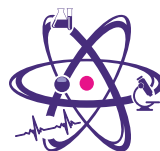


Multiplelabs
Turnkey Laboratories Solutions

HPLC-GPC-9000i





Engineered using the core competencies of our experience, HPLC-9000i provides superior data quality, excellent robustness and long-term performance.

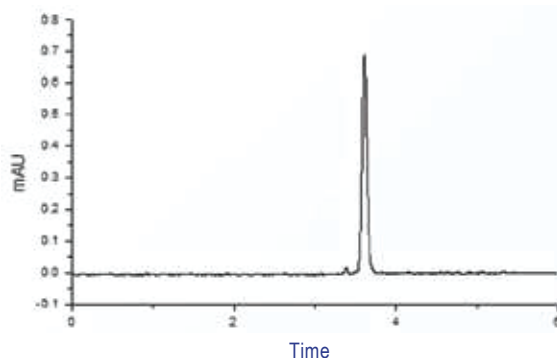
►► Key Technologies:

- Connections University
- Methods Validation Software and System
- Performance Certified Training and Education

►► Excellent Performances:

The LOD as low as 4×10^{-9} g/mL

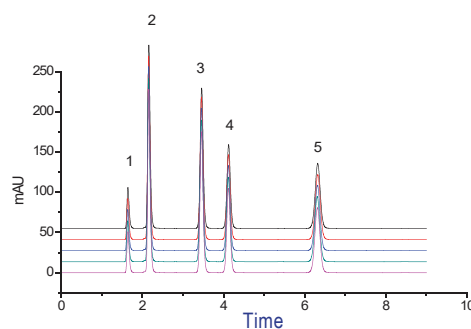
Mobile phase:	Methyl alcohol
Flow rate:	1 mL/min
Detection wavelength:	254 nm
RT:	1.0 s
Sample:	Naphthalene (1×10^{-7} g/mL)



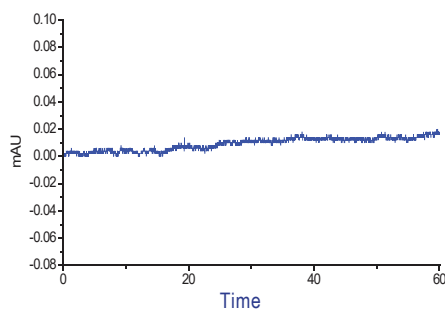
Repeatability

1-uracil, 2-acetophneone, 3-toluene, 4-ethyl benzene, 5-fluorene

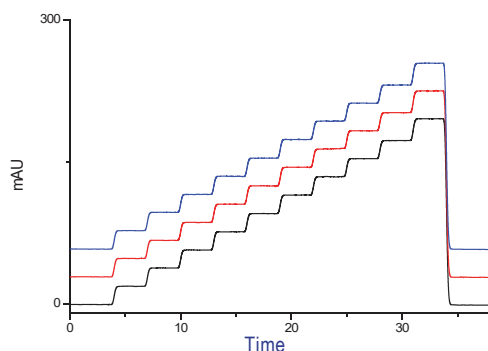
Peak area of fluorene:	RSD=0.048%
Retention time of fluorene:	RSD=0.017%

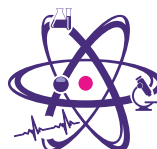


Baseline Noise

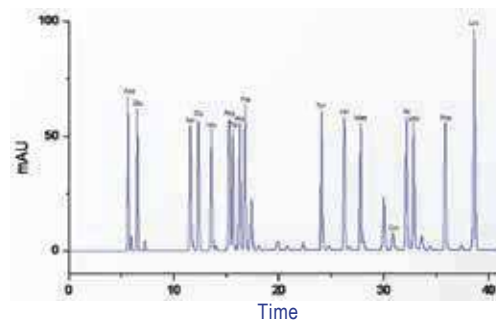


Gradient





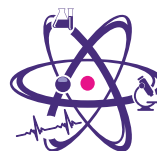
High Resolution	
Analysis method:	HPLC-Pre-Column derivation method
Derivative agent:	Phenyl isothiocyanate (PITC)
Column:	Elite AAP C18 column
Sample:	17 amino acids



► **P9000i High Pressure Constant Flow GPC Pump:**



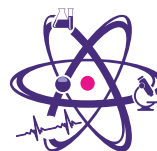
Delivery Pump	P9000i Isocratic pump	P9000i Binary pump	P9000i Quarternary
Online Degassing	None	2-channel	4-channel (480µL/channel)
Delivery Method	Double piston plunger, series/ pallel.		
Flow Rate Range	0.0001mL/min -10.000mL/min (increment 0.001mL/min)		
Flow Rate Accuracy	±0.5% (@1mL/min, water)		
Flow Rate Precision	≤0.025% RSD (@1mL/min, water)(ASTM)		
Max. Pressure	9,000 psi (Standard)	12,000 psi (Optional)	18,000 psi (Optional)
Pressure Pulsation	≤1% (@1mL/min, water, backpressure 60Mpa)		
Gradient Accuracy	None	+0.5%	
		≤0.2% SD	≤0.2% SD
Composition precision	≤0.15%		
Composition accuracy	±0.5%		
Retention time	RSD <0.5%		
Pump Seal Wash	Automatic, integral, active, recirculating		
Pumping system	Software controlled		
Compressibility compensation	automatic and continuous		
Gradient mixing	Active		
Power Requirments:	100-120V, 60Hz; 200-240 V,50 Hz		
Solvent setting range	4 solvents setting range: 0-100% with 0.1% step		
pH Range	1 to 12		
Delay volume	≤200µL		
Plunger rinsing	Automatic and programmable		
Safety features	Leak sensor error detection & display & safe leak handling		
Wet prime	Automatic		
Operation	11 gradient curves		
Function	Automatic purge		



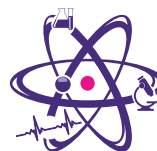
►► **D9000 UV/VIS Detector:**



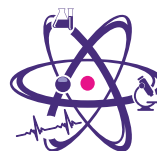
UV-VIS Detector	9000i UV-VIS Detector
Measurement range	0.0001-4.0AU
Wavelength	190-800 nm
Light Source	Deuterium lamp, Tungsten lamp
Spectral Width	≤ 6nm
Wavelength Accuracy	±1 nm
Wavelength Precision	<±0.1 nm
Baseline noise, Single wavelength	≤5.0x10 ⁻⁶ AU
Baseline noise, Dual wavelength	0.25 x 10 ⁻⁴ AU
Drift	≤1x10 ⁻⁴ AU/Hz
Linear Range	≤5% at 2.5AU (ASTM)
Max. Sampling Rate	120 Hz
Flowcell Pressure	1200 PSI
Flowcell light Path	10 mm
Flowcell Volume	14 µL
Flowcell design	suitable flow cell
Detection limit	5x10 ⁻⁹ g/mL
Lamp Hour	D2 lamp > 2000hr Lifetime
Repeatability	0.1 nm.
Wetted material	SS, PEEK, Fused silica
Cell Temperature	Up to 40 °C



Refractive Index Detector	9000i Refractive Index Detector
Flow cell type	3 chamber-type
Measuring method	Deflection type
Refractive Index range	1.00 to 1.75 RIU
Measuring range	0.125 to 600 μ RIU
Drift	1x 10 ⁻⁷ RIU/h (pure Water, Response : 1.5 sec)
Response	0.1,0.25,0.5,1,1.5,2,3,6 sec
Flow rate(Typical)	0.2 ~3.0mL/min
(Max.)	10mL/min(solvent: pure water)
Auto Zero	Full Auto Zero
Auto Zero Range	All Range
Noise	< $\pm 1.5 \times 10^{-9}$ RIU
Integrator output	DC 0 TO 1 V (Sensitivity) 4m V/ μ RIU, 16m V/ μ RIU)
Cell Volume	10 μ L
Cell pressure	70 psi
Max .back Pressure	50kpa
IN to Cell	ca .80 μ L
Internal Volume	cell to Out :ca 600 μ L ALL (Cell to Out :ca 690 μ L
Recorder output	0 to 10m V/FS
Temperature operating range	5° below ambient to 77°C
External Output	(1) READY (temperature control) (2) LEAK (3) ERROR (ROM, RAM, PARAMETER,HOME POSITION,OVER-HEAT,OPTI.-BALANCE,INTENSITY)
Temperature Accuracy	$\pm 0.5^\circ\text{C}$ OFF, 30 to 500°C (1°C Step)
Temperature Control	77 °C Temp. fuse (Double Temperature Control)
Communication port	USB
Operational support functions	None
Wetted materials	Stainless steet 316, Teflon, Quartz glass
Valves	purge & recycle
Power Source, Power consumption	AC 100 to 240V +10%, 50/60 Hz, 150VA max.
Dimensions, Weight	W260xD400xH150(mm),ca.12Kg
Linearity Range	≤ 1 n RIU



Diode Array Detector	9000i Diode Array Detector
Diode Array	1024 diodes
Diode width	≤1.2 nm
Wavelength	190 - 800 nm
Operating mode	Simultaneous acquisition of multiple wavelengths
Light Source	Deuterium lamp & Tungsten lamp
Spectral Resolution	0.6 nm/pixel
Spectral width & Slit width	Programmable 2 to 8 nm
Wavelength Accuracy	± 1 nm
Wavelength Repeatability	± 0.1 nm
Wavelength Precision	± 0.1 nm
Noise	<10x10 ⁻⁶ AU (ASTM)
Drift	<1x10 ⁻³ AU/Hr
Linear Range	≤5% at 2 AU
Max. Sampling Rate	12 channels, 100 Hz Full spectrum, 100Hz
Data Acquisition	100 Hz
Flowcell Pressure	1750 PSI
Flowcell Light Path	10 mm
Flowcell Volume	10μL-15μL (semi-micro) with minimum RI effect
Detection Limit	2x10 ⁻⁸ g/mL (naphthalene)
Wavelength Calibration	Mercury peaks and built-in homium oxide filter
Temperature Operating Range	5°C below ambient temp to 50°C (temperature control facility)
Lamp Hour	D2 lamp > 2000hr Lifetime
Rise Time	0.0s - 9.9s
Power	AC 10V / 220V, 50Hz / 60Hz
Consumption	110W
Dimensions	420mm x 280mm x 175mm
Detection	Double Wavelength
GLP function	Date of lamp replacement, number of ignitions, Ignition time, energy and automatic wavelength check etc.
Flow cell design	Taperslit for reduced RI effect.
Resolution	1.2 nm per photodiode
Digital and Optical mode	3D
Provision	Provision of low noise performance within the operable wavelength range without lamp change

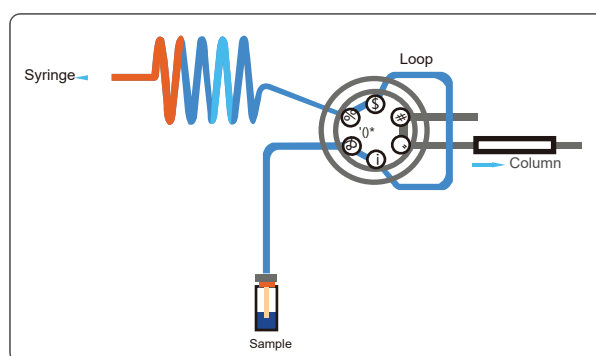


► 9000i Sample Injector System

The Analytical 9000i Sample Injector System is a very flexible and powerful HPLC autosampler with excellent reproducibility and linearity properties. Variable vial racks and adaptors for microliter plates as well as a multitude of firmware options make this system highly adaptable and suitable for any analytical application.

Flow line rinse capability for both before and after sampling.

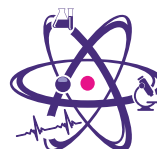
Wetted Materials:	Stainless Steel / PEEK*, PPS, PVDF
Sample Capacity:	120 (2 ml), 192/200 (microtiter plates)
Injection (syringe) Volume:	Programmable upto 2000µL
Volume Accuracy:	±0.8%
Sample loop	Available with 5, 20, 50 & 2000µl
Replicate Injection:	1-50 Per vial
Sample Heating/Cooling:	optional: +4 – +60 °C
Injection Precision:	< 0.5 % Variable Volume Injection (10 µl; typically ~0.25 %) Correlation Factor > 0.999 (10 µl injection volume, 500 µl Syringe)
Cross contamination:	<0.1% Wash with & without automated needle Wash
Temperature Accuracy:	±0.5°C
Carry Over:	< 0.003% RSD with wash program
Dimensions:	396 x 275 x 478 mm
(W x H x D)	
Power Supply:	100 - 250 ~V (47 - 63 Hz)



Full loop injection



Autosampler	AS-9000i		
Injection modes	Full-loop	Partial loop-fill	µL-pick-up
Cross Contamination	<0.02%		
Injection volume	Programmable from 0.1 µl-100 µl (increase upto 1500µL) 0.1 µl increments(optional for 10,20,100 µl)		
Injections Volume Accuracy	0.1%		
Injection precision	Full-loop injection	< 0.25% RSD	
	Partial loop-fill	< 0.5% RSD	
	µL-pick-up	< 1.0% RSD	
Injection	1-99 injections per vials		
Sample viscosity	0.1 - 5 cP		
Needle wash	inside and outside needle wash with drying.wash can be programmed between injections and between vials/wells.		
	1 solvent 5 additional wash solvents		
Injection cycle time	< 18 seconds		
Valve switching time	18 msec		
Wetted parts	SS316, PTFE, TEFLON, VESPEL,glass, For Bio-kit option: PEEK and Coaleet-steel (needle) instead of SS316		
Carry-over	≤0.0025% RSD with standard wash Typically <0.01% with extra wash Vials: 2x 50 (2 mL)		
Sample capacity	2x50 2ml vials(Standard) (optional: 96 well plate)		
Safety features	Leak sensor, Automatic rack and Vial recognition		

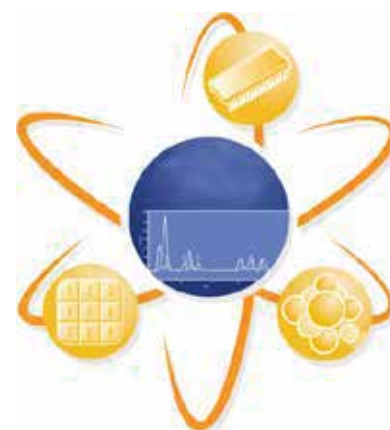


Minimum sample required	10µl residual
Needle rinsing	Automatic needle rinsing before and after every injection
Injection linearity	>0.999
Injection needle wash	integral, active and programmable
Pressure limit	6000psi (15000psi sampling valve is optional)
Dimensions	300 x 510 x 360 mm (WxDxH)™ cool 300 x 575 x 360 mm for ALIAS
Standard features	Auto dilution and auto addition
Weight	19 kg,21 kg for ALIAS™ cool
pH Range	1 to 12.5
other	Compatible with back pressure of pump
Max load on top cover	65 kg
Power requirements	95 - 240 Volt AC ± 10%; 50-60 Hz,200 VA
Sound pressure level	LeAq < 70 dB
Working temperature	4° - 80°C (0.1°C increments)
Temperature Accuracy	±0.5°C
Storage temperature	-25°C to -60°C
Humidity	20 - 80% RH

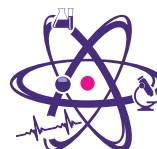
►► **Software module for GPC/SEC** **(Gel Permeation/Size Exclusion Chromatography)**

Gel Permeation Chromatography (GPC) / Size Exclusion Chromatography (SEC) is the technique used for obtaining a rapid and reliable characterization of polymer molecular weight and molecular weight distribution.

GPC Extension provides interactive and automated GPC analysis, including recalibration and GPC reporting, as well as simplifies the retrieval of GPC data. The GPC Extension allows flow rate and multi-detector delay corrections and includes Narrow, Broad and Broad on Narrow calibrations.



GPC Extension is an optional part of ATL Software, it cannot be used as a standalone program.



▶▶ **ATL GPC Extension**

Software module for Gel Permeation /
Size Exclusion Chromatography (GPC/SEC)

The GPC Extension is an optional, fully integrated part of ATL software. It can be ordered as a part of new software or as an extension to existing software.



The ATL Chromatography Software is designed to acquire and evaluate data from up to four multidetector chromatographs at a time (four independent baselines). The ATL Chromatography Station can acquire data from any HPLC system with standard analog output. GPC mode is selectable for any Instrument within a station. GPC Extension is compatible also with ATL Offline Software.

▶▶ **Specification**

• **Data Acquisition:**

Simultaneous data acquisition from up to four chromatographs, detector delay correction for multi-detector measurement.

• **Data Processing:**

The same chromatograms can be evaluated in both standard and GPC modes, multiple peaks and multiple signals are processed in one chromatogram.

• **GPC Integration:**

Separate integration tables for GPC and standard evaluation are used. There for modifying chromatograms. The chromatogram integration can be changed by entering global parameters or interactively, through the direct graphical modification of the baseline.

• **GPC Calibrations:**

Narrow, Broad, Broad on Narrow standard calibration methods combined with Flow Rate correction and Universal calibration. Manual calibration or automated recalibration from sequence. Multiple Broad standards can be used.

• **GPC Calculations:**

Polynomial (n= 1-5) curve fits (independent for signals), M_p , M_n , M_w , M_v , M_z , M_{z+1} molecular weight averages and polydispersity.

• **Overlay:**

Simultaneously displays a virtually unlimited number of chromatograms. Overlay of $dW/d \log M$ vs $\log M$ and cumulative height graphs.

- **Export:**
Slice Table results, graphs, result and summary tables.
- **User Calculations:**
User can define custom calculations in the Result and Summary tables. Using the integrated editor you can create your own columns from the original columns and individual mathematical functions.
- **GPC Results Table:**
Displays molecular weight averages together with peak details for active signal. Multiple peaks can be evaluated from one chromatogram.
- **GPC Summary Result Tables:**
Displays and prints selected results from all simultaneously displayed chromatograms.
- **Post Run:**
Automatically displays, prints, exports and starts other programs after the completion of a measurement.
- **Batch:**
Automatically batch processes, displays, exports or prints any number of chromatograms.
- **Reports:**
User selectable report sections and WYSIWYG formatting of Graphs and Tables.

