

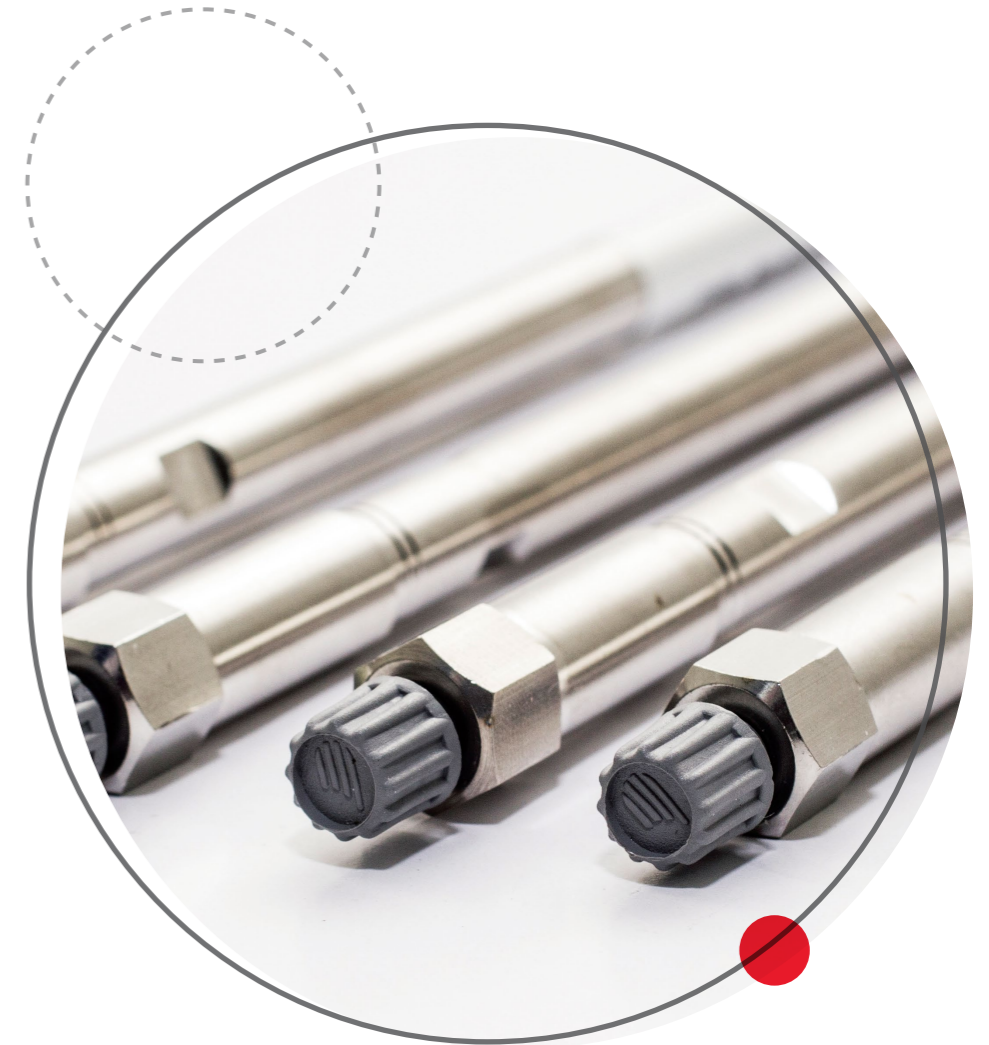
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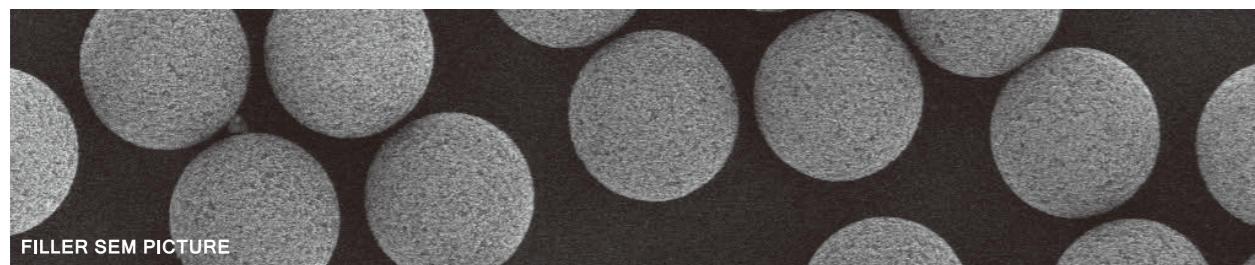
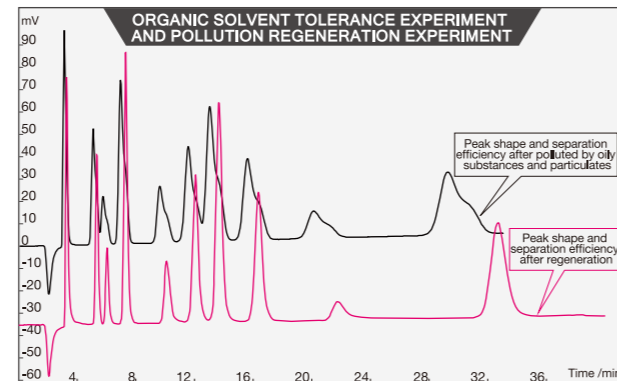
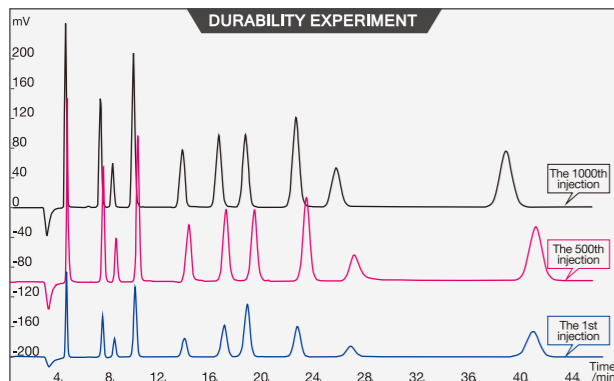
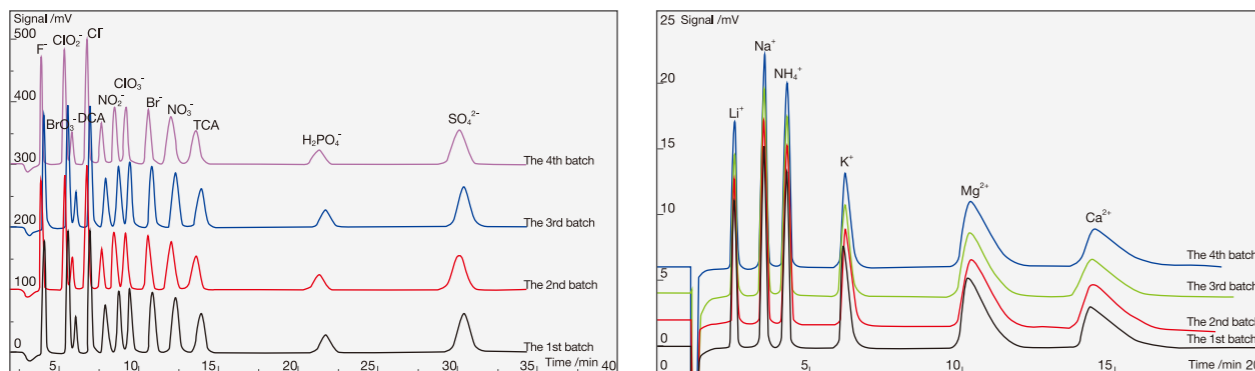
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- > The first choice for developing or improving IC methods;
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- > Complete batch tracking and reproducibility;
- > The only mass-produced IC column in China;
- > It has wide applicability and can be widely applied to domestic and imported brand IC.

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- > High mechanical strength particles;
- > Advanced particle Sieving Technology;
- > Selectivity between batches remains stable;
- > Innovation of porous base ball manufacturing technology to provide super high exchange capacity;
- > Unique surface treatment technology for packing.



PRODUCTION TECHNIC /

- > The mechanical stability and pressure resistance of the column bed are up to 300 bar;
- > Advanced packing technology and equipment for column.



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.

Anion Ion Chromatographic Columns(stainless steel)

Model	Specification (mm)	Function
SH-AC-1	4.6*250	Carbonate system; A basic column, can simultaneously analyze 6 kinds of common anions: Cl ⁻ , NO ₂ ⁻ , Br ⁻ , NO ₃ ⁻ , H ₂ PO ₄ ⁻ , SO ₄ ²⁻ .
SH-AC-3	4.0*250	Carbonate system; Simultaneously analyzing 7 kinds of common anions: F ⁻ , Cl ⁻ , NO ₂ ⁻ , Br ⁻ , NO ₃ ⁻ , H ₂ PO ₄ ⁻ , SO ₄ ²⁻ and disinfection by-products of drinking water: ClO ₂ ⁻ , BrO ₃ ⁻ , ClO ₃ ⁻ , DCA, TCA; certain organic acids such as formic acid, acetic acid, tartaric acid and oxalic acid.
SH-AC-4	4.6*250	Carbonate system; Analyzing BrO ₃ ⁻ in wheat flour, SO ₃ ²⁻ and 7 kinds of common anions, as well as some organic acids such as oxalic acid and tartaric acid.
SH-AC-9	4.6*250	Carbonate system; Simultaneously analyzing 7 kinds of common anions: F ⁻ , Cl ⁻ , NO ₂ ⁻ , Br ⁻ , NO ₃ ⁻ , H ₂ PO ₄ ⁻ , SO ₄ ²⁻ . The negative peaks of water and F ⁻ peaks are well separated.
SH-AC-11	4.6*250	Hydroxide system; A bromate analysis column, can simultaneously analyze 7 kinds of common anion.
SH-AC-16	4.6*250	Hydroxide system; A special column for various phosphates (4 kinds, do not analyse 6 partial phosphoric acid at present) in aquatic products (fishes, shrimps and related products).
SH-AC-17	4.6*250	Hydroxide system; Analyzing I ⁻ by conductance method, can also be used to analyze I ⁻ , SCN ⁻ , S ₂ O ₃ ²⁻ .
SH-AC-18	4.6*250	Carbonate system; Simultaneously analyzing 7 kinds of common anions: F ⁻ , Cl ⁻ , NO ₂ ⁻ , Br ⁻ , NO ₃ ⁻ , PO ₄ ³⁻ , SO ₃ ²⁻ . It is especially good at separating SO ₃ ²⁻ .
SH-AC-19	2.1*200	Hydroxide system; A microbore anion column. With fine diameter, low flow rate, high signal response value, it can simultaneously analyze 8 kinds of anions: F ⁻ , BrO ₃ ⁻ , Cl ⁻ , NO ₂ ⁻ , Br ⁻ , NO ₃ ⁻ , PO ₄ ³⁻ .
SH-AC-20	2.1*200	Carbonate system; A microbore anion column. With fine diameter, low flow rate, high signal response value, it can simultaneously analyze 8 kinds of anions: F ⁻ , BrO ₃ ⁻ , Cl ⁻ , NO ₂ ⁻ , Br ⁻ , NO ₃ ⁻ , H ₂ PO ₄ ⁻ , SO ₄ ²⁻ .
SH-AC-22	4.0*250	Hydroxide system; Having the characteristics of large capacity and high resolution. It can simultaneously analyze seven common anions: F ⁻ , BrO ₃ ⁻ , Cl ⁻ , NO ₂ ⁻ , Br ⁻ , NO ₃ ⁻ , H ₂ PO ₄ ⁻ , SO ₄ ²⁻ . Some small molecular organic acids and disinfection by-products, especially for the detection and analysis of F ⁻ in complex matrix such as fruit juice or tea.
SH-G-1	4.6*50	Universal guard column; Insoluble solid particles in mobile phase and samples can be filtered on-line. Used to prevent stainless steel column from being polluted and prolong the life of column.

Anion Ion Chromatographic Columns(peek)

Model	Specification (mm)	Function
SH-AP-1	4.6*250	Hydroxide system; With alkyl quaternary amine exchange group, it can be equipped with eluent generator to analysis 7 kinds of common anions (F ⁻ , Cl ⁻ , NO ₂ ⁻ , Br ⁻ , NO ₃ ⁻ , H ₂ PO ₄ ⁻ , SO ₄ ²⁻) and some disinfection by-products.
SH-AP-2	4.0*250	Carbonate system; With alkyl quaternary amine exchange group, it can analysis 7 kinds of common anions (F ⁻ , Cl ⁻ , NO ₂ ⁻ , Br ⁻ , NO ₃ ⁻ , H ₂ PO ₄ ⁻ , SO ₄ ²⁻) and some disinfection by-products.
SH-AP-3	4.0*150	Carbonate system; With alkyl quaternary amine matrix, it can analysis 7 kinds of common anions (F ⁻ , Cl ⁻ , NO ₂ ⁻ , Br ⁻ , NO ₃ ⁻ , H ₂ PO ₄ ⁻ , SO ₄ ²⁻) rapidly.
SH-GP-2	4.0*50	Universal guard column; Insoluble solid particles in mobile phase and samples can be filtered on-line. Used to prevent peek column from being polluted and prolong the life of column.

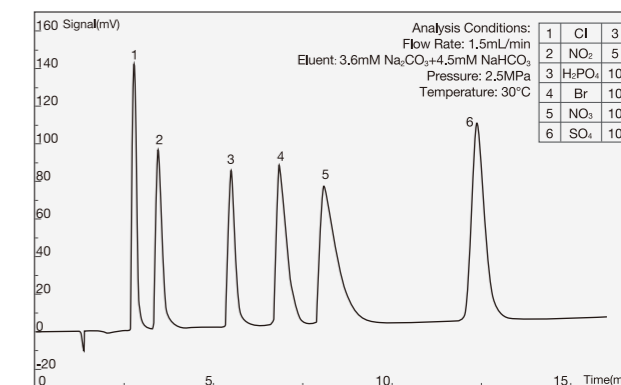
Cation Ion Chromatographic Columns(stainless steel)

Model	Specification (mm)	Function
SH-CC-2	4.6*250	Oxalic acid / ethylenediamine system; A special column for metal ion analysis such as Zn ²⁺ , Fe ²⁺ , Mn ²⁺ , Mg ²⁺ , Ca ²⁺ by non-suppression conductivity method. Mainly used for the detection of Mn/Zn.
SH-CC-3	4.6*100	MSA system; Polymer matrix weak acid cation column, can analyze 6 kinds of common cations: Li ⁺ , Na ⁺ , NH ₄ ⁺ , K ⁺ , Mg ²⁺ , Ca ²⁺ .
SH-CC-4	4.0*200	MSA system; Polymer matrix weak acid cation column, can analyze 6 kinds of common cations. High organic solvent tolerance.
SH-CC-6	3.0*250	MSA system; It is used for the determination of monovalent alkali metals, ammonium salts, divalent alkaline earth metals and choline.
SH-CC-7	2.1*200	MSA system; A microbore weak acid cation column. With fine diameter, low flow rate, high signal response value, it can detect 6 kinds of conventional cations at low concentration.

ANION CHROMATOGRAPHY COLUMN

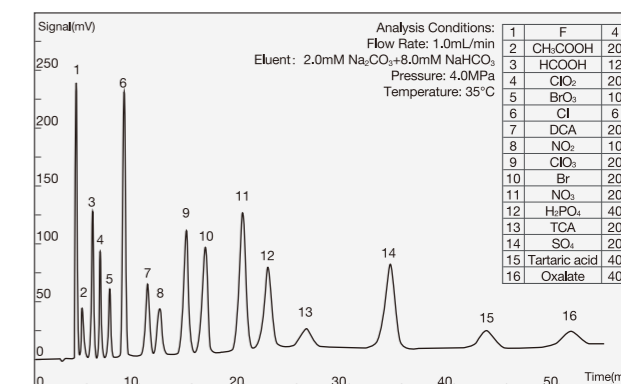
SH-AC-1 COLUMN/ 4.6*250MM/

A basic anion column, using carbonate system eluent, can simultaneously analyze 6 kinds of common anions: Cl⁻, Br⁻, NO₂⁻, NO₃⁻, H₂PO₄⁻, SO₄²⁻. With fast analysis speed and high cost performance, it is suitable for environmental protection, cement and other industries.



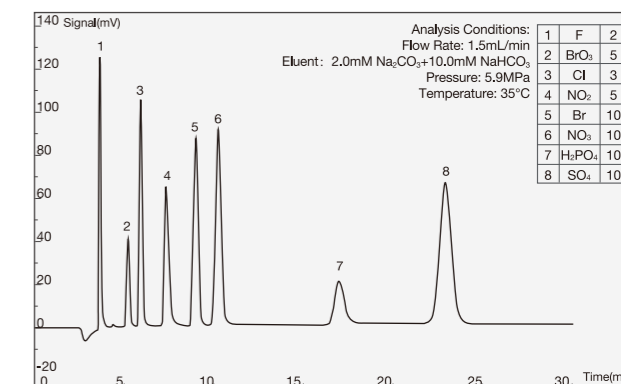
SH-AC-3 COLUMN/ 4.0*250MM/

An anion column with high efficiency, using carbonate system eluent. It can simultaneously analyze 7 kinds of common anions (F⁻, Cl⁻, Br⁻, NO₂⁻, NO₃⁻, H₂PO₄⁻, SO₄²⁻), disinfection by-products (BrO₃⁻, ClO₂⁻, ClO₃⁻, dichloroacetic acid DCA, trichloroacetic acid TCA) and other anions, especially for the analysis of halogenates containing oxygen and is suitable for various industries such as disease control, food, environment, metallurgy, geology and so on.



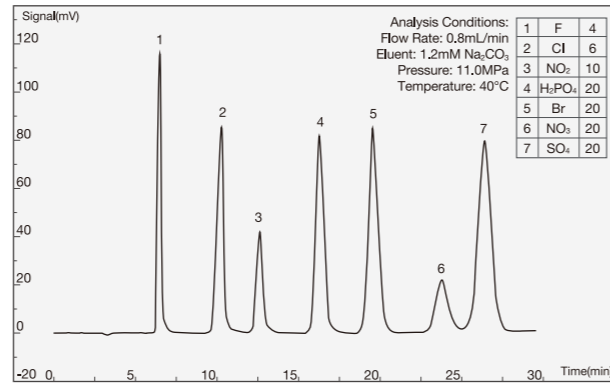
SH-AC-4 COLUMN/ 4.6*250MM/

A universal anion column, using carbonate system eluent, can simultaneously analyze F⁻, Cl⁻, Br⁻, NO₂⁻, NO₃⁻, H₂PO₄⁻, SO₃²⁻, SO₄²⁻, BrO₃⁻. With low pressure and fast analysis speed, it is suitable for food, environment, metallurgy, geology and other industries.



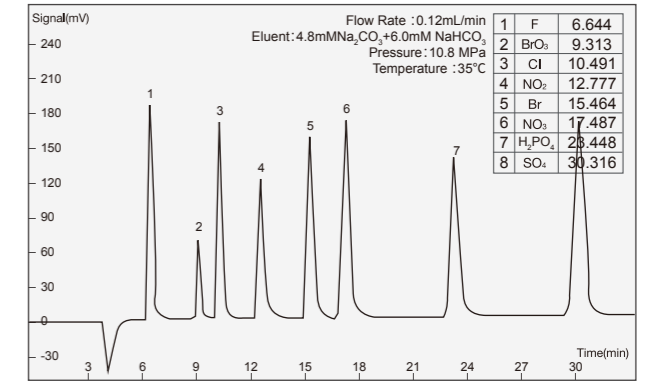
SH-AC-9 COLUMN / 4.6*250MM /

> A hydrophilic anion column, using carbonate system eluent, can simultaneously analyze 7 kinds common anions: F⁻, Cl⁻, Br⁻, NO₂⁻, NO₃⁻, H₂PO₄⁻, SO₄²⁻. With good separation of water negative peak and the F⁻ peak, it is suitable for electronic and electrical, petrochemical, environmental, metallurgical and other industries.



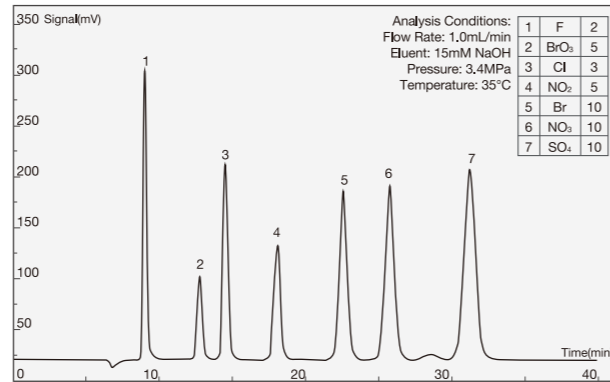
SH-AC-20 COLUMN / 2.1*200MM /

> A microbore anion column, using carbonate system eluent With fine particle diameter, low flow rate and high signal response value, it can simultaneously analyze 8 kinds of anions :F⁻, BrO₃⁻, Cl⁻, NO₂⁻, Br⁻, NO₃⁻, H₂PO₄⁻, SO₄²⁻.



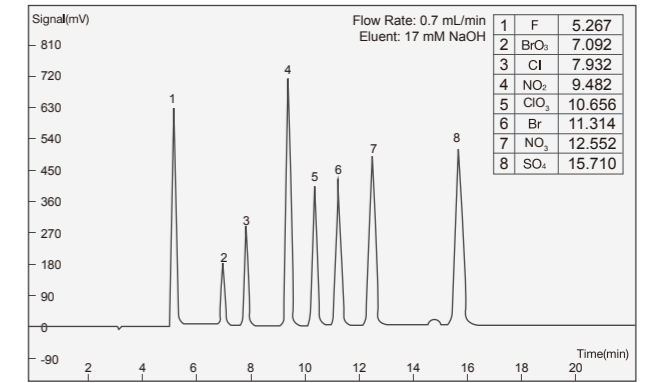
SH-AC-11 COLUMN / 4.6*250MM /

> An anion column with high efficiency, using hydroxide system eluent. It can simultaneously analyze 7 kinds of common anions (F⁻, Cl⁻, Br⁻, NO₂⁻, NO₃⁻, PO₄³⁻, SO₄²⁻), disinfection by-products (BrO₃⁻, ClO₂⁻, ClO₃⁻, dichloroacetic acid DCA, trichloroacetic acid TCA) and other anions. With good peak shape, gradient elution, higher sensitivity and wider application scope, it is suitable for drinking natural mineral water, packaging drinking water, drinking water and other industries.



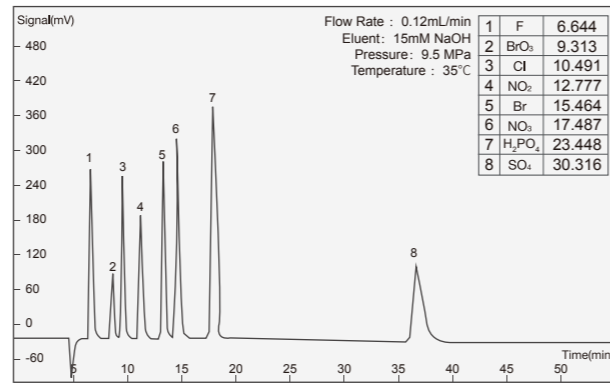
SH-AP-1 COLUMN / 4.0*250MM /

> An anion columns with PEEK tube. Using hydroxide system eluent , it can be equipped with eluent generator to analysis 7 kinds of common anions (F⁻, Cl⁻, NO₂⁻, Br⁻, NO₃⁻, H₂PO₄⁻, SO₄²⁻.) and some disinfection by-products.



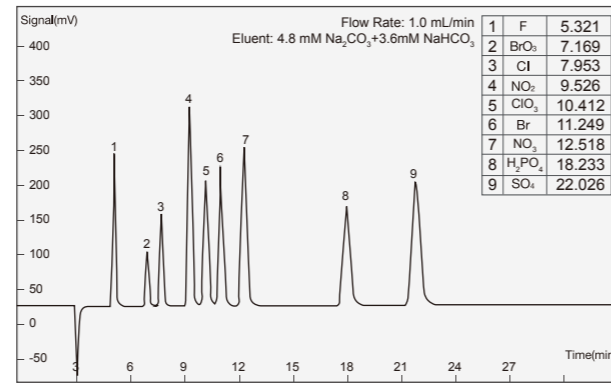
SH-AC-19 COLUMN / 2.1*200MM /

> A microbore anion column, using hydroxide system eluent . With fine particle diameter, low flow rate and high signal response value, it can simultaneously analyze 8 kinds of anions: F⁻, BrO₃⁻, Cl⁻, NO₂⁻, Br⁻, NO₃⁻, PO₄³⁻.



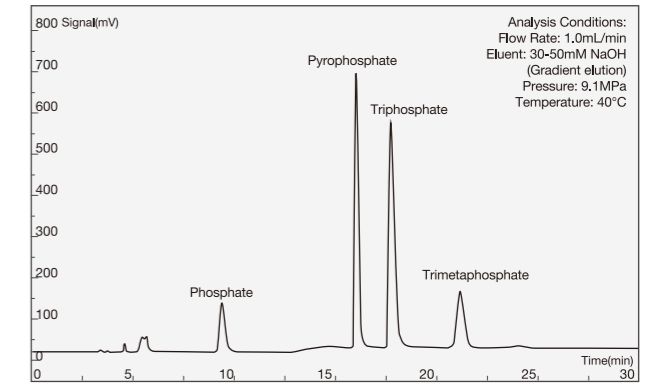
SH-AP-2 COLUMN/4.0*250MM /

> An anion columns with PEEK tube.Using carbonate system eluent , it can analysis 7 common anions: F⁻,Cl⁻,NO₂⁻,Br⁻,NO₃⁻,H₂PO₄⁻,SO₄²⁻,and some disinfection by-products.



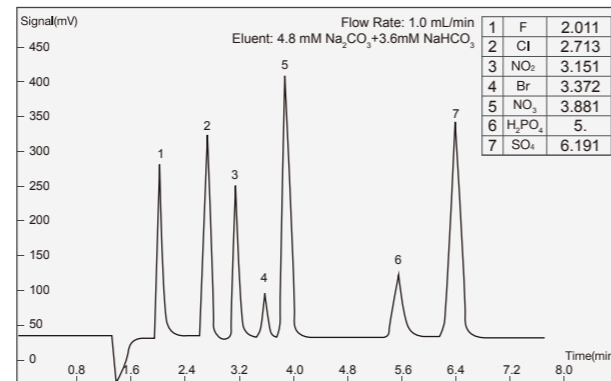
SH-AC-16 COLUMN /4.6*250MM /

> A special anion column for polyphosphates, using hydroxide system eluent, mainly used to analyze polyphosphates in aquatic products.



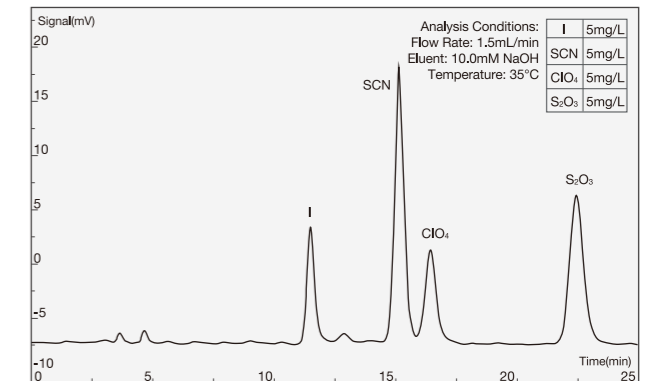
SH-AP-3 COLUMN/4.0*150MM /

> A rapid anion columns with PEEK tube.Using carbonate system eluent , it can analyze 7 common anions(F⁻,Cl⁻,NO₂⁻,Br⁻,NO₃⁻,H₂PO₄⁻,SO₄²⁻) rapidly.



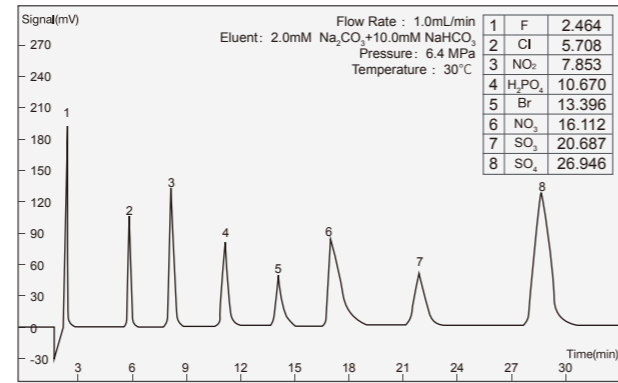
SH-AC-17 COLUMN /4.6*250MM /

> A special anion column for I⁻ with conductivity method, using hydroxide system eluent. It is mainly applicable to the analysis of I⁻, SCN⁻ and S₂O₃²⁻ in the environment, solid waste and other industries.



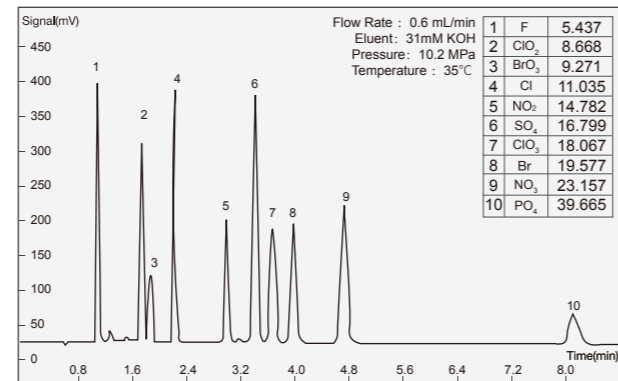
SH-AC-18 COLUMN/4.6*250MM /

> A hydrophilic anion column with alkyl quaternary amine as the filler and carbonate as the eluent. Simultaneously analyzing 7 kinds of common anions: F⁻, Cl⁻, NO₂⁻, Br⁻, NO₃⁻, PO₄³⁻ and SO₃²⁻. It especially good at separating SO₃²⁻.



SH-AC-22 COLUMN/4.0*250MM /

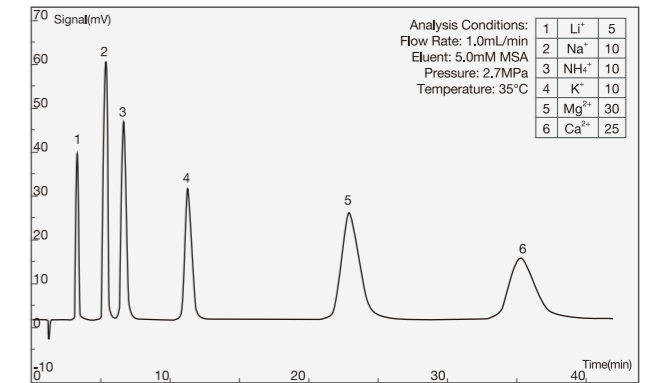
> An anion column with large capacity and high resolution, using hydroxide system eluent. It is suitable for high resolution analysis of conventional anions and analysis of disinfection by-products. With the use of the eluent generator, the detection and analysis of fluoride in complex matrix such as fruit juice or tea, the analysis of some weakly retained small molecular organic acids in the complex matrix, and the analysis of nitrite in nitrite injection in the pharmacopoeia can be completed.



CATION CHROMATOGRAPHY COLUMN

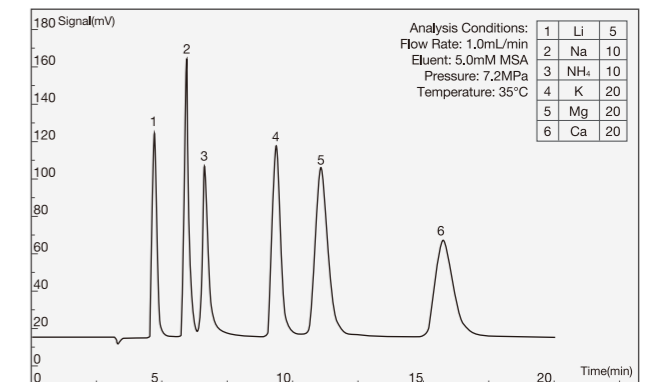
SH-CC-3 COLUMN /4.6*100MM /

> A universal cation column, is mainly used to analyze 6 kinds of common cations (Li⁺, Na⁺, NH₄⁺, K⁺, Mg²⁺, Ca²⁺). With well separability of Na⁺ and NH₄⁺ and low tailing factor of Mg²⁺ and Ca²⁺, it is suitable for environmental, water quality, medical, food and other industries.



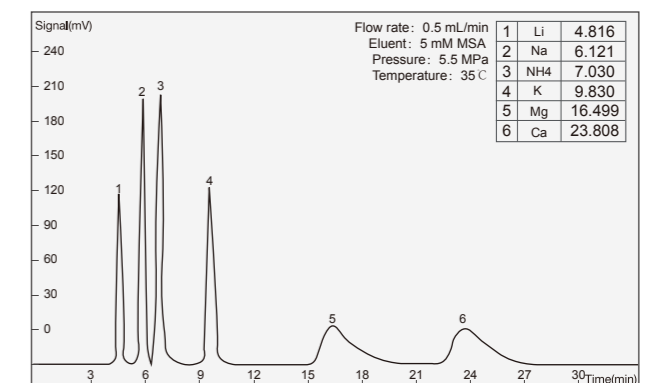
SH-CC-4 COLUMN /4.0*200MM /

> A multifunctional cation column with MSA eluent. It can analyze 6 kinds of cations: Li⁺, Na⁺, NH₄⁺, K⁺, Mg²⁺, Ca²⁺. With low tailing factor of Mg²⁺ and Ca²⁺ and 100% acetone tolerance, it is suitable for cationic analysis in environmental, water quality, medical, food and other industries.



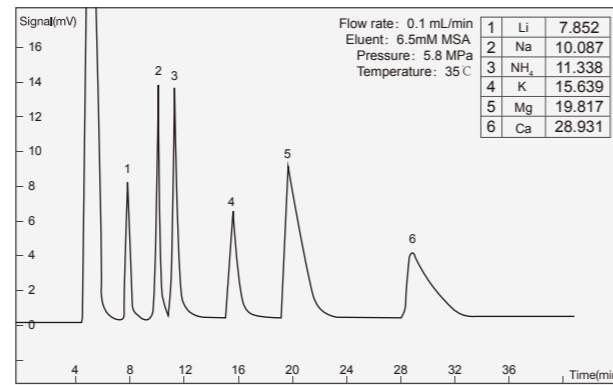
SH-CC-6 COLUMN/3.0*250MM /

> A weak acid cation column with MSA eluent; It is used for the determination of monovalent alkali metals, ammonium salts, divalent alkaline earth metals and choline.



SH-CC-7 COLUMN/2.1*200MM /

> A microbore weak acid cation column. With fine particle diameter, low flow rate and high signal response value, it can detect 6 kinds of conventional cations at low concentration and greatly reduce the consumption of eluent.



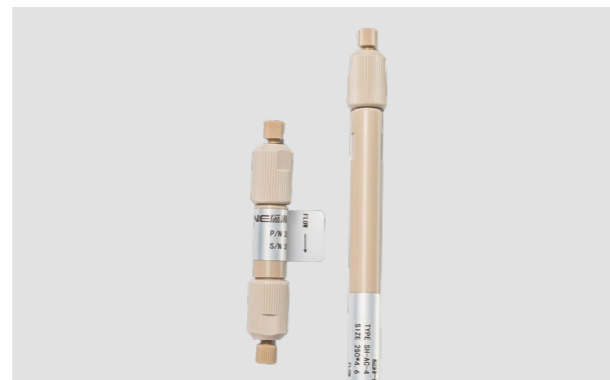
SH-G-1 COLUMN /4.6*50MM /

> A universal guard column. It can filter the insoluble solid particles in mobile phase and sample, prevent column from being polluted and prolong the life of column.



SH-GP-2 COLUMN/4.0*50MM /

> A universal guard column with PEEK tube. It can filter the insoluble solid particles in mobile phase and sample, prevent column from being polluted and prolong the life of column.

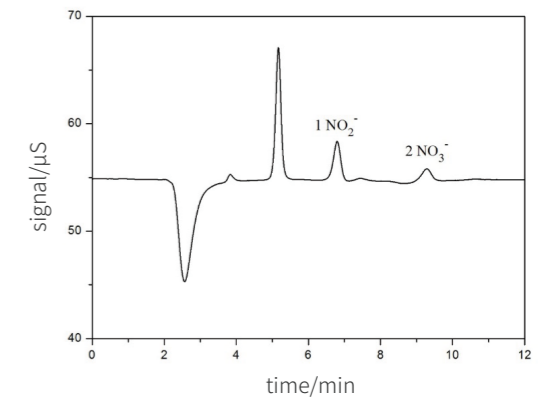


INDUSTRY APPLICATION SOLUTIONS

Application of Ion Chromatography in Food Safety Analysis

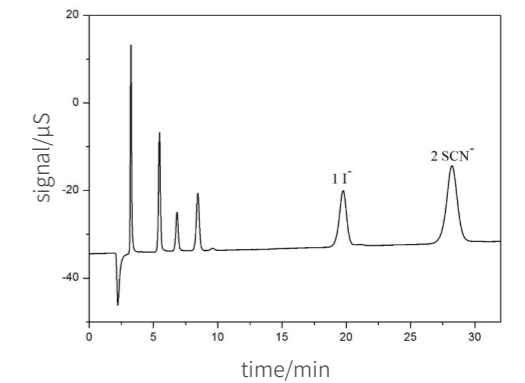
1. Nitrate and nitrite in food

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-D180 ion chromatograph, SH-AC-5 anion column, 10.0 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

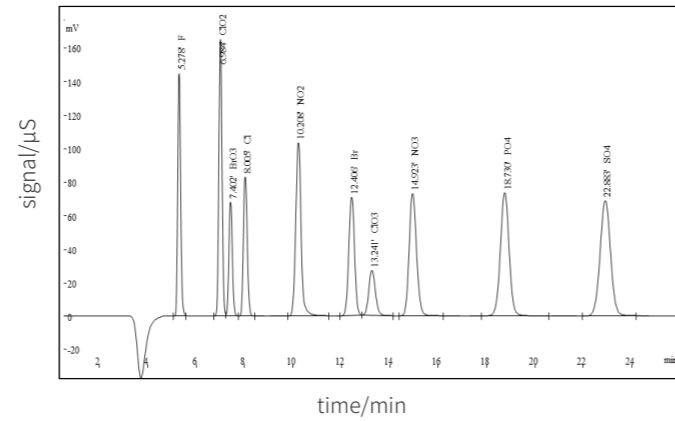
The milk powder samples are dissolved, mixed with 3% acetic acid and deionized water, filtered by 0.22μm microporous filter membrane and treated by IC-RP column. Using CIC-D180 ion chromatograph, SH-AC-11 anion column, 30 mM NaOH eluent and bipolar pulse conductance method, under the recommended chromatographic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



II. Application of Ion Chromatography in Drinking Water Analysis

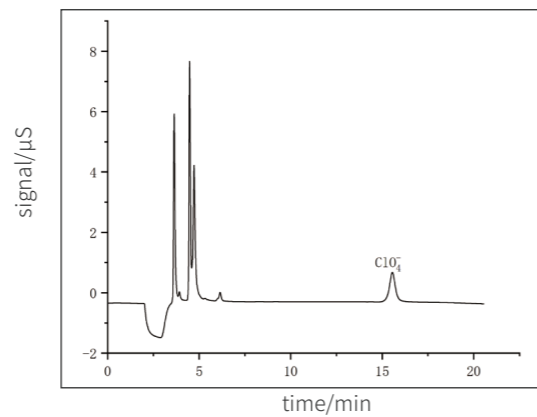
1. Detection of anions in drinking water

The samples are filtered by 0.45μm microporous filter membrane or centrifuged . Using CIC-D150 ion chromatograph, SH-AC-3 anion column, 2.0 mM Na₂CO₃/8.0 mM NaHCO₃ eluent and bipolar pulse conductance method,under the recommended chromatographic conditions, the chromatogram is as follows.



2. Determination of Perchlorate in Drinking Water (EPA 314.0)

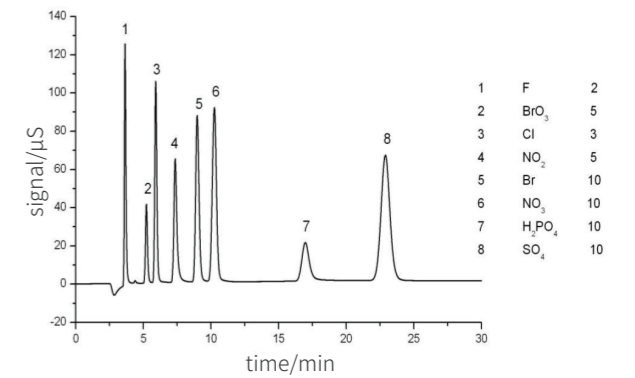
Using CIC-D180 ion chromatograph, SH-AP-1 anion column, 35mmol/mL NaOH eluent ,under the recommended chromatographic conditions,the chromatogram is as follows.



III. Application of Ion Chromatography in Environmental Analysis

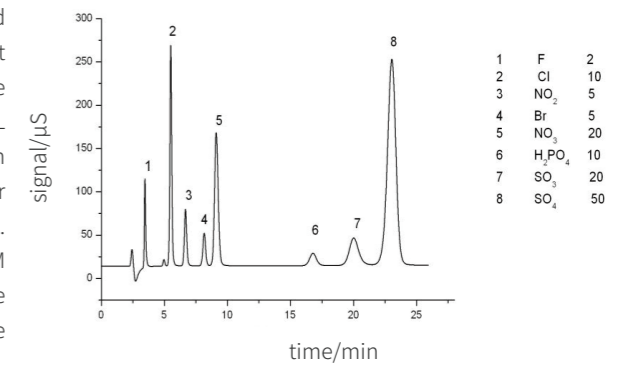
1. Detection of common anions in surface water

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-D150 ion chromatograph, SH-AC-3 anion column, 3.6 mM Na₂CO₃+ 4.5 mM NaHCO₃ eluent and bipolar pulse conductance method,under the recommended chromatographic conditions,the chromatogram is as follows.

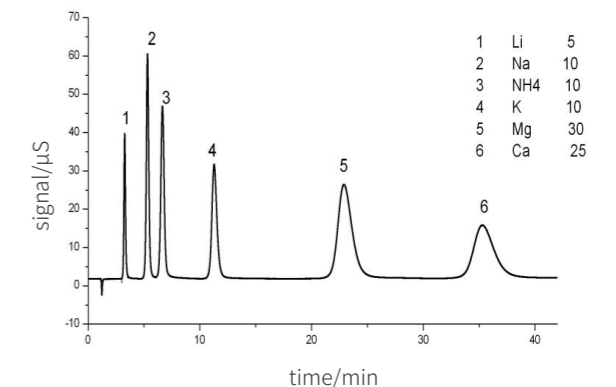


2. Analysis of particulates in atmosphere

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 beeing extracted in the ultrasonic cleaner and filtered by a 0.45μm microporous filter membrane. After all this,the sample can be injected for analysis. Using CIC-D150 ion chromatograph, SH-AC-3 anion column, 3.6 mM Na₂CO₃+4.5 mM NaHCO₃ eluent and bipolar pulse conductance method,under the recommended chromatographic conditions, the chromatogram is as follows.



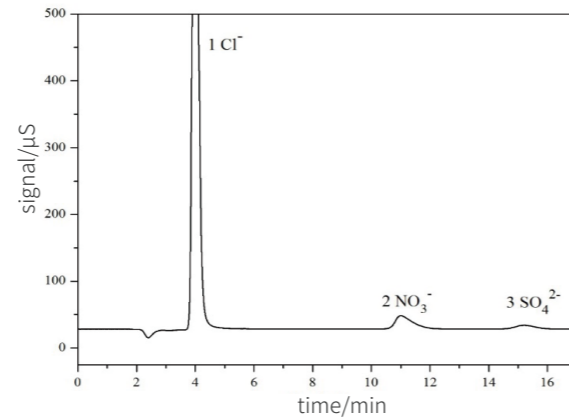
Using CIC-D150 ion chromatograph, SH-CC-3 cation column, 5.5 mM MSA eluent and bipolar pulse conductance method,under the recommended chromatographic conditions, the chromatogram is as follows.



IV. Application of Ion Chromatography in Petrochemical Analysis

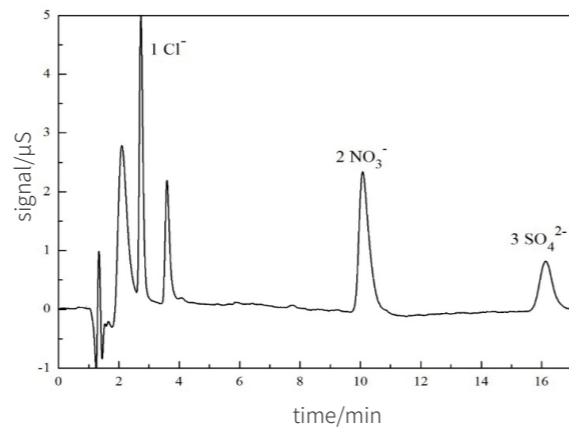
1. Anion analysis in oil field waste water

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-D150 ion chromatograph, SH-AC-3 anion column, 3.6 mM Na₂CO₃+4.5 mM NaHCO₃ 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 Na₂CO₃+4.5 mM NaHCO₃ eluent and bipolar pulse conductance method, under the recommended chromatographic conditions, the chromatogram is as follows.

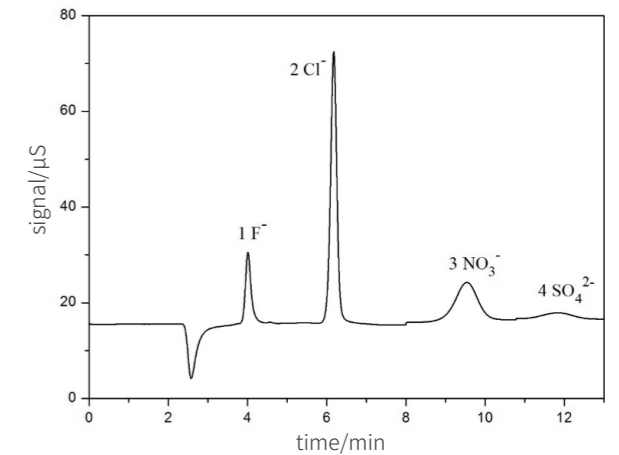


V. Application of Ion Chromatography in Metallurgical Ore Analysis

1. Plating solution

According to the replacement of low boiling acid by high boiling acid, F⁻ and Cl⁻ are distilled together with sulfuric acid as distillation agent at a certain temperature for separation and enrichment. Using CIC-D150 ion chromatograph, SH-AC-3 anion columns, 3.6 mM Na₂CO₃+4.5 mM NaHCO₃ eluent and bipolar pulse conductance method, under the recommended chromatographic conditions, the chromatogram is as follows.

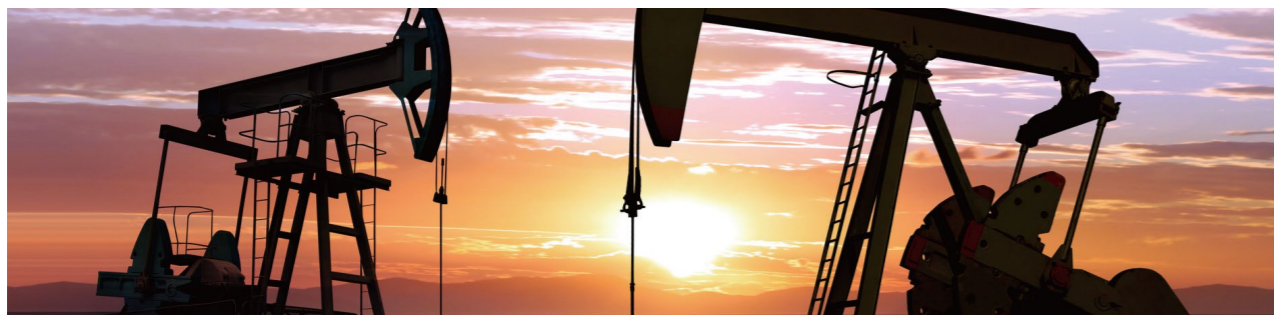
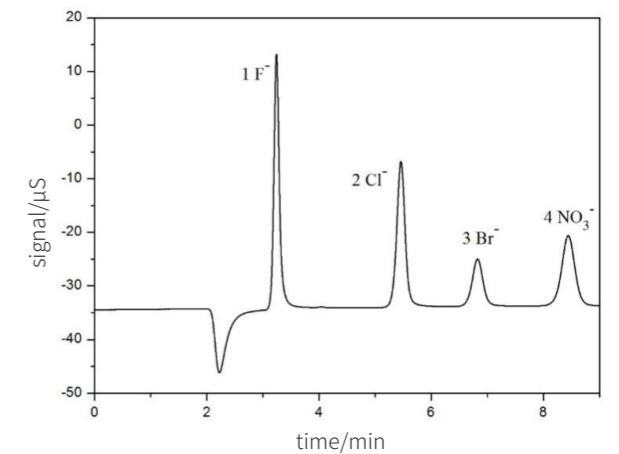
The detection limits of F⁻ and Cl⁻ are 0.84ug/L and 0.37 ug/L. The recoveries of F⁻ and Cl⁻ are 91%-107% and 95%-105%(n=10). The coexisting ions in the plating solution had no interference with the determination of F⁻ and Cl⁻.



2. Iron ore

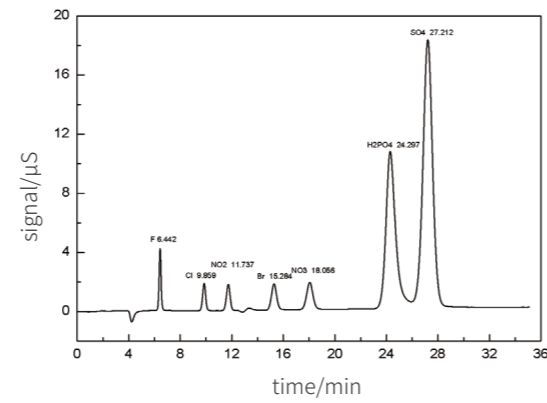
After ultrasonic extraction and centrifuge separation and precipitation, iron ore samples were filtered by IC-RP column, IC-Na column and 0.22 um microporous filtration membrane respectively. Using CIC-D150 ion chromatograph, SH-AC-3 anion column, 3.6 mM Na₂CO₃+4.5 mM NaHCO₃ eluent and bipolar pulse conductance method, under the recommended chromatographic conditions, the chromatogram is as follows.

The detection limits of F⁻ and Cl⁻ are 2.1 ug/g and 3.5 ug/g. The recoveries of F⁻ and Cl⁻ are 96%-104%. It can be used for the analysis of natural iron ore, iron ore concentrate and other samples.



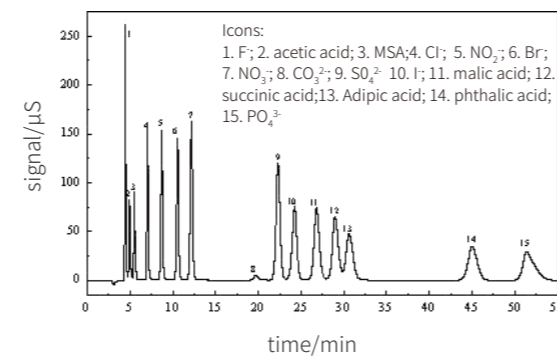
VI. Application of Ion Chromatography in Halogen Analysis

Using oxygen bomb combustion method to detect the halogen content in printed circuit boards. In the airtight oxygen bomb combustion chamber, the samples to be measured were fully burned and absorbed by the absorbed liquid. Using CIC-D150 ion chromatograph, SH-AC-9 anion column, 1.8 mM Na₂CO₃+1.7 mM NaHCO₃ eluent and bipolar pulse conductance method, under the recommended chromatographic conditions, the chromatogram is as follows. Ion chromatography can be used for halogen analysis in loudspeaker base, tympanic membrane, power and communication cable, connector, PCB board and other electronic products.



VII. Application of Ion Chromatography in The Analysis of Synthetic Polymer Materials

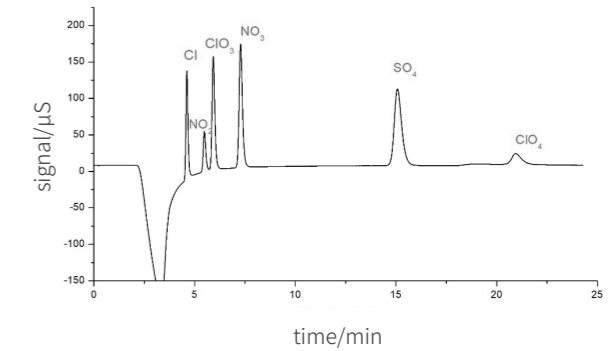
Using CIC-D150 ion chromatograph, SH-AC-11 anion column, 12 mM KOH (Eluent generator) eluent, under the recommended chromatographic conditions, the chromatogram is as follows. This method is widely used in the determination of anion in circuit boards (IPC-TM-650 2.3.28).



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

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 μm microporous filtration membrane. Using CIC-D150 ion chromatograph, SH-AC-12B anion column, 4.0 mM Na₂CO₃ 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-D150 ion chromatograph and SH-AC-3 anion column, 3.6 mM Na₂CO₃+4.5 mM NaHCO₃ eluent and bipolar pulse conductance method, under the recommended chromatographic conditions, the chromatogram is as follows.

