



**Younglin**  
FIRST & BEST

# Young Lin Gel Permeation Chromatograph 9200 System



Average Molecular Weight and Distribution  
Analysis of Polymers



YOUNG LIN INSTRUMENT

## Young Lin 9200 GPC

Young Lin GPC 9200 is for used analysis of average molecular weight and molecular weight distribution for polymers, rubbers, plastics and synthetic fibers. It provides all the information necessary to identify physical properties of polymers. As even a little error in measuring average molecular weight or molecular weight can take considerable effect on the physical properties of final polymer products, flow accuracy of pump and stability of RI detector are critical factors for reliable GPC analysis.

GPC 9200 is developed to minimize this error and delivers highly accurate and reproducible GPC analysis results. Autochro-GPC Data System adds more reliability into your GPC analysis results.

### Features

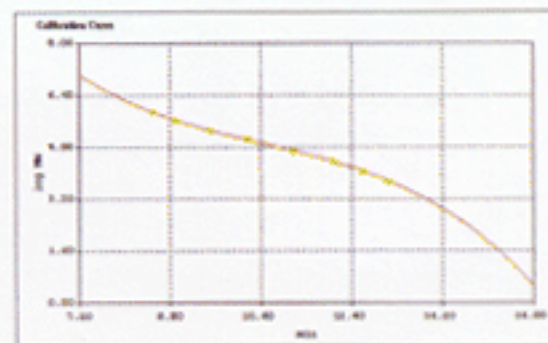
- SP930D Pump for precise control of flow rates
- Wide dynamic range of RI750F Detector
- Autochro-WIN GPC software for fast and accurate GPC analysis

### System Configurations

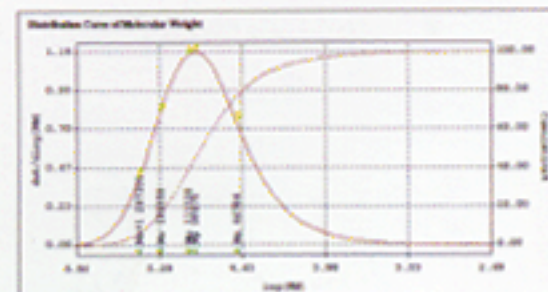
- |                                    |       |
|------------------------------------|-------|
| ■ SP930D Solvent Delivery Pump     | 1 set |
| ■ SDV30 LPG Module (optional)      | 1 set |
| ■ 7725i Rheodyne Injector          | 1 set |
| ■ RI750F Refractive Index Detector | 1 set |
| ■ CTS-30 Column Oven               | 1 set |
| ■ Autochro-GPC Data System         | 1 set |

### Autochro-GPC Data system

- Compatible with MS-Windows
- Data acquisition and analysis
  - Multi-channel acquisition
  - Automatic integration
- Calibration curve and quantitation
  - Calibration curve adjustments
  - Text inputs onto calibration curve
  - Up to 200 standards for calibration
  - Average molecular weight
  - Molecular weight distribution
  - Cumulative %
  - Distribution curve overlay up to 16 samples
  - Molecular weight range adjustments



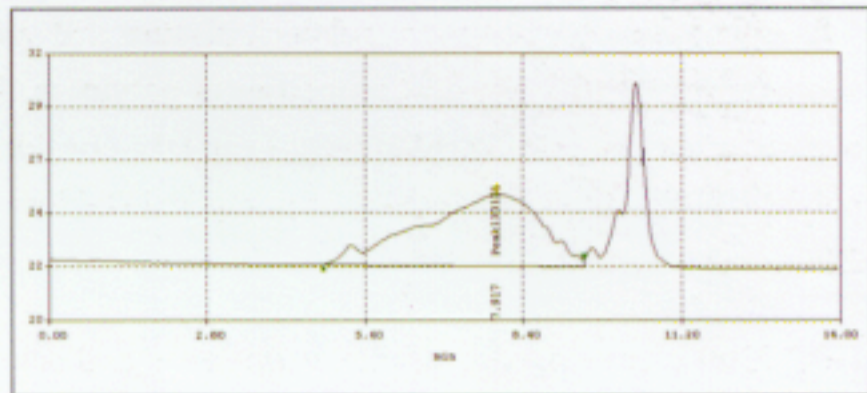
Calibration Curve



Distribution Curve of Molecular Weight

## Polyester Analysis

Small difference in molecular weight distribution and polymer additives components takes effect on the physical properties of final polymer products and the producing process. 2 Polyesters were analyzed to compare the data and find the reason the 2 materials have different physical properties in viscosity when diluted even though they have similar Mn(Average Number Molecular Weight).



Polyester analysis

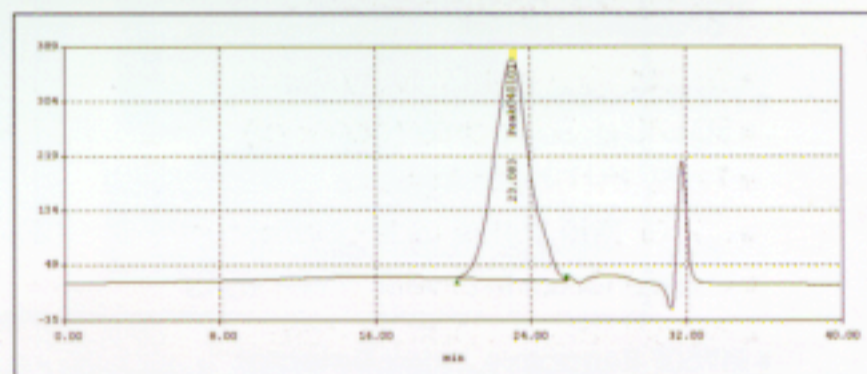
### Analytical Conditions

- Column : Styragel HR 4E 7.8 x 300 mm
- Mobile Phase : THF 100%
- Flow rate : 1 ml/min
- Detector : RID
- Temperature : 40°C

## Polymer Analysis

### Analysis of anion & cation hydrophobic polymers

For GPC analysis of water soluble polymers, the Non-size Exclusion Effect should be considered. Anionic and cationic hydrophobic polymers cause this effect. The effect results from ionic reaction between polymer and solid phase, adsorption to solid phase and inter-molecular static electric attraction. This effect should be removed by adding electrolytic solution( $\text{NaNO}_3$ ) and surfactant to the solvent.



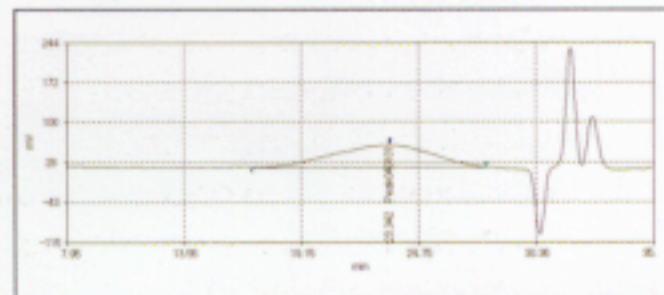
Anion polymer analysis

### Analytical Conditions for anion

- Column : Ultrahydrogel Linear, 7.8 x 300 mm  
Ultrahydrogel 500, 7.8 x 300 mm  
Ultrahydrogel 120, 7.8 x 300 mm
- Mobile Phase : 0.1 N  $\text{NaNO}_3$
- Flow rate : 1 ml/min
- Detector : RID

### Analytical Conditions for cation

- Column : Ultrahydrogel Linear, 7.8 x 300 mm  
Ultrahydrogel 1000, 7.8 x 300 mm  
Ultrahydrogel 500, 7.8 x 300 mm
- Column Temp : 80°C
- Mobile Phase : 0.5 M  $\text{CH}_3\text{COOH}$ , 0.3M  $\text{Na}_2\text{SO}_4$
- Flow rate : 1 ml/min
- Detector : RID



Cation polymer analysis



## Specification

### ■ SP930D Solvent Delivery Pump

- Solvent delivery : Ultra Stable Dual Reciprocating Parallel Pistons
- Pump head volume : 64  $\mu$ L x 2
- Flow range : 0.001 ~ 6.25 ml
- Flow precision :  $\pm \leq 1.0\%$
- Flow accuracy :  $\pm \leq 2.0\%$
- Pressure pulsation :  $\pm \leq 1.0\%$
- Operating pressure : up to 6,000 psi(420 bar)
- Automatic compressibility compensation
- Master and slave function
- Control mode : Isocratic, Gradient, Constant pressure, Slave
- Flow pass material : SUS 316, Zirconium, Sapphire
- GLP feature : Elapsed time, Delivery volume, Viscosity, Ratio, Pressure, Flow rate, Composition
- Control and communication : RS-232, Frequency
- Display : 20 lines x 20 characters
- Dimension : 297 x 198 x 495 mm(W x H x D)

### ■ SDV30 mixing & Helium Degasser

- Flow path material : PTFE, PPS, ETFE
- Mixing : up to 4 channels
- Degassing : Helium

### ■ 7725i Rheodyne Injector

- Flow path material : SUS316
- Load and Inject position
- Wide and 30° port angle
- 20  $\mu$ l sample loop standard
- Position sensor to provide a start signal

### ■ RI750F Refractive Index Detector

- Detection method : Deflection
- RI Range : 1.00 to 1.75 RIU
- Typical flow rate : 0.2 ~ 3.0 ml/min
- Noise :  $\leq 5 \times 10^{-10}$  RIU
- Auto zero range :  $40 \times 10^{-5}$  RIU
- Auto zero resolution :  $\sim 5 \times 10^{-10}$  RIU
- Recorder output :  $\pm 1$  V
- Linear dynamic range :  $80 \times 10^{-5}$  RIU
- Drift rate :  $4 \times 10^{-8}$  RIU
- Flow rate range : 0.2 ~ 3.0 mL/min
- Cell volume : 9  $\mu$ l

- Cell pressure : 6 kg/cm<sup>2</sup>(84 psi)
- Volume into cell : 24  $\mu$ l
- Temperature control : 35°C ~ 55°C
- Digital interface : RS-232C(Available on 2001)
- Digital input : Purge, Auto Zero
- Dimension : 297 x 198 x 495 mm(W x H x D)
- Power requirement : 110/220 VAC, 50/60 Hz
- Weight : 15 kg

### ■ CTS-30 Column Oven

- Temperature control
  - a) Range : Ambient + 5°C - 120°C
  - b) Accuracy :  $\pm 0.2^\circ\text{C}$
  - c) Stability :  $\pm 0.1^\circ\text{C}$
  - d) Repeatability per day :  $\pm 0.^\circ\text{C}$
  - e) Programming rate : 7°C/min
  - f) Temperature programming : 20 files/40 lines
  - g) Stability :  $\pm 0.1^\circ\text{C}$
- General
  - a) LCD display : Current temperature, Set up temp., Error,
  - b) Safety function : Set up temperature for upper limit, Leak sensor, Flammable gas sensor, Automatic shutdown for overheat, Warning and alarm message
  - c) Option : sample injector x 2 dampers, mixer, switching valve
  - d) Oven dimension : 160 x 400 x 140 mm(WxHxD)
  - e) Column : upto 4 installed
  - f) Communication : via RS-232

### ■ Autochro-GPC Data System

- Based on and compatible with MS Windows
- GPC data acquisition and processing
- Multi-channel supports up to 4 channels
- Calculates molecular weight averages for each peak found in unknowns
- Displays molecular weight distribution, cumulative percent, molecular weight averages
- Displays slice table
- Print quantitation result with chromatogram
- Supports MWD overlays of up to 16 unknowns samples



These Products are manufactured in the Young Lin ISO 9001-certified facility that is periodically audited by the registering body to ensure compliance

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**YOUNG LIN INSTRUMENT**

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