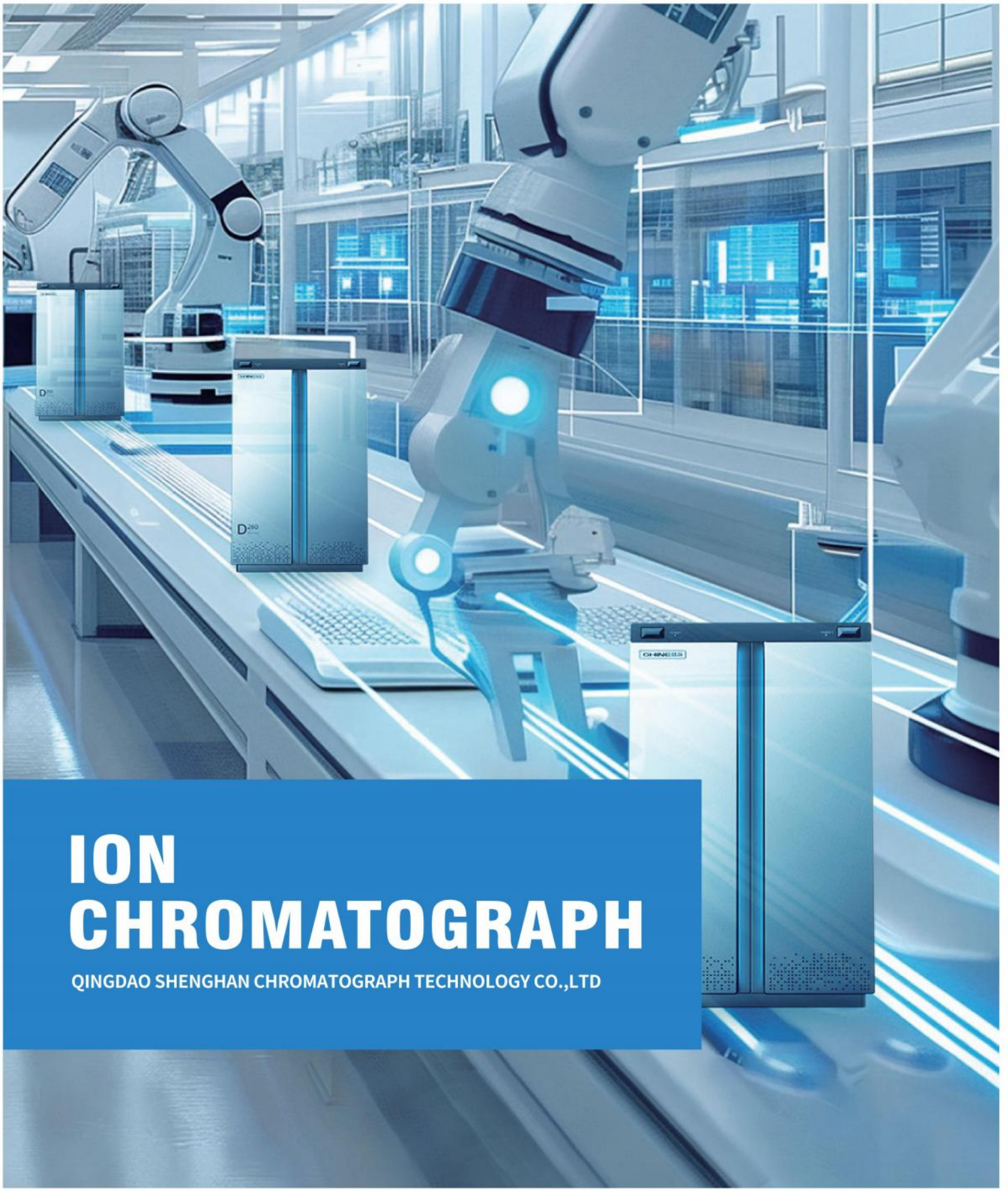


# ION CHROMATOGRAPH

QINGDAO SHENGHAN CHROMATOGRAPH TECHNOLOGY CO.,LTD

ISO 9001

CE

SHINE

MAKING EFFORTS TO LABEL CHINESE SCIENTIFIC INSTRUMENTS AS TOP-CLASS,
COME TOWARDS THE WORLD AND SERVICE GLOBALLY.

# About us

Qingdao Shenghan Chromatograph Technology Co., Ltd. is a subsidiary of Qingdao Qingyuanfengda Holdings Group Co., Ltd. The company was founded in 2002 and is a high-tech international company dedicated to the research and production of scientific instruments. The company focuses on the research and development, production, sales, and technical services of ion chromatography and its core components.It has gradually laid out product lines such as liquid chromatography, atomic fluorescence, and ICP combination, and is currently committed to building a global core industry zone for ion chromatography.

SHINE has established the "Greater Bay Area Innovation Center" in the Guangdong Hong Kong Macao Greater Bay Area. This innovation center is a comprehensive innovation center that integrates application development, after-sales service, and technological innovation. Relying on the geographical advantages of the Bay Area, it actively lays out the overseas market of SHINE.

In the field of ion chromatography, SHINE has developed five series including laboratory desktop, portable, online, customized, and combined ion chromatography equipment, more than 30 models of ion chromatography equipment, and over 100 consumables products, which are widely used in 127 fields such as food, water quality, agriculture, customs, and environment, serving more than 7000 customers.

SHINE has over 90 independent intellectual property rights, including patents and software copyrights, for all its products. It has participated in more than 50 national, industry, and group standards related to IC and is the first domestic enterprise to mass produce IC columns. SHINE's product performance is close to the international advanced level and can achieve domestic substitution in the vast majority of fields.

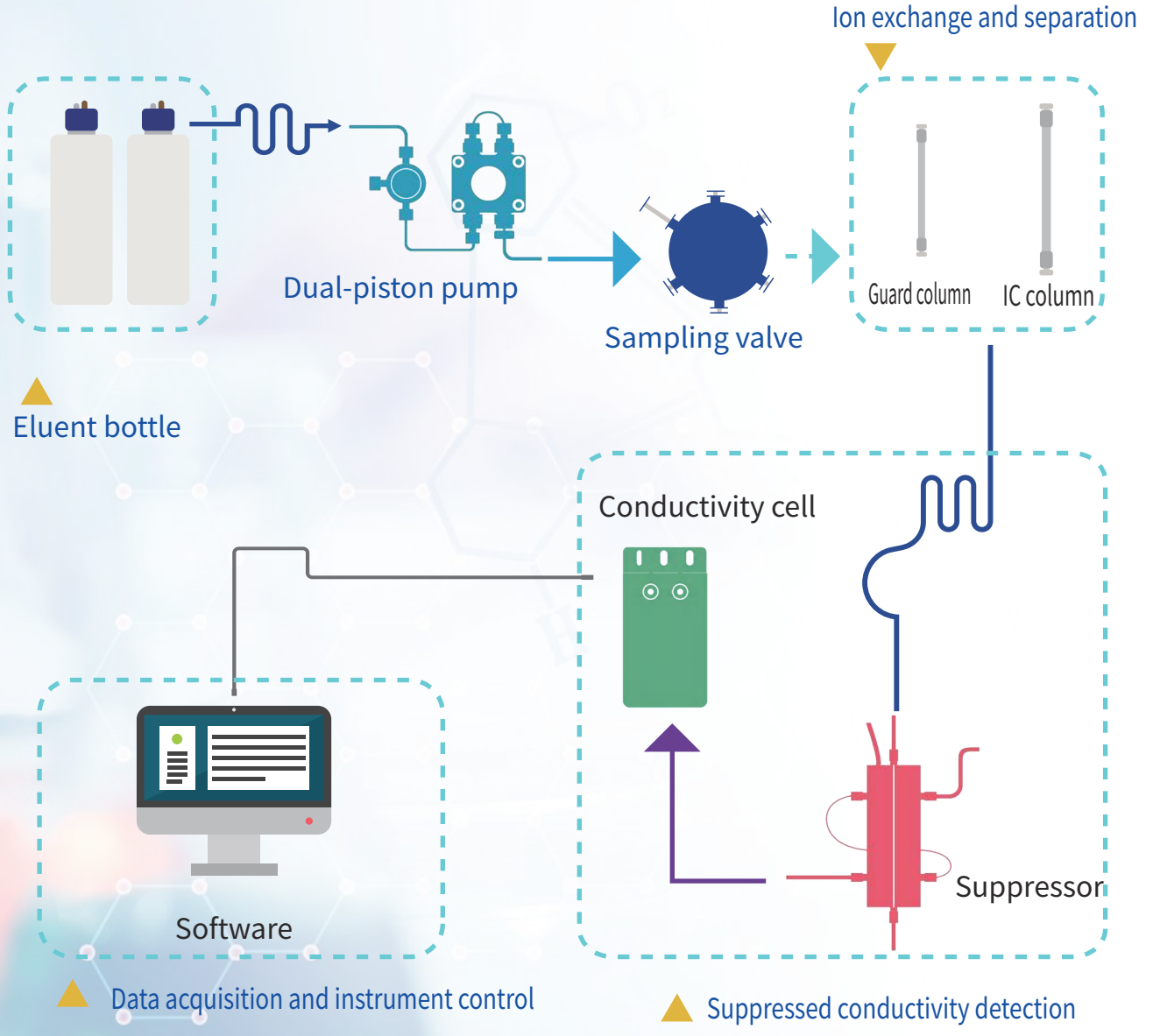
At present, SHINE has been ranked first in the domestic brand market share for 8 consecutive years and has exported to more than 80 countries and regions around the world, including the United States, Germany, Japan, and Singapore.

# TYPICAL USER

# ION CHROMATOGRAPHY FLOW DIAGRAM

Ion exchange chromatography is a separation technology. The dissociatable ions on ion exchange resin exchange reversibly with the solute ions with the same charge in mobile phase. Ions are separated because of their difference in affinity to ions exchangers. So ion chromatograph is generally applicable to the separation and detection of hydrophilic anions and cations.

After the sample is injected, the ions to be analyzed are exchanged with dissociatable ions on the ion exchange resin at first (i.e. retained on the analytical column). When NaOH solution is used as eluent to analyze $F^-$, $Cl^-$ and $SO_4^{2-}$ in the sample, the ions retained on the analytical column are replaced by $OH^-$ in the eluent, and the ions with weak affinity to the resin are eluted firstly. This is the separation process of ion chromatography. The eluent is suppressed by a chemical suppressor which can reduce the background conductance of the eluent. Then the ions to be analyzed can be measured accurately when it entered into the conductivity cell, and the detection signal can be outputted.



# INTERNATIONAL STANDARD

| Standard Number | Title of Standard |
|---|---|
| ASTM UOP 991 | Trace chloride, fluoride, and bromide in liquid organics by combustion ion chromatography. |
| EPA 1621 | Detection of adsorbable organic fluorines in water samples by combustion ion chromatography |
| DIN 38409-59 | Detection of adsorbable organic halogens in water samples by combustion ion chromatography (AOX, AOF、AOCl、AOBr and AOI) |
| EN 17813 | Detection of halogens and sulfur in solid environmental matrix by combustion ion chromatography |
| ASTM D8247 | Detection of adsorbable organic halogens in water samples by combustion ion chromatography (AOX, AOF、AOCl、AOBr and AOI) |
| ASTM D7359 | Standard test method for total fluorine, chlorine and sulfur in aromatic hydrocarbons and their mixtures by oxidative pyrohydrolytic combustion followed by ion chromatography detection |
| IEC 62321 | Determination of certain substances in electrotechnical products - Part 3-2: Screening - Total bromine in polymers and electronics by combustion ion chromatography |
| ASTM D7994 | Standard test method for total fluorine, chlorine, and sulfur in liquefied petroleum gases (LPG) by combustion ion chromatography |
| US EPA 300.0 | Determination of inorganic anions:$F^-$, $Cl^-$, $NO_2^-$, $Br^-$, $NO_3^-$, $H_2PO_4^-$, $SO_4^-$ ,$ClO_2^-$, $BrO_3^-$, $ClO_3^-$. |
| US EPA 300.1 | Determination of inorganic anions in drinking water $F^-$, $Cl^-$, $NO_2^-$, $Br^-$, $NO_3^-$, $H_2PO_4^-$, $SO_4^-$ ,:$ClO_2^-$, $BrO_3^-$, $ClO_3^-$. |
| US EPA 302.0 | Determination of $BrO_3^-$ in drinking water using two-dimensional ion chromatography with suppressed conductivity detection. |
| US EPA 314.0 | Determination of $ClO_4^-$. in drinking water using ion chromatography with suppressed conductivity detection. |
| US EPA 321.8 | Determination of $BrO_3^-$ in drinking waters by ion chromatography(IC) inductively coupled plasma - mass spectrometry(ICP-MS). |
| US EPA 1636 | Determination of Cr（VI） by ion chromatography. |
| US EPA 6860 | $ClO_4^-$in water soils and solid wastes using ion chromatography-electrospray ionization-mass spectrometry (IC-ESI-MS or IC-ESI-MS-MS). |
| US EPA 9056 | Determination of inorganic anions by ion chromatography：$F^-$, $Cl^-$, $NO_2^-$, $Br^-$, $NO_3^-$, $PO_4^-$ , $SO_4^-$ ,: |
| US EPA 9058 | Determination of $ClO_4^-$ using ion chromatography with chemical suppression conductivity detection. |
| US EPA 332.0 | Determination of $ClO_4^-$ in drinking water by ion chromatography with suppressed conductivity and electrospray ionization-mass spectrometry(IC-EIMS). |
| US EPA 314.0 | Determination of perchlorate in drinking Water |
| AOAC Official Method 2001.02 | Determination of trans-Galactooligosaccharides.(TGOS) in selected food products. |
| AOAC Official Method 2012.20 | Choline in infant formula and adult nutritionals. |
| AOAC Official Method 995.13 | Carbohydrates in soluble (instant) coffee. |
| AOAC Official Method 996.04 | Sugars in cane and beet final molasses. |
| AOAC Official Method 997.08 | Fructans in food products. |
| AOAC Official Method 2000.11 | Polydextrose in foods. |
| ASTM D5794 – 95 (Reapproved 2008) | Determination of anions in cathodic electrocoat permeates by ion chromatography. |
| ASTM D2036 – 09 | Standard test methods for cyanides in water. |
| ASTM D 6832 – 08 | Determination of hexavalent chromium in workplace air by ion chromatography and spectrophotometric measurement using 1,5-diphenylcarbazide. |
| ASTM D6919-09 | Determination of dissolved alkali and alkaline earth cations( $Li^+$, $Na^+$, $NH_4^+$, $K^+$, $Mg^{2+}$, $Ca^{2+}$) and ammonium in water and wastewater. |
| IPC-TM-650 2.3.28 | Ionic analysis of circuit boards |

# PRODUCT INTRODUCTION

**Our company now has four series of ion chromatograph: desktop IC, portable IC , on-line IC and customized IC.**

The new D-series desktop IC has been greatly improved in instrument stability, intelligence, convenience, functional diversity, and play an important role in the detection of common anions, cations and trace ions.

Portable IC can meet the needs of rapid on-site detection of unexpected events. It not only keeps the accuracy of laboratory IC, but also makes up for the application defects of laboratory IC with the characteristics of portability, on-site and rapid detection.

On-line IC perfectly realize on-line pretreatment, automatic sampling, automatic data processing and other functions, which can continuously detect atmospheric and water quality. On-line combustion IC system provides a simple and reliable way for on-line detection of halogen and sulfur in solid and liquid samples,which greatly expands the application field of IC.

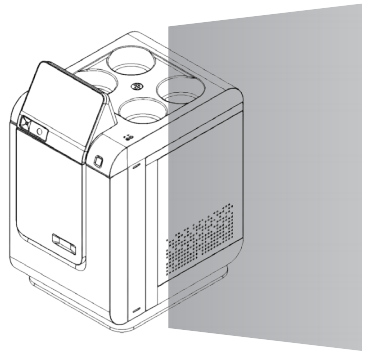
Customized IC is to upgrade the original instruments according to customer requirements.

SHINE IC products are widely used in many industries, such as environmental protection, hydrogeology, petroleum, chemical industry, food, pharmacy, health, epidemic prevention, electronics, electricity and scientific research.

Desktop IC

Portable IC

On-line IC



Customized IC

TOP TWO IC BRAND

# LABORATORY IC

new

## CIC-D100

CIC-D100 ion chromatograph is a classic product of SHINE, which has been accepted by many customers.Based on the latest requirements of users,a newly upgraded CIC-D100 for conventional detection came into being.The new IC not only can detect anions, cations and other polar substances in different matrix samples, but also separate ions with 4 orders of magnitude difference.Compared with the previous one, it is more accurate and reliable. One-key switch and intelligent maintenance functions are added to give users a better experience. It is suitable for commercial labs, enterprises, environmental protection, chemical industry, mining & metallurgy ,etc.

## Highlights:

**Built-in circulating 3D constant temperature technology.**
Temperature stability time is less than 30 mins, ensuring the accuracy and reliability of test data.

**The world's leading full-range series of ion chromatograph columns.**
High efficiency, large capacity of the columns for detecting ions of varied compositions.

**Self-Regenerating electrolytic micro-membrane suppressor.**
High pressure resistance, small dead volume, highly responsive to signals.

**Auto-range conductivity detector**
It can detect the signal from ppb to ppm without adjusting the range. Only one conductivity detector can detect anions and cations.

**ShineLab software**
Integrated control, With intelligent start-up, shutdown and maintenance functions. Compatible with a variety of instruments.

**Automatic post flush**
Automatic post flush the pump head to prevent crystallization and improve the service life of the plunger rod and sealing ring

# LABORATORY IC

## CIC-D120+

## SHA-18i

### Highlights:

It has the functions of pressure alarm, liquid leakage alarm and eluent alarm to protect the safe operation of the instrument in real time, alarm and shut down when liquid leakage occurs.

The key components of the suppressor and column have real-time monitoring function to ensure the timely replacement of consumables and ensure the stability and accuracy of the instrument operation.

The gas-liquid separator can effectively remove the influence of bubbles on the test.

Standard autosampler with automatic dilution function, three injection methods, and optional different sample bottle specifications.

# LABORATORY IC

CIC-D120+ ion chromatograph is the third generation of SHINE basic intelligent product. The design of the instrument adopts a new concept from appearance to internal structure . It is a fully plasticized reagent-free product, which can be used in many fields such as environmental protection, petrochemical, drinking water, food detection and other conventional and trace detection.

Standard equipped with SHINE high-performance autosampler, more accurate injection control.

The instrument can be started up in advance according to the setting, and the operator can test directly at the unit.

The software has the baseline deduction function and filtering algorithm to effectively remove the baseline drift caused by gradient elution, and the sample response is more obvious.

Auto-range conductivity detector, ppb-ppm concentration range signal is directly expanded, without adjusting the range.

LABORATORY IC


# CIC-D160+

## Highlights:

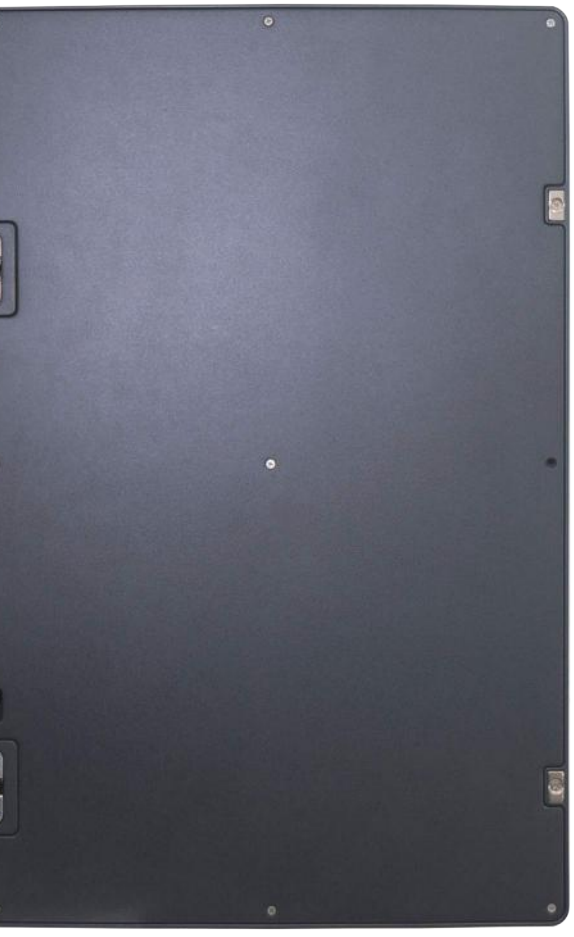
Built-in eluent generator,which generate eluent of hydroxide or methanesulfonic acid online, can achieve isocratic or gradient elution.

The suppressor and the column have real-time monitoring functions to ensure timely replacement of consumables ,It can ensure the stability and accuracy of instrument operation.

The software has a baseline deduction function and filtering algorithm to effectively remove baseline drift and low baseline noise caused by gradient elution.

# LABORATORY IC

The CIC-D160+ ion chromatograph is more intelligent, stable, and accurate in performance, and can perform suppression or non suppression conductivity detection. As an upgraded version of CIC-D160, it has a built-in eluent generator. If equipped with an autsampler and ShineLab software, it can achieve 24-hour unmanned injection. At the same time, multiple configuration modes can meet the needs of customers with small sample volumes for single machine use.



It has the functions of pressure alarm, liquid leakage alarm, and washing liquid alarm, which can protect the safe operation of the instrument in real time, and alarm and shut down when liquid leakage occurs.

Auto-range conductivity detector, which directly expands the ppb-ppm concentration range signal without adjusting the range.

Gas-liquid separator, which can effectively remove the impact of bubbles on the test.

The instrument can be started up in advance according to the settings, and the operator can directly test at the unit.

Built-in vacuum degasser to remove bubble interference in the eluent, making testing more stable.

SHINE

# LABORATORY IC

## CIC-D300+

### Highlights:

10 inch HD touch screen: real time display of flow path and operation status of the instrument.

The built-in eluent generator generates high-purity KOH and MSA eluent by electrolysis, which saves manual configuration time and completes more detection items by gradient elution.

Ultra pure online purification module: it can purify water online and reduce the water requirements of the instrument, so as to reduce the baseline background and improve the signal-to-noise ratio.

TOP TWO IC BRAND

# LABORATORY IC

CIC-D300+ is a new generation of intelligent dual-channel ionchromatograph.Each channel of it operates independently at the same time without mutual interference, realizing the simultaneous detection of cation and anion.

Suction sampling system: use peristaltic pump to suck samples to reduce cross pollution at the injection port;

The gas-liquid separator will remove most of bubbles entering the flow path, and the constant pressure and low pressure degasser will continuously remove the residual gas dissolved in water.

In the heating degassing unit, there is an integrated on-line vacuum chamber, which can remove the gas in the eluent on-line to make the experimental results more accurate.

Powerful safety assurance system: including eluent consumption alarm, liquid leakage alarm, low pressure alarm, overpressure alarm, fault alarm to reduce possible hurt by misoperation.

SHINE

# LABORATORY IC


## CIC-D150


### Highlights:

Leakage alarm,the pump will stop automatically after 5 minutes if no treatment.

Auto-range conductivity detector to realize the simultaneous determination of 5ppb-100ppm concentration sample without setting the range.

A micro gas-liquid separator is set to remove the bubble from the eluent.

TOP TWO IC BRAND

# LABORATORY IC

CIC-D150 ion chromatograph is designed for the intelligentization, which realizes the functions of remote control by mobile APP, timing startup and preheating, one-key intelligent maintenance, etc. it is more convenient to use and greatly improves the productivity and user experience of the laboratory.

By timing startup and preheating function ,users can set the start-up and all parameters of the instrument in advance(the maximum setting time is 24 hours).

Set "intelligent maintenance", the instrument can complete the flow path switch to the pure water path.

The mobile APP can remotely control the instrument on /off and observe the operation performance parameters of the instrument.

The large screen displays the operation parameters and status of the instrument.

LABORATORY IC


# CIC-D180

## Highlights:


High definition touch screen can display the flow path and running status of the instrument in real time, operate with one key and view at any time.

The built-in eluent generator generates high-purity KOH and MSA eluent by electrolysis, which saves manual configuration time and completes more detection items by gradient elution.

Built in gas-liquid separation system can filter out the bubbles in the flow path, enhancing the stability.

# LABORATORY IC

The simple pipeline layout and various component configurations make CIC-D180 flexible and changeable. It can be equipped with various detectors on demand to realize the combination technology easily. It can also be transformed into dual system and two-dimensional ion chromatograph, which is suitable for various application scenarios.

The intelligent alarm function can recognize the leaks.

Using intelligent detector to detect the residual liquid in the eluent cartridge in real time.

Mobile APP can remotely master every step of analysis in real time , making the work easy and efficient.

LABORATORY IC


# CIC-D260

CIC-D260 is a third-generation dual-channel ion chromatograph developed by SHINE. The product adopts HDI intelligent technology and is equipped with 100% self-developed core components. While improving detection efficiency, it can also provide users with an unprecedented operating experience.

Whether you are engaged in environmental monitoring, food analysis, chemical production or drug development and quality analysis, CIC-D260 can meet your practical needs with excellent performance and reliable stability.

## Highlights:

- Dual channel design, allows for simultaneous detection of anions and cations.
- Optional eluent generator.
- Intelligent alarm system. Leakage alarm, residual eluent alarm, low pressure alarm and high pressure alarm.
- Real time monitoring of consumables usage, with clear status at a glance.
- Inhalation sampling or match autosampler.
- Equipped with autosampler, the six way valve can be used for valve switching applications.
- Wider usage scenarios, in addition to traditional CD detectors, can also be combined with detectors such as ECD, UV, DAD, ICP-OES. AFS, MS, etc. The scenario is beyond your imagination.
- The compact exterior design can improve the space utilization rate of the laboratory.

TOP TWO IC BRAND

LABORATORY IC

# CIC-D500+

CIC-D500+ ion chromatograph, as a new multi-functional ion chromatograph, realizes the modularization of key components such as infusion pump, eluent generator, column oven, conductivity detector, suppressor, etc. The whole machine can be configured optionally. It can not only use conductivity detector, but also use ampere detector or ultraviolet detector at the same time, effectively responding to the needs of high-end customers for multiple detection capabilities of ion chromatograph.

## Highlights:

- Two-channel system, two channels operate independently without interference with each other, and can analyze sulfur, iodine, sugar and other components while completing anion/cation detection.
- The dual-channel autosampler can be equipped with three kinds of detectors. In addition to the conventional conductivity detector, it is also equipped with ultraviolet detector and ampere detector, which is more powerful and has a wider
- detection range.
- Built-in low pressure degassing module can remove the bubble interference in the eluent and make the test more stable.
- Intelligent workstation system, with powerful data processing capability and data traceability, is compatible with massive external components.
  The eluent generator module can generate anion/cation eluent online to achieve isocratic or gradient elution.
- Adapt to the valve switching system of six-way and ten-way valves, which can realize online trace detection and it have great significance for practical detection.

# CIC-P80
# Portable Ion Chromatograph

## Highlights:

- Portable, on-site detection
- Three control methods: touch screen, Bluetooth keyboard, and mouse
- Separation of liquid and electricity to protect the circuit board
- Uninterrupted power supply, replace power supply without stopping the IC
- Inhalation injection to prevent contamination

# CIC-D200E
# Sugar Detection Instrument

## Highlights:

- Equipped with an ECD, it has three modes: DC, pulse, and scan
- Autosampler with multiple sample bottle specifications to choose from
- Three injection modes of autosampler: Full loop, partial and uL pick up
- Optional nitrogen protection device
- Binary or quaternary pumps can be optionally selected

# SH-GIC7000 On-line Atmosphere Ion Chromatograph

SH-GIC7000 is a fully automatic and intelligent on-line IC for atmosphere, which can detect anions and cations in TSP, PM2.5, PM10 and dustfall to meet the testing requirements of HJ799-2016 and HJ800-2016.The instrument runs continuously for 24 hours and can work continuously for 20 days after one maintenance.

Full plasticized flow system, dual suppression mode, all-weather continuous operation, remote control, remote data transmission and so on make the IC has perfect and advanced solution ability, which brings automatic , intelligent and humanized instrument application experience to users.

# SH-WIC5000 On-line Water Quality Ion Chromatograph

SH-WIC5000 is a fully automatic and intelligent on-line water quality IC, which can realize real-time detection of anions and cations in water samples. The equipment removes organic impurities and solid particles from the samples to be measured by on-line pretreatment system, achieving the functions of continuous automatic sampling, sample pretreatment and data processing, and continuously uploads real-time monitoring data to headquarters or servers in 24 hours.

Full plasticized flow system, dual suppression mode, all-weather continuous operation, remote control, remote data transmission and so on, make the on-line water quality IC has perfect and advanced solution ability.The equipment can provide a complete solutions for the monitoring of inorganic anions and cations in water samples such as tap water, surface water, circulating water of power plants and water for enterprise production.

# SH-CIC3200
# On-line Combustion Ion Chromatograph

SH-CIC3200 on-line combustion ion chromatograph, which can perfectly replace manual oxygen bomb combustion, has better accuracy and repeatability. The combustion furnace can be set to 5 different temperatures, with gradient heating, prevent sample splashing. Equipped with parcel cooling, It can quickly start different temperature programs and automatically retain samples for traceability and retesting. It is the best choice for solid sample detection.

## Highlights:

- Automatic sampling: 50-position disc automatic sampler, easy to use and excellent reliability; The cup type sampling boat is more convenient for adding samples, which can effectively avoid accidents such as gas blowing into the combustion tube;
- Automatic sample retention: there is a disc-type automatic sample retention device on the top of the absorption unit, which corresponds to the position of the sample injector one by one. After absorption, the sample will be automatically sucked into the sample retention bottle to meet the requirements of retest and traceability;
- Oxygen purging design: the front of the combustion pipe is equipped with purging oxygen pipeline, which can blow the unburned ash back to the combustion area to ensure full combustion;
- Enrichment function: it can connect the enrichment column to enrich the ions to be tested and improve the accuracy of the detection results;
- Base elimination: can effectively eliminate the interference of hydrogen peroxide base for analysis;
- Peltier cooling module: the minimum temperature can reach 5 °C, which can fully cool the high-temperature gas and increase the absorption efficiency.


# ShineLab Software

- Comply with the requirements of FDA 21 CFR Part 11/GMP/GLP and other regulations on user authority management, electronic signature, audit trail, backup and restore.
- With baseline deduction function and filtering algorithm, effectively remove baseline drift caused by gradient elution.
- Built-in virtual column technology to quickly explore chromatography conditions.
- All operation information during instrument operation is stored in the database to ensure the integrity and reliability of data traceability.
- Automatic identification of instrument failure, instrument leakage, over pressure, abnormal data, etc.
- Powerful data analysis capability, realizing efficient sequence setting, acquisition, automatic integration correction and other functions.
- The analysis method can be imported with one click to synchronize the corresponding analysis conditions and operation parameters, greatly improving the analysis efficiency.
- Perfect compatibility and control of SHINE IC, HPLC, AFS and other analytical instruments.
- Real time control of pump pressure, temperature, rinsing solution concentration, suppressor current and other operating parameters.
- The graphical software operation interface can display the running status of the instrument in real time.
- A variety of interface styles are available, giving you an efficient and simple experience.

Qingdao Shenghan Chromatograph Technology Co., Ltd.has been developing ion chromatographic column since 2008. As the only enterprise in China which can realize mass production of IC columns,SHINE breaks the monopoly of foreign countries. Professional R&D team and advanced production technology ensure that you can get IC columns with good reproducibility and separation effect at any time.

SH series ion chromatographic column

01.The first choice for developing or improving IC methods;
02.Excellent performance and stable polymer stationary phase;
03.Complete batch tracking and reproducibility;
04. The only mass-produced IC column in China;
05.It has wide applicability and can be widely applied to domestic and imported brand IC.


## Suppressor

Suppressor produces $H^+$ and $OH^-$ through electrolysis of water at the electrode, and under the combined action of electric field and ion exchange membrane,can realizes the directional migration and exchange of ions. It reduces the background conductance, improves the sensitivity of ions to be measured, and makes the "counter ion" in the sample enter the waste liquid.


## Eluent Generator

The double membrane eluent generator can produce high-purity KOH and MSA eluent by electrolysis, which saves the manual configuration time, the degassing pipe and capture column are not required, the pressure resistance can reach 30MPa, the flow path is simpler and the dead volume is smaller.At the same time, it can realize the gradient elution and separation operation of complex samples which can not be completed by the isocratic pump, which further improves the accuracy of the analysis.

## Amperometric Detector

In the case of applied voltage, the amperometric detector detects the change of current caused by the redox reaction of the substance to be measured on the electrode surface. Amperometric detector is often used to analyse ions with low dissociation, which are difficult to detect with conductivity detectors and have electrical activity .

## Ultraviolet Detector

The SHUV-10 ultraviolet detector adopts high-speed signal processing technology, has high sampling rate and excellent resolution, advanced optical path design, multi-color filter and grating, and the test wavelength is more stable, ensuring a better linear range. The wavelength is easy to disassemble, clean and maintain the flow cell, effectively extending the service life of the detector.

# Autosampler

SHA-9 Single channel

SHA-9D Single channel

SHA-18i Single /Dual channel

SHA-16 Single /Dual channel

# On-line Degasser

SHT-5 is an on-line degasser that can realize multi-channel degassing. It adopts continuous vacuum pumping mode, and the degassing efficiency is more continuous and stable. It can be used for online degassing of mobile phase of liquid chromatograph, ion chromatograph and other equipment. It can meet the expansion requirements of four channels, and the intelligent screen can display the instrument parameters and performance status in real time.

# Automatic Liquid Preparation

SH-ASP-100 automatic liquid preparation can achieve the preparation of two different mother liquor mixed eluents, and can also be used for dilution of large volume samples and reagents.

# Carbon Dioxide Removal Device


SH-CRD-1 carbon dioxide removal is installed between the suppressor and conductivity detector. Carbonates from the sample in the hydroxide system can interfere with the analysis of anions, such as sulfates. Under these conditions, using a carbon dioxide removal device to minimize carbonates can improve the integration and quantification of target anion peaks.

# Auto-diluter

SH-AD-100 is a basic sample dilution preparation instrument. Only input the concentration of the mother solution and the required standard solution concentration and volume, and place the mother solution and pure water in place.

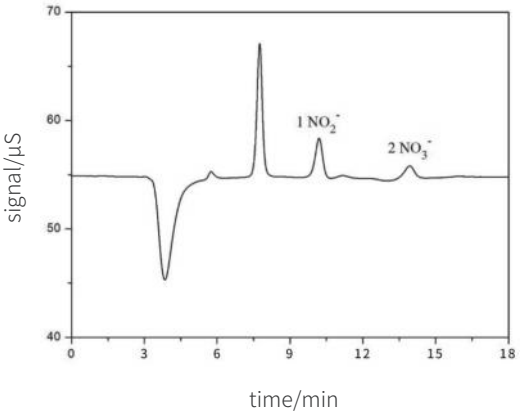
The instrument can automatically calculate and dilute up to 9 different concentrations of standard solutions, with a dilution ratio of up to 1000 times. It provides standard samples for subsequent instruments such as IC, LC, LC/MS, and provides services for preparing standard curves, replacing traditional manual preparation. This not only frees up hands, but also saves person-nel and time costs, And it can greatly improve the accuracy and stability of the analysis results.


# INDUSTRY APPLICATION SOLUTIONS

# I .Application of Ion Chromatography in Food Safety Analysis

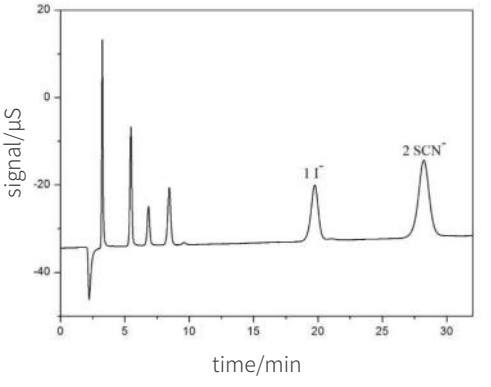
## 1. Nitrate and nitrite in food

The samples are pretreated according to GB/T 5009.33, and after protein precipitation and fat removal, the samples are extracted and purified by corresponding methods. Using CIC-D160+ ion chromatograph,SH-AC-11 anion column, 15.0 mM NaOH eluent and bipolar pulse conductance method,under the recommended chromatographic conditions, the chromatogram is as follows.




## 2. Iodide and thiocyanate in dairy products

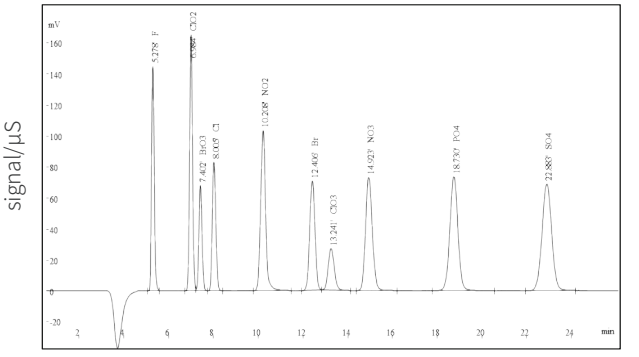
The milk powder samples are dissolved, mixed with 3% acetic acid and deionized water, filtered by 0.22μm microporous filter membrane and treated by IC-RP column. Using CIC-D180 ion chromatograph, SH-AC-11 anion column, 30 mM NaOH eluent and bipolar pulse conductance method, under the recommended chromatographic conditions, the chromatogram is as follows.




# II . Application of Ion Chromatography in Drinking Water Analysis

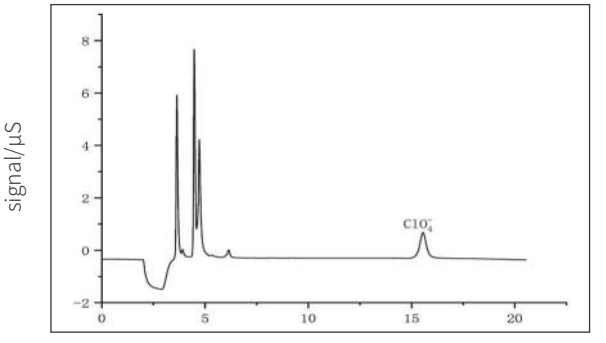
## 1. Detection of anions in drinking water

The samples are filtered by 0.22μm microporous filter membrane or centrifuged. Using CIC-D120+ ion chromatograph, SH-AC-3 anion column, 2.0 mM $Na_2CO_3$/8.0 mM $NaHCO_3$ eluent and bipolar pulse conductance method,under the recommended chromatographic conditions, the chromatogram is as follows.




## 2. Detection of perchlorate in drinking water

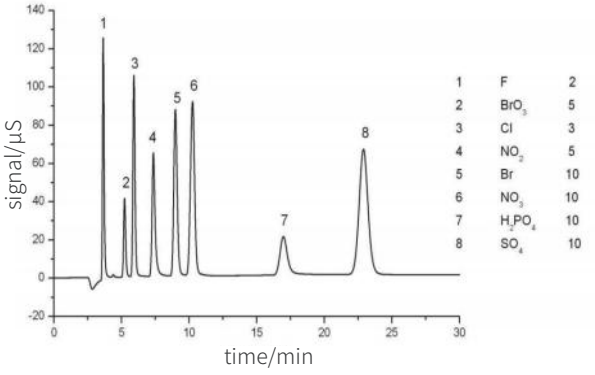
Using CIC-D120+ ion chromatograph,SH-AP-1 anion column, 35mmol/mL NaOH eluent ,under the recommended chromatographic conditions,the chromatogram is as follows.




# III. Application of Ion Chromatography in Environmental Analysis

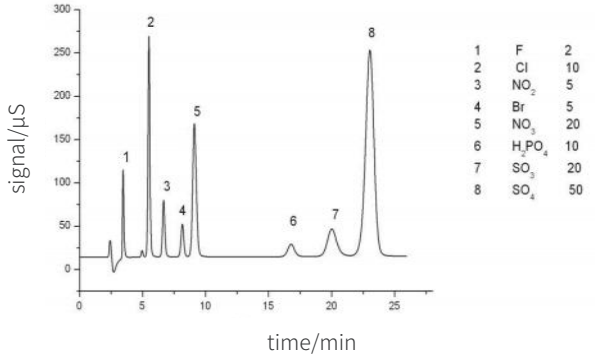
## 1. Detection of common anions in surface water

Surface water is generally relatively clean. After 30 minutes of natural precipitation, taking the non precipitation part of the upper layer for analysis. If there are many suspended substances in the water sample or the color is darker, pretreat it by centrifugation, filtration or steam distillation. Using CIC-D160+ ion chromatograph SH-AP-2 anion column, 3.6 mM $Na_2CO_3$+ 4.5 mM $NaHCO_3$ eluent and bipolar pulse conductance method,under the recommended chromatographic conditions,the chromatogram is as follows.

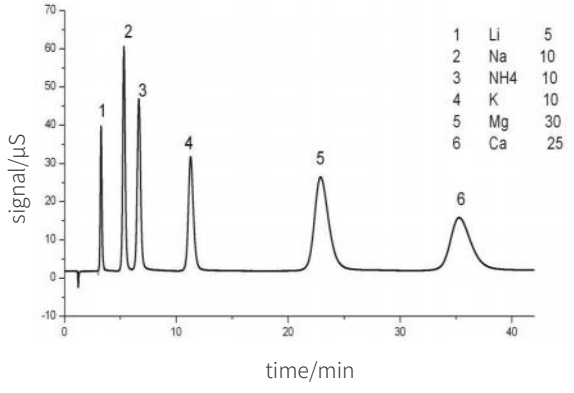



## 2.Analysis of particulates in atmosphere

The environmental samples of a certain volume or time are collected according to the sampling requirements of TSP, PM10, natural dust and dust storms in the atmosphere. A quarter of the filter membrane samples collected are accurately cut into plastic bottles,adding 20mL deionized water ,then volumed to 50mL after beening extracted in the ultrasonic cleaner and filtered by a 0.22μm microporous filter membrane. After all this,the sample can be injected for analysis. Using CIC-D260 ion chromatograph, SH-AP-2 anion column, 3.6 mM $Na_2CO_3$+4.5 mM $NaHCO_3$ eluent and bipolar pulse conductance method,under the recommended chromatographic conditions, the chromatogram is as follows.



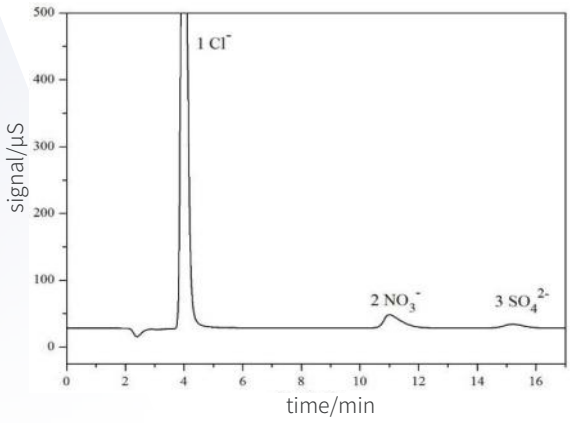

Using CIC-D260 ion chromatograph, SH-CC-3 cation column, 5.5 mM MSA eluent and bipolar pulse conductance method,under the recommended chromatographic conditions, the chromatogram is as follows.



# IV. Application of Ion Chromatography in Petrochemical Analysis

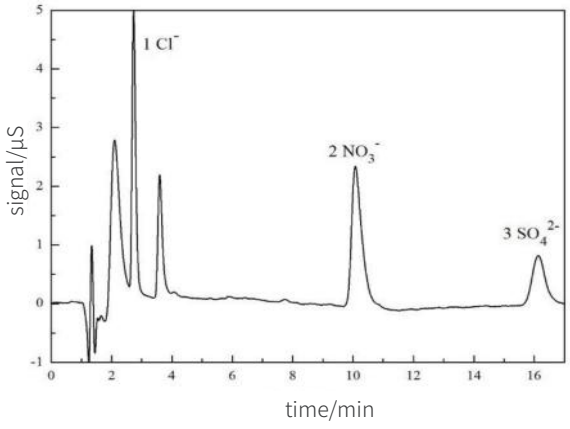
## 1. Anion analysis in oil field waste water

Choosing appropriate dilution ratio to dilute oil field waste water, the diluent was filtered by 0.22 um microporous membrane and treated by IC-RP column.If the sample contains heavy metal and transition metal ions, it must be treated by IC-Na column . Using CIC-D120+ ion chromatograph,SH-AC-3 anion column, 3.6 mM $Na_2CO_3$+4.5 mM $NaHCO_3$ eluent and bipolar pulse conductance method,under the recommended chromatographic conditions,the chromatogram is as follows.




## 2. Oil analysis

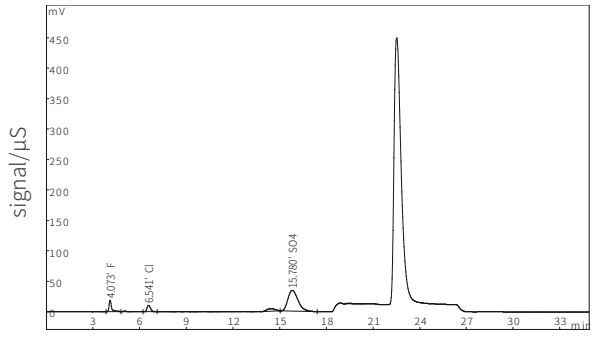
Based on the flammability of petroleum, chlorine, nitrogen and sulfur in petroleum products are converted into hydrides and oxides at high temperature by combustion furnace, then absorbed by alkali liquor. Using CIC-D150 ion chromatograph, SH-AC-3 anion column, 3.6 mM $Na_2CO_3$+4.5 mM $NaHCO_3$ eluent and bipolar pulse conductance method, under the recommended chromatographic conditions, the chromatogram is as follows.




# V .Application of Ion Chromatography in Lithium Battery Analysis

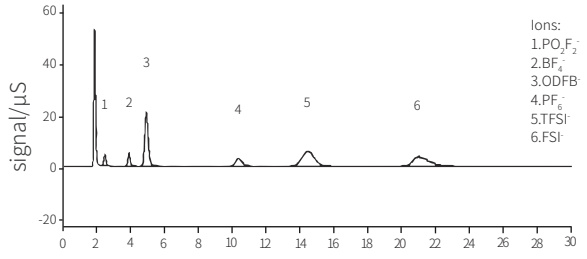
## 1. Anions in nickel hydroxide

Nickel hydroxide is the positive active material of Ni based batteries.Ion chromatography can be used to simultaneously detect the impurity anions to provide scientific basis for the production process and performance evaluation of various materials.Using CIC-D180 ion chromatograph, SH-AC-11 anion column and KOH (Gradient Eluent ) eluent.Under the recommended chromatographic conditions,the chromatogram is as follows.



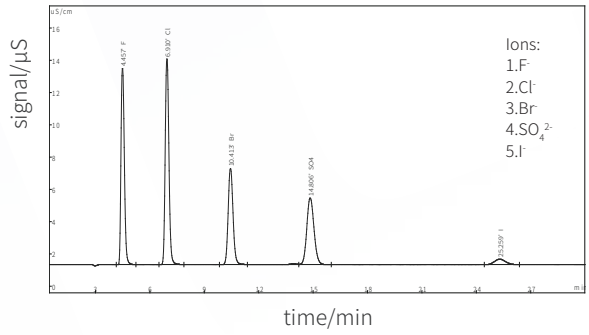

## 2. Anions in electrolyte

The sample needs to be diluted 1000 times, over 0.22 μ M filter membrane. Using CIC-D100 ion chromatograph, SH-AC-24 anion column and 10 mM KOH Eluent.Under the recommended chromatographic conditions,the chromatogram is as follows.



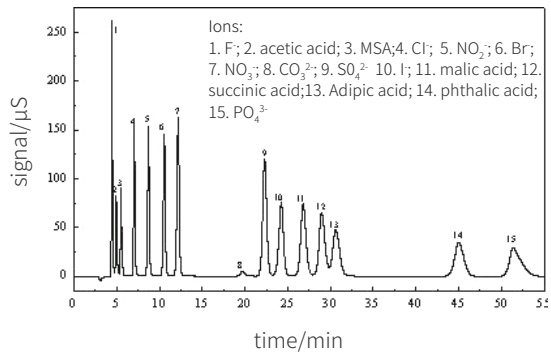

## VI.Application of Ion Chromatography in Halogen Analysis

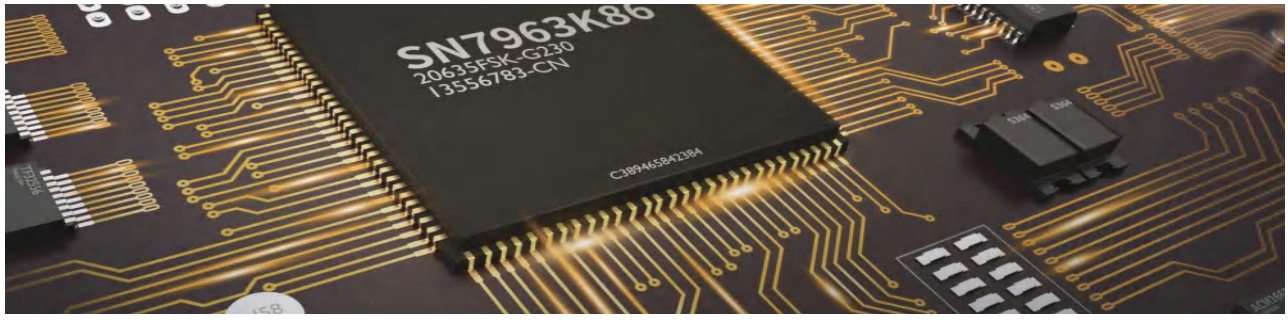
Using SH-CIC3200 on-line combustion ion chromatograph,SH-AC-11 anion column and 15 mM KOH Eluent.Under the recommended chromatographic conditions,the chromatogram is as follows.




## VII.Application of Ion Chromatography in Polymer Materials Analysis

Using CIC-D160+ ion chromatograph, SH-AC-11 anion column,12 mM KOH (Eluent generator) eluent, under the recommended chromatographic conditions, the chromatogram is as follows. This method is widely used in the determination of anion in circuit boards ( IPC-TM-650 2.3.28 ) .

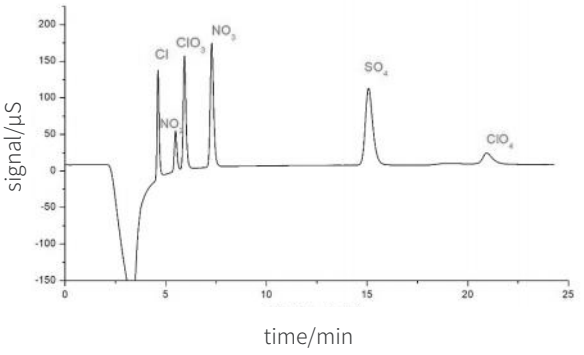


# Ⅷ. Application of Ion Chromatography in Public Security Systems Analysis

### Explosive analysis

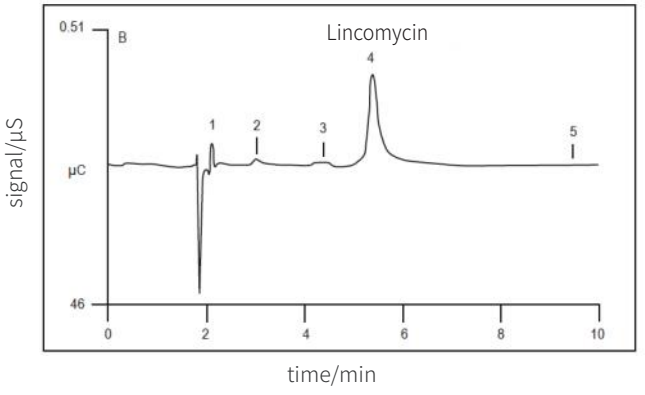
In order to detect chlorate in ammonium nitrate explosive, the soil sample after explosion was extracted by water oscillation,then taking supernatant after centrifugation, filtered by IC-RP column and 0.22 um microporous filtration membrane.Using CIC-P80 ion chromatograph, SH-AC-12B anion column, 4.0 mM $Na_2CO_3$ eluent and bipolar pulse conductance method, under the recommended chromatographic conditions, the chromatogram is as follows.




# IX.Application of Ion Chromatography in Pharmaceutical Analysis

### Antibiotic analysis

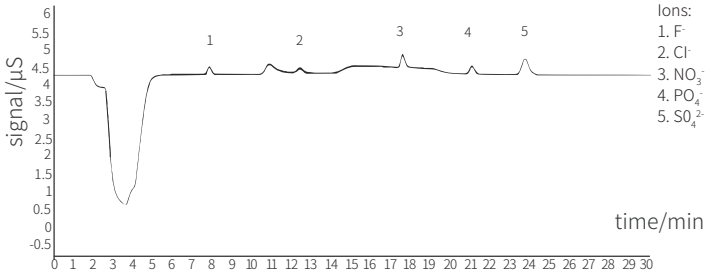
In order to determine lincomycin in drugs, samples were extracted by water oscillation , then taking supernatant after centrifuged and filtered by 0.22 microporous membrane.Using CIC-D260 ion chromatograph and SH-AC-3 anion column,3.6 mM $Na_2CO_3$+4.5 mM $NaHCO_3$ eluent and bipolar pulse conductance method, under the recommended chromatographic conditions, the chromatogram is as follows.




# X.Application of Ion Chromatography in Nuclear Power

### Anions in boric acid

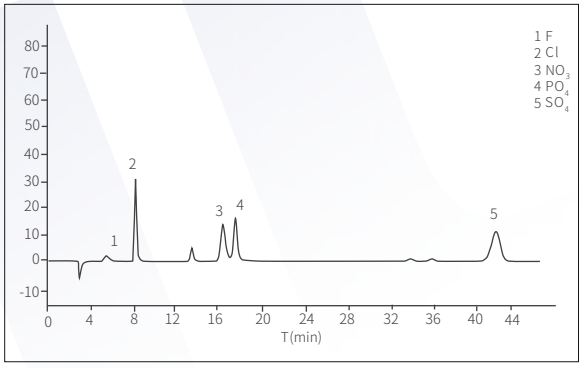
Using CIC-D300+ ion chromatograph,SH-AP-1 anion column , KOH (Gradient Eluent) eluent and , 2000 μL large sample loop.Under the recommended chromatographic conditions,the chromatogram is as follows.



# XI.Application of Ion Chromatography in Semiconductor Analysis

### Analysis of silicon oxide powder

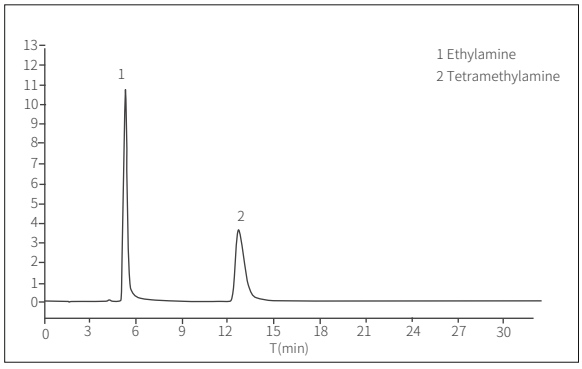
To detect anions in semiconductor silicon oxide powder, dissolve the sample,pass through a pretreatment column, use CIC-D180 ion chromatograph, anion column, and bipolar pulse conductance method. Under the recommended chromatographic conditions, the obtained chromatogram is as follows.

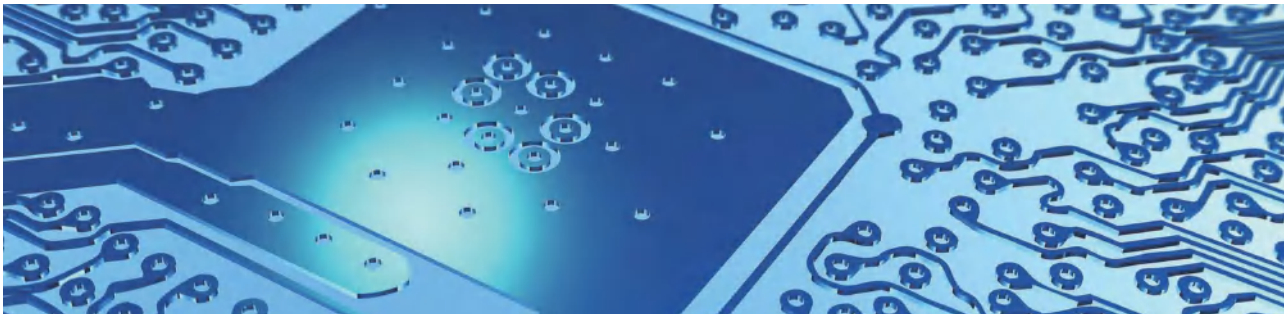



# XII.Semiconductor Wastewater Analysis

### Analysis of silicon oxide powder

To detect the content of ethylamine and tetramethylamine in semiconductor wastewater,the samples need to pass through a pretreatment column, use CIC-D180 ion chromatograph, anion column,and bipolar pulse conductance method. Under the recommended chromatographic conditions, the obtained chromatogram was as follows.

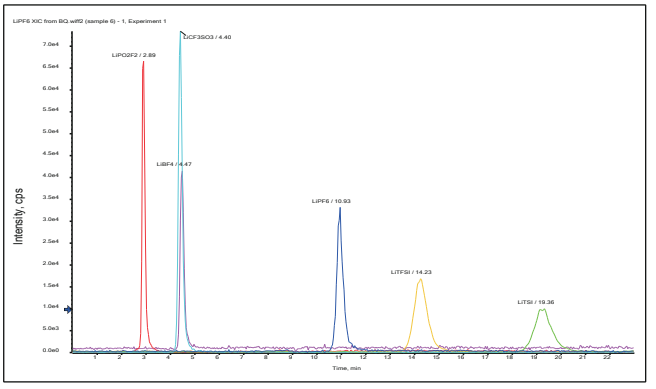


## XIII.Detection of Lithium in Lithium battery Electrolyte by IC-MS

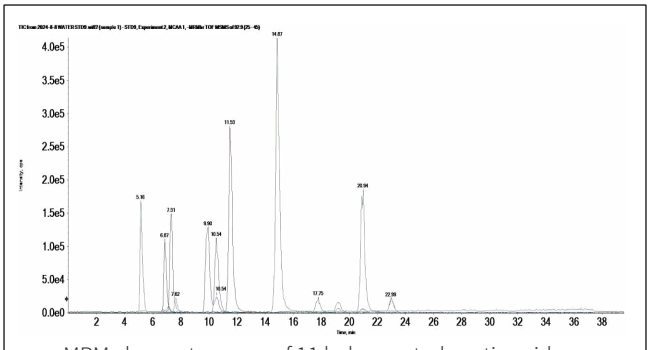
As the "blood" of lithium batteries, electrolyte is the carrier of ion transport in lithium batteries, which is generally prepared by mixing lithium salts, solvents, and additives in a certain proportion. Lithium salt, as an important component of lithium-ion battery electrolyte, largely determines the power density, energy density, cycling, and safety performance of the battery. Lithium hexafluorophosphate (LiPF6) is the most widely used lithium salt due to its relatively optimal comprehensive performance in carbonate mixed solvent electrolytes.

First stage extraction ion chromatogram (XIC) of six lithium salts

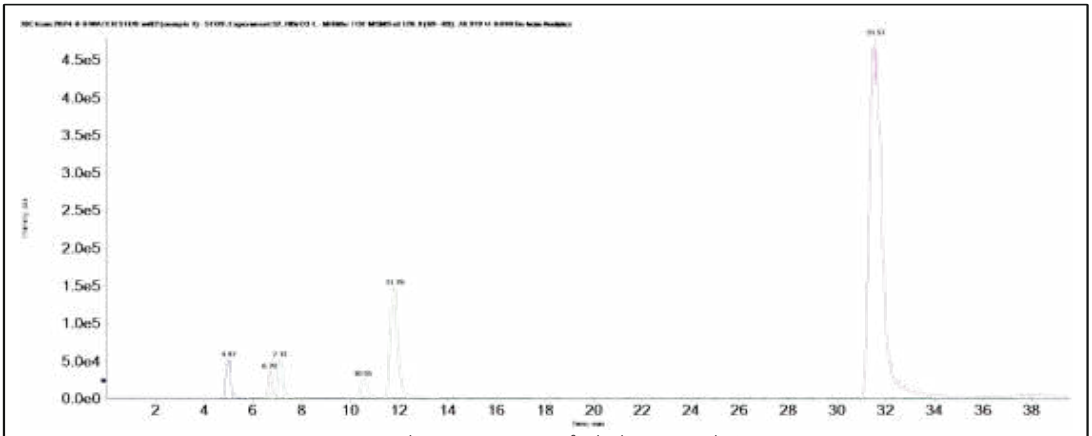



## XIV.Detection of Haloacetic Acid in Drinking Water by IC-MS

Disinfectants are indispensable in water treatment processes , but during the disinfection process, disinfectants react with halogen ions and natural organic compounds contained in the source water to generate infection by products, DBPs , Harmful to human health, among which halogenated oxides and halogenated acetic acids (HAAs) have received significant attention both domestically and internationally.

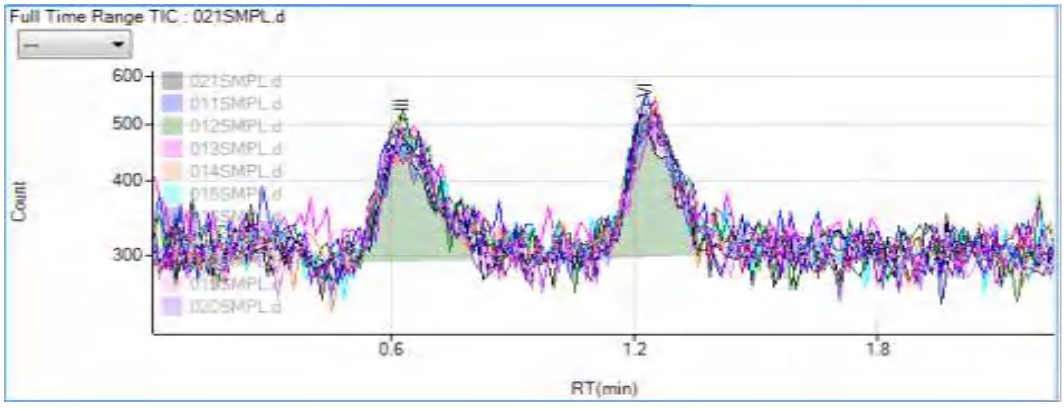



MRM chromatograms of 11 halogenated acetic acids




MRM chromatograms of 5 halogen oxide ions

## XV.IC-ICP-MS Detects the Migration of Elements




Chromatogram of 11 injections of 10ppt Trivalent chromium (Cr III) and hexavalent chromium (Cr VI)

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