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Ion Chromatography

www.innovabiomed.com

COMPANY PROFILE

YOCELL Biotechnology is your trusted partner in the field of bioprocess. YOCELL has a team of energetic young scientists and engineers. From initial R&D to production, we are committed to providing the most reliable solutions for biotechnology scientists and engineers around the world. Accepting the challenges of continuous innovation in biotechnology and solving problems from multiple perspectives are the most impressive qualities of the team.

Pragmatic

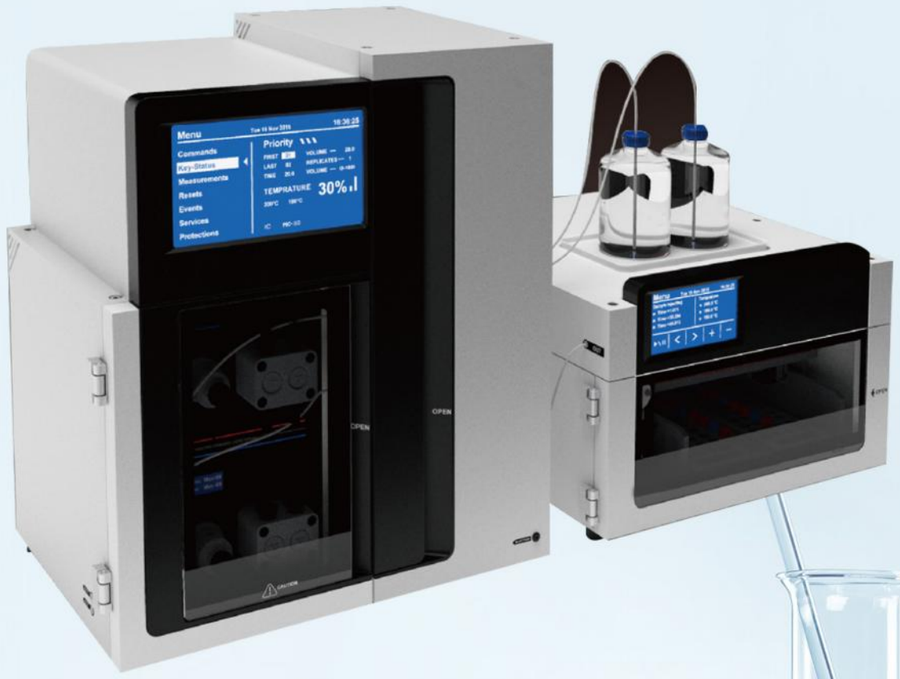
Always listen carefully to your needs and provide the most competitive solutions.

Efficient

Respond quickly and have a strong supply chain to ensure fast delivery.

Focus

Continuous attention and passion for innovation in the field of biotechnology control.



PIC-80 DUAL-SYSTEM ION CHROMATOGRAPH

Features:

Automatic sample dilution:

With internal sample dilution system, the operator could set suitable dilution rates for high-concentration samples through the embedded workstation on the touch screen.

Modular design to make multi-function customization:

All basic function cells could be assembled into one integrated structure by customers' requirements

Peak flow routes

All peak materials for the whole system, including pump head, six-pot valve, flow routes with peek tubing, flow connectors and so on, to avoid the contamination of metal ions and to prevent corrosion.

Internal thermostatic system

Conductivity cell, column, six-pot valve and suppressor all are highly integrated in a thermostat, which shortens the length of flow path, reduces dead volume of the whole system and makes eluent preheating.

Dual data backup mechanisms to enhance reliability:

Local storage:

At least one year's chromatogram data by the machine itself

Cloud storage:

Backup all data to the Internet automatically to achieve almost unlimited storage capacity.

Multiple detector options

Conductivity detector, Voltammetric detector

PIC-10A ION CHROMATOGRAPH

Mono/dual IC system can be customized.

Features:
Integrated system with double work efficiency:
Dual IC system contains two conductivity detectors、two pumps、two valves、two columns and only one work station into one integrated structure, which effectively overcomes mutual interference between two systems. It is high work efficiency, cost-effective and space-saving.
Mono IC system: With effective column/valve switch mechanism, it could achieve time-sharing detection of anions and cations.

Powerful functional extensions:
Gradient elution can be done with the eluent generator or extra pump/valve mechanism.
Voltammetric detector is optional to detect bromide, iodide, sulfide, cyanide, lead, copper, zinc, cadmium, etc.
Auto-sampler is optional which could operate 100 sample injections without manual duty.

Technical specifications:
PIC-10A Ion Chromatograph (conductivity detector)
Detection limit (injection volume 25μL): Cl-≤0.0005mg/L (hydroxide eluent); BrO3-≤0.0005 mg/L(hydroxide eluent); Li+≤0.002mg/L; Linear range: ≥103(tested by Cl-); correlation coefficient: ≥0.999; Baseline noise: ≤ 0.5%FS; Baseline drift: ≤1.0FS; Repeatability for qualification: ≤0.5%; Repeatability for quantification: ≤1.0%; Max pressure for pump: ≥36.0MPa; Thermostatic stability: ≤0.1℃/h

GENERAL TECHNICAL SPECIFICATIONS OF PIC SERIES OF IC

Field of Application:

Tap water, Drinking water, Environmental monitoring, Sanitation and Epidemic prevention, Quality management, Petrochemical engineering, Geologic survey, Scientific research, the-third-party inspection and so on.

Detection Subjects:

Anions:fluoride、silicate、chlorite、bromate、chloride、carbonate、bicarbonate、nitrite、selenite、bromide、chlorate、nitrate、phosphate、sulfite、sulfate、tellurate、selenate、 arsenate、iodide、 sulfide、cyanide、molybdate、 tungstate、chromate、thiosulfate、 lactate、 formate、 methylsulfonate、 methylbenzenesulfonate、 acetate、 meleate、 glyoxalate、 propionate、 butyrate、 valerate、 hydroxylacetate、tartarate、 haloacetate、 polyphosphate、 pyruvate、 malate、 oxalate、 benzoate、 sorbate、 glyphosate、diglycolate、 succinate、 cyclamate、 acesulfame、 alkylsulfonate

Cations:lithium、sodium、ammonium、potassium、rubidium、cesium、magnesium、calcium、 strontium、barium、nickel、copper、lead、zinc、manganese、cadmium、chromium、ferrum(Ⅱ)、ferrum(Ⅲ)、hydrazine、melamine、Dicyandiamide、methylamine、dimethylamine、trimethylamine 、betaine、choline chloride、quaternary ammonium、cadaverine、putrescine、 spermidine、spermine、histamine

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Outline Dimensions:

PIC-10/10A ion chromatograph: 415mm (length) X 360mm (width) X 525mm (height);

PIC-online ion chromatograph:

Mono-system cabinent: 600mm (length) X 600mm (width) X 1700mm (height);

Dual-system cabinet: 600mm (length) X 600mm (width) X 1700mm (height).

STANDARD ACCESSORIES

Conductivity detector:

5-electrode conductivity cell : Every electrode is made of circular passivated 316 stainless steel; Cell volume : < 0.8ul, which can effectively overcome the electrode polarization phenomenon; Low baseline noise, high detection sensitivity; Embedded electronic thermostatic systems with temperature compensation, constant temperature range from 5 to 65℃±0.01℃, temperature compensation precision (1.7%-2.0%) /℃; The entrance of conductivity detector is connected to the micro-membrane suppressor with the maximum pressure 10MPa (1500Psi) . Non-suppressed mode can be used in the detection of cations; Auto-regeneration suppressed mode can be used in the detection of anions and cations.

Conductivity detection range : 0-35000uS , adjusted by manual or automatic measure range selection.

Full-scale resolution : ≥1/40000(≤0.0020ns/cm)

Baseline noise : ≤0.06%Fs Baseline shifting : ≤±0.7%Fs

linear range : $>10^2$ linear correlation coefficient : ≥0.995 (that is, linear error ≤0.5%)

Output voltage : -6000mv ~ +6000mv; Automatic zeroing range : -6000mv ~ +6000mv

Suppresser current : 0-150mA , increment: 1mA (set on the screen)。

Dual-piston high-pressure Pump

The pump is microprocessor-controlled with serial dual-reciprocating pistons to eliminate the disturbance of flow pulse. It has a RS-232/485 interface, and can bring about dual to quaternary gradient elution with computer remote control. With advanced seal technology and pump head self-cleaning function, the pump could work under high pressure for a long period.

Pump operating pressure : 0~42.0MPa (stainless steel) , 0~36MPa(PEEK), 0~50MPa for special request

Flow rate range : 0.001ml/min ~ 9.999ml/min

Flow rate precision : RSD < 0.1% (measured at no more than 1 ml/min)

Pressure sensor: Pressure displaying precision: 0.1 MPa

Gradient ratio precision:≤ ±0.1%(2.0ml/min)

Overpressure protection : The pump will stop and alarm automatically when working pressure is out of normal pressure range.

Six-port Injection Valve:

Using American Rheodyne automatic valve or manual valve and the maximum pressure is 7000psi. The valve has the function of automatic signal collection if the instrument is configured with auto-sampler. The injection loop range from 20 to 1000μL according to user' s demand.

Flow Path System:

All flow paths are made of PEEK material and could tolerate strong acidic or basic eluent and are 100% compatible with reverse phase solvent. It' s convenient for users to flush and maintain. Users are free to change the column and the eluent. The instrument has the function of leakage detection.

Thermostatic control system:

The temperature has an apparent effect on the mobility and the conductivity of the ions. Conductivity increases 2 ~ 3%by increasing 1℃。The temperature can also influence on the resolution of certain ions. PIC series of ion chromatograph employ integrated structure of constant temperature technology, with temperature precision 5 ~ 65℃±0.004℃. For obtaining high resolution and excellent repeatability, the structure of double adiabatic layer is used to ensure constant temperature for flow path and chromatographic column.

Columns

According to different requirements, We provide various kinds of columns (Shodex、Alltech、domestic column etc.) The columns could work under PH0-14,100% compatible with reverse phase solvent. High capacity anion columns could simultaneously separate F^-、Cl^-、NO_2^-、Br^-、NO_3^-、$H_2PO_4^-$、SO_4^{2-}、ClO_2^-、ClO_3^-、BrO_3^-、$I^-$and other anions. High capacity cation columns could simultaneously separate Li^+、Na^+、NH_4^+、K^+、Mg^{2+}、Ca^{2+}、Sr^{2+}、Ba^{2+} and other cations.

Suppressor

Auto-regeneration electrochemical micro membrane suppressor, high capacity, low background conductance, low noise and baseline drift, wide PH range (0-14), low void volume, rapid suppression(within 12min), exceptional repeatability.

OPTIONAL ACCESSORIES

PAS-I Auto-sampler

PAS-II Auto-sampler

PAS-I AUTOMATIC SAMPLER

Samples are isolated from the control and operation system, avoiding the corrosion and pollution of acidic and basic samples. The auto-sampler adopts full-pipe injection mode with precision 0.01%, which effectively resolved the problem of sample residual、injection rate 、injection repeatability and so on. Puren possesses the innovation patent of auto-sampler and utility module patent for clamping、promotion and demotion of needle frame、expansion and contraction of needle frame、needle bracket、pedestal turntable.

Sample number: no less than 100
Volume of sample bottle: ≥10mL
Loop: 0.1μL～1000μL(full-pipe injection mode)
Injection volume precision: 0.01%RSD
Cross contamination: CV<0.001%
PAS-Ⅰ auto-sampler is a biaxial system (50 sample positions for the mono system and 100 sample positions for the dual system).

PAS-II AUTOMATIC SAMPLER

Operation module: X Y Z triaxial linkage movement
Sample number: 138 at most
Sample batch: 2

Features:

- User-friendly interactive interface: With a 4.3 inches highlight touch screen, all information can be on real-time display that includes the current sample position, the number of cleaning, sampling times, current operating procedure, for example cleaning, filling and rinse, sampling, dilution, mixing, injection, analysis and other half-way process.
- High work efficiency due to the combination of three functions of sampling、dilution、preparation;
- Two control mode: Touch-screen mode or online mode free to swap
- Needle washing function: independent needle washing position with infusion needle washing mode, that is fast and efficient;
- Operating password to ensure security
- With a RS-485 interface, it can be convenient to communicate with a variety of ion chromatographs;
- Two sample plates: While one in use, the other can be taken out for sample preparation;
- Closed working space that is conducive to the health of lab staff

Automatic eluent generator:
Basic principle of the eluent generator is electrolysis of water for online generation of eluent, producing the eluent for anion or cation exchange and regenerating the capture column online. Ion analysis could be accomplished by using water as reagent. This technology could further save the time and human resource and eliminating the error of manually prepared eluent, attaining better repeatability. Moreover, gradient elution could be accomplished using one pump.

Pretreatment filter system
Pretreatment filter system includes oil-free vacuum degassing pump, sand core filter and a filter bottle, which combines two functions of degassing and filtration together and is indispensable for an ion chromatography system.

Voltammetric Detector:
Four detection modes: DC amperometric detection、impulse amperometric detection、Integral amperometric detection、differential pulse voltammetric detection; Adopting the flow path mode or the flow injection mode and choose appropriate working electrodes for the detection mode mentioned above; Applied to the detection of bromide、iodide、sulfide、cyanide(etc anions),Lead、cupric、zinc、cadmium(etc cations)and organic compound.
Linear range：1μg/L-1000mg/L

UV-Vis detector:
Applied to the detection of nitrite、nitrate ferrum(Ⅱ) ferrum(Ⅲ) chromium(Ⅲ) chromium(VI) etc. Wavelength range:190nm～740nm; Cutoff filter:370nm; light source: deuterium lamp or halogen lamp(optional); bandwidth:8nm; wavelength precision:±1nm; noise:2 10^{-15}; AU drift:15 10^{-15}AU/h; detection limit:5 10^{-9}g/mL; detection range:0-2.5AU

Sample-pretreatment columns:

Na column:
exchange with transition metal、heavy metal

Ag column:
elimination of high concentration of halide(Cl-、Br-、I-)

RP column:
adsorption of hydrophobic organic compound

Micro-membrane:
filtration of particles

Workstation:

The workstation is a human-machine interactive system, which help users achieve remotely setting the parameters of ion chromatography, data processing and spectrum analysis. Finally, users could export spectrograms, customer’ s reports or other data in a computer by an USB port.

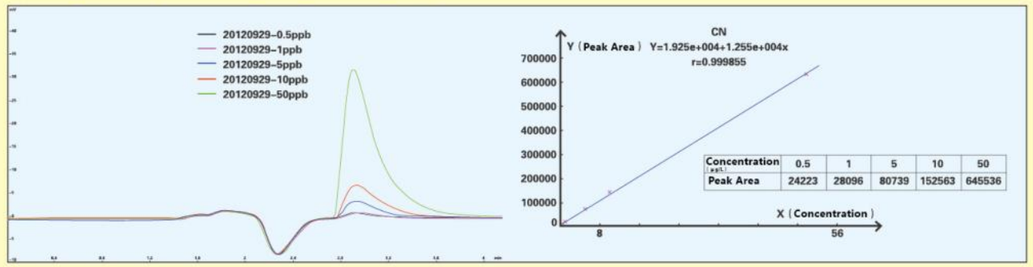
This software system is very powerful, which could automatically distinguish negative peak, do baseline subtraction, calculate peaks’ areas, supervise instrument’ s operating state, and alarm if necessary.

Real-time Chromatograph Display of workstation

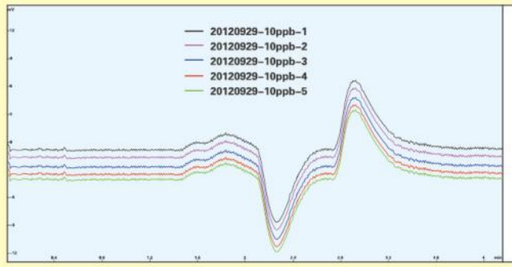
Instrument control panel Of workstation

TYPICAL CHROMATOGRAMS

Linearity and repeatability of cyanide by amperometric detector:

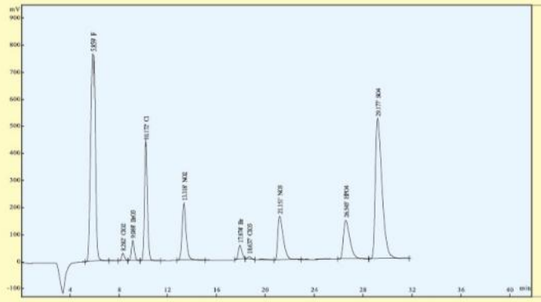


Linearity of cyanide by amperometric detector:
Repeatability of cyanide by amperometric detector (10μg/L):



Column: Anion exchange column
Injection volume: 200μL
Temperature: 25℃
Linear range: 0.5～50.0μg/L

Retention time/min	2.916	2.904	2.919	2.916	2.919	0.21 (RSD/%)
Peak Area	153549	150603	152100	149620	152563	1.05 (RSD/%)



EPA300 10 anions analysis

Column: Shodex IC SI 52 4E, 250X4.6mm

Detector: Suppressed Conductivity Detection

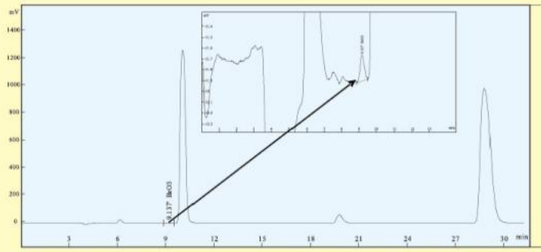
Eluent: Na_2CO_3

Flow rate: 0.8mL/min

Column temperature: 40℃

Injection volume: 50μL

Sample(mg/L):F^-:5;ClO_2^-:5;BrO_3^-:8;Cl^-:10;NO_2^-:10;Br^-:6;ClO_3^-:1; NO_3^-: 20; $H_2PO_4^-$:30; SO_4^{2-}: 40



Spiked chromatogram of tap water with 10μg/Lbromate

Column: Shodex IC SI 52 4E, 250X4.6mm

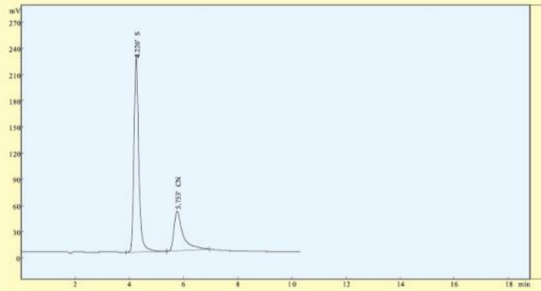
Detector: Suppressed Conductivity Detection

Eluent: 3.6mMNa_2CO_3

Flow rate: 0.8mL/min

Column temperature: 40℃

Injection volume: 100μL



Simultaneous separation and detection of S^{2-}、CN^- by direct current amperometric detector

Column: YSA-8, Column: Shodex IC SI 52 4E, 250X4.6mm

Detector: Direct Current amperometric detector

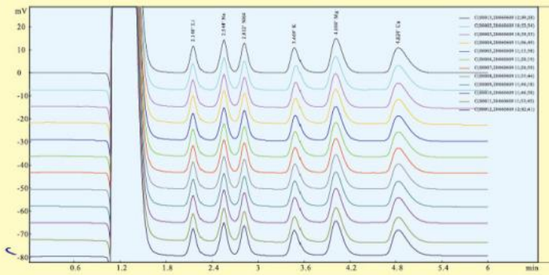
Eluent: Na_2CO_3/H_3BO_3/$NH_2CH_2CH_2NH_2$

Flow rate: 1.50mL/min

Column temperature: 25℃

Injection volume: 500μL

Sample (mg/L): S^{2-}: 1.0 CN^-: 1.0



12 consecutive injection of cations sample:

Column: Universal Cation

Detector: Non-suppressed conductive detection

Eluent: Methylsulfonic acid

Flow rate: 1.00mL/min

Column temperature: 25℃

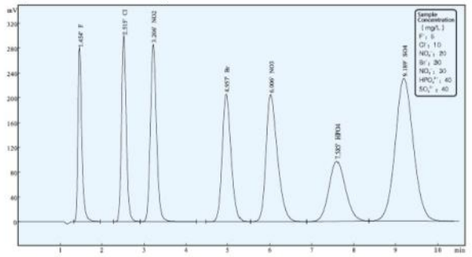
Injection volume: 100μL

Sample (mg/L): Li^+ : 0.5、Na^+ : 2.0、NH_4^+ : 2.0、K^+ : 5.0、Mg^{2+} : 5.0、Ca^{2+}:5.0

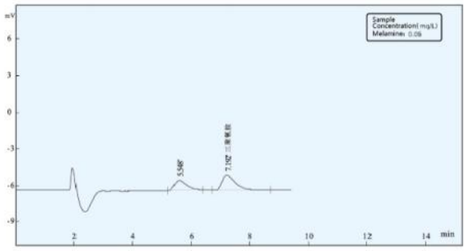
Repeatability of peak area: 0.29 0.70 0.44 0.75 0.56 0.68

Repeatability of retention time: 0.06 0.02 0.04 0.20 0.05 0.01

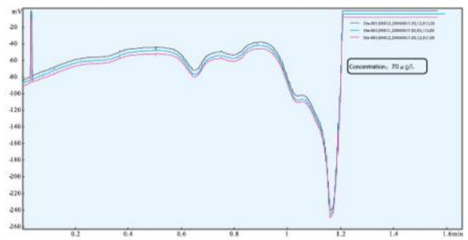
7anions analysis in environment monitoring (the 4th edition)



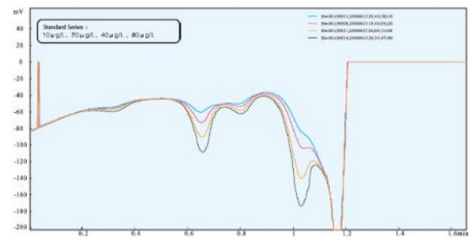
Determination of melamine



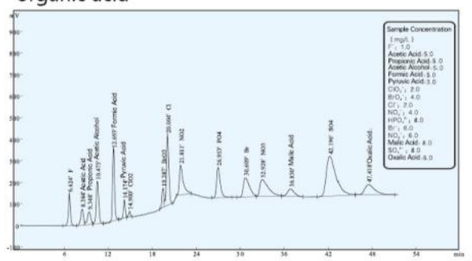
Repeatability of Zn^{2+}、Cd^{2+}、Pb^{2+}、Cu^{2+} by amperometric detector



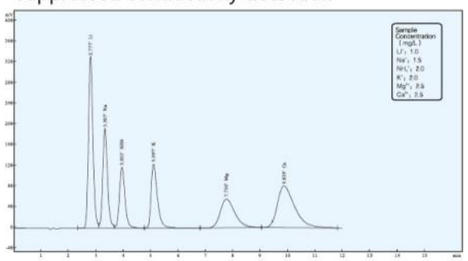
Linearity of Zn^{2+}、Cd^{2+}、Pb^{2+}、Cu^{2+} by amperometric detector



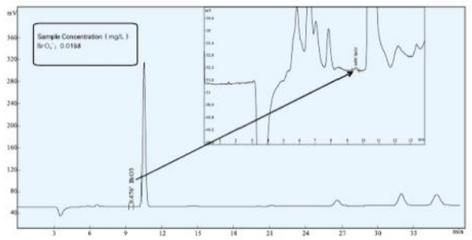
Gradient elution of inorganic anions and organic acid



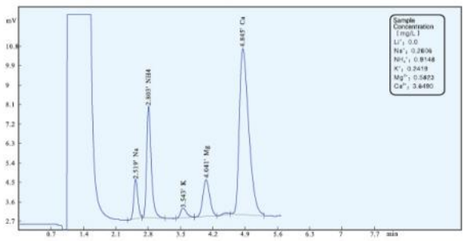
Determination of cations by suppressed conductivity detection



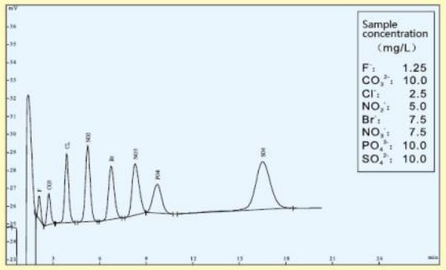
Analysis report of bromate in wheat flour



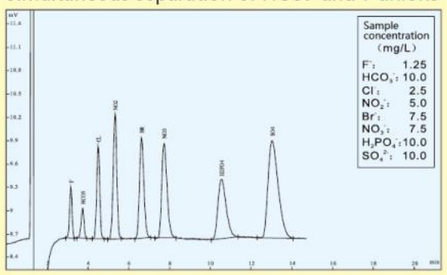
Cation analysis in environment monitoring (the 4th edition)



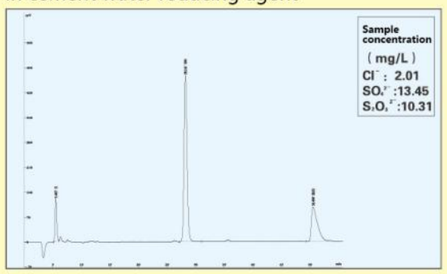
Simultaneous separation of CO_3^{2-} and 7 anions



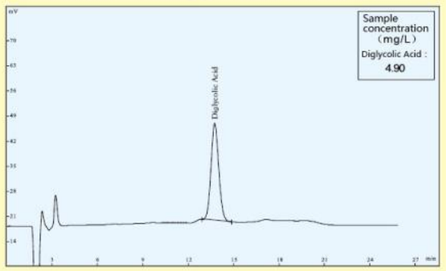
Simultaneous separation of HCO_3^- and 7 anions



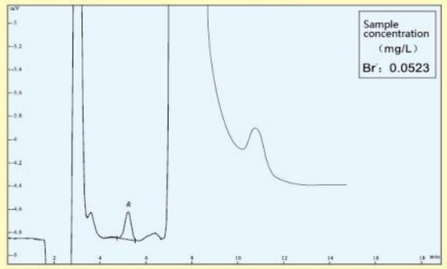
Determination of Cl^-、 SO_4^{2-} and $S_2O_3^{2-}$ in cement water reducing agent



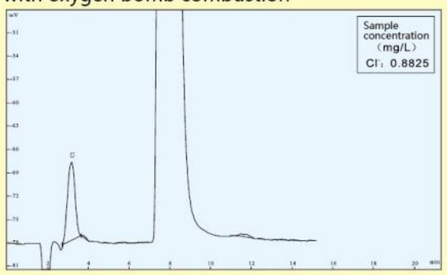
Determination of diglycolate in medicine



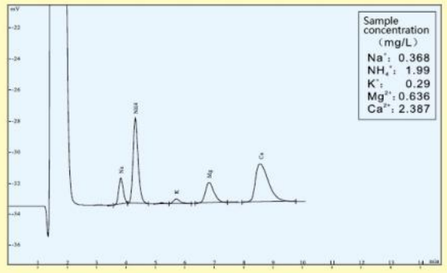
Determination of Br^- in NHFR (Fire retardant) with oxygen bomb combustion



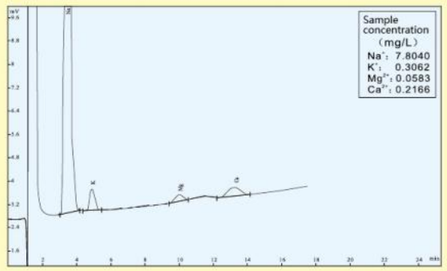
Determination of Cl^- in NHFR (Fire retardant) with oxygen bomb combustion



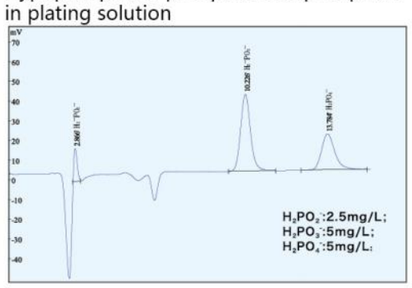
Determination of Cations in rainfall by suppressed conductivity



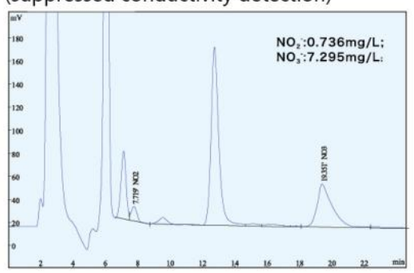
Cations determination in crude in offshore oilfield



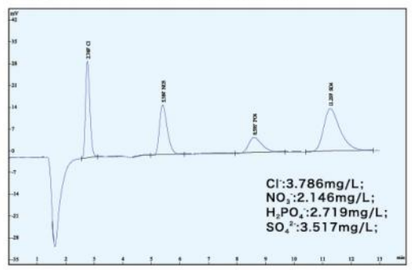
Hypophosphite、phosphite and phosphate in plating solution



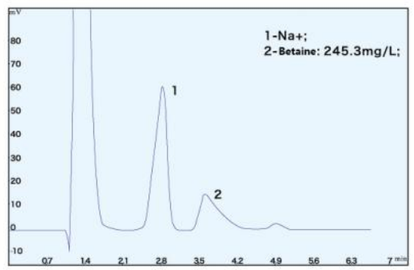
Nitrite and nitrate in milk powder (suppressed conductivity detection)



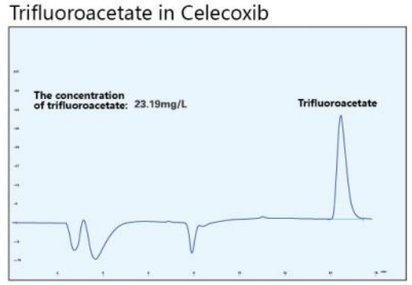
Inorganic anions in Bio-butanol



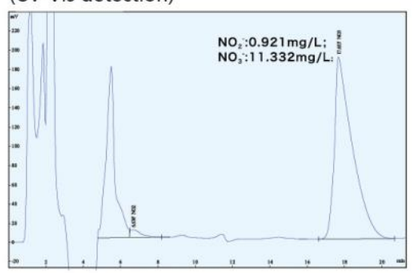
Betaine in feed



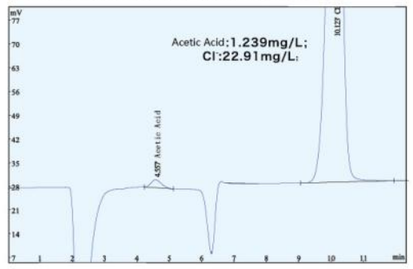
Trifluoroacetate in Celecoxib



Nitrite and nitrate in milk powder (Uv-Vis detection)



Chloride and acetate in dialysis fluid



Rapid separation of anions (suppressed conductivity detection)