



TOSOH

Tosoh Ion Chromatography Catalog



ION CHROMATOGRAPHY SYSTEM

IC-2010

IC WORKSTATION

ION CHROMATOGRAPHY SYSTEM

Further evolved new concept IC, Which inherited advanced separation technology, Provides for increasing comfort and reliability.

Over 40 years has passed since the publishing of the report in Limits to Growth*, which warns that global growth will reach its limit in the late 21st century due to population growth, lack of food, resource consumption, environmental issues and so on, and calls for the shift from growth to sustainable balance and the crystallization of the wisdom of mankind.

Global environmental degradation such as air pollution, acid rain, water pollution, soil pollution, ozone depletion, global warming and so on is increasingly worsening, and becomes a globally urgent task to resolve.

Tosoh is making great efforts in a wide range of fields such as environment, chemistry, food, drug medicine, electronics and so on in order to restore a beautiful and abundant earth based on its advanced separation technology.



Ion Chromatography System IC-2010



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* This is the report on the future of the global environment issued in 1972 by "Rome Club", an NPO which was organized by Scientists, economists and other experts from 10 countries worldwide in 1970. It is considered as the origin to work on global environmental problems.

Ion Chromatography System

IC-2010

High throughput and high-speed multi-sample treatment are realized

IC-2010 is a high-performance and high-speed ion chromatography system which adopts high-speed and high-resolution column newly developed by Tosoh and can realize high throughput analysis.

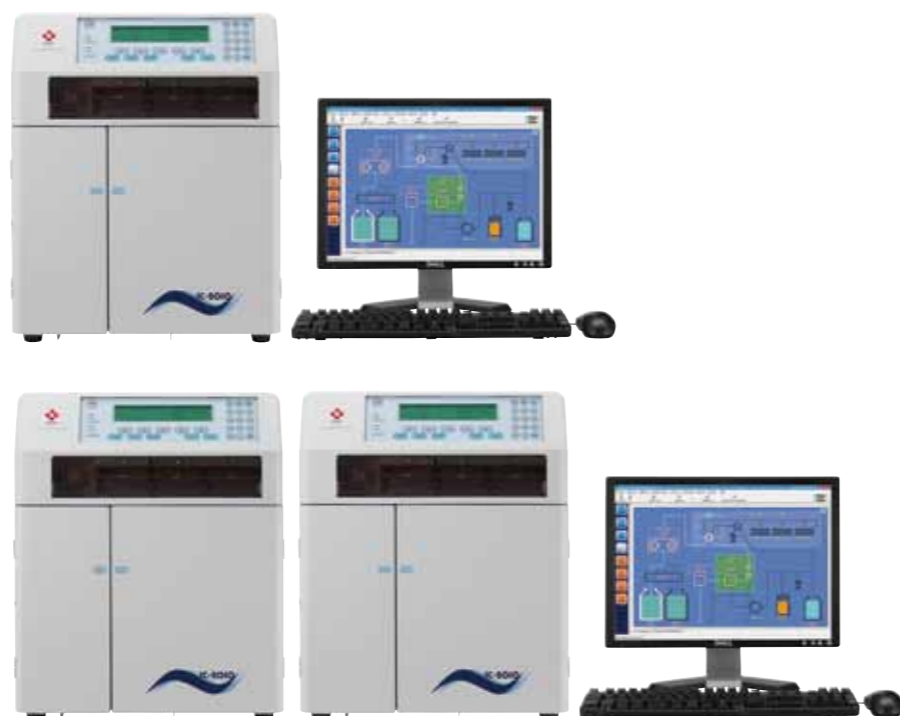
The measurement time is within 5 minutes for both anions and cations.

It is equipped with auto-sampler and suppressor, continuous multi-sample treatment and high-sensitivity measurement can be realized.

High reliability measurement is provided by the dedicated workstation.

System Configuration

- Anion Measurement System
- Cation Measurement System
- Simultaneous Measurement System of Anion and Cation



- ● 2 Systems of Anion and Cation

*2 systems can be controlled by one PC

Ion Chromatography System IC-2010

Auto-Sampler

It is possible to set 150 samples. Maximum 250 samples measurement is possible by sequence setting. Therefore it is powerful for multiple samples measurement.



Pump

High throughput analysis is possible by the use of micro-capacity dual pump of plunger type with a high pressure limit of 35MPa.

Degasser

2 flow lines. Stable liquid feeding without air trouble possible.

Operation Panel

Backlight LCD is adopted for good visibility. Simple operation is possible.

Suppressor Gel Suppressor Rotary Valve

Suppressor gel is changed in each measurement, and stable suppression effect can be achieved.

Column Oven

Stable baseline high-sensitivity measurement is realized by block temperature controller integrated with the conductivity cell.



Features of IC-2010

1 Continuous Multi-sample Treatment

High throughput analysis realized. Respond to continuous multi-sample treatment.

2 High Specification Functions

Equipped with automatic dilution function and gradient function.

3 Stable High-sensitivity Measurement

Equipped with gel suppressor method.

High-speed Multi-sample

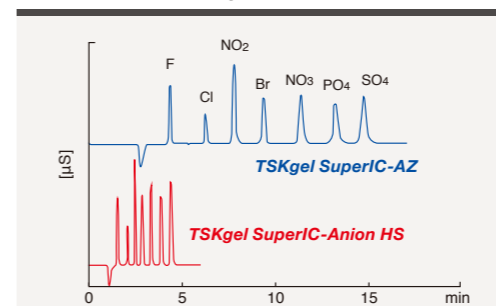
High throughput analysis within 5 minutes

The measurement of anions and cations can be completed within 5 minutes combined with dedicated high-speed and high-resolution column.

The analysis time can be greatly shortened.

- The measurement time of anions can be shortened from 16 minutes to 5 minutes (Compared to our conventional product).
- The measurement time of cations can be shortened from 20 minutes to 5 minutes (Compared to our conventional product).
- Continuous multi-sample measurement can be conducted efficiently.

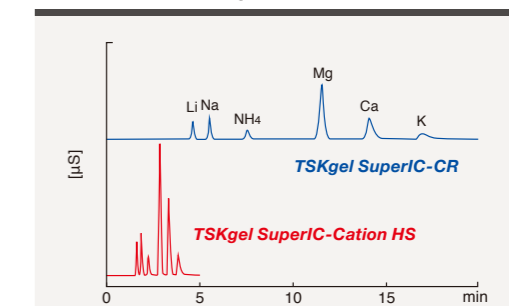
Measurement Example of Standard Anions



Flow rate: (upper) 0.8 mL/min
(lower) 1.5 mL/min
Device: IC-2010

Pressure: (upper) 8.5 MPa
(lower) 16.0 MPa

Measurement Example of Standard Cations



Flow rate: (upper) 0.7 mL/min
(lower) 1.2 mL/min
Device: IC-2010

Pressure: (upper) 9.0 MPa
(lower) 15.6 MPa

High-speed Multi-sample

Continuous 150-250 samples measurement

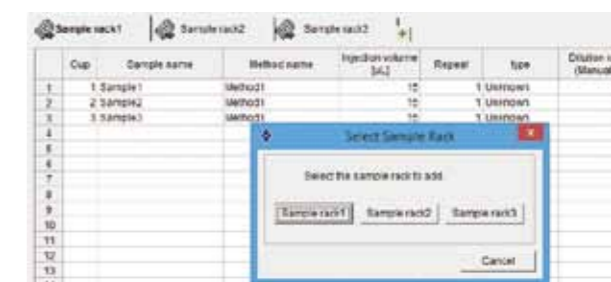
Sample rack of 150 samples is equipped regularly. Continuous 250 samples analysis can be realized by sequence setting.

Combined with high throughput analysis, continuous multi-sample measurement can also be realized efficiently within short time.

- 150 samples set is possible.
- 3 racks of 50 samples/rack are equipped. Samples are efficiently set.
- The continuous measurement of maximum 250 samples is possible.



50 samples/rack × 3 racks = 150 samples



The sequence setting screen also responds to 3 racks.

Sequence setting of a maximum 5 racks (250 samples) is possible.

High function

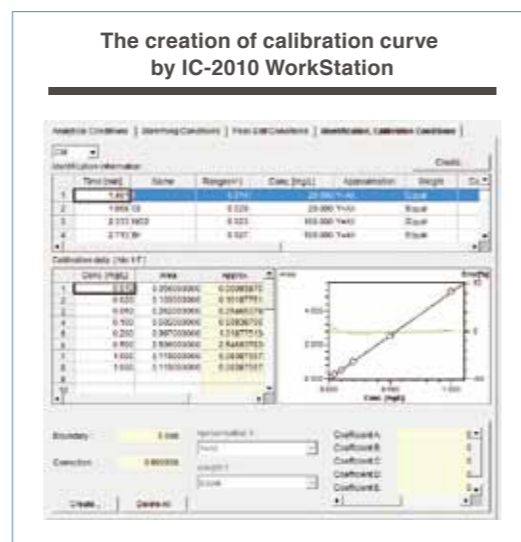
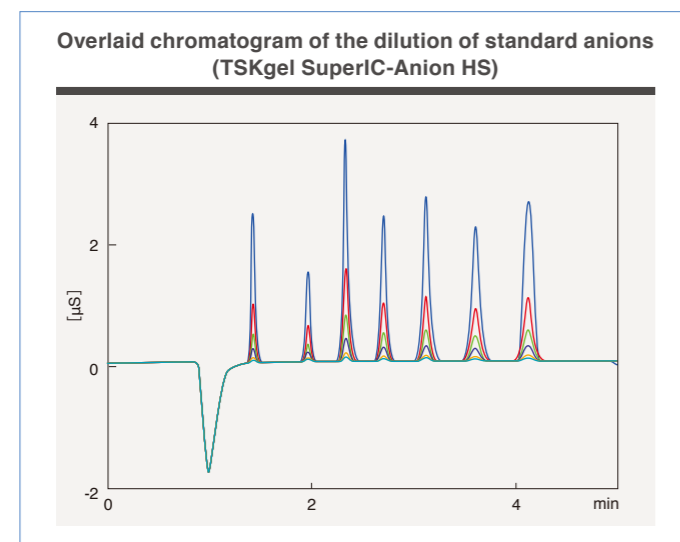
Automatic dilution function with 5-minutes dilution

The dilution and injection of samples containing high-concentration ion can be conducted continuously by the automatic dilution function of auto-sampler.

- Dilution ratio can be chosen from 6 levels including 2-fold, 5-fold, 10-fold, 20-fold, 50-fold, and 100-fold. They can be changed according to each sample.
- Dilution can be completed in 5 minutes. It is conducted during the measurement.
- Dilution reproducibility is realized within CV 1 % (area).
- Calibration curve can also be created by the control of IC-2010 WorkStation.

Dilution procedure is as the followings. First draw the original solution from the standard cup into the dilution cup, and mix with diluent.

25 samples can be set on each rack when using dilution function.



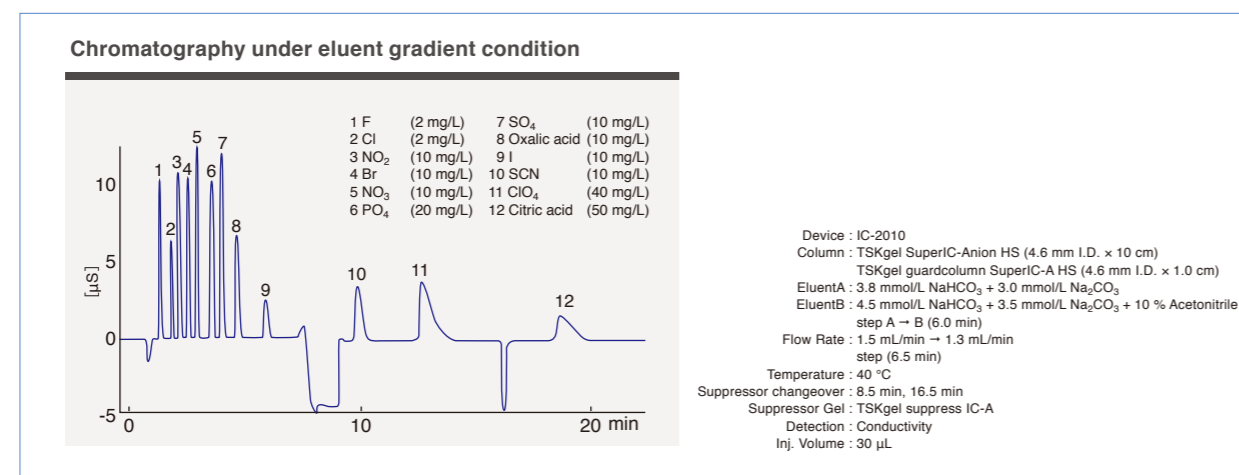
High function

Eluent and Flow Gradient function

Eluent gradient and flow gradient is possible.

It is convenient for simultaneous measurement of wide range retention capacity ions. And the cleaning of column can be efficiently performed.

- Analysis time is greatly shortened by eluent step gradient.
- Column cleaning can be efficiently performed by flow rate step gradient.
- The degasser has two flow line.

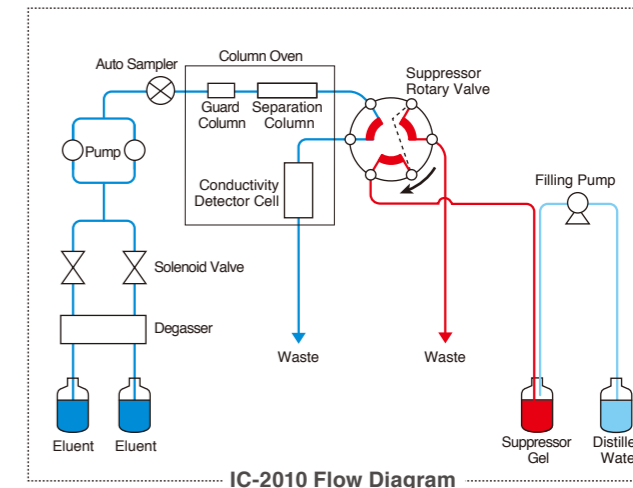


High sensitivity

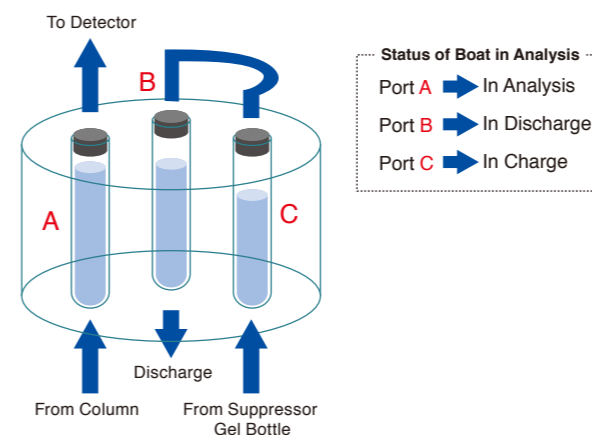
Automatic gel replacing suppressor system

Stable continuous high-sensitive analysis can be achieved by gel suppressor system which consists of suppressor gel and rotary valve.

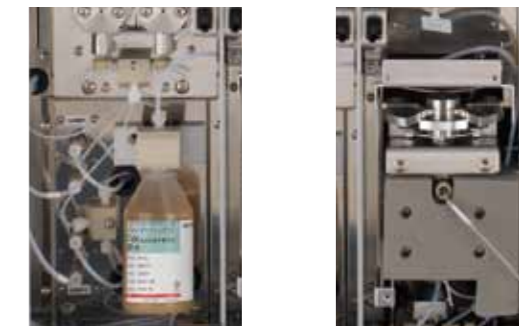
- Suppressor gel is automatically replaced according to the injection timing of auto-sampler.
 - The regeneration procedure of suppressor is not needed.
 - The contaminants from sampler do not accumulate in suppressor.
 - There will be no sensitivity decrease due to suppressor degradation.
- The diffusion of samples is lessened due to low dead volume.
- Suppressor gel lackness sensor is equipped.
- 2 types of suppressor bottle are available. (60 mL, 30 mL)



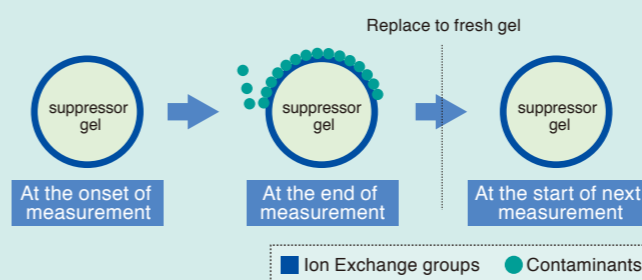
Suppressor Gel Replacement



Suppressor Gel Bottle (60 mL) Suppressor Rotary Valve



Features of Gel Suppressor System



Gel suppressor system conducts suppressor gel replacement automatically according to the injection timing of auto-sampler. Suppressor gel is not influenced by contaminants from samples because fresh suppressor is used for each measurement. Even after many samples are treated, stable baseline analysis in each measurement is possible.

IC-2010 WorkStation

Data processing program dedicated to IC-2010 realizing advanced capability and ease of use

IC-2010 WorkStation, data processing program dedicated to IC-2010 comprises system control and data analysis. This software provides simple operation of system and high quality of data analysis by simple and easy operational functionality, high precision of measurement and excellent data management functionality.

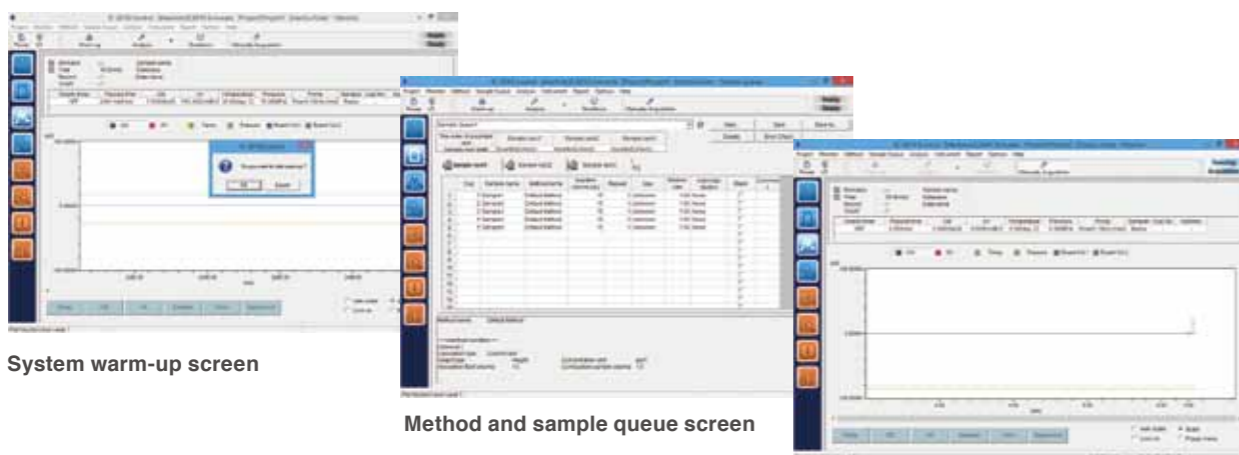


IC-2010 WS

Features of IC-2010 WorkStation

Easy operation from system warm-up to data acquisition

Simplified setup process improves ease of operation up to measurement.
Simple measurement schedule setup process realizes continuous multi-sample treatment.



System warm-up screen

Method and sample queue screen

Monitor screen at measurement start

Visual and ease-of-use data acquisition application

Visual system flow diagram provides ease of operation for each unit and system status monitoring.
Real time monitoring for chromatogram is available.
System log is available and can be checked analysis record.



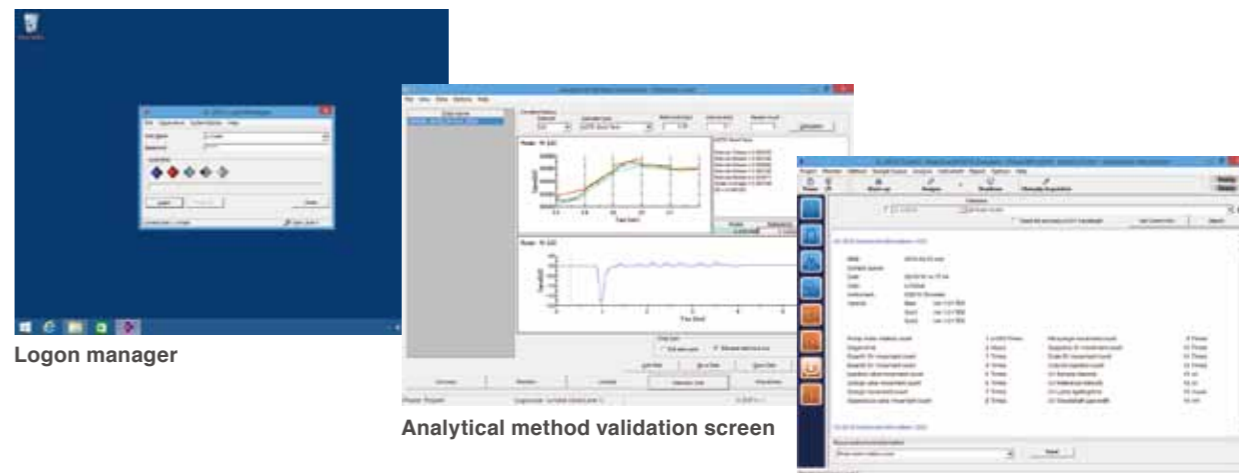
System flow diagram

Monitor screen

Execution history

Excellent data management

Authentication logon manager application enables easy confirmation of restriction of users or change log.
Method validation application enables monitoring of system precision easily.



Logon manager

Analytical method validation screen

System validation screen

High-performance Ion Chromatography Columns for IC-2010

IC Columns for Anion analysis

For Suppressor Mode

- TSKgel® SuperIC-Anion HS**
 - For high-throughput analysis (general inorganic anions)
 - Standard anions (F, Cl, NO₂, Br, NO₃, PO₄, SO₄) are analyzed within 5 minutes.
 - High resolution is realized by 3.5 μm particle size gel.
- TSKgel SuperIC-AZ**
 - For analysis of general inorganic anions, organic acids (formic acid, acetic acid, propionic acid) and halogen-oxide.
 - High resolution of more than 10,000 theoretical plates (for SO₄) is realized.
 - Organic solvents can be widely used (e.g. methanol and acetonitrile) for eluent and cleaning solution.
- TSKgel SuperIC-AP**
 - For analysis of general inorganic anions, organic acids (formic acid, acetic acid, propionic acid) and halogen-oxide.
- TSKgel SuperIC-Anion**
 - For analysis of general inorganic anions.

For Non-suppressor Mode

- TSKgel IC-Anion-PWxl**
 - For analysis of general inorganic ions and organic acids.
- TSKgel IC-Anion-SW**
 - For analysis of inorganic ions with a strong hydrophobic character.



Analytical Columns

Part Number	Product	Particle Size	Column Size	Ion Exchange Group	Shipping Solvent	Counter Ion
0022766	TSKgel SuperIC-Anion HS	3.5 μm	4.6 mm I.D. x 10 cm	Quaternary Ammonium Group	Eluent for column inspection *1	Carbonate Ion
0021444	TSKgel SuperIC-AZ	4 μm	4.6 mm I.D. x 15 cm	Quaternary Ammonium Group	Eluent for column inspection *2	Carbonate Ion
0019840	TSKgel SuperIC-AP	6 μm	4.6 mm I.D. x 15 cm	Quaternary Ammonium Group	Eluent for column inspection *3	Carbonate Ion
0019841	TSKgel SuperIC-AP	6 μm	4.6 mm I.D. x 7.5 cm	Quaternary Ammonium Group	Eluent for column inspection *3	Carbonate Ion
0019673	TSKgel SuperIC-Anion	5 μm	4.6 mm I.D. x 15 cm	Quaternary Ammonium Group	Eluent for column inspection *4	Carbonate Ion
0018010	TSKgel IC-Anion-PWxl	6 μm	4.6 mm I.D. x 7.5 cm	Quaternary Ammonium Group	Eluent for column inspection *5	Borate Ion
0006839	TSKgel IC-Anion-SW	5 μm	4.6 mm I.D. x 5 cm	Quaternary Ammonium Group	Methanol	Tartaric acid

*1 : 3.8 mmol/L Sodium Hydrogen Carbonate
 *2 : 6.3 mmol/L Sodium Hydrogen Carbonate + 1.7 mmol/L Sodium Carbonate
 *3 : 1.7 mmol/L Sodium Hydrogen Carbonate + 1.8 mmol/L Sodium Carbonate
 *4 : 6.0 mmol/L Sodium Tetraborate + 1.5 mmol/L Boric Acid + 0.2 mmol/L Sodium Hydrogen Carbonate
 *5 : Boric-Gluconic Buffer Solution

Guard Column

Part Number	Product	Column Size	Remarks
0022767	TSKgel guardcolumn SuperIC-A HS	4.6 mm I.D. x 1 cm	For TSKgel SuperIC-Anion HS
0021445	TSKgel guardcolumn SuperIC-AZ	4.6 mm I.D. x 1 cm	For TSKgel SuperIC-AZ
0019842	TSKgel guardcolumn SuperIC-AP	4.6 mm I.D. x 1 cm	For TSKgel SuperIC-AP
0019674	TSKgel guardcolumn SuperIC-A	4.6 mm I.D. x 1 cm	For TSKgel SuperIC-Anion

Guard Filter

Part Number	Product	Packaging	Remarks
0018014	Filter Kit (PEEK)	Holder + Filter Element	For TSKgel IC-Anion PWxl
0018012	Filter Element (PEEK)	3	

Suppressor Gel for IC-2010

Part Number	Product	Packaging	Measurable Sample Number	Remarks
0022770	TSKgel suppress IC-A	30 mL x 10	150 samples/bottle	For Anion Analysis
0022771	TSKgel suppress IC-A	60 mL x 15	300 samples/bottle	For Anion Analysis

IC Columns for Cation analysis

For Suppressor Mode

- TSKgel SuperIC-Cation HS II**
- TSKgel SuperIC-Cation HS**
 - For high-throughput analysis (mono-valent, di-valent cation)
 - Standard cations (Li, Na, NH₄, Mg, Ca, K) are analyzed within 5 minutes.
- TSKgel SuperIC-CR**
 - For analysis of mono-valent, di-valent cation.
 - Higher resolution for Na and NH₄
 - *can also be used for non-suppressor mode

For Non-suppressor Mode

- TSKgel IC-Cation I/IIHR**
 - For analysis of mono-valent, di-valent cation.
- TSKgel IC-Cation**
 - For analysis of mono-valent, di-valent cation.
- TSKgel IC-Cation-SW**
 - For analysis of transition metal Ion and rare-earth metal Ion.



Analytical Columns

Part Number	Product	Particle Size	Column Size	Ion Exchange Group	Shipping Solvent	Counter Ion
0022837	TSKgel SuperIC-Cation HS II	3 μm	4.6 mm I.D. x 10 cm	Carboxyl Group	Eluent for column inspection *6	Hydrogen Ion
0022768	TSKgel SuperIC-Cation HS	3 μm	4.6 mm I.D. x 10 cm	Carboxyl Group	Eluent for column inspection *7	Hydrogen Ion
0021475	TSKgel SuperIC-CR	3 μm	4.6 mm I.D. x 15 cm	Carboxyl Group	Eluent for column inspection *8	Hydrogen Ion
0018677	TSKgel IC-Cation I/IIHR	5 μm	4.6 mm I.D. x 10 cm	Carboxyl Group	Acetonitrile	Hydrogen Ion
0007171	TSKgel IC-Cation	10 μm	4.6 mm I.D. x 5 cm	Sulfonic acid Group	Nitric acid	Hydrogen Ion
0008055	TSKgel IC-Cation-SW	5 μm	4.6 mm I.D. x 5 cm	Sulfonic acid Group	Methanol	Hydrogen Ion

*6 : 4.0 mmol/L methanesulfonic acid + 1.1 mmol/L 18-crown 6-ether
 *7 : 3.0 mmol/L methanesulfonic acid + 0.4 mmol/L 18-crown 6-ether
 *8 : 2.2 mmol/L methanesulfonic acid + 1.0 mmol/L 18-crown 6-ether

Guard Column

Part Number	Product	Column Size	Remarks
0022840	TSKgel guardcolumn SuperIC-C HS II	4.6 mm I.D. x 1 cm	For TSKgel SuperIC-Cation HS II
0022769	TSKgel guardcolumn SuperIC-C HS	4.6 mm I.D. x 1 cm	For TSKgel SuperIC-Cation HS
0021476	TSKgel guardcolumn SuperIC-CR	4.6 mm I.D. x 1 cm	For TSKgel SuperIC-CA
0018678	TSKgel guardcolumn IC-Cation I/IIHR	4.6 mm I.D. x 0.5 cm	For TSKgel IC-Cation I/IIHR
0007172	TSKgel guardcolumn IC-C	4.6 mm I.D. x 5 cm	For TSKgel IC-Cation

Suppressor Gel for IC-2010

Part Number	Product	Packaging	Measurable Sample Number	Remarks
0022772	TSKgel suppress IC-C	30 mL x 10	150 samples/bottle	For Cation Analysis
0022773	TSKgel suppress IC-C	60 mL x 15	300 samples/bottle	For Cation Analysis

Column for Simultaneous Analysis of Anion and Cation

- TSKgel SuperIC-A/C**
 - Simultaneous analysis of anion and cation is realized by the use of ion-exclusion mode and ion-exchange mode.
 - Ion balance which is required in acid rain monitoring can be measured easily.
 - * This method uses the joint patent of National Institute of Advanced Industrial Science and Technology (AIST), Chubu Center and Tosoh. (Japan Patent No.2055752)



Analytical Column

Part Number	Product	Particle Size	Column Size	Shipping Solvent
0019843	TSKgel SuperIC-A/C	4 μm	6.0 mm I.D. x 15 cm	Water

Guard Column

Part Number	Product	Column Size	Remarks
0019844	TSKgel guardcolumn SuperIC-A/C	4.6 mm I.D. x 2 cm	For TSKgel SuperIC-A/C

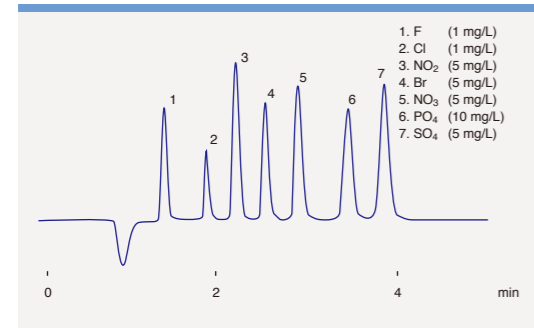
Column Connecting Parts

Part Number	Product	Packaging
0022106	Connecting Pipe Set *9	2 sets
0017898	Union 1/16" PEEK *9	5
0022460	Handy Connector PEEK	2

*9 These are the connecting parts to connect TSKgel IC-Anion-SW, TSKgel IC-Cation and TSKgel IC-Cation-SW with IC-2010.

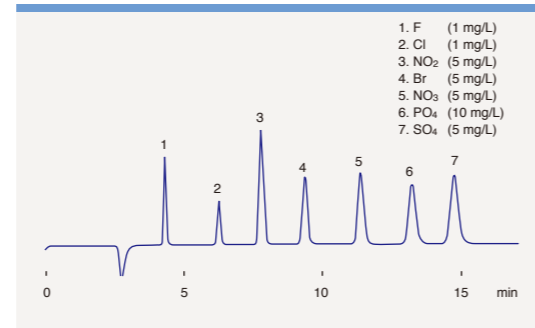


Separation of Standard Anions



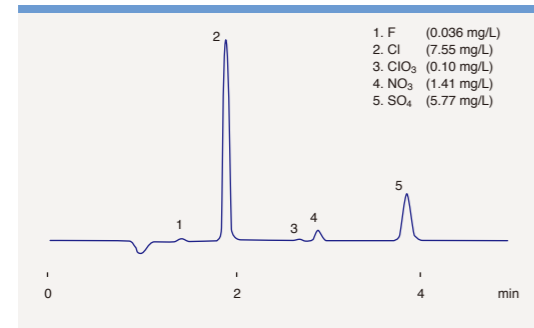
Column : TSKgel SuperC-Anion HS (4.6 mm I.D. x 10 cm, PEEK)
 TSKgel guardcolumn SuperC-A HS (4.6 mm I.D. x 1 cm, PEEK)
 Eluent : 3.8 mmol/L NaHCO₃ + 3.0 mmol/L Na₂CO₃
 Suppressor Gel : TSKgel suppress IC-A
 Flow Rate : 1.5 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C

Separation of Standard Anions



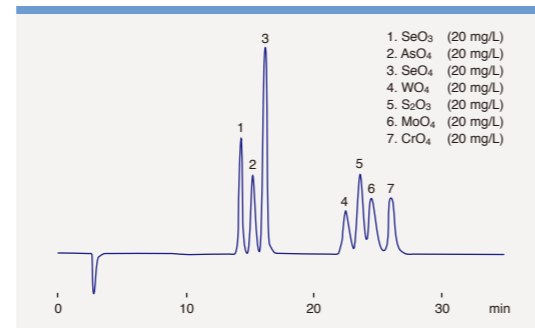
Column : TSKgel SuperC-AZ (4.6 mm I.D. x 15 cm, PEEK)
 TSKgel guardcolumn SuperC-AZ (4.6 mm I.D. x 1 cm, PEEK)
 Eluent : 1.9 mmol/L NaHCO₃ + 3.2 mmol/L Na₂CO₃
 Suppressor Gel : TSKgel suppress IC-A
 Flow Rate : 0.8 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C

Analysis of Tap Water



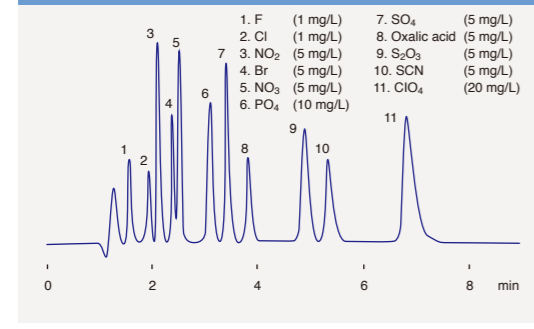
Column : TSKgel SuperC-Anion HS (4.6 mm I.D. x 10 cm, PEEK)
 TSKgel guardcolumn SuperC-A HS (4.6 mm I.D. x 1 cm, PEEK)
 Eluent : 3.8 mmol/L NaHCO₃ + 3.0 mmol/L Na₂CO₃
 Suppressor Gel : TSKgel suppress IC-A
 Flow Rate : 1.5 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C

Separation of Hydrophobic Anions



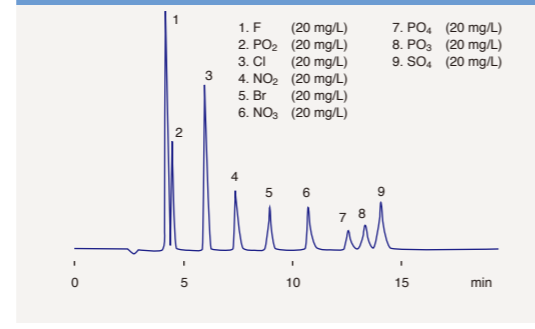
Column : TSKgel SuperC-AZ (4.6 mm I.D. x 15 cm, PEEK)
 TSKgel guardcolumn SuperC-AZ (4.6 mm I.D. x 1 cm, PEEK)
 Eluent : 1.9 mmol/L NaHCO₃ + 3.2 mmol/L Na₂CO₃
 Suppressor Gel : TSKgel suppress IC-A
 Flow Rate : 0.8 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C

Separation of Standard Anions Containing Hydrophobic Anions



Column : TSKgel SuperC-Anion HS (4.6 mm I.D. x 10 cm, PEEK)
 TSKgel guardcolumn SuperC-A HS (4.6 mm I.D. x 1 cm, PEEK)
 Eluent : 5.7 mmol/L NaHCO₃ + 4.5 mmol/L Na₂CO₃ + 20 % Acetonitrile
 Suppressor Gel : TSKgel suppress IC-A
 Flow Rate : 1.2 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C

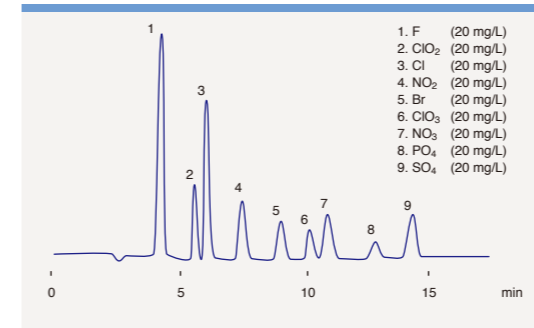
Separation of Phosphoric Acid, Phosphorous Acid, and Hypophosphorous Acid



Column : TSKgel SuperC-AZ (4.6 mm I.D. x 15 cm, PEEK)
 TSKgel guardcolumn SuperC-AZ (4.6 mm I.D. x 1 cm, PEEK)
 Eluent : 1.9 mmol/L NaHCO₃ + 3.2 mmol/L Na₂CO₃
 Suppressor Gel : TSKgel suppress IC-A
 Flow Rate : 0.8 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C

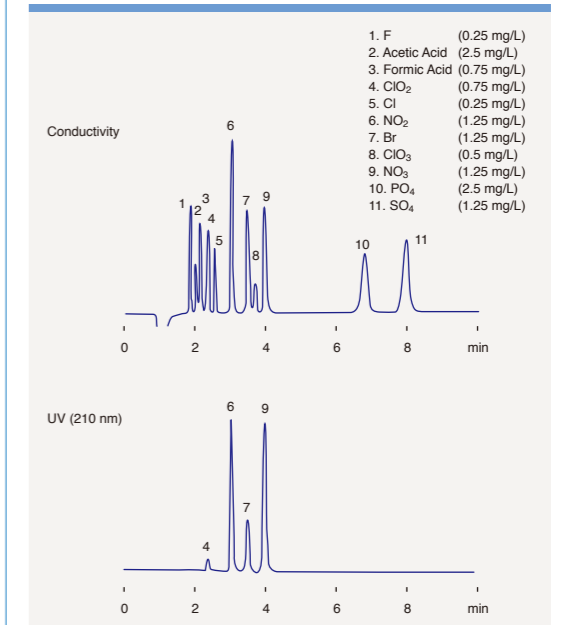


Separation of Hypochlorite and Chloric Acids



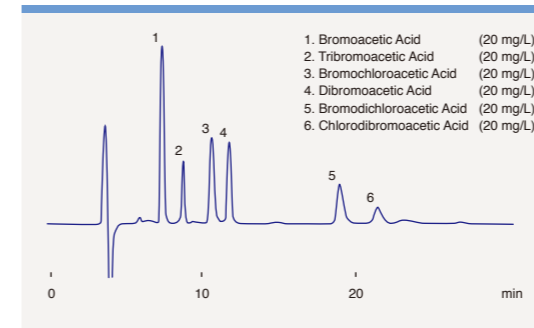
Column : TSKgel SuperC-AZ (4.6 mm I.D. x 15 cm, PEEK)
 TSKgel guardcolumn SuperC-AZ (4.6 mm I.D. x 1 cm, PEEK)
 Eluent : 1.9 mmol/L NaHCO₃ + 3.2 mmol/L Na₂CO₃
 Suppressor Gel : TSKgel suppress IC-A
 Flow Rate : 0.8 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C

Separation of Anions for Water Quality Control



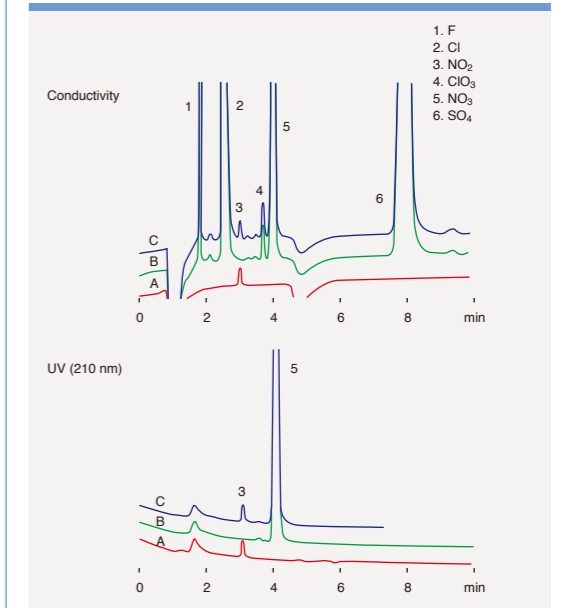
Column : TSKgel SuperC-Anion HS (4.6 mm I.D. x 10 cm, PEEK)
 TSKgel guardcolumn SuperC-A HS (4.6 mm I.D. x 1 cm, PEEK)
 Eluent : 7.5 mmol/L NaHCO₃ + 0.8 mmol/L Na₂CO₃
 Suppressor Gel : TSKgel suppress IC-A
 Flow Rate : 1.5 mL/min
 Inj. Volume : 100 µL
 Detection : Conductivity, UV (210 nm)
 Temperature : 40 °C

Separation of Halogenated Acetic Acids



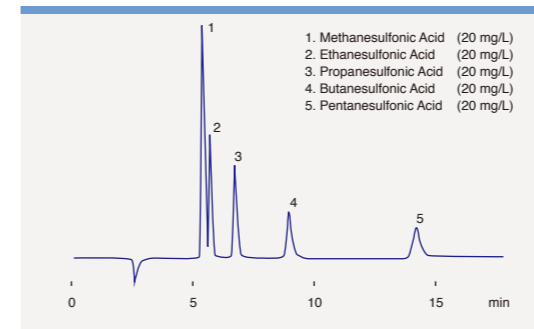
Column : TSKgel SuperC-AZ (4.6 mm I.D. x 5 cm, PEEK)
 TSKgel guardcolumn SuperC-AZ (4.6 mm I.D. x 1 cm, PEEK)
 Eluent : 1.9 mmol/L NaHCO₃ + 3.2 mmol/L Na₂CO₃ + 23 % Acetonitrile
 Suppressor Gel : TSKgel suppress IC-A
 Flow Rate : 0.6 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C

Analysis of Nitric Nitrogen in Tap Water



Column : TSKgel SuperC-Anion HS (4.6 mm I.D. x 10 cm, PEEK)
 TSKgel guardcolumn SuperC-A HS (4.6 mm I.D. x 1 cm, PEEK)
 Eluent : 7.5 mmol/L NaHCO₃ + 0.8 mmol/L Na₂CO₃
 Suppressor Gel : TSKgel suppress IC-A
 Flow Rate : 1.5 mL/min
 Inj. Volume : 100 µL
 Detection : Conductivity, UV (210 nm)
 Temperature : 40 °C
 A : Standard nitrite ion (0.004 mg/L as NO₂-N)
 B : Tap water
 C : Tap water (nitrite ion spiked, 0.004 mg/L as NO₂-N)
 * Ethylenediamine solution (50 mg/mL) is added in each samples (1 mL).

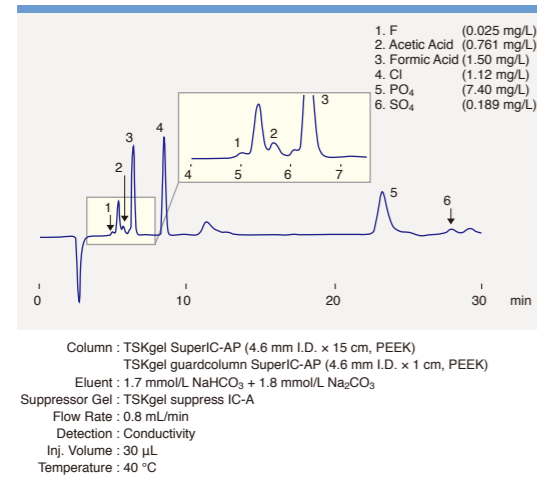
Separation of Alkylsulfonates



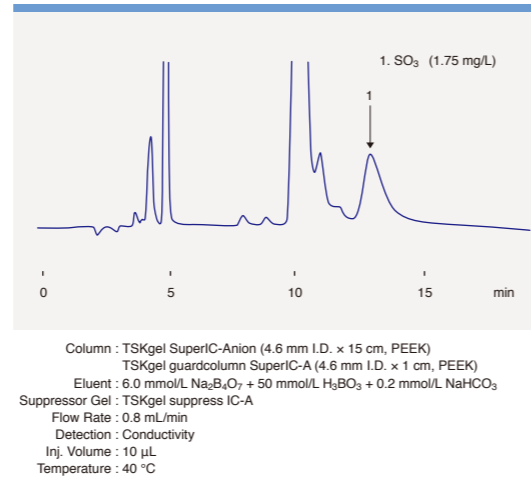
Column : TSKgel SuperC-AZ (4.6 mm I.D. x 15 cm, PEEK)
 TSKgel guardcolumn SuperC-AZ (4.6 mm I.D. x 1 cm, PEEK)
 Eluent : 6.3 mmol/L NaHCO₃ + 1.7 mmol/L Na₂CO₃
 Suppressor Gel : TSKgel suppress IC-A
 Flow Rate : 0.8 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C



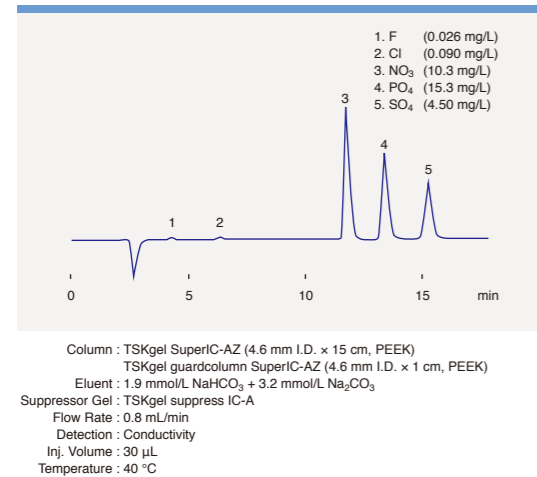
Analysis of Industrial Waste Water



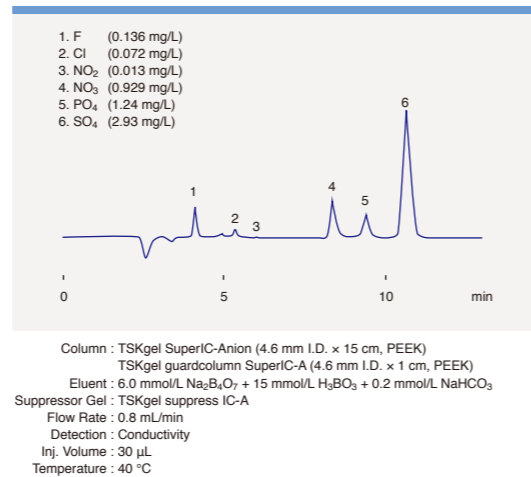
Analysis of Sulfite in the Disposable Chopsticks



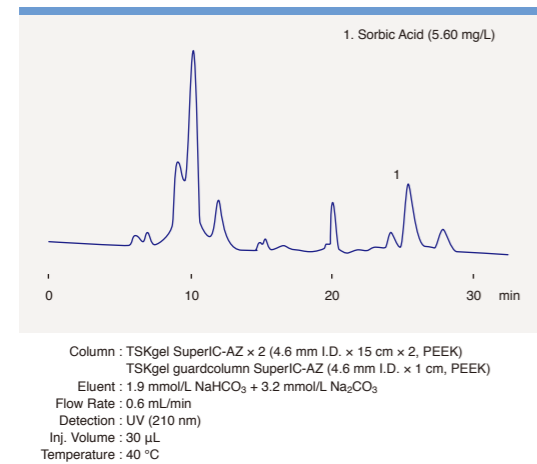
Analysis of Solid Fertilizer



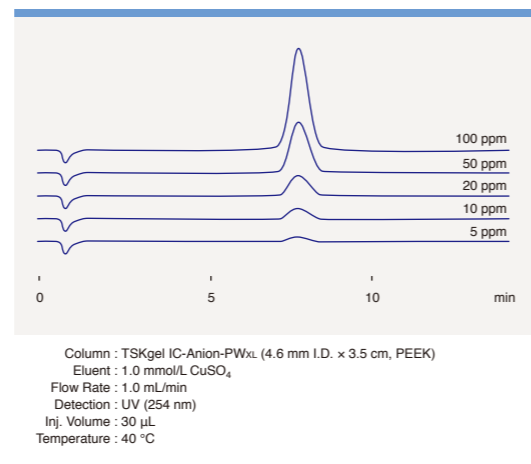
Analysis of Soil Extract



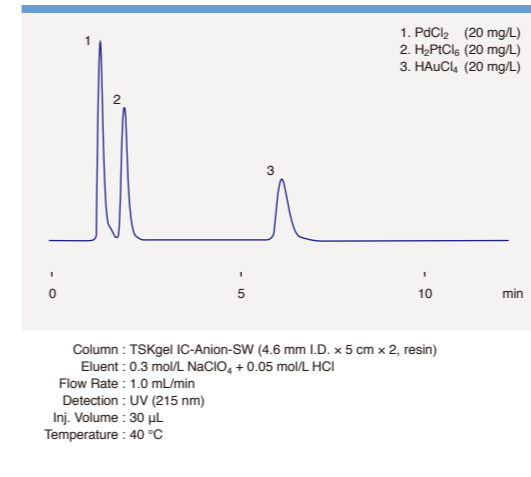
Analysis of Sorbate Acid in Miso Soup



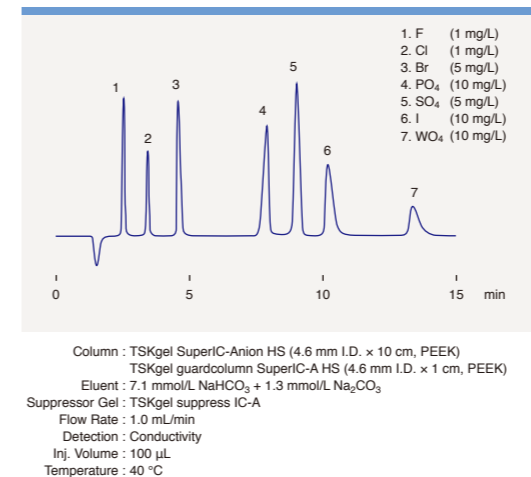
Analysis of EDTA



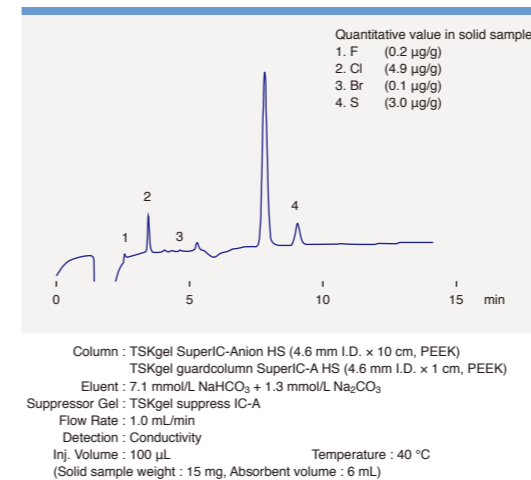
Separation of Precious Metal Ions



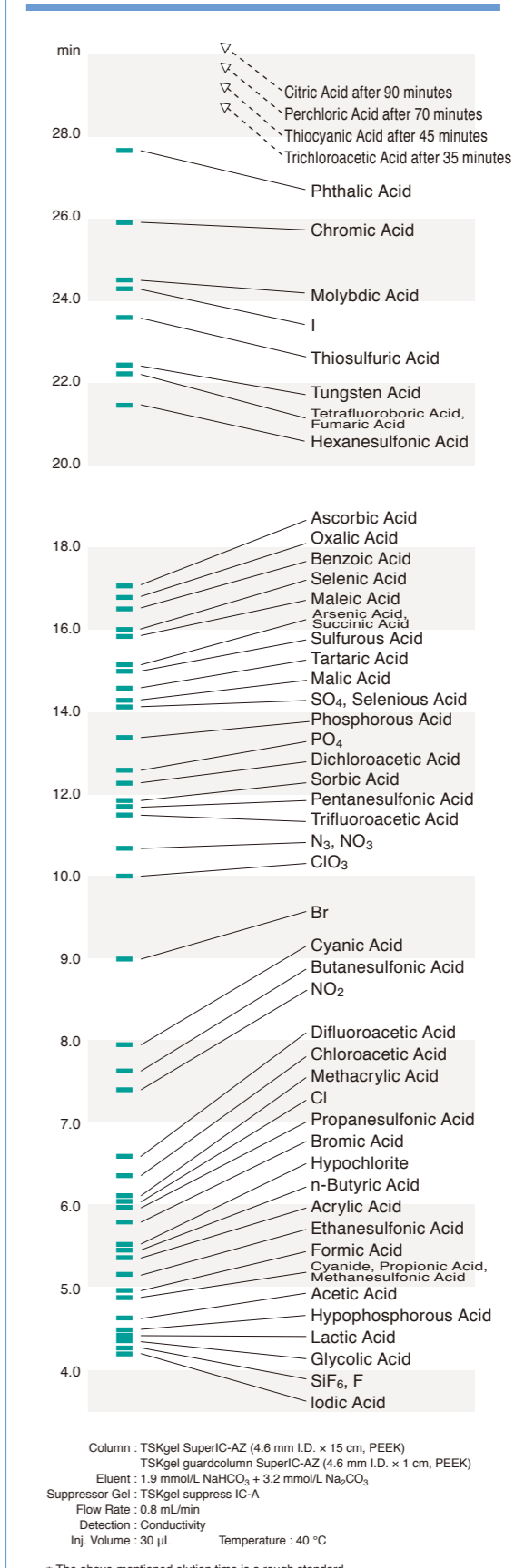
Separation of Anions for Combustion-Ion Chromatography



Analysis of Polystyrene by Combustion-Ion Chromatography



TSKgel SuperIC-AZ Retention Time Index

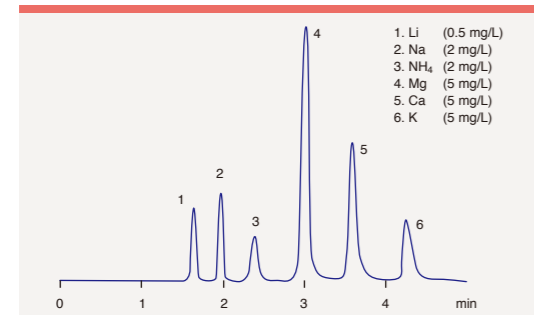


Cation

Application Data

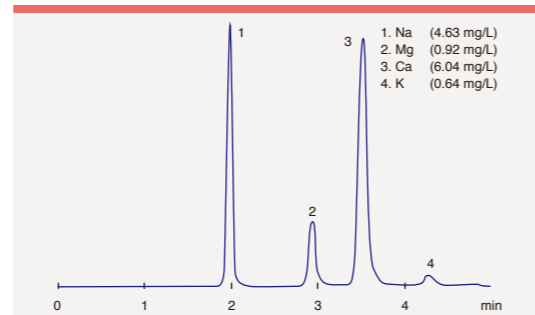


Separation of Standard Cations



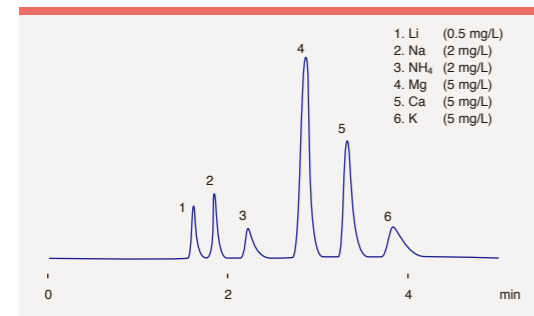
Column : TSKgel SuperIC-Cation HS II (4.6 mm I.D. x 10 cm, PEEK)
 TSKgel guardcolumn SuperIC-C HS II (4.6 mm I.D. x 1 cm, PEEK)
 Eluent : 4.0 mmol/L Methanesulfonic Acid + 1.1 mmol/L 18-Crown-6
 Suppressor Gel : TSKgel suppress IC-C
 Flow Rate : 1.2 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C

Analysis of Tap Water



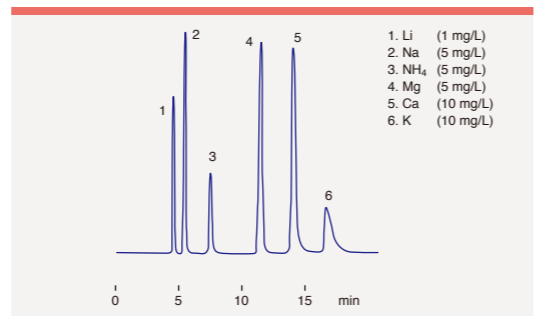
Column : TSKgel SuperIC-Cation HS II (4.6 mm I.D. x 10 cm, PEEK)
 TSKgel guardcolumn SuperIC-C HS II (4.6 mm I.D. x 1 cm, PEEK)
 Eluent : 4.0 mmol/L Methanesulfonic Acid + 1.1 mmol/L 18-Crown-6
 Suppressor Gel : TSKgel suppress IC-C
 Flow Rate : 1.2 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C

Separation of Standard Cations



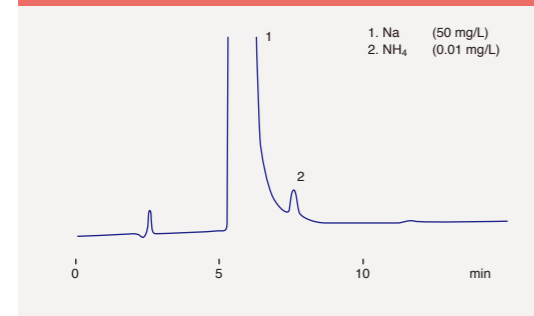
Column : TSKgel SuperIC-Cation HS (4.6 mm I.D. x 10 cm, PEEK)
 TSKgel guardcolumn SuperIC-C HS (4.6 mm I.D. x 1 cm, PEEK)
 Eluent : 3.0 mmol/L Methanesulfonic Acid + 0.4 mmol/L 18-Crown-6
 + 0.2 mmol/L Histidine
 Suppressor Gel : TSKgel suppress IC-C
 Flow Rate : 1.2 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C

Separation of Standard Cations



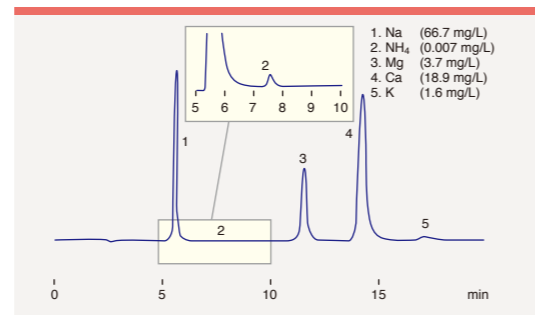
Column : TSKgel SuperIC-CR (4.6 mm I.D. x 15 cm, PEEK)
 TSKgel guardcolumn SuperIC-CR (4.6 mm I.D. x 1 cm, PEEK)
 Eluent : 2.2 mmol/L Methanesulfonic Acid + 1.0 mmol/L 18-Crown-6
 + 0.5 mmol/L Histidine
 Suppressor Gel : TSKgel suppress IC-C
 Flow Rate : 0.7 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C

Separation of Trace level of NH₄-N in high conc. of Na



Column : TSKgel SuperIC-CR (4.6 mm I.D. x 15 cm, PEEK)
 TSKgel guardcolumn SuperIC-CR (4.6 mm I.D. x 1 cm, PEEK)
 Eluent : 2.2 mmol/L Methanesulfonic Acid + 1.0 mmol/L 18-Crown-6
 + 0.5 mmol/L Histidine
 Suppressor Gel : TSKgel suppress IC-C
 Flow Rate : 0.7 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C

Analysis of River Water



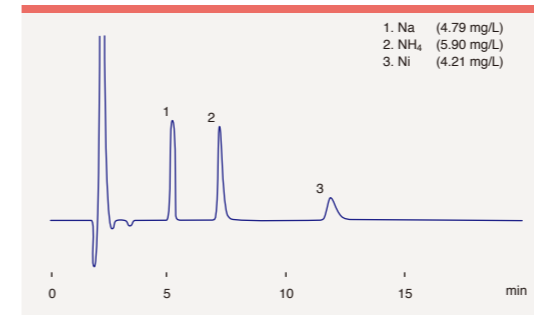
Column : TSKgel SuperIC-CR (4.6 mm I.D. x 15 cm, PEEK)
 TSKgel guardcolumn SuperIC-CR (4.6 mm I.D. x 1 cm, PEEK)
 Eluent : 2.2 mmol/L Methanesulfonic Acid + 1.0 mmol/L 18-Crown-6
 + 0.5 mmol/L Histidine
 Suppressor Gel : TSKgel suppress IC-C
 Flow Rate : 0.7 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C

Cation

Application Data

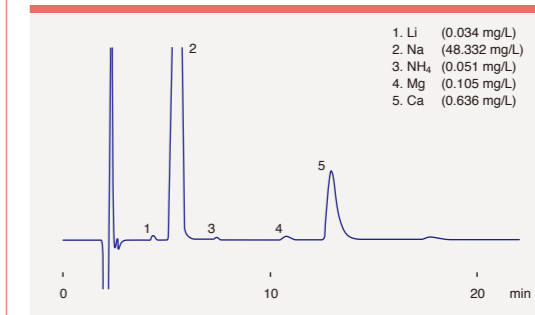


Analysis of Nickel Plating Solution



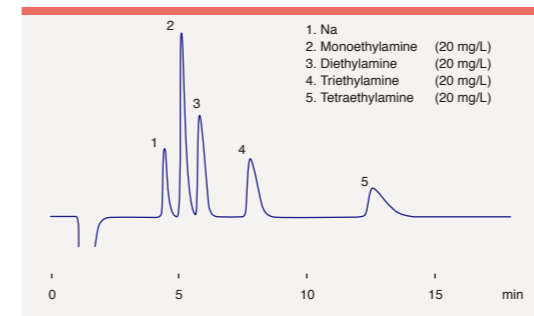
Column : TSKgel SuperIC-CR (4.6 mm I.D. x 15 cm, PEEK)
 TSKgel guardcolumn SuperIC-CR (4.6 mm I.D. x 1 cm, PEEK)
 Eluent : 2.2 mmol/L Methanesulfonic Acid + 1.0 mmol/L 18-Crown-6
 Suppressor Gel : TSKgel suppress IC-C
 Flow Rate : 0.7 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C

Analysis of Hot Spring Water



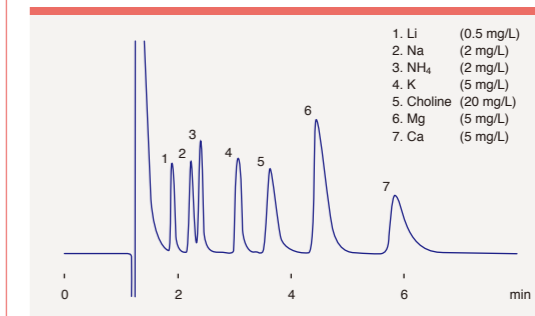
Column : TSKgel SuperIC-CR (4.6 mm I.D. x 15 cm, PEEK)
 TSKgel guardcolumn SuperIC-CR (4.6 mm I.D. x 1 cm, PEEK)
 Eluent : 2.2 mmol/L Methanesulfonic Acid + 1.0 mmol/L 18-Crown-6
 Suppressor Gel : TSKgel suppress IC-C
 Flow Rate : 0.7 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C

Separation of Ethylamines



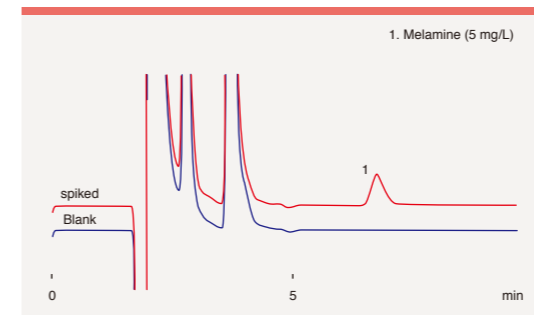
Column : TSKgel IC-Cation I/IIHR (4.6 mm I.D. x 10 cm)
 TSKgel guardcolumn IC-Cation I/IIHR (4.6 mm I.D. x 1 cm)
 Eluent : 1.2 % Propionic Acid/Acetonitrile=75/25
 Flow Rate : 1.0 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C

Separation of Choline



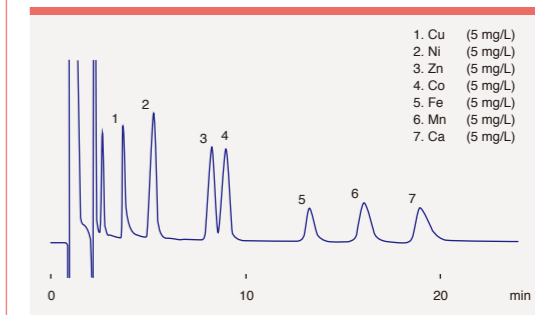
Column : TSKgel IC-Cation I/IIHR (4.6 mm I.D. x 10 cm)
 TSKgel guardcolumn IC-Cation I/IIHR (4.6 mm I.D. x 1 cm)
 Eluent : 2.5 mmol/L HNO₃
 Flow Rate : 1.0 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C

Analysis of Melamine in Milk



Column : TSKgel IC-Cation I/IIHR (4.6 mm I.D. x 10 cm)
 TSKgel guardcolumn IC-Cation I/IIHR (4.6 mm I.D. x 1 cm)
 Eluent : 3.0 mmol/L HNO₃/Acetonitrile=9/1
 Flow Rate : 0.7 mL/min
 Detection : Conductivity
 Inj. Volume : 30 µL
 Temperature : 40 °C

Separation of Heavy-metal Ions



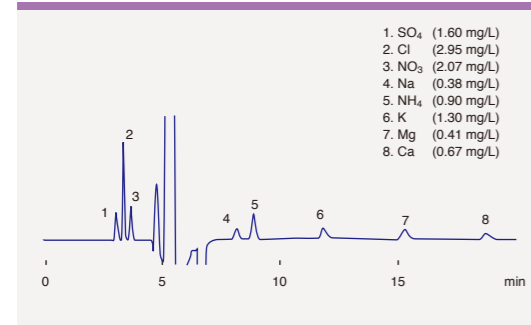
Column : TSKgel IC-Cation-SW (4.6 mm I.D. x 7.5 cm)
 Eluent : 3.5 mmol/L Ethylenediamine + 10 mmol/L Citric Acid
 Flow Rate : 1.0 mL/min
 Detection : Conductivity
 Inj. Volume : 200 µL
 Temperature : 40 °C

● Anion/Cation Simultaneous Analysis

Application Data

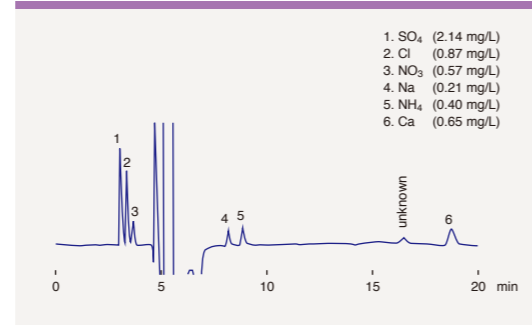


Separation of Standard Anions/Cations



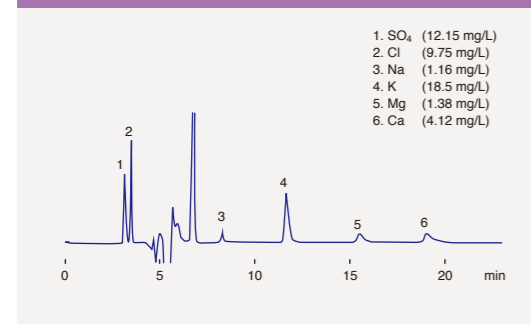
Column : TSKgel SuperIC-A/C (6.0 mm I.D. × 15 cm, SUS)
 TSKgel guardcolumn SuperIC-A/C (4.6 mm I.D. × 2 cm, SUS)
 Eluent : 6 mmol/L 18-Crown-6 + 0.45 mmol/L 5-Sulfosalicylic Acid
 + 5 mmol/L L-Tartaric Acid + 5 % Acetonitrile
 Flow Rate : 0.6 mL/min
 Detection : Conductivity
 Inj. Volume : 30 μL
 Temperature : 40 °C

Analysis of Rain Water



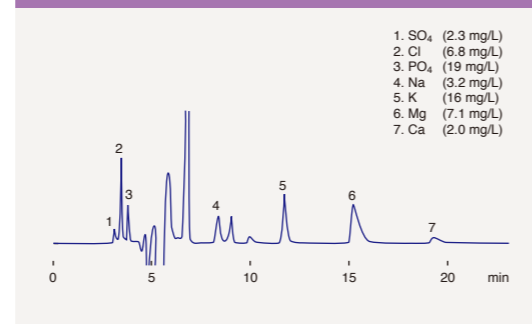
Column : TSKgel SuperIC-A/C (6.0 mm I.D. × 15 cm, SUS)
 TSKgel guardcolumn SuperIC-A/C (4.6 mm I.D. × 2 cm, SUS)
 Eluent : 6 mmol/L 18-Crown-6 + 0.45 mmol/L 5-Sulfosalicylic Acid
 + 5 mmol/L L-Tartaric Acid + 5 % Acetonitrile
 Flow Rate : 0.6 mL/min
 Detection : Conductivity
 Inj. Volume : 30 μL
 Temperature : 40 °C

Analysis of Brown Sugar (5 g/L)



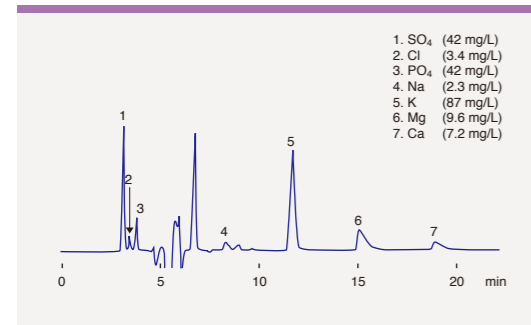
Column : TSKgel SuperIC-A/C (6.0 mm I.D. × 15 cm, SUS)
 TSKgel guardcolumn SuperIC-A/C (4.6 mm I.D. × 2 cm, SUS)
 Eluent : 6 mmol/L 18-Crown-6 + 0.45 mmol/L 5-Sulfosalicylic Acid
 + 5 mmol/L L-Tartaric Acid + 5 % Acetonitrile
 Flow Rate : 0.6 mL/min
 Detection : Conductivity
 Inj. Volume : 30 μL
 Temperature : 40 °C

Analysis of Rice Vinegar (25-fold Dilution)



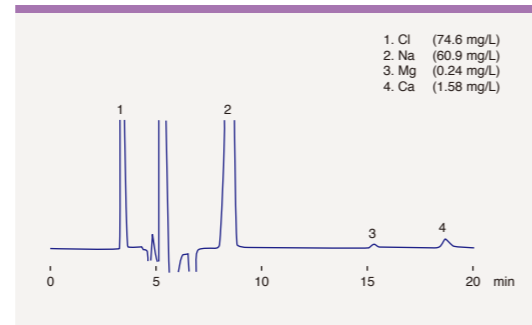
Column : TSKgel SuperIC-A/C (6.0 mm I.D. × 15 cm, SUS)
 TSKgel guardcolumn SuperIC-A/C (4.6 mm I.D. × 2 cm, SUS)
 Eluent : 6 mmol/L 18-Crown-6 + 0.45 mmol/L 5-Sulfosalicylic Acid
 + 5 mmol/L L-Tartaric Acid + 5 % Acetonitrile
 Flow Rate : 0.6 mL/min
 Detection : Conductivity
 Inj. Volume : 30 μL
 Temperature : 40 °C

Analysis of Red Wine (10-fold Dilution)



Column : TSKgel SuperIC-A/C (6.0 mm I.D. × 15 cm, SUS)
 TSKgel guardcolumn SuperIC-A/C (4.6 mm I.D. × 2 cm, SUS)
 Eluent : 6 mmol/L 18-Crown-6 + 0.45 mmol/L 5-Sulfosalicylic Acid
 + 5 mmol/L L-Tartaric Acid + 5 % Acetonitrile
 Flow Rate : 0.6 mL/min
 Detection : Conductivity
 Inj. Volume : 30 μL
 Temperature : 40 °C

Analysis of Infusion Solution (50-fold Dilution)



Column : TSKgel SuperIC-A/C (6.0 mm I.D. × 15 cm, SUS)
 TSKgel guardcolumn SuperIC-A/C (4.6 mm I.D. × 2 cm, SUS)
 Eluent : 6 mmol/L 18-Crown-6 + 0.45 mmol/L 5-Sulfosalicylic Acid
 + 5 mmol/L L-Tartaric Acid + 5 % Acetonitrile
 Flow Rate : 0.6 mL/min
 Detection : Conductivity
 Inj. Volume : 30 μL
 Temperature : 40 °C

■ Filter & Cartridge for Sample Pretreatment



■ Pretreatment filter Series

Pretreatment filter is disposable disc filter developed for sample pretreatment of HPLC. It can contribute to column life time extension and improvement of data reproducibility.

Product	W-3-2	W-13-2	W-25-2	W-3-5	W-13-5	W-25-5	
Diameter	mm	3	13	25	3	13	25
Part Number		0016145	0016146	0016147	0016148	0016149	0016150
Pore Size	μm	0.2		0.5			
Membrane Material	Cellulose Acetate						
Housing Material	Polypropylene						
Size (φ × L)	mm	7 × 19	18 × 19	30 × 24	7 × 19	18 × 19	30 × 24
Effective Filtration Area	cm ²	0.06	0.9	4	0.06	0.9	4
Amount of Residual Liquid	μL	< 10	< 30	< 100	< 10	< 30	< 100
Pressure Limit	MPa (25 °C)	1					
Maximum Operating Temperature	°C	60					
Possible Sterilization Method	Ethylene Oxide Gas Sterilization						
Connection	Outlet	Lure Lock					
	Inlet	Lure Slip					
Packaging Unit	Number/Box	100					

■ TOYOPAK® Series

TOYOPAK is cartridge for solid phase extraction. Various kinds of gel are packed in the polypropylene housing. It is easy to operate due to disposable type.



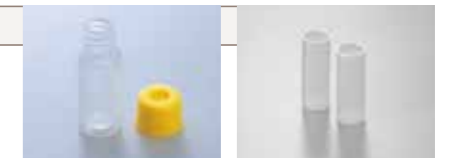
Part Number	Product	Ion Exchange Group	Amount of Gel	Ion Exchange Capacity
0008489	TOYOPAK IC-SP M	Sulfopropyl Group	1.0 mL	0.4 meq
0008592	TOYOPAK DEAE M	Diethylaminoethyl Group	1.0 mL	0.1 meq
0008487	TOYOPAK ODS M	Octadecyl Group	300 mg	

■ Directions for Pretreatment Filter & TOYOPAK Series

Types	Specifications	Purpose	Preparation Method	Product
Microfilter	Pore 0.2 μm	to remove substances with size more than 0.2 μm	After it is cleaned with more than 10 mL pure water, load samples and collect the filtrate.	Pretreatment Filter W-3-2 W-13-2 W25-2
	Pore 0.45 μm	to remove substances with size more than 0.45 μm	After it is cleaned with more than 10 mL pure water, load samples and collect the filtrate.	Pretreatment Filter W-3-5 W-13-5 W-25-5
ODS Cartridge	Cartridge packed with octadecyl gel	to remove hydrophobic organic substances	After it is cleaned with more than 20 mL pure water, load samples and collect the filtrate.	TOYOPAK ODS M
SP Cartridge	Cartridge packed with sulfopropyl (H ⁺) gel	to remove cation * It is also suitable for the removal of halogen ion if changed into Ag type.	After it is cleaned with more than 20 mL pure water, load samples and collect the filtrate.	TOYOPAK IC-SP M
DEAE Cartridge	Cartridge packed with diethyl aminoethyl (Cl ⁻) gel	to remove anion	After it is cleaned with more than 20 mL pure water, load samples and collect the filtrate.	TOYOPAK DEAE M

■ Sample Cup

Part Number	Product	Packaging
0019736	Sample cup	1,000
0019737	Cap	1,000
0022469	Dilution cup for IC-2010	100



Sample cup & Cap Dilution cup for IC-2010

For Anion Analysis

TSKgel SuperIC-Anion HS (Standard Condition)

Eluent Composition	3.8 mmol/L Sodium Hydrogen Carbonate + 3.0 mmol/L Sodium Carbonate	
Reagent for Use	Sodium Hydrogen Carbonate	319 mg
	Sodium Carbonate (anhydrous)	318 mg
Preparation Method	Mix the above weighed reagents with ultrapure water up to 1 L	

TSKgel SuperIC-Anion HS (High Resolution Condition)

Eluent Composition	7.5 mmol/L Sodium Hydrogen Carbonate + 0.8 mmol/L Sodium Carbonate	
Reagent for Use	Sodium Hydrogen Carbonate	630 mg
	Sodium Carbonate (anhydrous)	85 mg
Preparation Method	Mix the above weighed reagents with ultrapure water up to 1 L	

TSKgel SuperIC-AZ (Standard Condition)

Eluent Composition	1.9 mmol/L Sodium Hydrogen Carbonate + 3.2 mmol/L Sodium Carbonate	
Reagent for Use	Sodium Hydrogen Carbonate	160 mg
	Sodium Carbonate (anhydrous)	339 mg
Preparation Method	Mix the above weighed reagents with ultrapure water up to 1 L	

TSKgel SuperIC-AZ (High Resolution Condition)

Eluent Composition	7.5 mmol/L Sodium Hydrogen Carbonate + 1.1 mmol/L Sodium Carbonate	
Reagent for Use	Sodium Hydrogen Carbonate	630 mg
	Sodium Carbonate (anhydrous)	117 mg
Preparation Method	Mix the above weighed reagents with ultrapure water up to 1 L	

TSKgel SuperIC-AP

Eluent Composition	2.9 mmol/L Sodium Hydrogen Carbonate + 3.1 mmol/L Sodium Carbonate	
Reagent for Use	Sodium Hydrogen Carbonate	244 mg
	Sodium Carbonate (anhydrous)	329 mg
Preparation Method	Mix the above weighed reagents with ultrapure water up to 1 L	

TSKgel SuperIC-Anion

Eluent Composition	6 mmol/L Sodium Tetraborate + 15 mmol/L Boracic Acid + 0.2 mmol/L Sodium Hydrogen Carbonate	
Reagent for Use	Boracic Acid	928 mg
	Sodium Tetraborate Decahydrate	2.3 g
	Sodium Hydrogen Carbonate	17 mg
Preparation Method	Mix the above weighed reagents with ultrapure water up to 1 L	

For Cation Analysis

TSKgel SuperIC-Cation HS II (Standard Condition)

Eluent Composition	4.0 mmol/L Methanesulfonic Acid + 1.1 mmol/L 18-Crown-6	
Reagent for Use	2 mol/L Methanesulfonic Acid solution	2.0 mL
	18-Crown-6	291 mg
Preparation Method	Mix the above weighed reagents with ultrapure water up to 1 L	

TSKgel SuperIC-Cation HS II (High Resolution Condition)

Eluent Composition	3.0 mmol/L Methanesulfonic Acid + 2.7 mmol/L 18-Crown-6	
Reagent for Use	2 mol/L Methanesulfonic Acid solution	1.5 mL
	18-Crown-6	714 mg
Preparation Method	Mix the above weighed reagents with ultrapure water up to 1 L	

TSKgel SuperIC-Cation HS

Eluent Composition	3.0 mmol/L Methanesulfonic Acid + 0.4 mmol/L 18-Crown-6 + 0.2 mmol/L L-histidine	
Reagent for Use	2 mol/L Methanesulfonic Acid solution	1.5 mL
	18-Crown-6	106 mg
	L-histidine	31 mg
Preparation Method	Mix the above weighed reagents with ultrapure water up to 1 L	

TSKgel SuperIC-CR

Eluent Composition	2.2 mmol/L Methanesulfonic Acid + 1.0 mmol/L 18-Crown-6 + 0.5 mmol/L L-Histidine	
Reagent for Use	2 mol/L Methanesulfonic Acid solution	1.1 mL
	18-Crown-6	264 mg
	L-Histidine	78 mg
Preparation Method	Mix the above weighed reagents with ultrapure water up to 1 L	

Simultaneous Analysis for Anions and Cations


TSKgel SuperIC-A/C

Eluent Composition	6 mmol/L 18-Crown-6 + 0.45 mmol/L 5-Sulfosalicylic Acid + 5 mmol/L L-Tartaric Acid + 5 % (v/v) Acetonitrile	
Reagent for Use	5-Sulfosalicylic Acid	114 mg
	L-Tartaric Acid	751 mg
	18-Crown-6	1.6 g
	Acetonitrile	50 mL
Preparation Method	Mix the above weighed reagents with ultrapure water up to 1 L	

※ Since 18-Crown-6 is poorly soluble, it is desirable to use the ultrasonic washer.
 ※ In order to decrease the adjustment error of the reagent concentration when preparing the eluent, it is recommended to prepare 10-fold concentrated solution at first and then to dilute it.

Configurations of Ion Chromatography System

IC-2010



Part Number	Name of Product/Type	Anion Measurement System	Cation Measurement System	Simultaneous Measurement System for Anion and Cation	2 System for Anion and Cation
0022400	Ion Chromatograph IC-2010	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> x2
0022410	Data Processing Program IC-2010 WorkStation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-	Column for Anion Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-	Guard Column for Anion Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-	Column for Cation Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-	Guard Column for Cation Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0019843	Column for Simultaneous Analysis of Anion and Cation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0019844	Guard Column for Simultaneous Analysis of Anion and Cation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-	Suppressor Gel TSKgel suppress IC-A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-	Suppressor Gel TSKgel suppress IC-C	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

※ Personal computer and printer are not included.
 ※ Column can be chosen from TSKgel SuperIC HS series and TSKgel SuperIC series. (Please refer to P10-P11)
 ※ UV-8320 IC can be connected (option).

Ion Chromatography System IC-2010 Specifications		
Measurement Mode		Suppressor System
		Non-suppressor System
Gradient		2-Solvent Low-pressure Step Gradient
		Flow Gradient
Degasser		Vacuum Degassing System
Liquid Feed Parts	Liquid Feed Pump	Dual Plunger System
	Flow Range	0.1~2.00 mL/min
	Flow Accuracy	Within $\pm 2\%$ (water)
	Flow Precision	Within $\pm 0.2\%$ (water)
	Pressure Limit	35 MPa
Sample Injecting Parts	Method	Loop Injection, Variable Volume Injection
	Number of Samples	150 (50 \times 3 rack)
	Standard loop	30 μ L
	Sample Injection Volume	10~500 μ L (1 μ L step)
Column Oven	Method of Temperature control	Temperature Control by Aluminum Block (PID Control)
	Range of Temperature control	25~45 (1 $^{\circ}$ C step)
	Accuracy of Temperature Setup	± 0.5 $^{\circ}$ C
	Precision of Temperature Control	± 0.1 $^{\circ}$ C
	Column Storage Availability	Analysis Column (4.6 mm I.D. \times 15 cm) \times 2 pieces Guard Column \times 1 piece
Suppressor	Method	3-Port, Suppressor Gel Replacement System
CM Detector	Method	Four-pole Electrode Method
	Detection Range	50, 500, 5000 μ S/cm
	Output Range	1/1, 1/2, 1/5, 1/10, 1/20
	Cell Capacity	0.6 μ L
	Noise	Below 0.2 nS/cm
	Temperature Control	Conducted in Column Oven
UV Detector (Option)	Type	UV-8320IC
	Method/Light Source	Dual Beam/Deuterium Lamp
	Wavelength Range	195~350 nm
	Range	0.5, 1, 2, 4 ABU/1V
	Cell Capacity	2 μ L
	Noise	2.5×10^{-5} ABU (254 nm, Air in Cell)
Control/Operation		Local Control Independent of Device and Remote Control by External PC
Data Processing		IC-2010 WorkStation Controlled by External PC
Wetted Material		Nonmetal Materials except for the Detector
External Dimensions		400 (W) \times 500 (H) \times 450 (D) mm
Weight		35 kg
Operation Environment	Temperature	15~35 $^{\circ}$ C
	Humidity	40~80 %
Power Source		AC100~240 V 50/60 Hz, 200 VA

IC WorkStation IC-2010 WorkStation Specifications		
System Control Function	Controllable Number	2 Systems (1 System/1USB Port)
	Device Connection	USB Cable
Data Collecting Function	Collection	2 Channel/System
	Maximum Collection Time	999.99 min
	Sampling Pitch	10 ms Step
	Setup Shutdown Function	<input type="radio"/>
	Weekly Timer	<input type="radio"/>
	Machinery Validation Function	<input type="radio"/>
Data Analysis Function	Calculation type	Peak normalization method, Absolute Calibration Curve Method, Column Test, Internal Reference Method
	Computing Standards	TOSOH, IUPAC, USP, JP
	Peak Detection	Automatic and Manual Peak Editing (Batched Waveform Processing is possible)
	Report Print	Printed according to the report layout
	Data Retrieval Function	<input type="radio"/>
	Statistic Calculation	<input type="radio"/>
Data Management Function	Format	Microsoft Access
	Batched Recalculation Function	<input type="radio"/> Handled by the Data Analysis Function
Others	Report Layout Function	Chromatogram Report, Method Report, Instrument Report, Instrument Validation Report, Analytical Method Validation Report
	Analysis Method Validation Function	Accuracy, Precision, Linearity, Detection Limit, Robustness
	Converter Function	Text, AIA Format, IC-2001 converter

● Personal Computer Recommended for IC WorkStation

Specifications	Contents
PCI Slot	Unnecessary
CPU	Higher than Core 2 Duo 2.0 GHz
Memory	Higher than 2 GB
HDD	Higher than 80 GB
Optical Drive	DVD/CD-RW Compound Drive
Monitor	17-inch Liquid Crystal
OS	Higher than Windows XP Professional Windows [®] 7 (32 bit)
Other Software	Microsoft [®] Office Professional 2010
Printer	Color, Monochrome inkjet or laser printer which can be used under Windows 7