

Dionex Training & Support Facilities

Dionex measures success by enabling customers to succeed. This level of success relies on training and support that empower our customers worldwide. To reach customers in every region, Dionex manages service and application facilities or Customer Support Centers, located in the United States, Europe, and Asia.



These state-of-the-art laboratories are equipped with the full line of Dionex HPLC and ion chromatography instrumentation, as well as updated software capabilities.

Dionex Customer Support Centers provide the worldwide scientific community with accessible locations for advanced training and enhanced application development capabilities. Chemists can attend these laboratories to learn new skills in addressing challenging applications, receive training and support, and discover new, innovative HPLC and IC solutions.

Corporate Headquarters

Dionex Corporation
1228 Titan Way
P.O. Box 3603
Sunnyvale, CA 94088-3603
Tel: (408) 737-0700
Fax: (408) 730-9403

Worldwide Sales and Service

North America

U.S./Canada (847) 295 7500

South America

Brazil (55) 11 3731 5140

Europe

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(32) 3 353 42 94

Denmark (45) 36 36 90 90

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China (852) 2428 3282

India (91) 22 2764 2735

Japan (81) 6 6885 1213

Korea (82) 2 2653 2580

Singapore (65) 6289 1190

Taiwan (886) 2 8751 6655

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UltiMate® 3000 RSLC System



DIONEX

Passion. Power. Productivity.

Rapid Separation LC

Ultimate Speed, Ultimate Resolution, Ultimate Performance

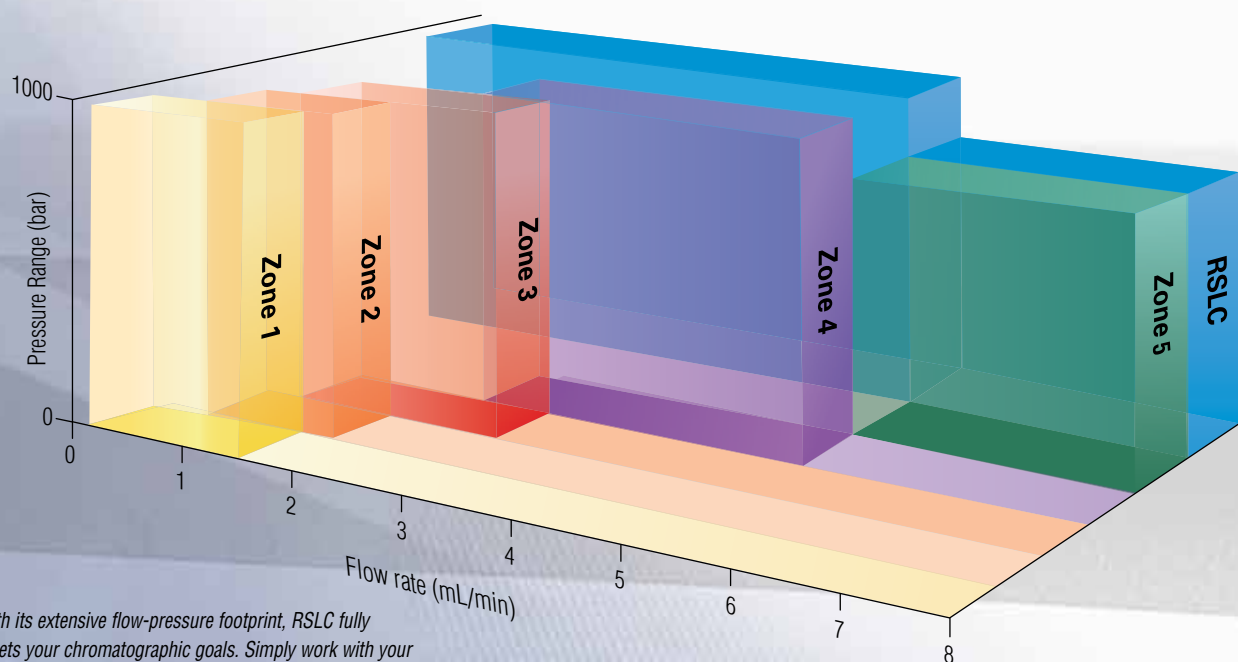
Accelerate LC with the UltiMate 3000 RSLC System

The UltiMate 3000 Rapid Separation LC (RSLC) system accelerates HPLC for unrivaled performance and flexibility. Precision-engineered instrumentation, advanced data processing, and highly optimized chemistries meet all chromatographic performance challenges. With its binary, quaternary, and dual-gradient pumps, the RSLC offers industry-leading system versatility covering the maximum range of HPLC, including conventional and ultrafast LC.

- Up to 50 times faster than conventional LC
- High resolution for maximum peak capacity
- Instant results with Chromeleon® software
- Universal method transfer and speed-up
- Viper™ fingertight fitting system
- Dual-gradient pumps and switching valve options for advanced chromatographic techniques

Together, these characteristics make RSLC the only available choice for maximum resolution to maximum speed LC.

UltiMate 3000 RSLC Flow-Pressure Footprint					
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
	RSLC				
Resolution	Ultrahigh	Conventional	Very High	High	High
Speed	High	Conventional	Very High	Ultrahigh	Ultrahigh
Typical Flow (mL/min)	0.2–1.5	0.75–2.0	1.0–3.0	2.5–5.0	5.0–8.0
Column Length (mm)	≥100	≥150	≥50 ≤100	≤50	≥100
Column i.d. (mm)	≤3	≥4	≤3	≤3	≥4
Particle Size (μm)	≤3	≥3	≤3	≤3	≥2



With its extensive flow-pressure footprint, RSLC fully meets your chromatographic goals. Simply work with your column of choice and in the appropriate zone for your application.

The Right Combination of Components and Data Management

The UltiMate 3000 RSLC system delivers superior performance, excelling at pressures of 100 MPa (15,000 psi) and flow rates up to 8 mL/min. Detector and autosampler technologies, powerful software, and small particle columns contribute to RSLC capabilities.

Solution Component	Key Feature
Binary, Quaternary, or Dual Gradient RS Pump	Pressure up to 100 MPa (15,000 psi) at flow rates up to 8 mL/min
In-line Split Loop Well Plate Sampler	Cycle times of 15 s Injection volumes of up to 500 μ L
Thermostatted RS Column Compartment	Temperature range of 5–110 $^{\circ}$ C Up to 12 columns
Diode Array, Variable Wavelength, and Fluorescence RS Detectors	Data collection rates up to 200 Hz, even when running full wavelength scans on the DAD-3000RS
Acclaim [®] RSLC Columns	Particle sizes of 2.2 and 3 μ m with up to 1000 bar pressure ratings
Viper Fingertight Fitting System	Zero dead-volume connections, robust performance, and unparalleled ease-of-use
Chromeleon Chromatography Data System	Dynamic data processing that produces results instantly



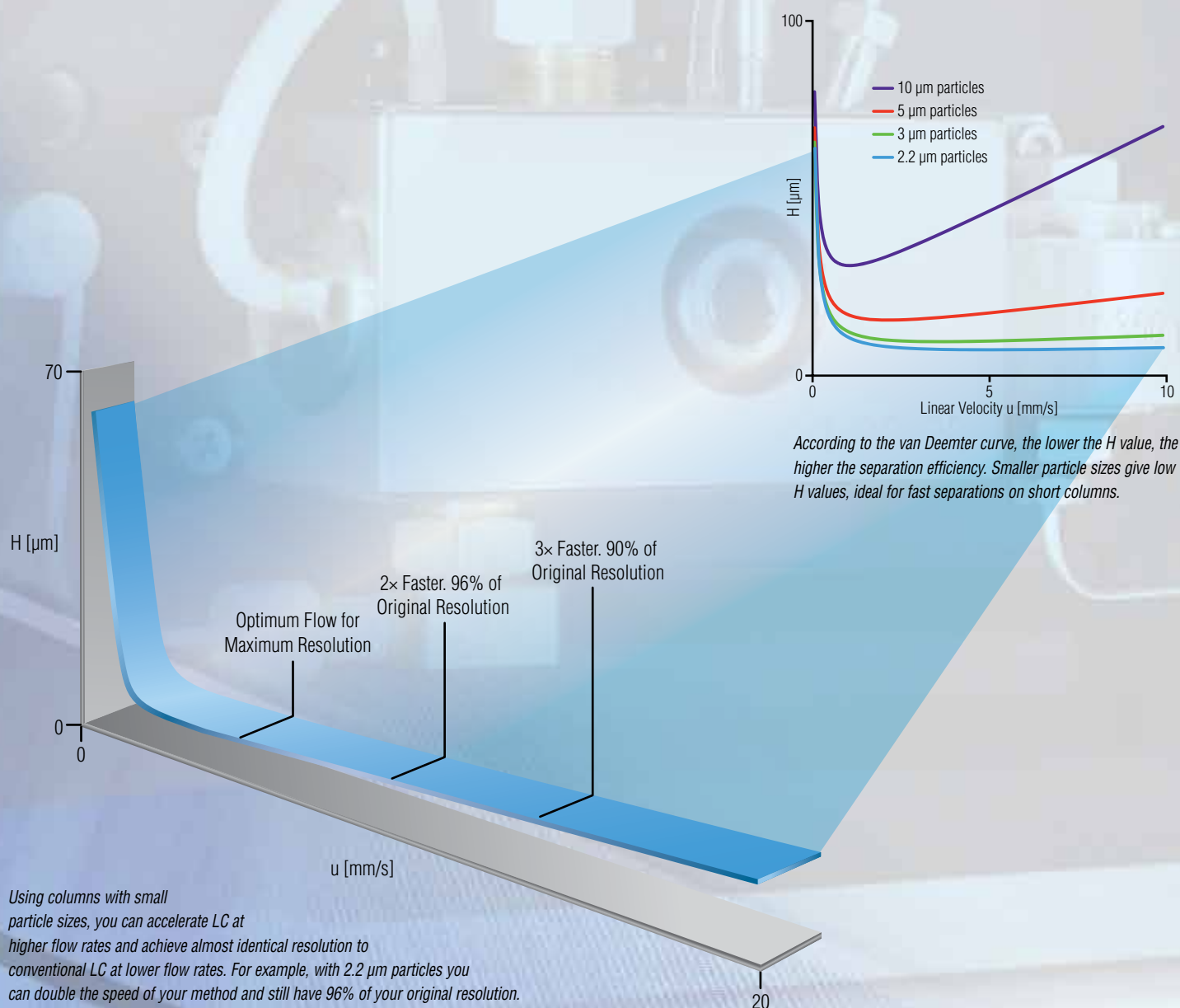
UltiMate 3000 RSLC system

Ingredients for Speed

High-Performance UHPLC Over a Wide Range of Flow Rates and Pressures

A Complete Package for Performance Leadership

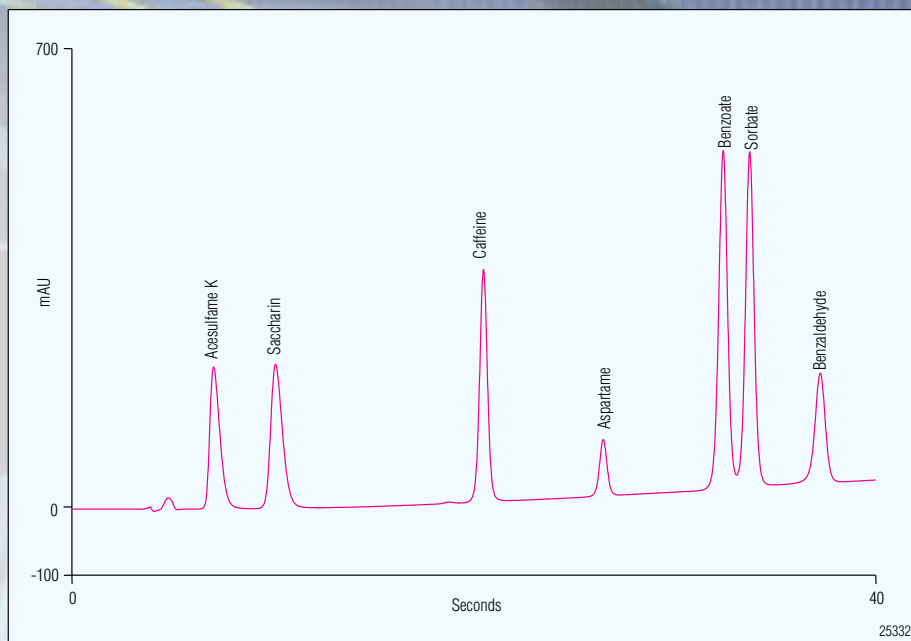
Engineered to the highest level of performance, the UltiMate 3000 RSLC system delivers the key flow rate and pressure capabilities to meet all LC challenges. With its extensive flow-pressure footprint, short sampler cycle times, high column temperatures, ultrafast data collection and processing, and high-resolution Acclaim RSLC 2.2 μm columns, the system maximizes LC flexibility. This combination of features delivers optimal separations at ultrahigh speed while maintaining good resolution.



High Flow and Efficiency

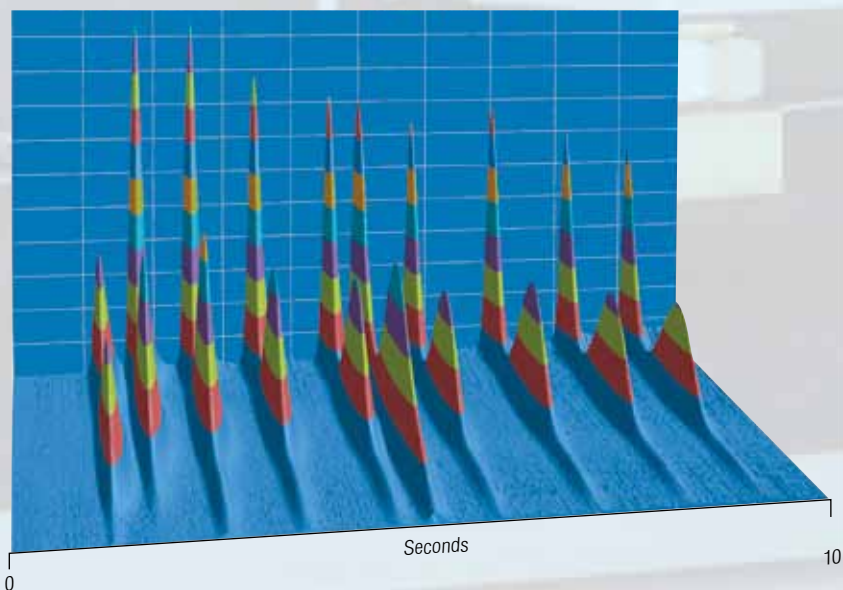
The Dionex UltiMate 3000 RSLC system is designed to deliver robust operation at high flow rates and high pressure.

- Backpressures up to 100 MPa (15,000 psi)
- Flow rates up to 8 mL/min
- Oven temperatures up to 110 °C
- Data collection rates up to 200 Hz



Analysis of seven key compounds in soft drinks in less than 40 s on the Acclaim RSLC 2.2 μ m column.

RSLC Provides Unrivaled Speed: 10 Peaks in 10 Seconds



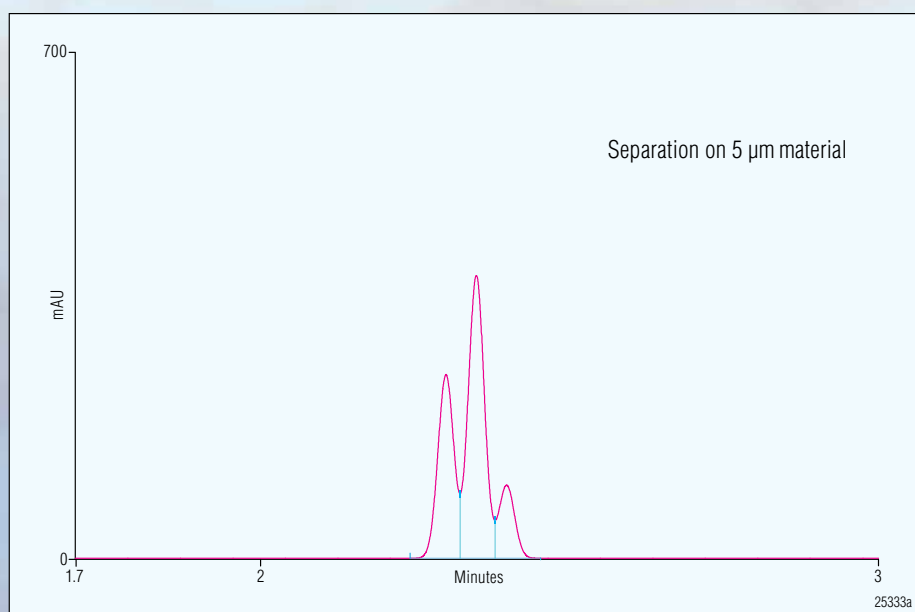
Separation of uracil and nine alkylphenones in 10 s, with a full 100 Hz DAD spectral scan. The run was performed using a flow rate of 3.7 mL/min, a backpressure of 730 bar, an oven temperature of 100 °C, and a 30 \times 2.1 mm C18 column with 1.8 μ m particle size.

High-Resolution RSLC

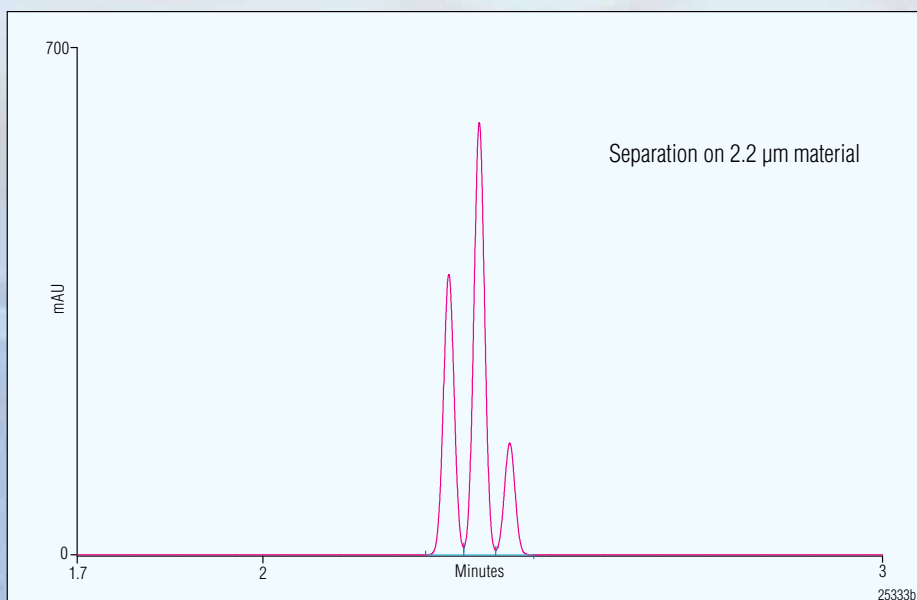
Acclaim Columns and RSLC Ensure Efficiency, Speed, and Resolution

Resolution and Speed: Meeting the Challenge for Superior LC

Achieving the highest resolution in the fastest run times takes more than a great LC system. High resolution also requires low extracolumn volumes and long columns with small particle sizes. The way to achieve high-resolution UHPLC is to improve efficiency and reduce band broadening. Small particle sizes significantly increase efficiency; lower extracolumn volumes ensure that this increase is not lost again due to band broadening.



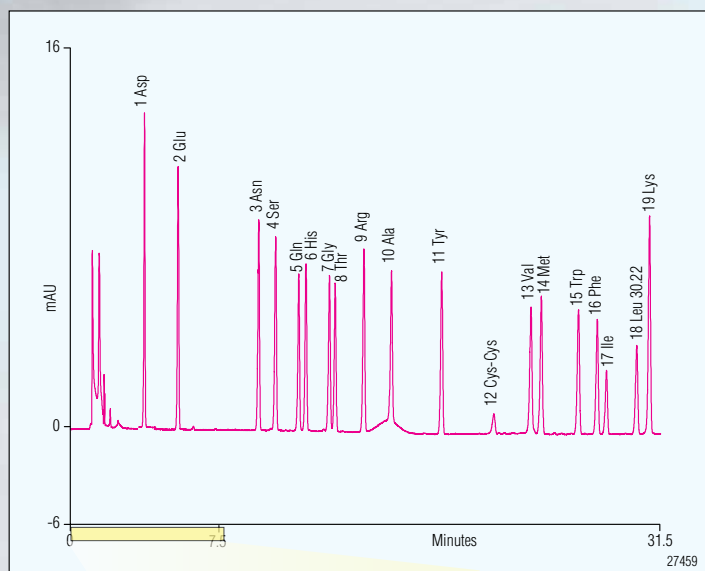
Reducing particle size increases separation of compounds, provides optimal peak resolution, and increases peak height for improved sensitivity.



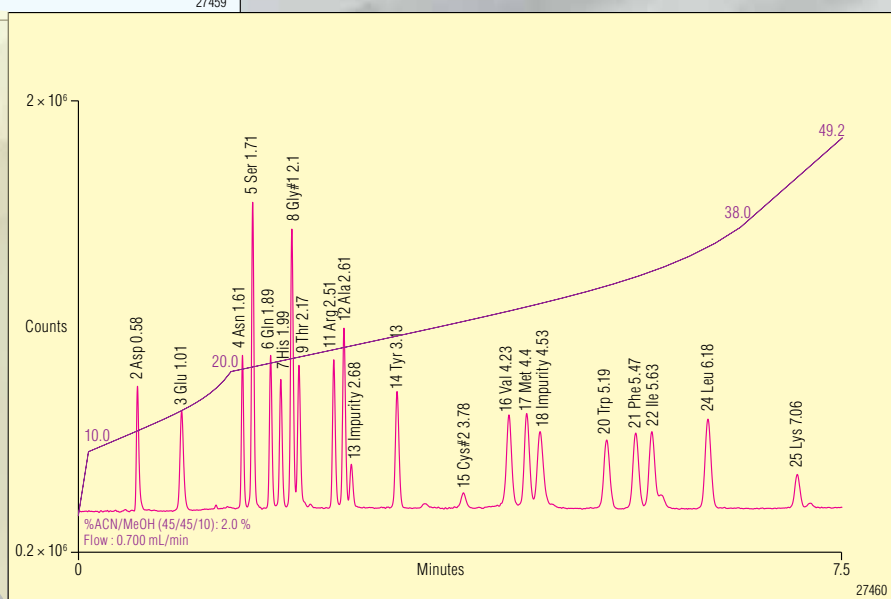
Small Particle Size Columns Provide the Highest Efficiency

To optimize your fast separations, the Dionex UltiMate 3000 RSLC system delivers the lowest extracolumn volumes and highest efficiency with small particle size columns.

- Unique, easily scalable Hurricane mixer technology
- Comprehensive mixer portfolio from 35 μ L to 1500 μ L for a wide application range
- Revolutionary Viper fingertight fitting system for performance without compromise
- Dedicated range of 1, 2.1, and 3 mm i.d. high-resolution columns
- Compatible with all commercially available stationary phases



Conventional reversed-phase LC separation of 19 amino acids in 31.5 min (60 min total run time).



Baseline separation of 19 amino acids in less than 7.5 min (16 min total run time).

Beyond UHPLC

Unique Solutions for Ultimate Throughput and Ease-of-Use

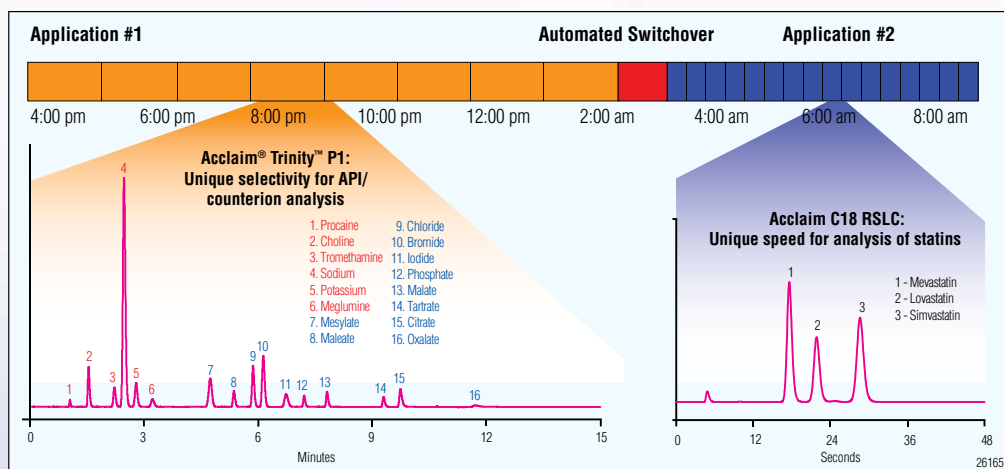
UHPLC Reaches a New Level of Flexibility and Performance

UltiMate 3000 x2 Dual RSLC systems offer laboratories unprecedented sample throughput and easy automation of advanced procedures. Seamless integration of UHPLC with x2 Dual RSLC technology and powerful Chromeleon software brings laboratories new possibilities:

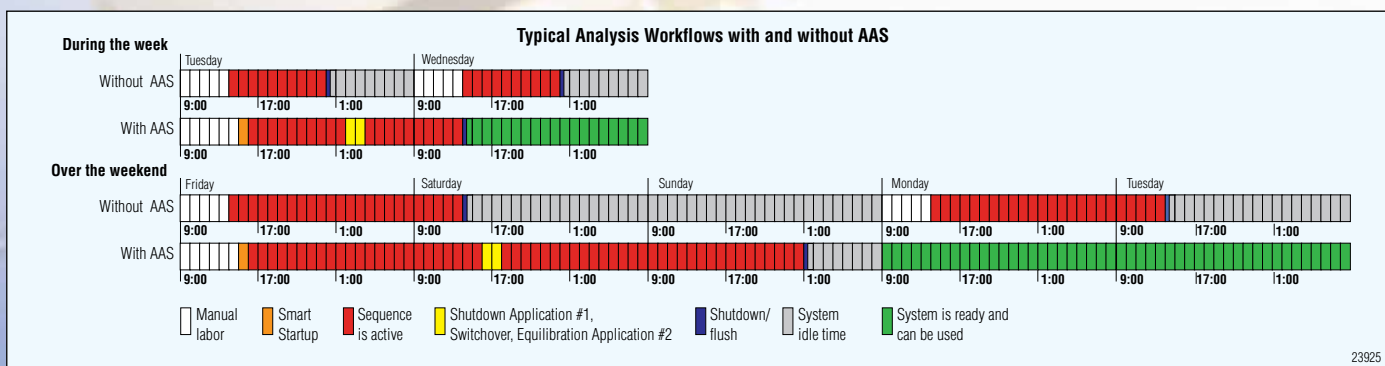
- Doubled sample throughput with parallel and tandem LC
- Increased use time by automatically switching between applications
- Highest selectivity and resolution with multidimensional LC



The DGP-3600RS combines two UHPLC pumps in a single housing.



Automatic switching between a conventional and a UHPLC method.



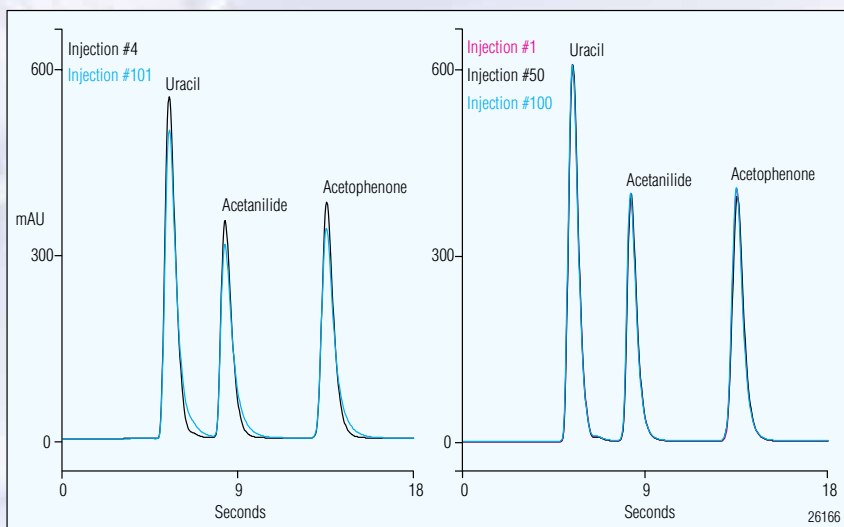
Automated application switching increases productivity by using nights and weekends, when the instrument would otherwise sit idle.

Connect to the Future

The revolutionary Viper fitting system does away with all problems experienced with conventional fitting systems. It provides a perfect fit each time it is used and ensures superior chromatographic performance.

- Straightforward, zero-dead-volume UHPLC fingertight fittings
- Compatible with virtually every type of valve and column hardware
- Tool-free, Viper-based kits for advanced LC solutions

All RSLC and x2 Dual RSLC system tubing kits feature the unique Viper design, making the best UHPLC system even easier to use.



Slipping capillaries cause deteriorated peak shapes (left). Viper capillaries provide robust performance at UHPLC pressures (right).



The Viper connector tightens at the tip of the capillary, and does not use ferrules that may cause incompatibility with the opposite holder.

Instant Results

Seamless Integration of Data Processing Tools

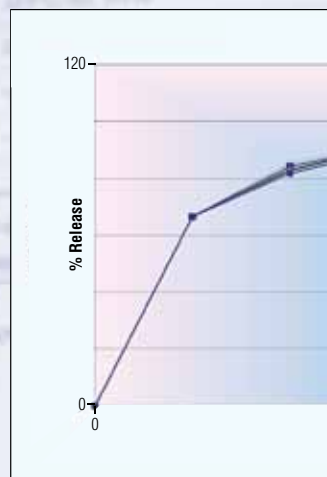
Chromeleon Software Ensures that RSLC is Ultrafast

The Dionex RSLC solution comes with Chromeleon Chromatography Data System software that produces results instantly. The following features ensure increased productivity and a laboratory focus on results, not just data.

- Data processing times reduced by as much as 90%
- Instant calculation of results
- Dedicated reports for method validation, related substances, EPA statistics, dissolution testing, content uniformity, and more

Method Speed-Up

A method speed-up calculator is provided for quick and easy conversion of conventional LC methods to RSLC methods.



To use the calculator, simply enter your old method details and your new column details. The calculator immediately identifies your new method parameters without the need for time-consuming lab work associated with method development.

In addition, it automatically calculates how much time and solvent your new method will save.

METHOD TRANSFER RECOMMENDATIONS

SELECT LANGUAGE ENGLISH

Best Viewed in 1024 x 768 screen resolution
MACROS MUST BE ENABLED TO USE THE TOOL

Planned Column
Length (mm) 150 mm
Diameter (mm) 2.1 mm
Particle Size (µm) 2.2 µm

Current Column
Length (mm) 150 mm
Diameter (mm) 3.0 mm
Particle Size (µm) 4.5 µm

Peak Details (Critical Pair)
Actual Rs (resolution factor) 3.10

Predicted Rs Change Factor 1.17 (18.3%)
Predicted Rs 3.62 Baseline resolution achieved

Current Method Conditions ☒ Consider Gradient Delay Volume (GDV)
Flow (mL/min) 1.100 mL/min
Injection Volume (µL) 8.0 µL
Max Pressure 100.0 bar
Number of Samples 100
Data Collection Rate (Hz) 10.0 Hz
Gradient Delay Volume (µL) 840 µL

Recommended Method Conditions
Boost Factor 1.00
Flow (mL/min) 1.103 mL/min
Injection Volume (µL) 2.2 µL
Estimated Max Pressure 570.5 bar
Number of Samples 100
Data Collection Rate (Hz) 35 Hz
Gradient Delay Volume (µL) 250 µL
Optimal GDV (µL) 275 µL

Step	Time (min)	%A	%B	%C	%D
1	0.000	50.0	10.0	0.0	0.0
2	15.000	20.0	80.0	0.0	0.0
3	20.000	20.0	80.0	0.0	0.0
4	21.000	90.0	10.0	0.0	0.0
5	25.000	90.0	10.0	0.0	0.0
6					
7					
8					
9					
10					

Step	Time (min)	%A	%B	%C	%D
1	0.000	90.0	10.0	0.0	0.0
2	0.022	90.0	10.0	0.0	0.0
3	4.911	20.0	80.0	0.0	0.0
4	5.541	20.0	80.0	0.0	0.0
5	6.667	90.0	10.0	0.0	0.0
6	8.193	90.0	10.0	0.0	0.0
7					
8					
9					
10					

End Time 25.000 min
Recommended Reconditioning Time 3.90 min

End Time 8.193 min
Recommended Reconditioning Time 1.25 min

TOTALS
Eluent Usage 2750.00 ml
Time 2500.0 min
41.67 hr
Sample Usage 800.00 µL

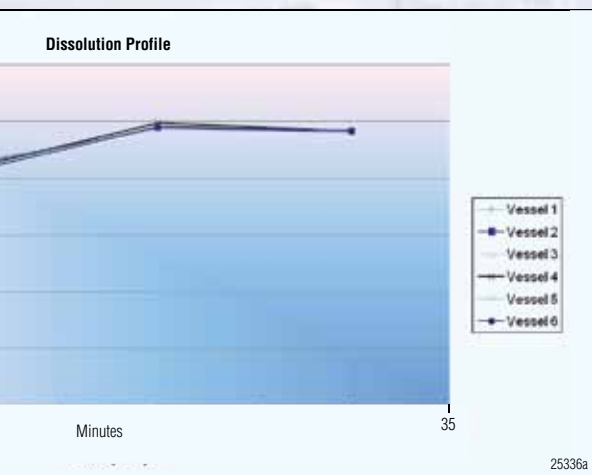
TOTALS
Eluent Usage 903.27 ml
Time 819.3 min
13.65 hr
Sample Usage 223.79 µL

SAVING
67%
67%
72%
Throughput x3.1

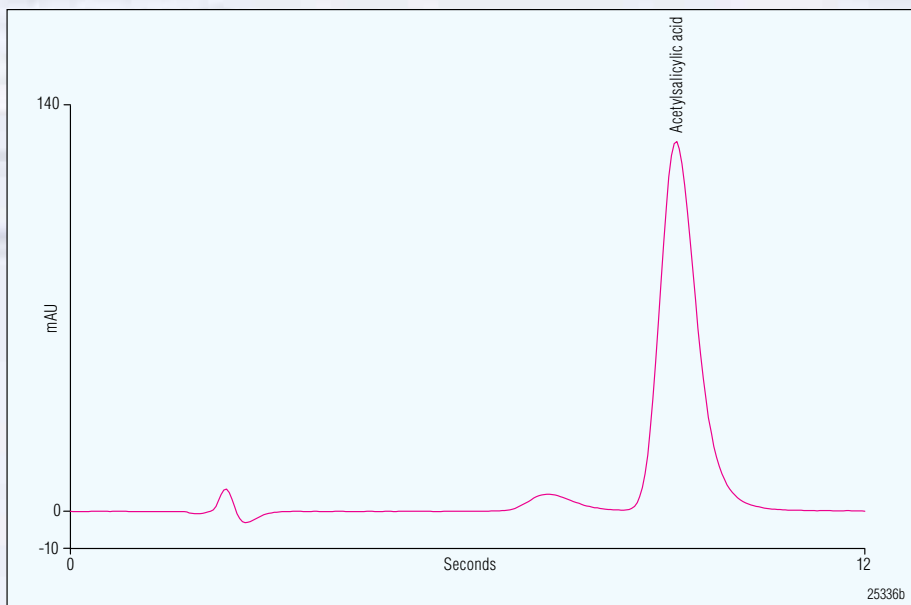
For more information on Rapid Separation LC (RSLC) visit www.dionex.com

RSLC Data Processing

UHPLC requires ultrafast data handling. Recognizing the necessity of data processing tools for RSLC, Dionex engineered the Chromeleon software to deliver seamless data handling that ensures instant results.



Using a fast dissolution method with a total run time of 18 s allows the analysis of all dissolution samples in less than 30 min. After that, the dynamic processing tools of the Chromeleon software instantly calculate the dissolution profile and assess the results against specifications.



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Validation Report: Linearity Test 1

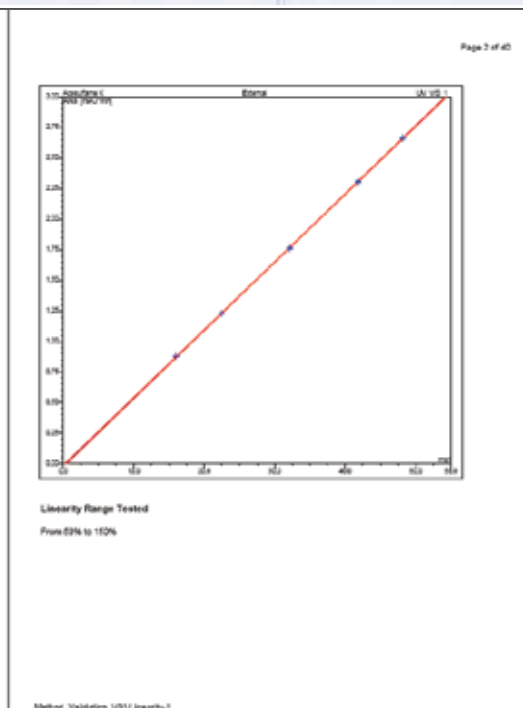
Peak Details

Peak Name: Acetylsalicylic acid
 Calibration Type: LOR
 Y Intercept: 0.0020
 Slope: 0.0007
 Min. Correlation Coefficient (Spec.): 0.9990 2 DP
 Correlation Coefficient (actual): 1.0000
 Correlation Coefficient (rounded): 1
 Residual Sum of Squares: 0.0004

Linearity Results

No.	Name	RANGE, LEVEL, %	X Value	Y Value	Residual	Residual Squared
1	Linearity 1	10.0000	10.0000	0.0020	0.0000	0.0000
2	Linearity 1	10.0000	10.0000	0.0020	0.0000	0.0000
3	Linearity 1	10.0000	10.0000	0.0020	0.0000	0.0000
4	Linearity 1	10.0000	10.0000	0.0020	0.0000	0.0000
5	Linearity 1	10.0000	10.0000	0.0020	0.0000	0.0000
6	Linearity 1	10.0000	10.0000	0.0020	0.0000	0.0000
7	Linearity 1	10.0000	10.0000	0.0020	0.0000	0.0000
8	Linearity 1	10.0000	10.0000	0.0020	0.0000	0.0000
9	Linearity 1	10.0000	10.0000	0.0020	0.0000	0.0000
10	Linearity 1	10.0000	10.0000	0.0020	0.0000	0.0000
11	Linearity 1	10.0000	10.0000	0.0020	0.0000	0.0000
12	Linearity 1	10.0000	10.0000	0.0020	0.0000	0.0000
13	Linearity 1	10.0000	10.0000	0.0020	0.0000	0.0000
14	Linearity 1	10.0000	10.0000	0.0020	0.0000	0.0000
15	Linearity 1	10.0000	10.0000	0.0020	0.0000	0.0000

Method: Validation_V01\Linearity-1



Using Chromeleon software, a 40 page validation report (based on ICH guidelines) is created in only 1 min.

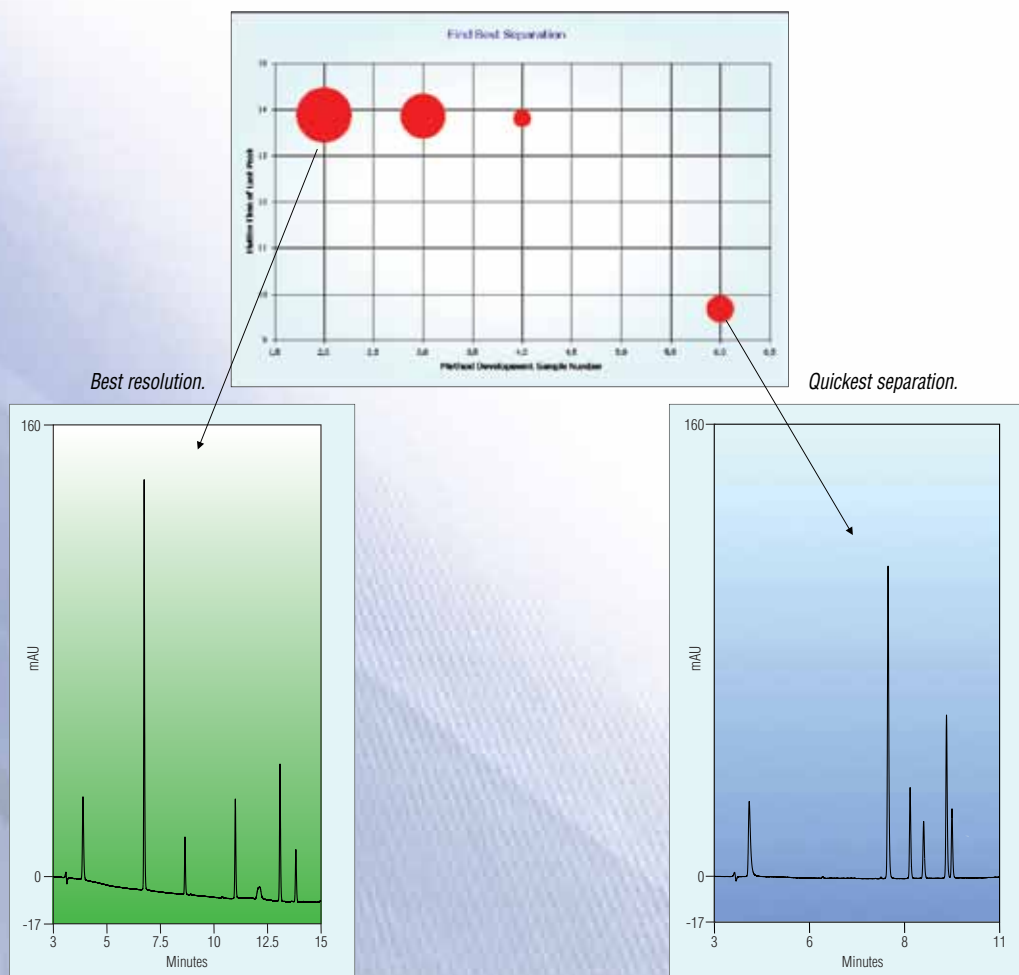
Ultrafast Method Development

Automated UHPLC Method Scouting with RSLC

Dedicated UHPLC Hardware Setup and the Intelligent Simplicity of Chromeleon Software

RSLC facilitates the acceleration of your existing methods and also speeds the development of new methods. The RSLC-based Automated Method Scouting solution enables you to screen a defined set of UHPLC columns combined with a set of buffers, solvents, and temperatures in the shortest possible time. This solution works with both quaternary and binary gradient pump types.

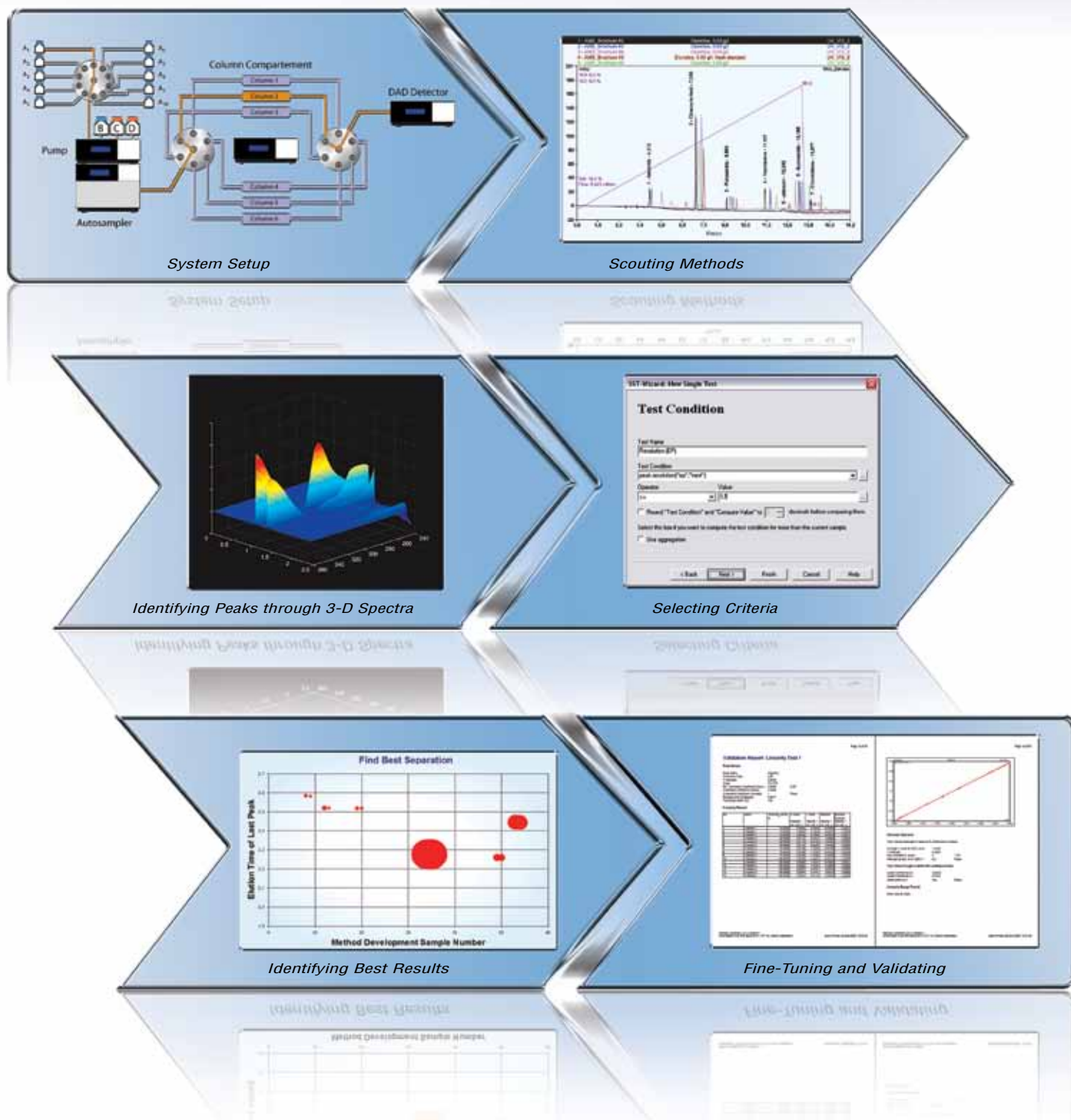
- Optimized hardware design with integrated multi-position buffer selector and ultrahigh-pressure, multi-position column selector valves
- Intuitive instrument control and method setup with Chromeleon software
- Powerful queries and automated processing to find all methods that meet user criteria
- Visualization tools make the best separations obvious at a glance



The bubble chart makes finding the most promising separations easy. The lower the bubble on the y-axis, the faster the separation. The size of the bubble represents the resolution between the critical peak pairs.

Method Scouting Workflow

RSLC-based Automated Method Scouting enables screening with ultrafast generic gradient methods, easily set up in the Chromeleon software. Execution, evaluation, and validation are fully automated.



Flexibility and Reliability

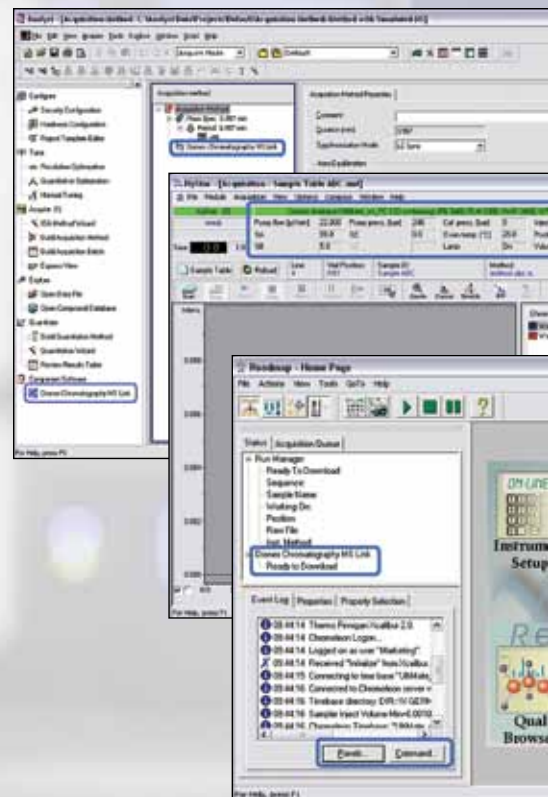
RSLC Ensures Ultrahigh Performance for All Your Applications

A Powerful Combination of Capabilities and Specifications

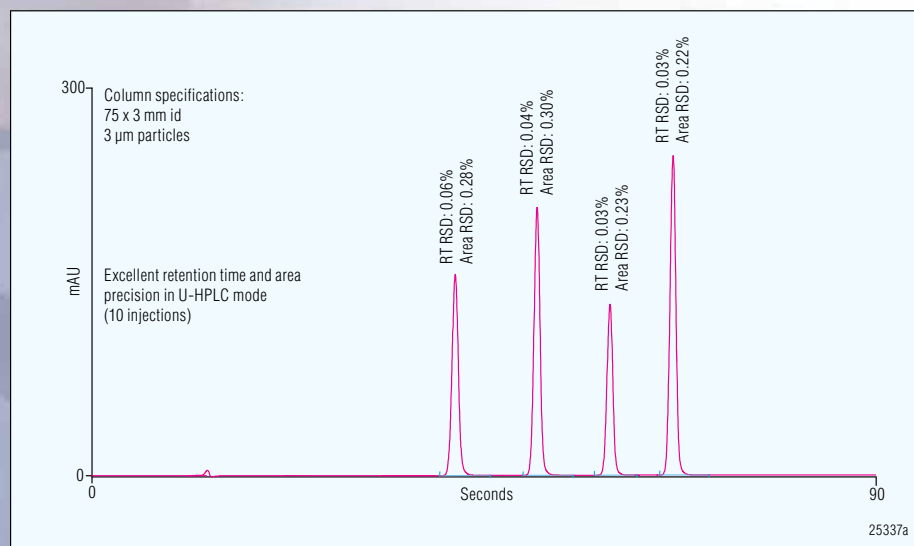
Flexible and reliable ultrafast LC has three main requirements: the ability to run ultrafast and conventional LC on one system; superior robustness to maximize productivity; and full compatibility with your detector of choice for optimal front-end separations. The data below demonstrate the UltiMate 3000 RSLC system's flexibility, handling both conventional LC and UHPLC with excellent performance.

Reliability—a Must for Liquid Chromatography

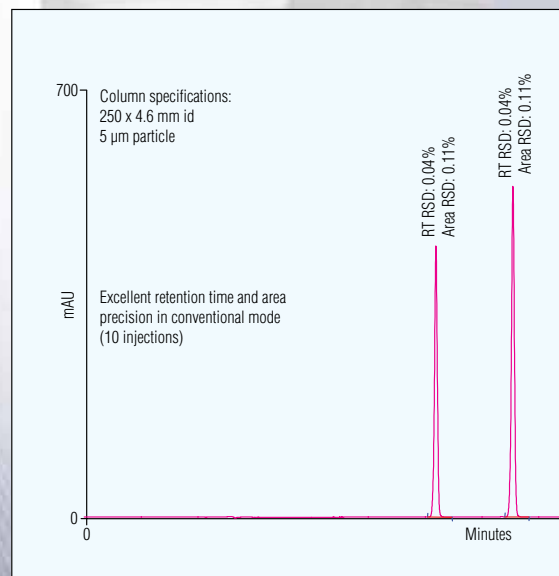
Capable of running both conventional and ultrafast LC methods, the UltiMate 3000 RSLC system delivers unrivaled reliability. RSLC ensures reproducibility and uptime for injections day after day, week after week, and year after year.



DCMS Link™ provides seamless operation of the UltiMate 3000 RSLC system from third-party MS software.



The chromatograms show a UHPLC method (above) and a conventional LC method (right), demonstrating the UltiMate 3000 RSLC system's industry-leading performance in both operational modes.



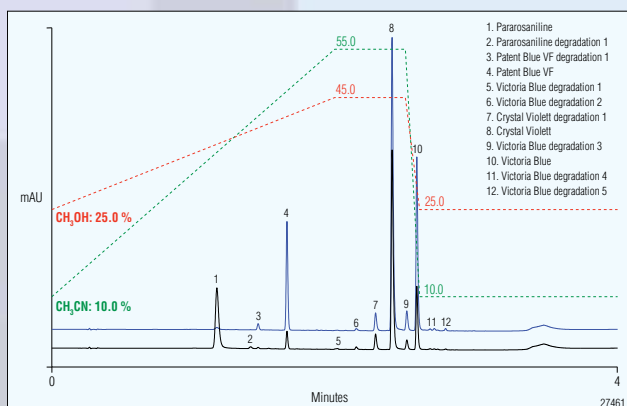


Maximum Flexibility

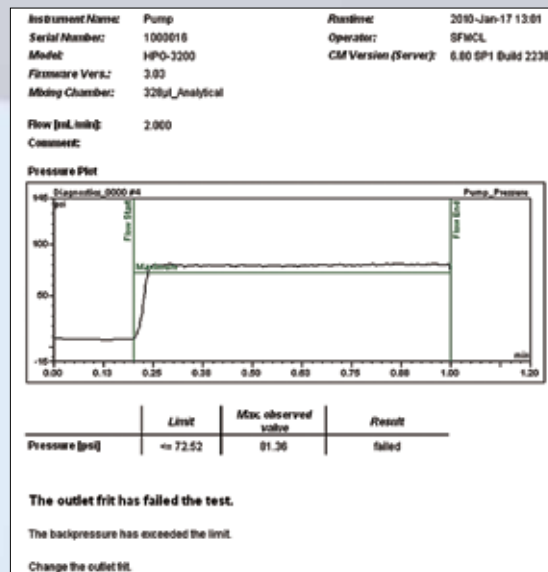
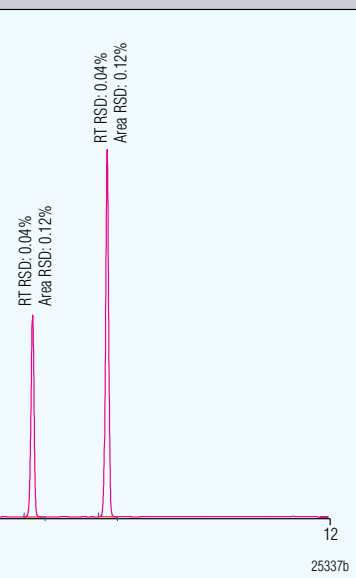
- Run conventional LC and UHPLC methods on the same instrument
- Take advantage of the powerful alternative quaternary and dual-gradient RSLC pumps for highest flexibility in analysis and method development at the UHPLC level
- Industry-leading range of detectors, including MS detectors from ABI/Sciex, Bruker, and Thermo Fisher Scientific

Maximum Reliability

- Precision engineered instrument provides robust operation and maximum uptime, even with advanced x2 Dual configurations
- Patented injection valve design ensures long-term operation at 100 MPa and up to 500 μ L injection volume
- Easy-to-use diagnostic tests allow immediate assessment of instrument performance



UHPLC analysis of ink using ternary gradient elution.
The UltiMate 3000 Quaternary RSLC pump can easily accelerate non-binary gradient methods.



Easy-to-use tests provide instant assessment of instrument performance.