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GC5400

Series Gas Chromatograph



Gas Chromatograph

Intelligent and Integrated GC-5400

The intelligent Gas Chromatograph GC-5400 presented by Skyray Instrument Inc. incorporates advanced modern manufacturing technologies with years of experience in research and development. It is manufactured under a quality system conforming to international standards. The multi functional, easy-to-use and remotely controllable gas chromatograph provides superior performance for all applications.

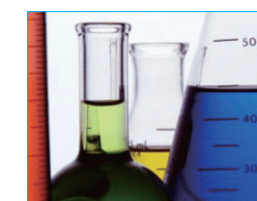
Precision Instruments

Skyray Elaborates



Wide Application Fields:

GC-5400 gas chromatograph plays a critical role in quality control of chemistry, medicine and food industries, and also applicable to quarantine, environment protection, quality supervision, oil, petrochemical industry, forensic analysis, agriculture and commodity inspection.



Advanced Microcomputer Control System

- ➔ With adoption of advanced control technology, the microcomputer temperature control system is highly precise (less than $\pm 0.05^{\circ}\text{C}$), reliable and anti-interfering. The system is divided into 5 independent heated zones with maximum temperature up to 400°C . Settable ultimate temperature and overheat protection mechanism ensure a safe operation of the instrument.
- ➔ Control and operating parameters can be set on the logical and easy-to-use keypad interface (including detector operating parameters). It has functions of self diagnosis, power-off protection, 10 method files saving and invoking, 2 controls of external events, timing start/stop of temperature control, time programming, detector selection, setting and display of range, polarity and current. The set value, actual value, retention and analysis time of each heated zone can be fully displayed.



High

Performance Large Column Oven

The large column oven allows for simultaneous accommodation of capillary column and double packed columns. It is equipped with automated back door mechanism, a rapid heating/cooling device (lowering temperature from 350°C to 50°C in 7 minutes), to realize quasi room temperature control. It supports 5 oven ramps with 6 plateaus.

High precise pneumatics with dual stability

The carrier gas pneumatics is designed with constant pressure valve plus constant flow valve for dual stability. Constant pressure valve plus needle valve are used in the air and Hydrogen pneumatics for stable gas regulation. Both valves are in form of digital knobs, which delivers high precision, outstanding repeatability, good reliability and intuitive flow rate adjustment.

High sensitive and high stable detectors

- ➔ Up to three kinds of detectors, Flame Ionization Detector (FID), Thermo Conductivity Detector (TCD) and Electron Capture Detector (ECD), are provided for GC-5400. Different combinations of detectors, in series or parallel operation, can meet different application requirements.
- ➔ The novel FID has lower limit of detection, with ejector nozzle and ions collector easily disassembled or cleaned. The fixed and accurate installation structure of the ejector ensures every instrument has consistent performance.
- ➔ The high sensitive TCD adopts the high resistant rhenium-tungsten wire, with twofold electronic amplification circuit optional, resulting in maximum sensitivity up to 5000mV·mL/mg. Its unique air insulation structure brings TCD higher stability of performance.
- ➔ Sensitivity and current selections of pulse modulation ECD constant current source are computerized.



Technical specifications

Temperature Control	
Temperature range	7°C ~ 400°C above room temperature, increment 1°C
Temperature control objects	Column oven, detector, thermal conductivity cell, injector, accessories
Temperature ramps	5-stage
Temperature ramp rate	0. 1°C ~ 40°C/min, increment 0. 1°C
Constant Temperature Retention time	0 ~ 655 min, increment 1 min

Hydrogen Flame Ionization Detector (FID)	
Sensitivity	$M \leq 1 \times 10^{-11} \text{ g/s (C}_{10}\text{)}$
Best testing results	$M \leq 8 \times 10^{-12} \text{ g/s (C}_{10}\text{)}$
Noise	$\leq 5 \times 10^{-14} \text{ A}$
Drift	$\leq 6 \times 10^{-13} \text{ A/h}$
Linear dynamic range	$\geq 10^6$

Thermal Conductivity Detector (TCD)	
Sensitivity	$\geq 2500 \text{ mV} \cdot \text{mL/mg (C}_{10}\text{)}$
Noise	$\leq 20 \mu \text{ V}$
Drift	$\leq 30 \mu \text{ V/h}$
Best testing results	$\geq 5000 \text{ mV} \cdot \text{mL/mg (Electronic amplification)}$
Linear dynamic range	$\geq 10^4$

Electron Capture Detector (ECD)	
Detection limit	$\leq 2 \times 10^{-13} \text{ g/s (r-666)}$
Linear dynamic range	$\geq 10^3$
Maximum operating temperature	350°C

Single packed column/double packed columns injector

- Allowing for on-column injection, this type of injector is versatile to many chromatographic columns. By adding a 6-way valve, gas injection can be analyzed. With connector attached, the injector can be used together with the 0.53 wide bore capillary columns for analysis.

2 kinds of capillary column injector systems for all sizes of capillary columns

- Special-purpose capillary column injector with septum purge and split back pressure valve
- Special-purpose capillary column split/splitless injector, with independent carrier gas and makeup gas pneumatics, septum purge and split back pressure valve, inlet cleaning solenoid valve, capillary column split/splitless injection controlled by timing program.

Powerful Data Processing System at Your Option

- The in-built data acquisition board enables the work station software to perform base flow monitoring, single column compensation and chromatographic data processing.
- Composed of absolutely independent dual-channel external data acquisition box and intelligent software, the work station is capable of acquiring either floating signals or grounded signals instantly and processing chromatographic data accurately.
- Rs232 communication board and software, linking with Work Station, provides two-way communication with and inversion of control of the mainframe, that is, the temperature setting, the detector parameters setting and monitoring, and data processing parameters setting can be done on the computer.
- Unique chromatographic simulation software provides simulated searching of optimum operating conditions for chromatograph, simulated teaching and training, knowledge base of chromatograph, etc.

Flexible Injector System Meets Various Analysis Requirements

Maximum of three injectors can be installed on the instrument simultaneously. Their combinations can be optimized for different analysis requirements. Each of them is under independent heated zone. Their assembly and disassembly is done at ease.

Free Accessories for Carefree Setup

A complete set of accessories, i.e., purifier, external pneumatics pipes, wrenches, syringe and various types of connectors, are provided for the initial setup. The users are supposed to prepare the gas source only. The above mentioned accessories are free of charge.



Complete spare parts
All sorts of gas generators

Common Models and Configurations

The mainframes of GC5400 series have the features below: full microcomputer control, five temperature control zones, five-stage temperature ramps, ten method files saved, two external parts for optional installation, automated back door mechanism.

Models	Main configurations
GC5400-1	Capillary column injector(containing septum purge, split back pressure valve) +makeup gas setting+SE54 Ø0.25×15m capillary column + FID
GC5400-2	Double packed column injector + TCD
GC5400-3	Double packed column injector + double FID
GC5400-4	Double packed column injector + capillary column injector (containing septum purge, split back pressure valve) +double FID
GC5400-5	Double packed column injector + independent capillary column injector (containing carrier gas control, septum purge, split back pressure valve) + make-up gas setting+ double FID

Note: The above configurations are basic, which can be combined freely upon request by the users. Please state the requirements when placing the order.

Accessories	Main configurations and functions
Split/splitless capillary column injector	Split/splitless capillary column injector, independent temperature control, independent pneumatics (containing carrier gas control, septum purge, split back pressure valve), makeup gas setting, inlet cleaning solenoid valve, split/splitless injection controlled by timing program.
GC5400-TCD	Thermal Conductivity Detector, independent temperature control
GC5400-ECD	Electron Capture detector, independent temperature control
Wf50 in-built chromatographic work station	In-built interface module+ work station software(PC excluded)
Wf50 dual-channel chromatographic work station	Independent external dual-channel data acquisition box + work station software(PC excluded)
Software of inverse of control	Rs232 communication board and software, linking with Work Station, provides two-way communication with and inversion of control of the mainframe,
Simulation software	Unique chromatographic simulation software provides simulated searching of optimum operating conditions for chromatograph, simulated teaching and training, knowledge base of chromatograph, etc.



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LC-310

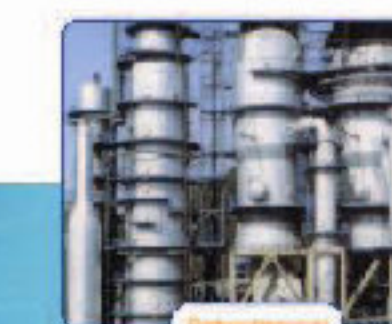
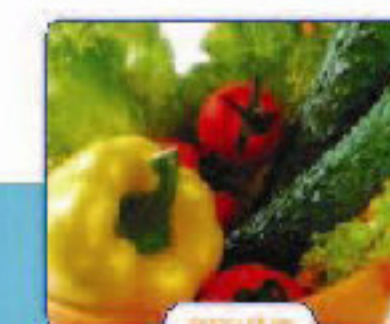
Skyray Skyray Instrument



>> Precise Rapid Sensitive

LC-310 PLUS

LC-310 PLUS Intelligent Full-Control Liquid Chromatographic System



www.skyray-instrument.com

Precision Instruments Skyray Elaborates



Skyray Instrument Inc. is located in the scenery Braintree Hill Park, in Braintree, MA and is a high-technology enterprise specializing in the development, manufacturing and sales of analytical testing equipment in spectroscopy, chromatography and Mass Spectrometry.

Skyray has built a strong reputation and has gained over 80% of the market share in XRF technology within the past 5 years alone. Skyray Instrument has stepped up to a level of highly reputable equipment, with some of the largest manufacturing companies entrusting us with supplying them with our analytical equipment, Skyray has built a strong ever lasting reputation globally.

Skyray Instrument has recently joined the North American Market and wants to bring these low-cost, precise analytical equipment to the North American Consumer and Manufacturing market. The company possesses a first class expert management team, a strong Research Development Team, unparalleled technology with over 50 patents and a reputable service team.

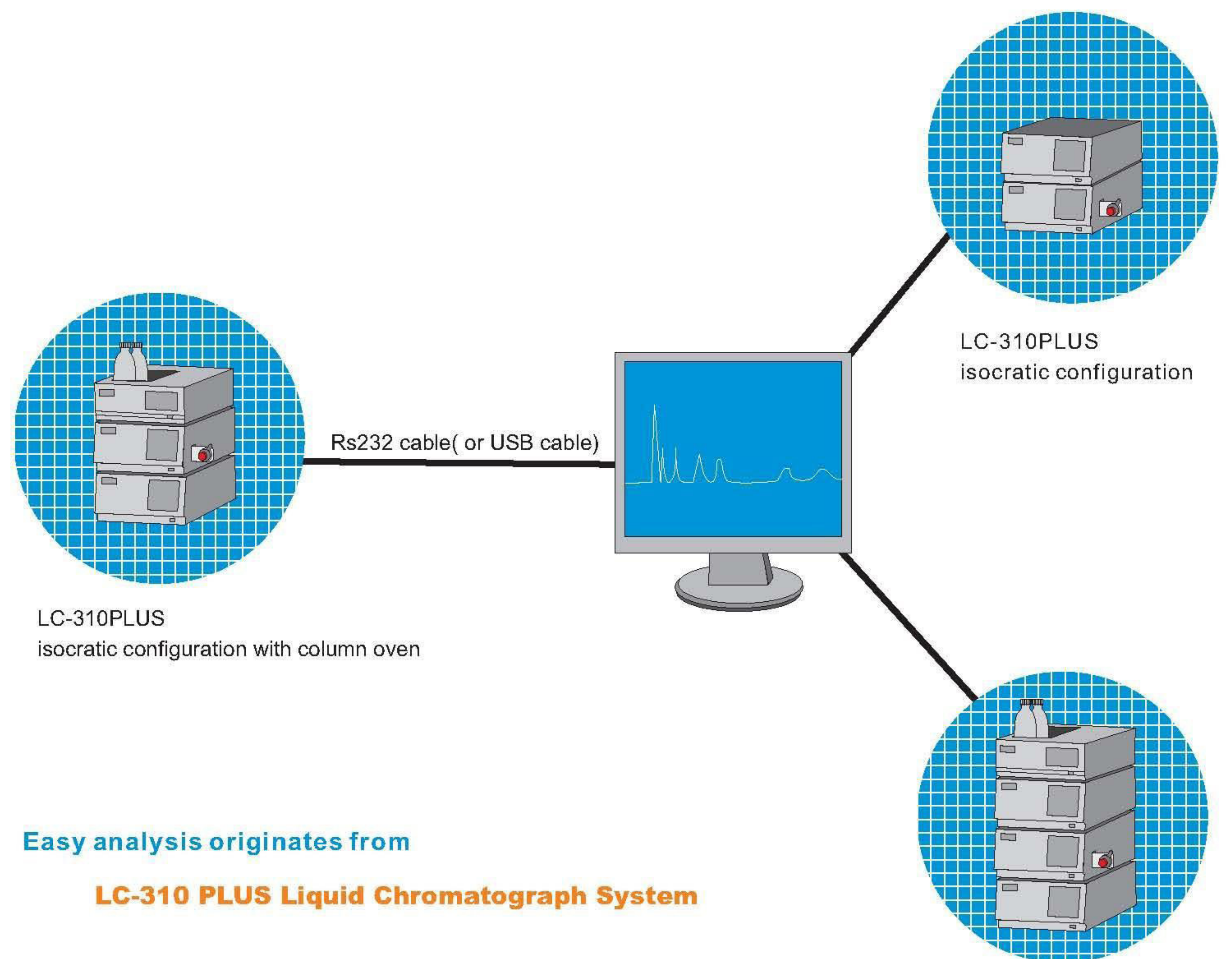
Skyray Instrument, as an industry technology leader, is constantly exploring the pinnacle of analytical field and providing customers with more advanced products and more satisfied services, meanwhile, providing more perfect solutions for electronics, electric appliances, jewelry, toys, food, construction materials, metallurgy, minerals, plastics, petroleum, chemistry, medicine and other industries.

A lab assistant you can depend on



Application Fields of Intelligent Full-control Gas Chromatograph

The Intelligent Full-control Liquid Chromatograph is designed to analyze the high-boiling, involatile, easily decomposable when heated, high-molecular-weighted, and polarity-different organic compounds; bioactive substances; natural products; and synthetic or natural macro molecular compounds. 80 % of the natural organic substances can be analyzed with Liquid Chromatograph System. LC can be seen in pharmaceutical analysis, hygiene and quarantine, environmental monitoring, agriculture, forestry, fishery, stockbreeding, manufacturing industry, petrochemical, quality inspection, scientific study, water conservation system, etc.

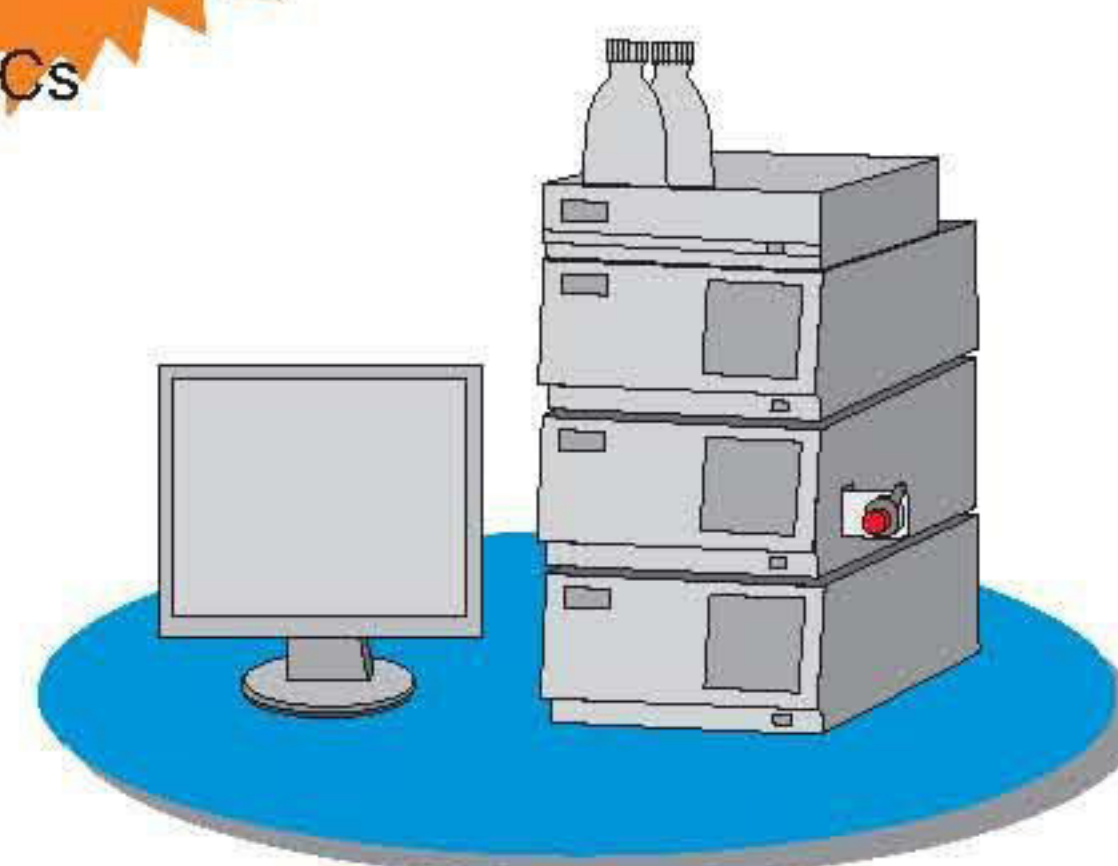


Easy analysis originates from

LC-310 PLUS Liquid Chromatograph System

- Intelligently Digitalized Full-control Liquid Chromatograph System
- Reciprocating dual-plunger parallel pump with improved stability and endurance
- Novel design, easy-to-use and humanity concern
- Excellence in every performance index, rival to the foreign popular LCs
- The optical path employs the precise positioning structure and the technology of heat insulation installation, offering high precision, minimum drift and short period for stabilization.
- All the parts are processed in the world leading CNC (Computerized Numerical Control) center.

Real-time control



Configurations:

- Standard P100 high pressure constant flow pump
- UV100 UV detector
- 7725i manual injector
- Exformma Pronaos Series chromatographic column
- WS100 workstation software

Note The above configurations may vary upon users' requirements.



Technical specifications of the pump:

- Flow rate Control Range: 0.001~9.999mL/min(step adjustable flow rate:0.001mL/min)
- Flow rate stability deviation: $S_r \leq 0.3\%$ RSD<0.006%
- Specification Error S_s : $S_s \leq 2\%$ (Flow rate 1mL/min, pure water, pressure 5~10MPa, room temperature)
- Pressure linearity and test accuracy: indicates pressure error smaller than 0.5MPa (0~42MPa)
- Pulse pressure: ≤ 0.1 MPa (Flow rate 1mL/min, pressure 5~10MPa)
- Airproof of pump: pressure 42MPa, time 10min, and pressure fall< 0.5MPa
- Maximal operating pressure: 42MPa(flow rate: 0.001~9.999mL/min)
- Dimension: 450mmX300mmX160mm (length x width x height)

Technical specifications of UV detector:

- Wavelength range: 190—680nm
- Spectral bandwidth: 8nm
- Wavelength indicated value error: $\leq \pm 1$ nm
- Wavelength repetitiveness: better than 0.1nm
- Baseline noise: $\leq 2 \times 10^{-5}$ AU(Dynamic)
- Baseline drift: $\leq 2 \times 10^{-4}$ AU(Dynamic)
- Minimum detectable concentration: 1×10^{-8} g/ mL (naphthalene/methanol solution)
- Dimension: 450mmX300mmX160mm (length x width x height)



Your trusted

LC-310 PLUS pump

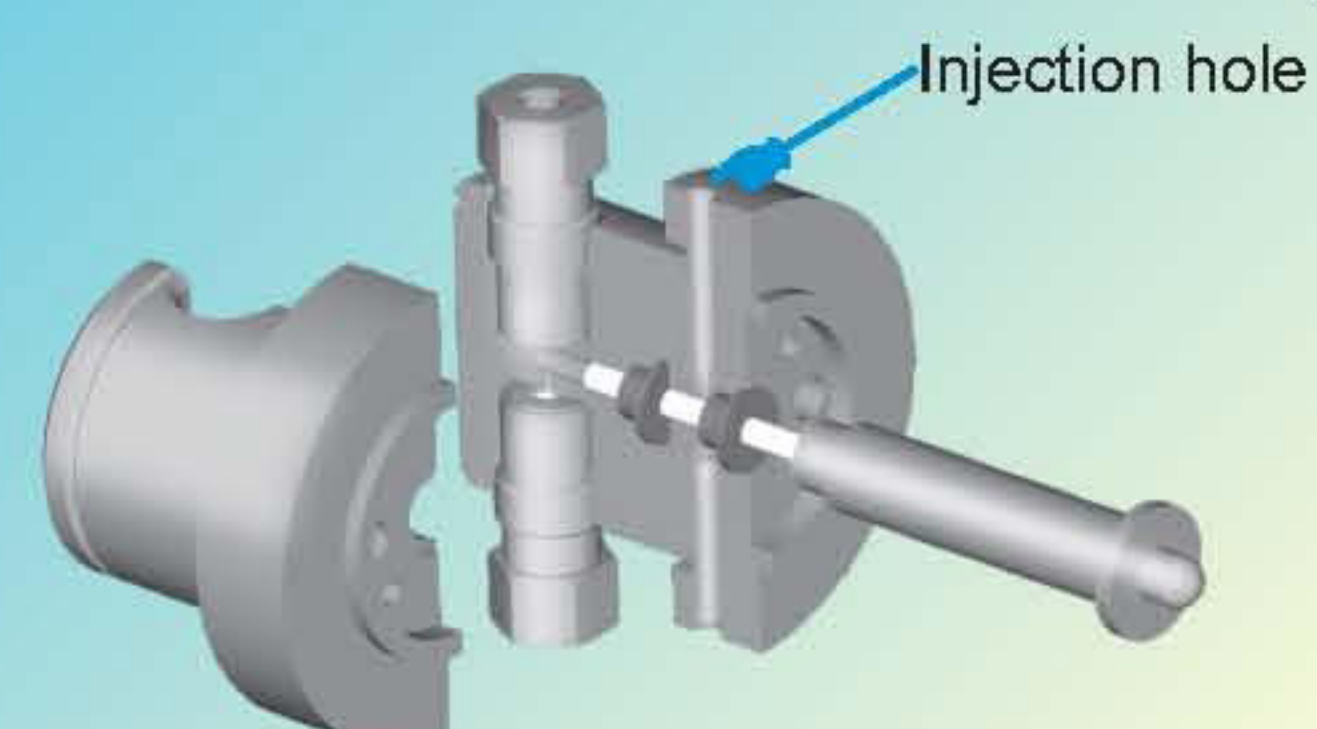
- Controlled by microprocessor, the reciprocating dual-plunger parallel pump offers high operating pressure, small pulsation, good stability and simple operation. As the dual plungers deliver solvents alternatively, the piston rod and the leather packing collar can work twice as long as those of common series pumps.
- The mechanical parts of the pump are computer aided design. Main parts are processed in the world leading CNC center. The fine workmanship and strict pressure test of every pump ensure no leakage happens. Free to use it!
- The pump has a function of process monitoring, where the microprocessor controls the flow rate and monitors the solvent pressure. It alerts and auto stops working when the pressure exceeds the limit.



The following pump is at your option

LC-P310 Post-column Rinsing Pump

If buffering salt acts as the mobile phase, it will accumulate at post column and cause mechanical wearing when not rinsed on time. Post-column Rinsing Pump is the answer. The double leather packing collars have longer wear-off period and extended service life.



Design of Check Valve

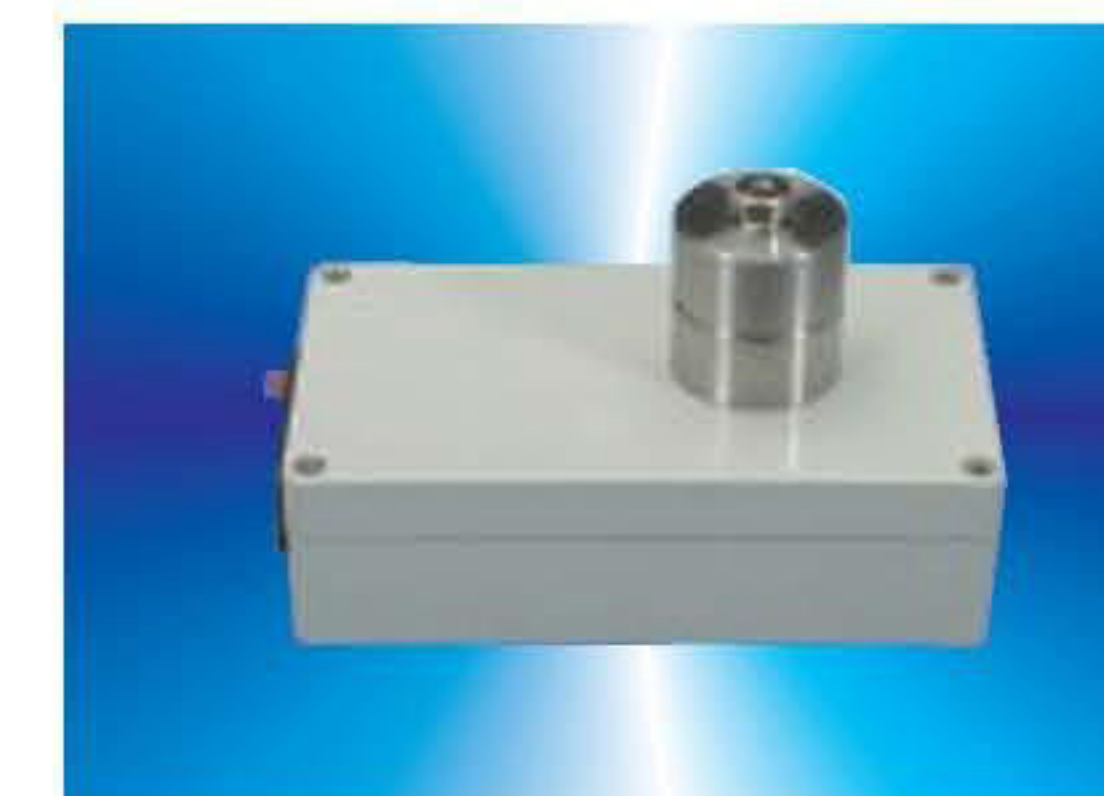
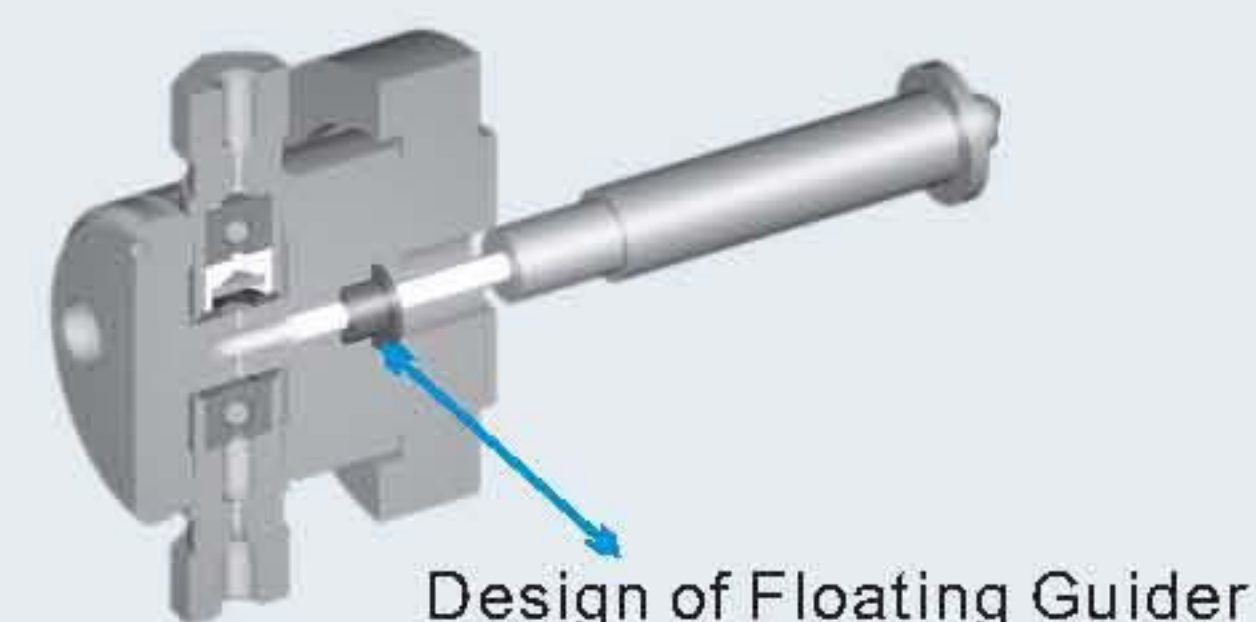
Check Valve



The valve body, the diamond ball seat and the diamond ball are integrated into a single unit, featuring simple structure and good sealing capability. The unit enhances flow rate accuracy of the pump and measurement precision of the system. Plus, it is easy to install and replace.

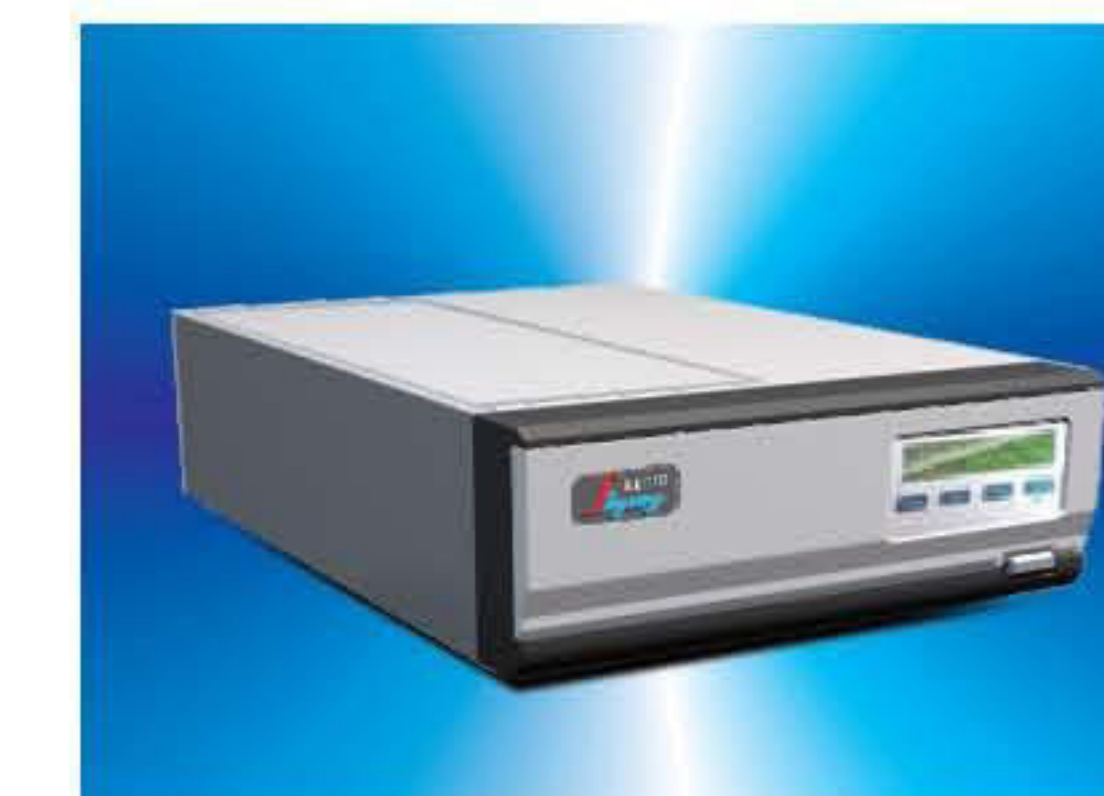
Design of Floating Guide

The floating guide mechanism extends the lifespan of the piston rod collar and delivers solvents stably in longer term.



Dm100 Dynamic Mixer

With the world-class dynamic mixing technology, the mobile phase can be mixed homogenously, making the tests more accurate and stable.



Co100 Column Oven

Temperature control range: 5°Cæambient to 80°C
Temperature control precision: $\pm 0.1^{\circ}\text{C}$
Features: intelligent microcomputer control; accommodating maximum of two chromatographic columns

High sensitive and programmable LC-310 PLUS UV detector



With the ground breaking digital switch system, the detector directly transfers the digital signals to WS1000 work station, eliminating the distortion and interference caused by multiple analog-to-digit conversions of chromatographic signals of common UV detector.

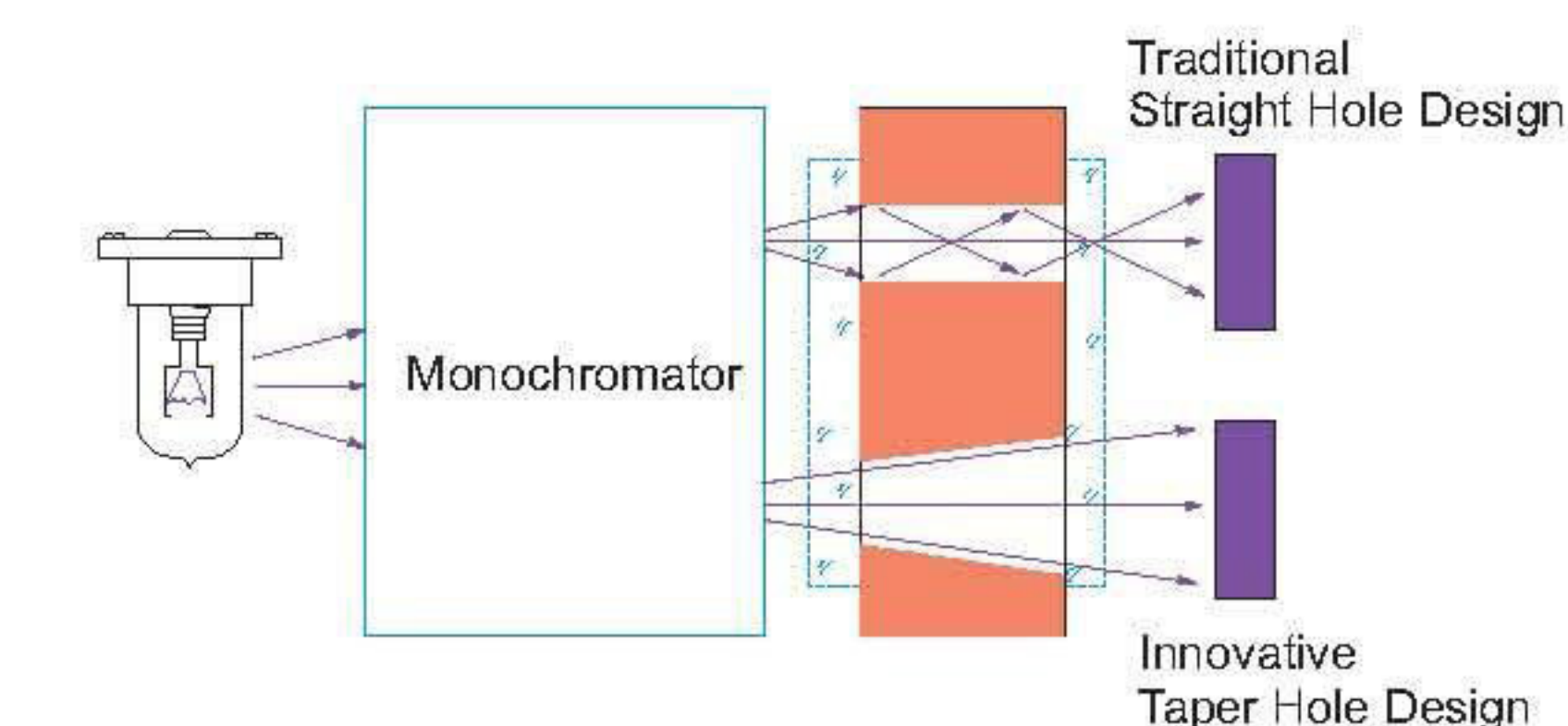
The outstanding flow cell design significantly improves the technical indexes of the instrument. The optical system adopts the precise positioning structure with high accuracy and tiny deviation. As the heat insulation technology is applied between D2 lamp and optical system, the period for stabilization is shortened and the influence the D2 lamp has on the optical path minimized.

The preamplifier combines a high resolution A/D switch with a high resistant and low drifting instrument amplifier. In routine analyses, the dynamic range amounts to 106, ensuring the accuracy of the logarithmic calculation.

Superior performance guaranteed by high quality finish machining and patented technologies.



The heart of UV detector: flow cell



Taper hole design in the flow cell improves 23.8% of the signal to noise ratio, dramatically enhancing the measurement sensitivity.

Powerful and easy-to-use WS100 Work Station Software

Ws100 Work Station Software has realized the fully automated integration of UV detector and high pressure constant flow pump, delivering powerful control and simple operation.

The software employs digit control system to simplify the workflow and generate the maximum precision. The software mainly consists of two modules, namely LC-310 PLUS control module and chromatographic data processing module.

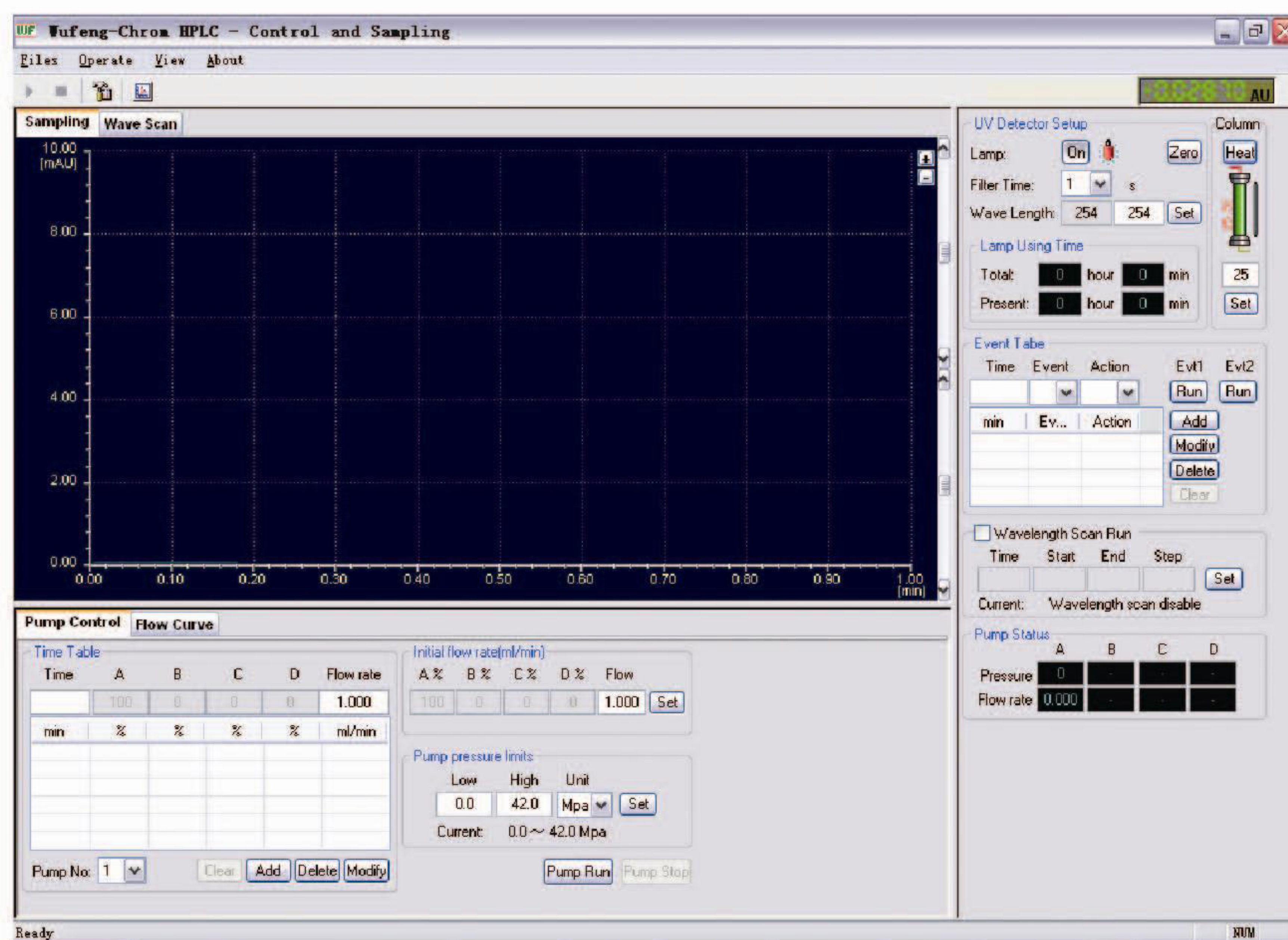
Simple interface setting

Real-time control interface sets all the basic parameters of the UV detector and the pump. What the users do is click the button with the mouse or enter the values with the keyboard. They can, as required, control the on/off of D2 lamp, zero the real-time acquired data, and adjust the filtering time and the settings of the wavelength. They may set the time or start the wavelength scan program during the operation. They can also open/close the pump, adjust its upper and lower limits, and regulate the flow rate in fixed time. Besides, during the gradient elution process, the users can directly use the timing program on the interface to do it and execute real-time flow rate monitoring of the entire process.

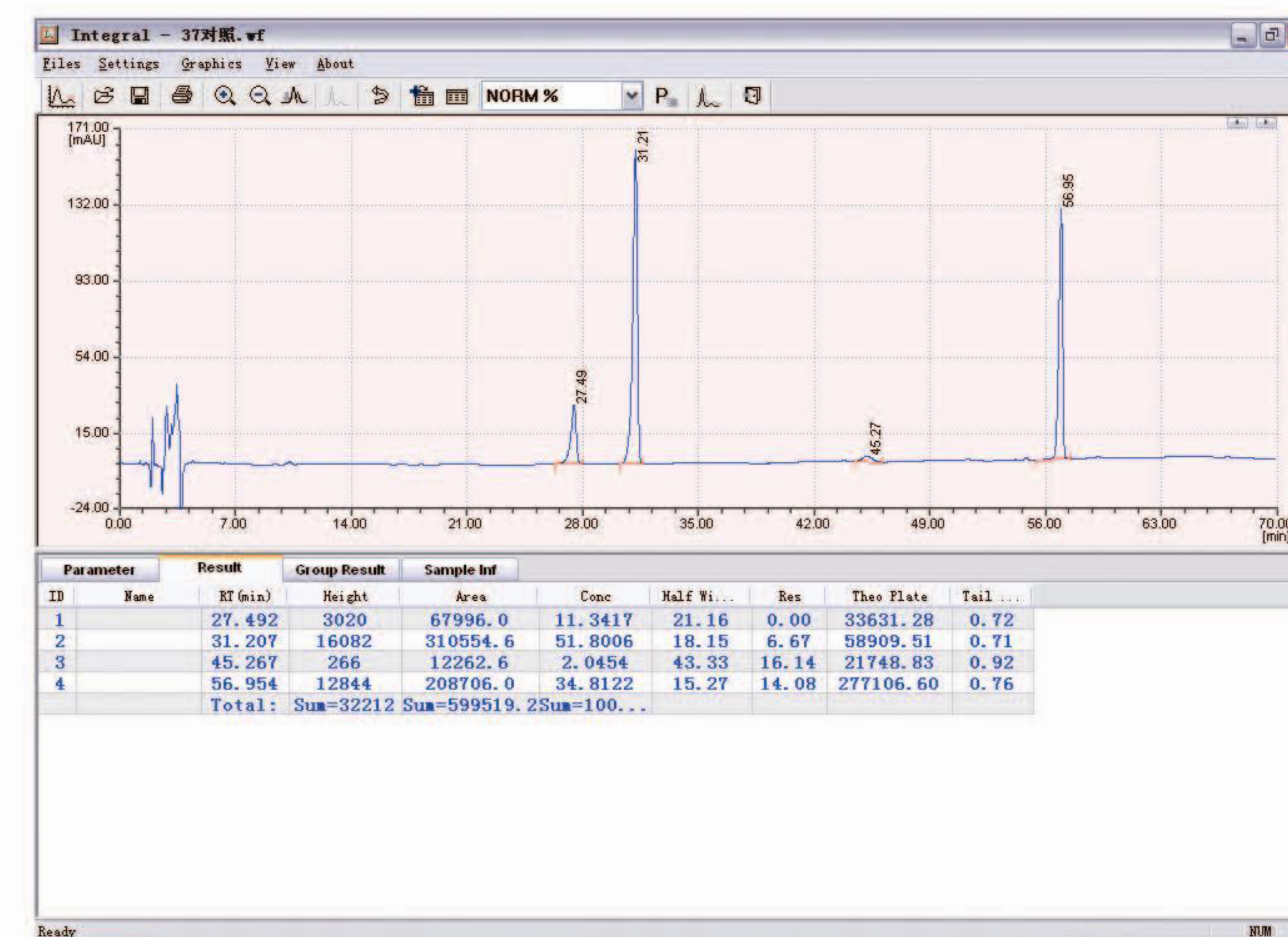
Clear parameter setting: In the parameter setting dialogue box, users can enter different values to set the peak handling parameters and the system parameters.

One-step units conversion: With WS100 work station, the units of chromatographic data processing parameters are converted into the units related to absorbency AU value, saving the users labor.

Real-time control interface of the work station



Work Station After-Treatment Interface



Six Quantitative Calculation Methods:

Normalization, revised normalization, revised normalization with actor of proportionality, internal standard method, external standard method, and index calculation method

Calibrating Operation:

Calibrate standard samples with multiple concentrations and establish a calibration curve of sample concentration-peak area.

Flexible peak identification and handling capability:

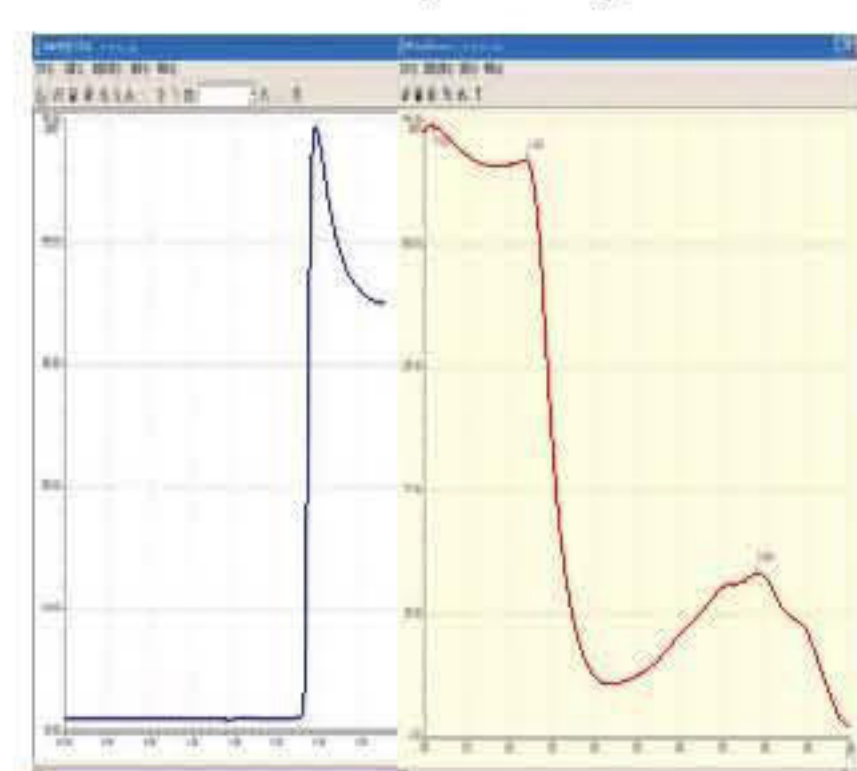
By setting the peak handling parameters and the timing program, chromatographic peaks can be identified and handled. Or, handle them manually.

Chromatogram adjustment

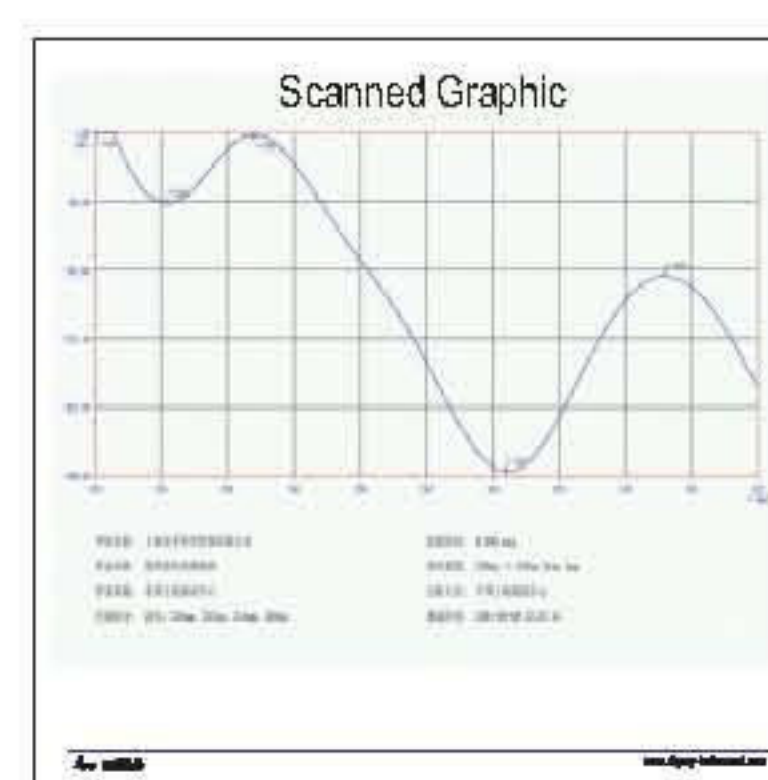
Chromatogram, configured quantitative calculation method, peak handling parameters, peak identification sheets, etc. can be saved to a file name assigned by the users.

Besides the chromatogram processing function of a traditional work station, WS100 offers:

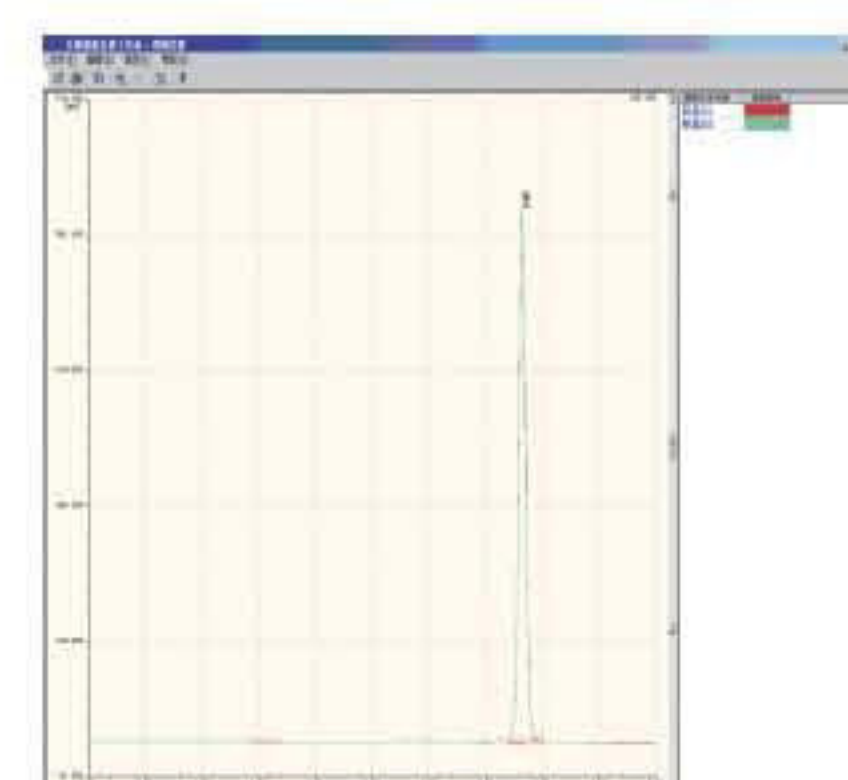
Wavelength scan graphics when in sample analysis



Spectrum scan



Work station graphics comparison

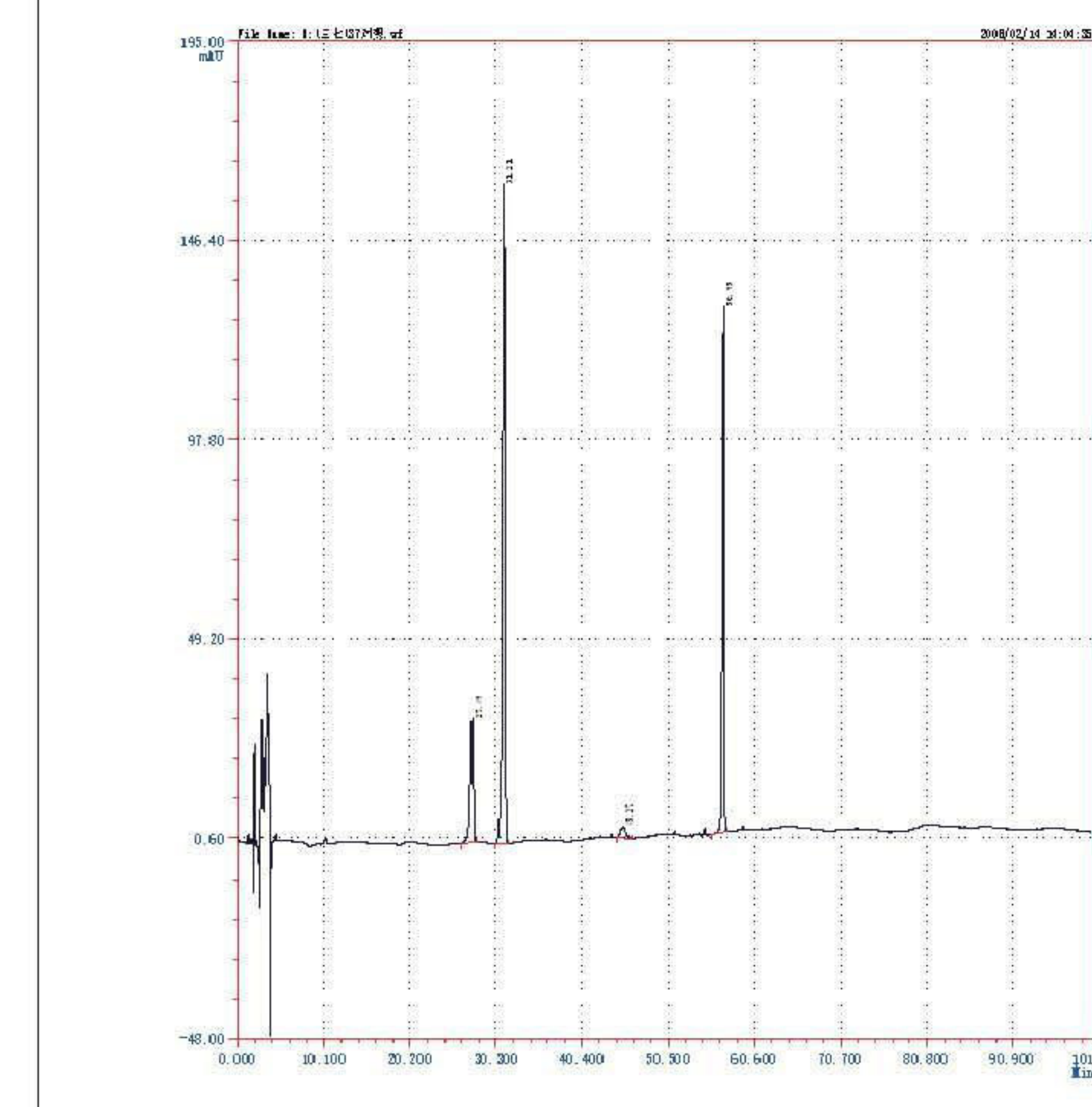


Normal analysis Stopping pump Wavelength scan



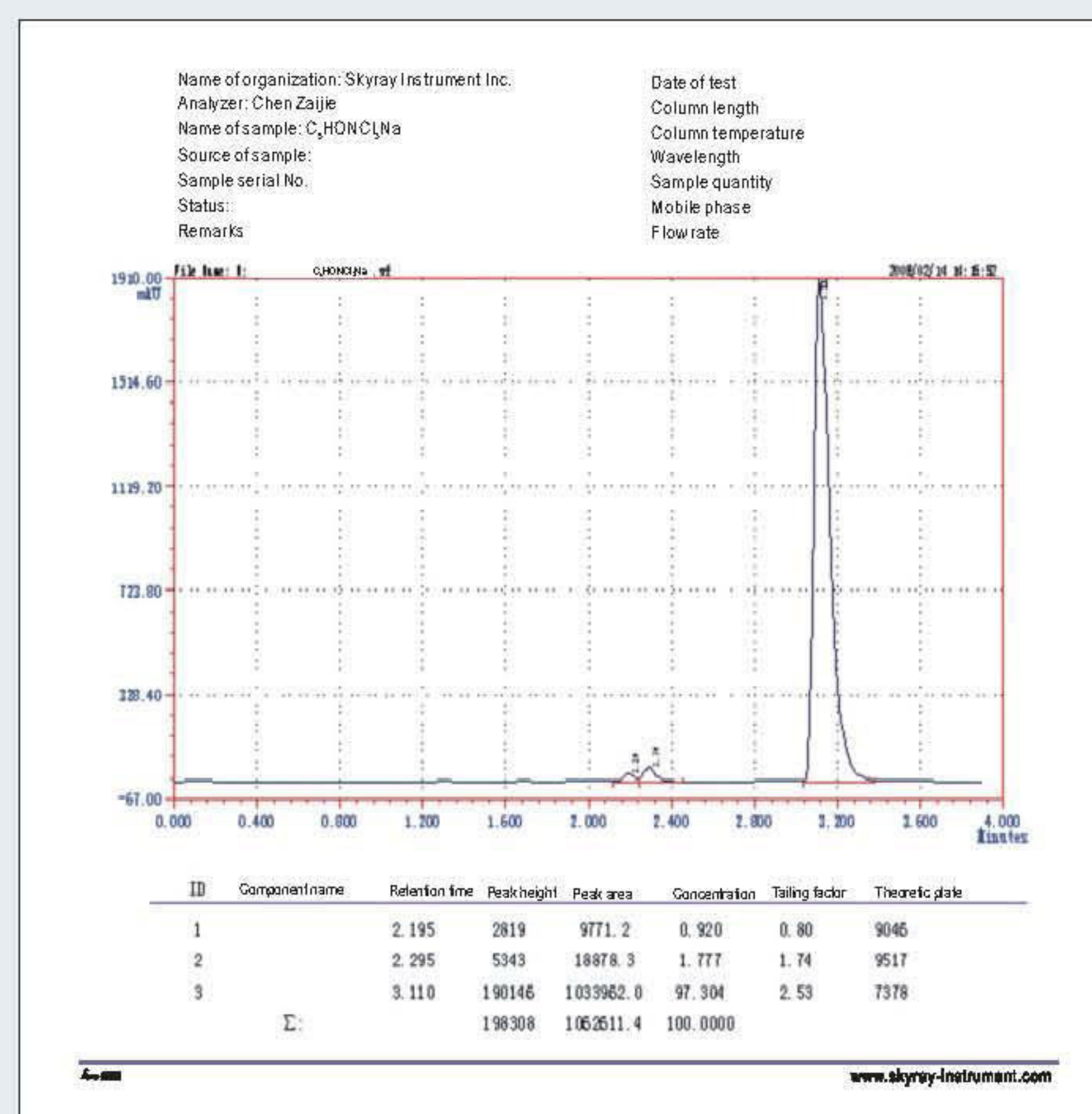
High stable binary high pressure gradient elution system produces more reliable results.

Analysis report of LC 310



LC-310PLUS

The high precise parallel pump design provides smooth delivery of solvents. The high sensitive detector observes the tiniest noise peak. Their combination makes the sample analysis easy and flexible.



Precision Instruments Skyray Elaborates

Name of sample: Pseudo-ginseng
Chromatographic column: Ultimate C18, 5.0μm, 4.6×250mm
Gradient program:
Time(minute) Acetonitrile Water
0-12 19 81
12-60 36 64
Wavelength: 203nm Temperature: ambient
Flow rate: 1ml/min injection volume: 20μl

Other accessories are available:

Pre-treatment device, columns of all sizes, connection pipes, fittings and other consumables

