RIGOL
Beyond Measure

Chemical Analysis Catolog

2013

L-3000 Series High Performance Liquid Chromatographic

RIGOL TECHNOLOGIES,INC.

Company Profile

Founded in 1998, RIGOL Technologies, Inc. is an ISO9001:2000 Quality Management System and ISO14001:2004 Environmental Management System Certified company, an emerging T&M leader and a technology innovator in Chemical Analysis and Electronic Measurement. RIGOL's premium line of products includes HPLC and UV-Vis Spectrophotometers, and General Purpose, RF Communication Electronic Instruments, which help the engineers, researchers, educators to address their measurement challenges in confidence with better affordability than ever before.

RIGOL is headquartered in Beijing, China, with the branch offices in Cleveland, OH, United States and Munich, Germany. The company's 400 employees and more than 150 distributors or representatives offer products and services in over 60 countries/regions on six continents. More information about RIGOL is available at www.rigol.com.

L-3000 Series High Performance Liquid Chromatography

L-3000 Series HPLC utilizes technologies that take liquid chromatographic analysis beyond the conventional limitation and achieve the level of performance that today's applications demand.

8000 PSI Up to 8000PSI operational pressure. Higer working pressure extends the dynamic range in the application of chromatographic analysis, and improves the durability and reliability of the entire system.

2.5 AU Up to 2.5 AU linear range of the detector, allows accurate analysis for widely varying sample concentrations, either with high concentrated substance(s) or trace component(s).

100 Hz Up to 100Hz data sampling rate, allows sharper peak(s) detection and enables ultra fast analysis.

HIGHER Reproducibility — Proprietary automatic solvent-compressibility compensation and pulsation dampening technologies enable excellent analysis reproducibility.

LOWER Detection Limit — As low as $5x10^{-9}$ g/mL detection limit, creating higher sensitivity with lower noise floor.

BETTER Durability — Proprietary pump design and precision fabrication process result in excellent system durability.

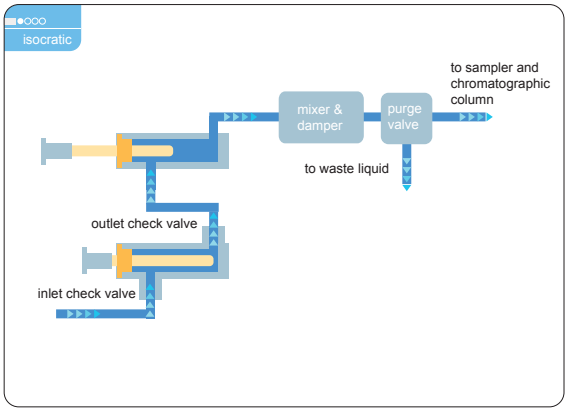
MORE user-friendly — User-friendly HPLC workstation, complies with the FDA 21 CFR Part 11, GLP, GMP regulations.

BCEIA Gold Prize

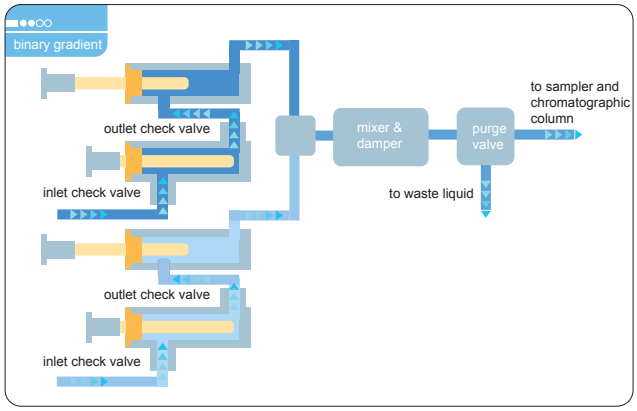
L-3200 Delivery Pump

- Maximum operational pressure up to 8000PSI
- Higher gradient accuracy (±1%) and reproducibility (≤0.15% RSD)
- Proprietary automatic solvent-compressibility compensation and pulsation dampening technologies
- Proprietary multi-flow mixer, dramatically reduces delay-volume, improving response to gradient changes

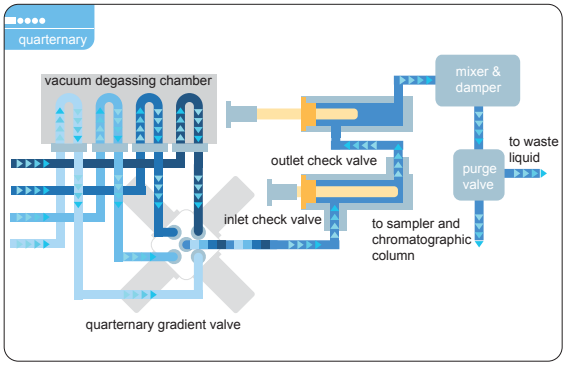
▶ A variety of pump types, isocratic/binary/quaternary, ideal for widely varying applications



Isocratic pump for regular QA/QC usage

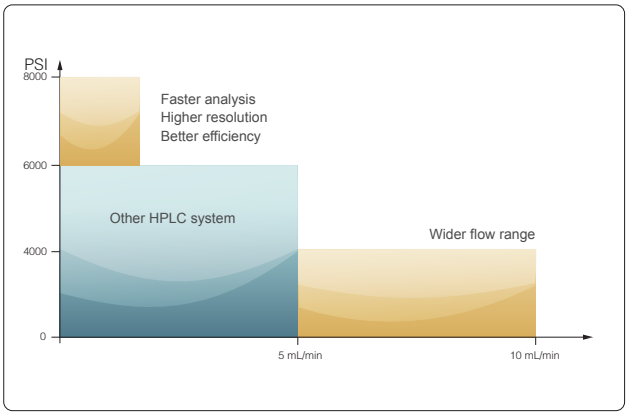


Binary pump for high-throughput & fast analysis

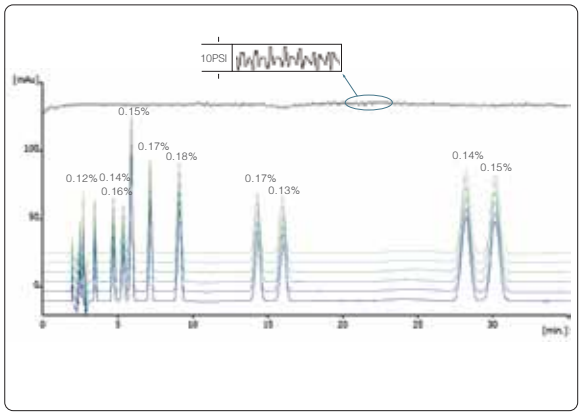


Quarternary pump for pharmaceutical, food and environmental test.

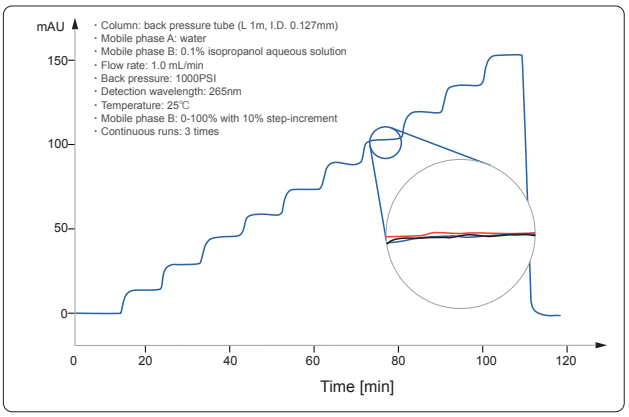
L-3200 Delivery Pump



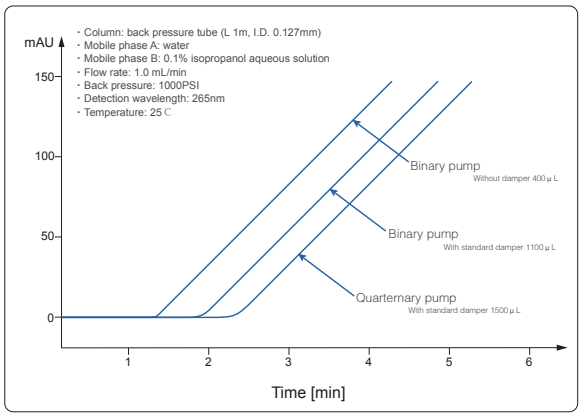
A higher pressure limit allows a wider flexible range of chromatographic separation conditions and higher efficiency.



Proprietary pulsation dampening technology keeps the pressure pulsation less than 10PSI, creating improved qualitative repeatability.



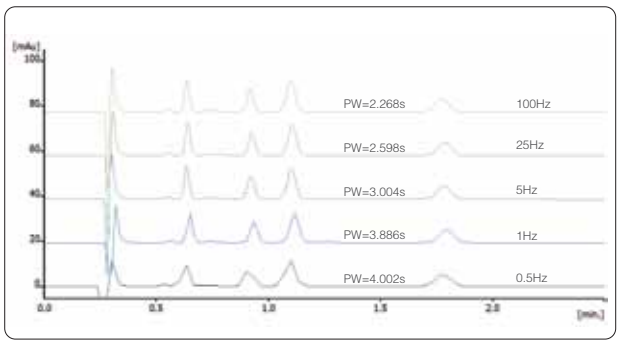
Precision automatic solvent-compressibility compensation and pulsation dampening, bring excellent gradient accuracy and repeatability.

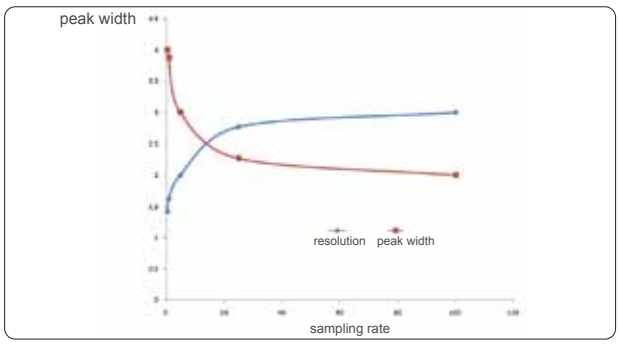


Lower delay volume enables a cleaner & faster response to the gradient changes.

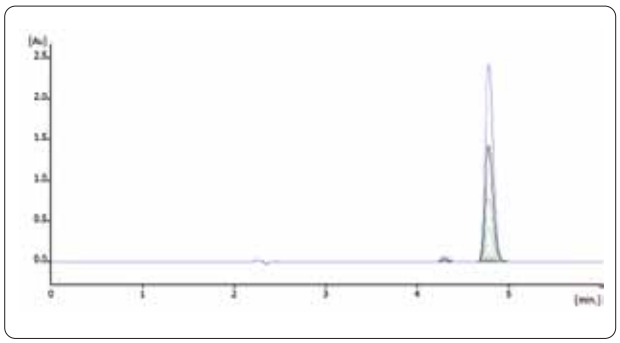
L-3500 UV-VIS Detector

- Data rate: 100Hz
- Linear range: 2.5AU
- Detection limit: 5×10^{-9}g/mL, with lower dynamic noise and drift
- Dual-wavelength testing function, higher efficiency for multi-substance analysis

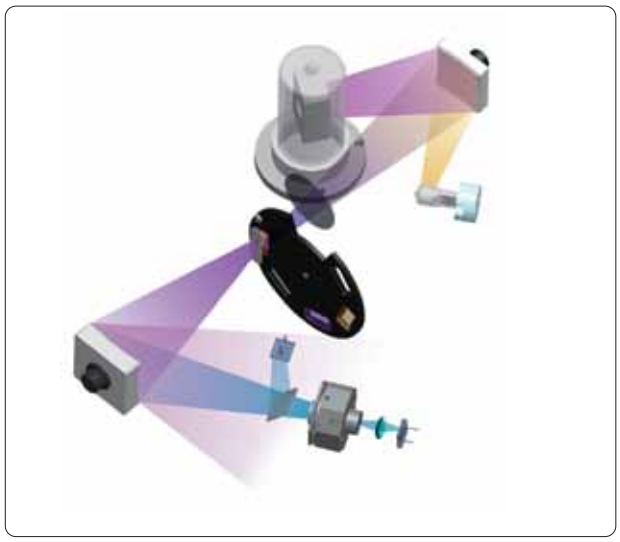




100Hz data sampling rate means that detection of peaks sharper than 5s wide is possible with excellent separation resolution.



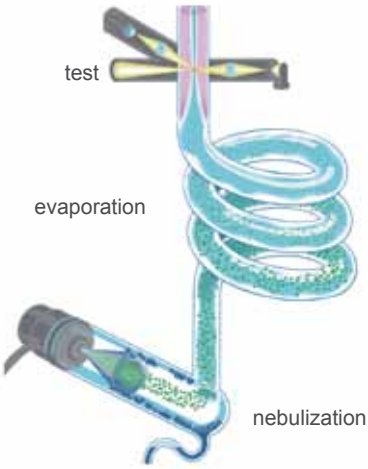
The detector keeps excellent linearity up to 2.5 AU absorbance

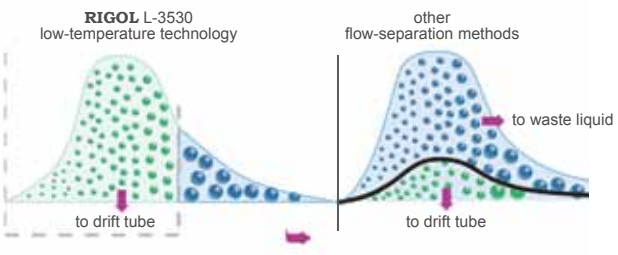


Proprietary optical design for improved signal to noise ratio.

L-3530 Evaporative Light Scattering Detector

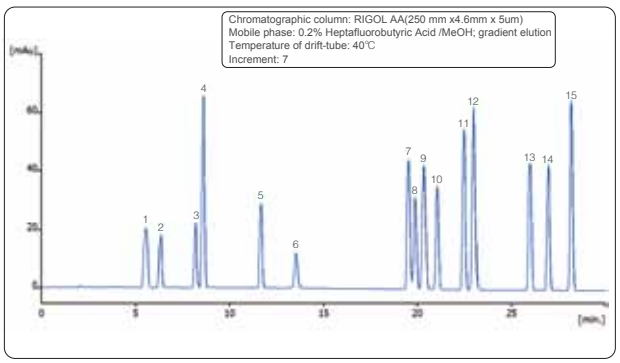
- Low temperature evaporation, suitable for tests of semi-volatile and thermal-sensitive compounds.
- Advanced optical head design allows high sensitivity with very low background noise.
- Proprietary GSF technology offers auto-cleaning functionality, lowers the cost of ownership.
- Automatic adjustment of gas flow rate



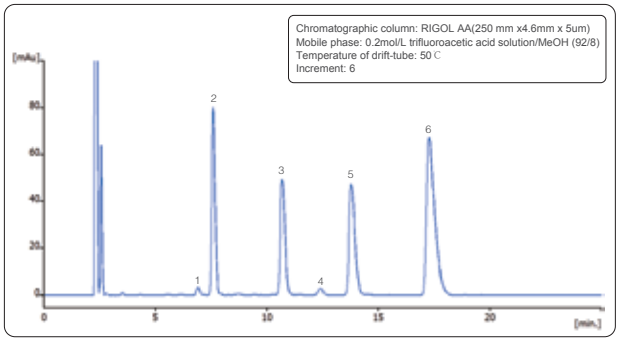


With low-temp evaporation technology, the L-3530 can dramatically reduce baseline noise to improve sensitivity.

▶ Determination of 15 underivatized amino-acids via HPLC-ELSD

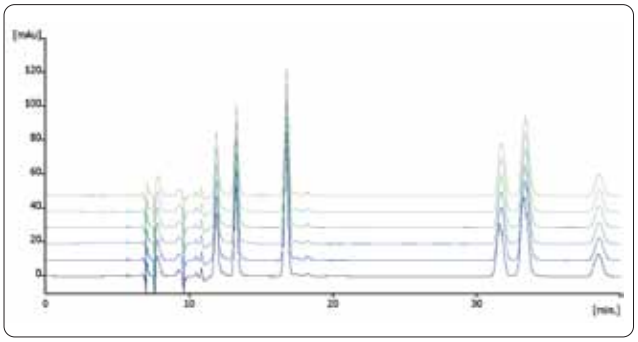


▶ Determination of gentamycin sulfate injection via HPLC-ELSD

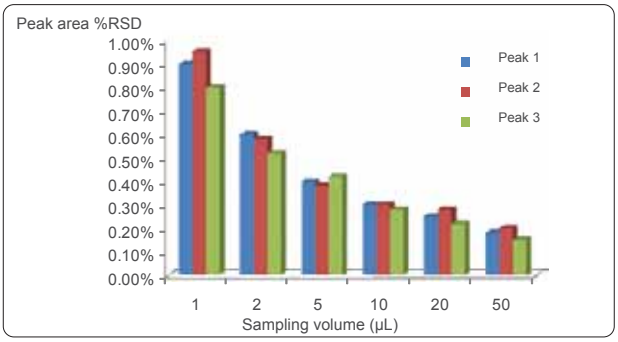


L-3320 Autosampler

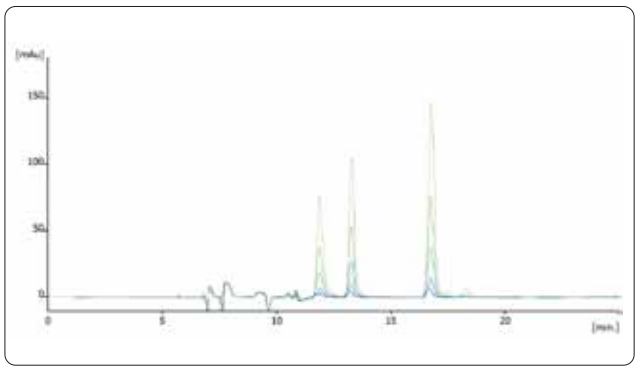
- High precision injector provides excellent accuracy and linearity of sample injection
- Proprietary needle design significantly reduces sample residue contamination
- μL pick-up mode achieves zero sample loss

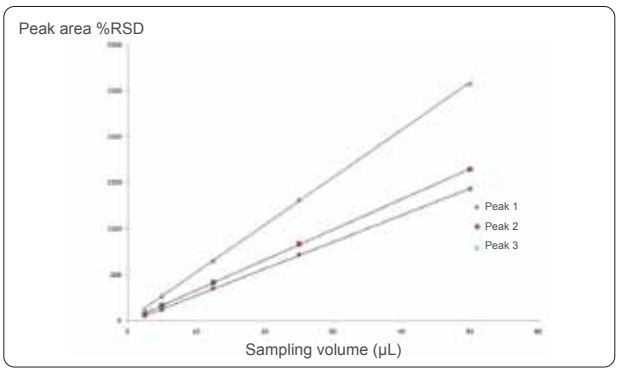


High-precision injector provides excellent accuracy and linearity of sample injection

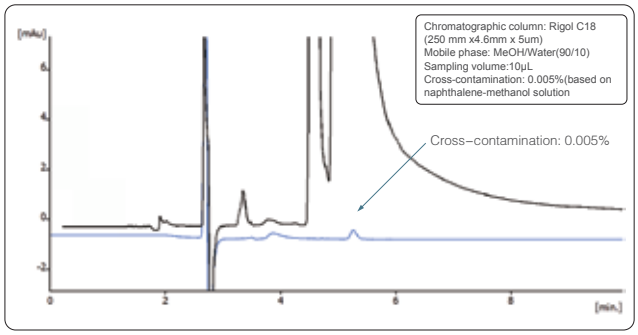


Peak-area repeatability of 3 compounds with different sampling volume (RSD%)(n=6)





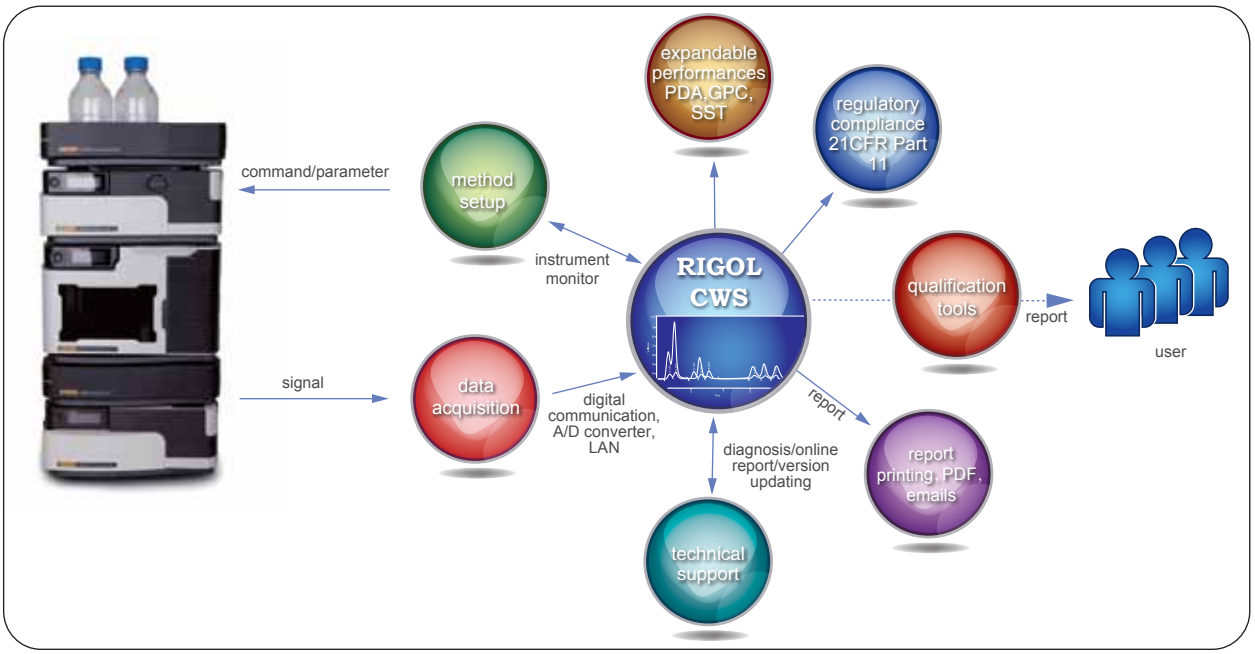
sampling volume from 2.5 to 50uL, correlation coefficients of the 3 compounds are all 0.9999



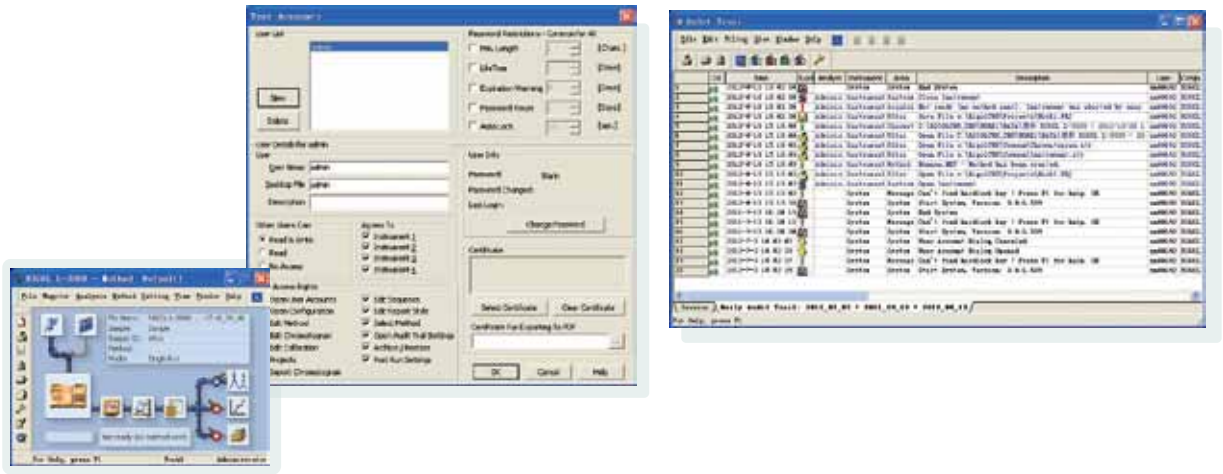
Proprietary needle design significantly reduces sample residue contamination

RIGOL Chromatography Workstation

RIGOL's workstation furthers the capability of L-3000 series HPLC system with Analysis solution research and development, instrument control, data acquisition and processing, report generation, and traceable record management with versatile extensibilities.

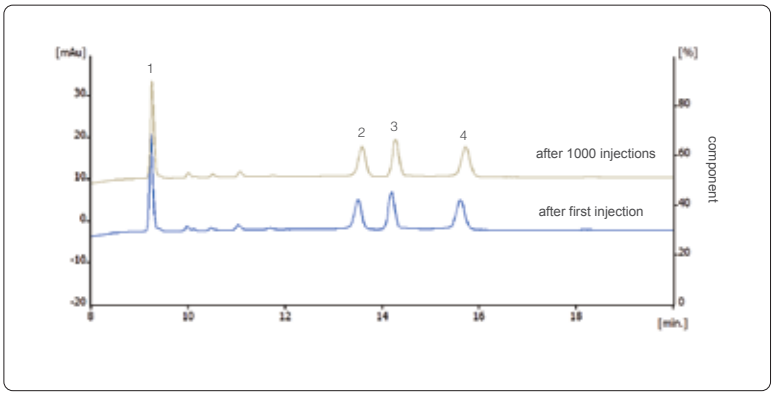


- Compliance with FDA 21 CFR Part 11/GMP/GLP
- Intelligent chromatographic workstation with integrated powerful instrument controller
- Powerful data processing, various integral functions and calculation procedures
- Monitoring, processing and calibration are all accessed from intuitive graphical user interface



RIGOL chromatographic column

- General types of high-inert reversed phase column
- Competence for acid, alkaline and neutral compounds
- Good selectivity
- Excellent performance repeatability



	Retention time				Symmetry factor				Capacity factor			
	1	2	3	4	1	2	3	4	1	2	3	4
after first injection	9.237	13.507	14.197	15.617	1.159	0.923	1.056	0.986	2.420	4.000	4.260	4.780
after 1000 injections	9.257	13.590	14.280	15.723	1.159	0.930	1.044	0.985	2.430	4.030	4.290	4.820

High repeatability of retention time, symmetry & capacity factors between 1st and 1000th injection

Application and Solutions

The professional product definition, proprietary design, solid performance and intuitive user interface make the RIGOL L-3000 series HPLC ideal for widely varying applications from pharmaceutical analysis and food safety to environmental monitoring and much more.

Application

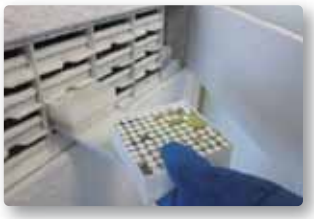
Pharmaceutical Analysis

Food Safety

Environmental Protection

Chemical Manufacturing

Bio-products



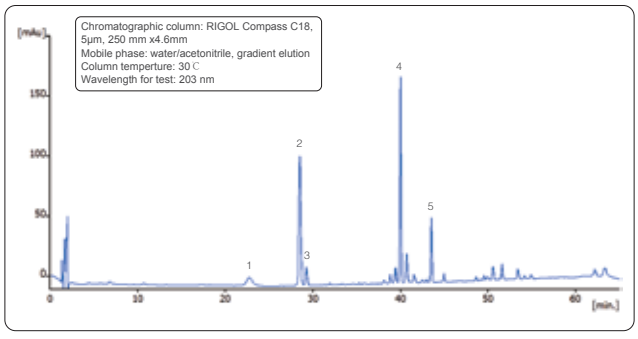
Agriculture

Education & Research

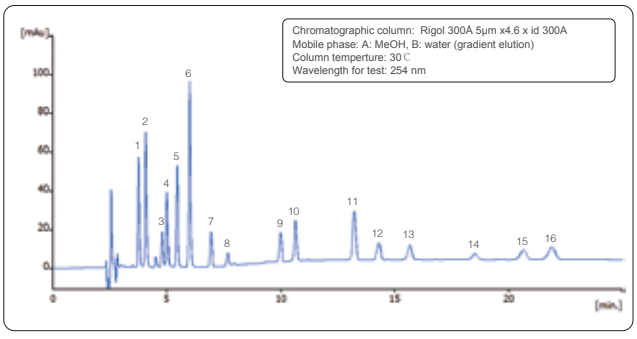
Cosmetics Test

Application case studies

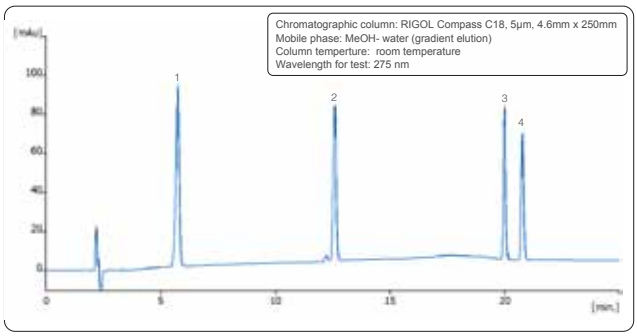
▶ HPLC determination of panax notoginseng saponins



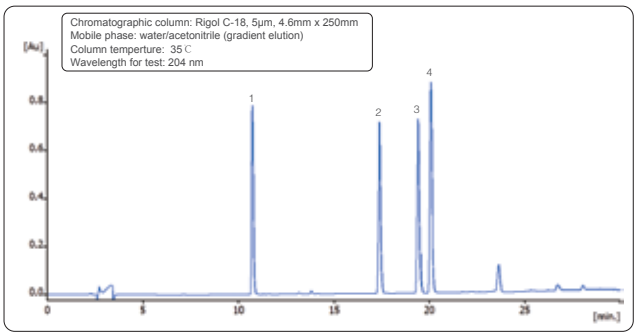
▶ HPLC determination of PAHs in air



▶ HPLC determination of Phthalate in beverage

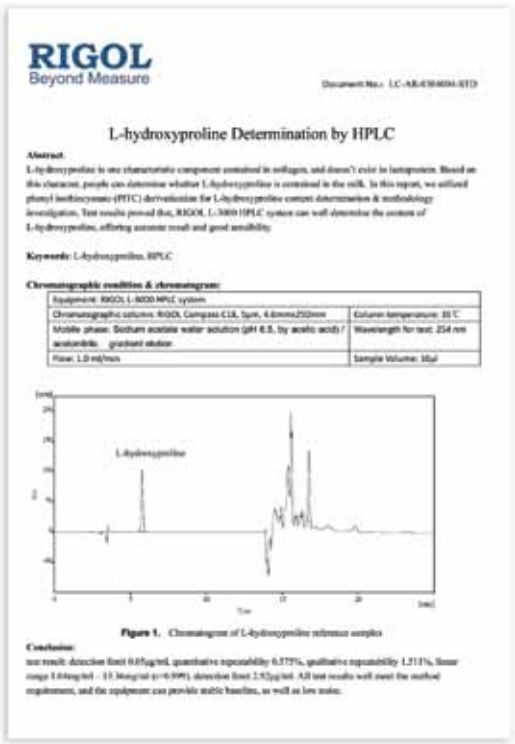


▶ HPLC determination of hormone in cosmetics



Application Solutions

RIGOL provides you with customized solutions that help you meet the challenges of today and tomorrow.



RIGOL
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L-hydroxyproline Determination by HPLC

Abstract

Keywords: L-hydroxyproline, HPLC

Chromatographic condition & chromatogram:

Equipment: RIGOL L-3000 HPLC system	
Chromatographic column: RIGOL Compass C18, 5μm, 4.6mm×250mm	Column temperature: 35℃
Mobile phase: Sodium acetate water solution (pH 6.5, by acetic acid) / acetonitrile; gradient elution	Wavelength for test: 254 nm
Flow: 1.0 ml/min	Sample Volume: 10μl

L-hydroxyproline

Figure 1. Chromatogram of L-hydroxyproline reference samples

Conclusion:

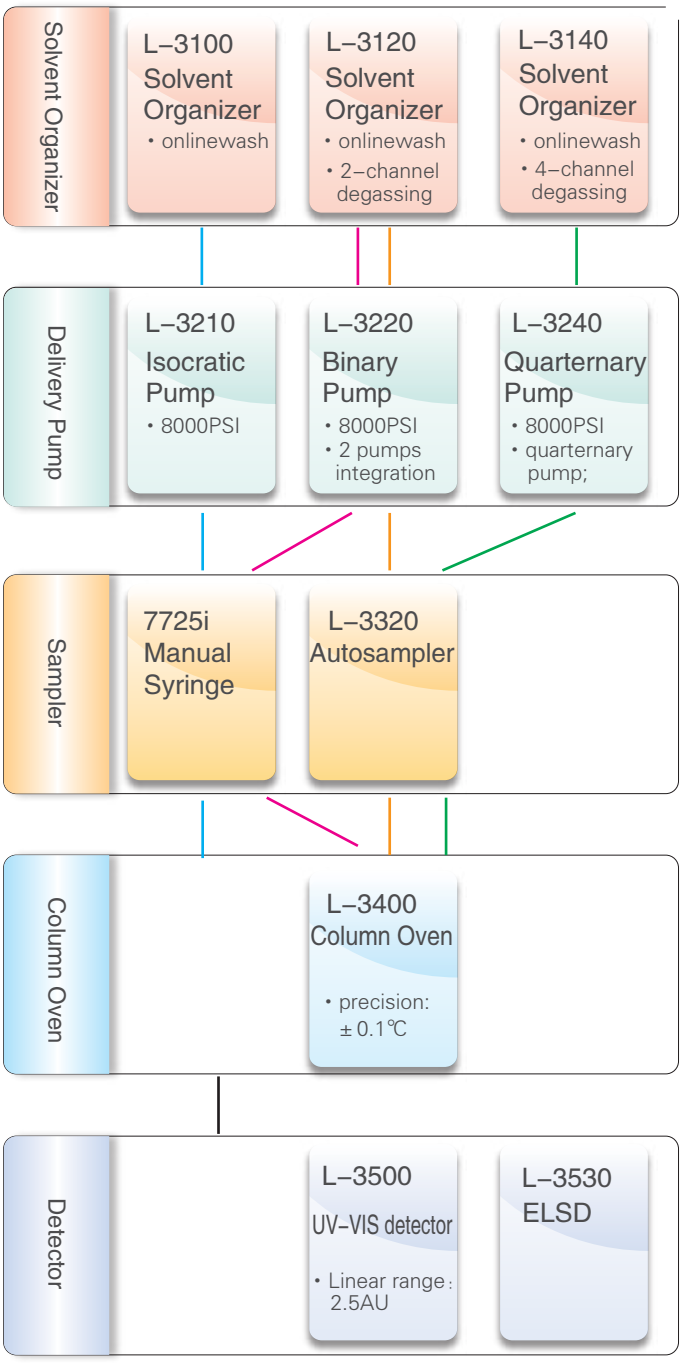
Application documents by **RIGOL**
TECHNOLOGIES,INC.

RIGOL L-3000 Complete solution for analysis and testing

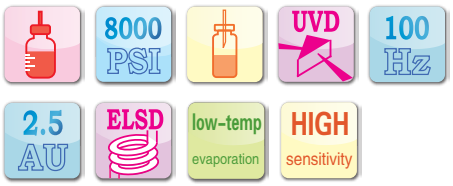
Detection of melamine in raw milk and dairy products by HPLC

L-3000 Modules and Configuration

Flexible solutions, Solid performance: L-3000 HPLC system features a variety of compatible, extensible and high-performance modules for customized applications.



Isocratic system, configurable with UV-VIS and ELS detector



Binary system with manual sampler, configurable with UV-VIS and ELS detector

Binary system with autosampler, configurable with UV-VIS and ELS detector

Quarternay system with autosampler, configurable with UV-VIS and ELS detector

Performance Parameters of RIGOL L-3000 Series

Solvent Organizer		L-3100 Solvent Organizer	L-3120 Solvent Organizer	L-3140 Solvent Organizer
				
	Online Wash	Standard Configuration		
	Online Degassing	None	2-channel (480μL/channel)	4-channel (480μL/channel)

Delivery Pump		L-3210 Isocratic pump	L-3220 Binary pump	L-3240 Quarternary pump
				
	Flow Rate Range	0.001mL/min – 10.000mL/min (increment 0.001mL/min)		
	Flow Rate Accuracy	±0.5% (@1mL/min, water)		
	Flow Rate Precision	≤0.1% (@1mL/min, water)(JJG) ≤0.07% RSD (@1mL/min, water)(ASTM)		
	Max. Pressure	8,000 psi (@0-2mL/min) 6,000 psi (@2-5mL/min) 3,000 psi (@5-10mL/min)		
	Pressure Pulsation	≤1% (@1mL/min, water, backpressure ＞10Mpa)		
	Gradient Accuracy	None	±0.5%	
	Gradient Rreproducibility		≤0.15% RSD	≤0.15% RSD

Autosampler		L-3320 autosampler
	Sampling Mode	Full loop，partial loopfill and μl pick-up
	Volume of Sample Loop	standard:50 μL (optional for 10, 20, 100μL)
	Max. Sampling Volume	Full loop = loop volume Partial loop fill = 1/2 loop volume μl pick-up =(loop volume- 3 × needle volume）/2
	Sample Volume	2*48 1.5mL vials（standard） (Optional: 96-hole panel, 384-hole panel, 10mL bottle)
	Cross Contamination	< 0.02%
	Linearity	0.9999
	Pressure Limit	6000 psi (15,000psi sampling valve is optional)

Column Oven		L-3400 Column Oven
	Temperature Range	Room Temp +5℃ - 70℃
	Temperature Accuracy	± 1.0 ℃
	Temperature Stability	± 0.1 ℃
	Column Load	250mm column ×1，50mm guard column ×1

UV-VIS Detector		L-3500 UV-VIS Detector
	Wavelength	190-800 nm
	Light Source	Deuterium lamp, Tungsten lamp
	Spectral Width	8nm
	Wavelength Accuracy	±1 nm
	Wavelength Precision	0.2 nm
	Noise	±0.5×10^{-5} AU (JJG) ±0.35×10^{-5} AU (ASTM)
	Drift	1×10^{-4} AU/Hr
	Linear Range	>5×10^{4} (JJG) >2.5AU (ASTM)
	Max. Sampling Rate	100 Hz
	Flowcell Pressure	1200 PSI
	Flowcell Light Path	10 mm
	Flowcell Volume	12μL
	Detection Limit	5×10^{-9} g/mL

ELSD		L-3530 Evaporative Light Scattering Detector
	Light Source	LED 470nm
	Detective	high-sensitive photomultiplier tube
	Evaporation Temperature	RT - 100 ℃ (increment 1℃)
	Flow Rate	0.1mL/min – 2.5mL/min (standard)
	Air Consumption	<3.0L/min
	Air Required	>5L/min nitrogen gas or air，2 -4.5Bar

Technical Support and Customer Service

Guarantee The Future

Powerful Lab Test Procedures–Development

RIGOL's experienced Application Engineer team is dedicated to lab solutions and test procedures development, public hot case study, application optimization, etc. in food safety, pharmacy, biology and environmental monitoring fields. The team also provides the customers with test procedures verification service.

Completed Solutions

RIGOL's technical support team understands customers needs, provides the customers' with application optimized system configurations, regulations complied test solutions, as well as responsive and quality customer support.

Quality Training Services

RIGOL offers on–site training service, RIGOL technical support engineers will help the customers better understand the instruments operations and maintenance, provide the customers with the prompt consulting and support on–site and/or remotely.

Comprehensive Customer Service

RIGOL's customer–service center is committed to answering customers' service requirement effectively and professionally.

RIGOL

Service & Support Email Address： service.chem@rigol.com