS RUNNING SMOOTHLY ON A SINGLE SYSTEM

### Flexibility that supports your unique materials research needs

The ACQUITY APC System enables researchers to analyze a diverse array of polymers using a single system, automatically switching between multiple applications throughout the day, regardless of the solvent or column required.

Capabilities	Polymer Isocratic Solvent Manager (p-ISM)	Polymer Quaternary Solvent Manager (p-QSM)
Ability to run multiple techniques on one system (LC and SEC)		✓
High Resolution SEC/GPC only	✓	
Prolonged use of aggressive solvents	✓	✓
Greater Resolution	✓	✓
Solvent switching capabilities	✓	✓
Comprehensive 2D Chromatography		✓
Efficient Method Development	✓	✓
Advanced gradient chromatography		✓

### Advanced detection option for greater information through a single analysis

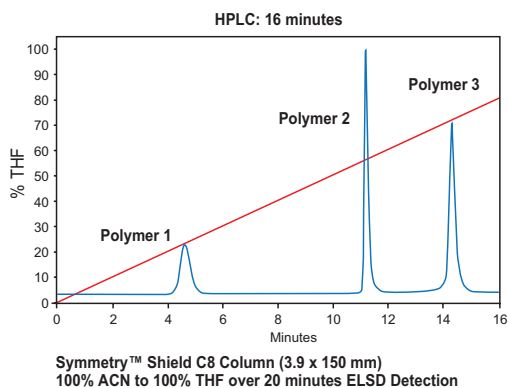
Combining the Waters APC System with advanced detection solutions significantly increases information attainable from a single analysis. Third party advanced detection integration options further enhance insight into the chemical structure and composition of novel complex polymers.



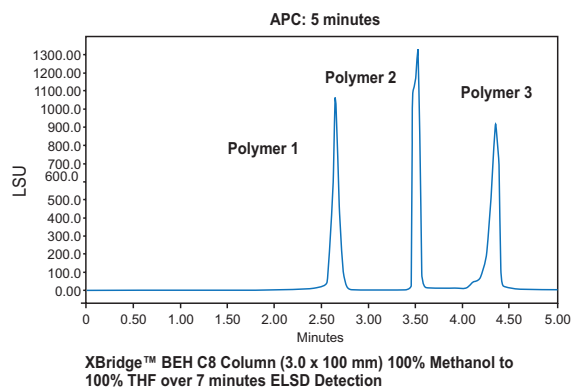
# Complex Polymer and Additive Analysis

## POLYMER QUANTENARY SOLVENT MANAGER (P-QSM) TECHNOLOGY

The reliability of systems utilizing harsh solvents associated with complex polymer and additive analysis can significantly impact long-term system performance. The ACQUITY APC System with Polymer Quantenary Solvent Manager (p-QSM) technology was designed specifically for these harsh environments, allowing for the development of gradient methods using the harshest of solvents. With p-QSM technology, researchers have the flexibility to analyze the most complex polymer blends and additives using standard polymer chromatography, GPEC, and reverse phase LC with a single system.



When performing GPEC using HPLC to characterize a mixture of three polymers, full separation of the polymers was achieved in a total of **16 minutes**.



In comparison, separating three polymers using the APC was achieved in a total of **5 minutes**.



## POWERFUL DATA PROCESSING AND REPORTING

Empower™ Software, our flagship chromatography data software (CDS), makes it easier than ever to run samples and produce meaningful results. Empower's interface is designed to maximize your productivity, improving how you collect, process and print chromatography data.



# Comprehensive 2D Chromatography

## IT'S ALL IN THE DETAILS - WE MAKE SURE YOU CAN FIND THEM

When combined with WinGPC UniChrom™ software from PSS Polymer Standards Service GmbH, the Waters APC System enables researchers to gather an impressively high level of insight into their complex polymeric materials using a multi-dimensional separation approach – increasing the peak capacity of a single chromatographic analysis.

Applying a multi-dimensional chromatographic approach enables separation of analytes by two different, sequential retention mechanisms. The process allows for analytes to be separated from other compounds that would normally co-elute in a single dimensional separation.

The result is a dramatically enhanced multi-dimensional resolution and in-depth information into the chemical structure and composition of complex polymeric samples.

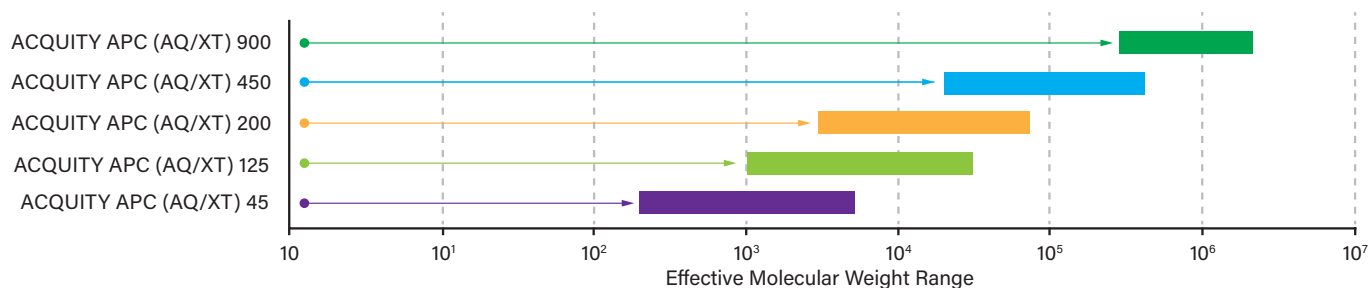


## ACQUITY APC COLUMNS: ENABLING SUPERIOR SPEED AND RESOLUTION

### Technology that keeps up with the pace of your research

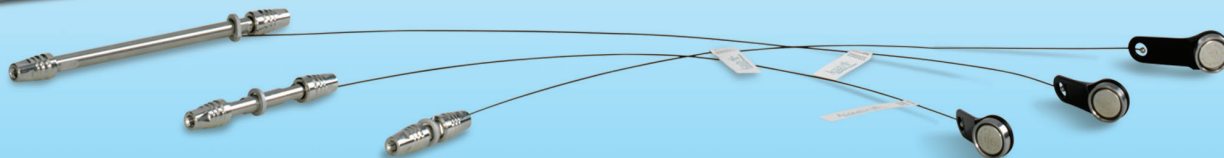
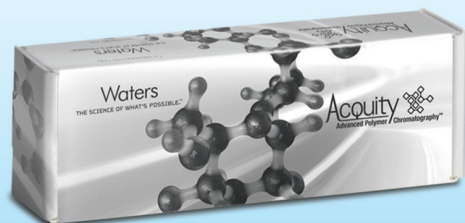
The BEH particles used in ACQUITY APC Columns enable rapid solvent switching and the ability to use multiple conditions for the same bank of columns. Conventional polymeric stationary phases are dedicated to a single set of analytical conditions and solvent because the chromatographic bed is vulnerable to shrinking and swelling. By eliminating this undesirable behavior, ACQUITY APC Columns allow for maximum robustness and method development flexibility.

The ACQUITY APC (AQ and XT) Columns Selection Guide



### State-of-the-art reversed-phase and HILIC HPLC columns

BEH columns are suitable for general purpose, reversed-phase chromatography and ideally suited for method development due to extreme pH stability and applicability to the broadest range of compound classes, providing optimum separation performance when paired with the APC with p-QSM technology.



## WATERS GLOBAL SERVICES

### DELIVERING WORLD RENOWNED SERVICE AND SUPPORT

Our team of experts will support your materials sciences success by providing you with tailored services to help maintain system peak performance, minimize down time, address scientific application challenges, and support stringent compliance requirements.

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



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**TA Instruments**  
159 Lukens Drive  
New Castle, DE 19720 U.S.A.  
T: 1 302 427 4000  
F: 1 302 427 4041  
[www.tainstruments.com](http://www.tainstruments.com)

**Waters Corporation**  
34 Maple Street  
Milford, MA 01757 U.S.A.  
T: 1 508 478 2000  
F: 1 508 872 1990  
[www.waters.com](http://www.waters.com)