

Thermo Scientific concentrator and trap columns

Keywords: Concentrator columns, trap columns, trace ion chromatography analysis, matrix elimination, pre-concentration, 2D-IC

Benefits

- Achieve lower detection limits to facilitate ultra trace analysis
- Easier integration of early eluting analytes vs. large-loop methods that introduce a large void volume in the baseline
- Remove matrix interferences while retaining analytes of interest

Thermo Scientific™ Dionex™ IonPac™ and Thermo Scientific™ Dionex™ IonSwift™ concentrator columns for anion, cation, and chelation ion chromatography are used to concentrate analytes, allowing determinations at µg/L (ppb) and sub-µg/L levels.

Dionex IonPac trap columns for anion and cation determinations prevent eluent contaminants from causing interfering peaks during gradient ion chromatography (IC).

Concentrator columns

Dionex IonPac concentrator columns are designed primarily for high-purity water analysis. The columns retain ions from a measured volume of aqueous sample matrix, thereby concentrating the analyte species and lowering detection limits. The advantage of using concentrator columns is the ability to perform routine analysis for ions at µg/L (ppb) to ng/L (ppt) levels.

Sample Preconcentration Using a 2 mm Dionex IonPac AS15 Column

Column: Dionex IonPac AG15, AS15, 2 mm
Concentrator
Column: Dionex IonPac AC15 (2 × 50 mm)
Eluent: Potassium hydroxide,
10 mM from 0 to 4 min,
10 mM to 40 mM from 4 min to 14 min,
40 mM to 60 mM from 14 to 18 min

Eluent Source: Dionex EGC III KOH
Temperature: 30 °C
Flow Rate: 0.5 mL/min
Inj. Volume: 20 mL, preconcentrated
Detection: Suppressed conductivity,
Dionex ASRS ULTRA 2 mm,
AutoSuppression
recycle mode

Peaks:		0.1 µg/L (ppb)
1.	Fluoride	0.1
2.	Acetate	0.1
3.	Formate	0.1
4.	Chloride	0.1
5.	Nitrite	0.1
6.	Carbonate	–
7.	Sulfate	0.1
8.	Oxalate	0.1
9.	Bromide	0.1
10.	Nitrate	0.1
11.	Phosphate	0.1

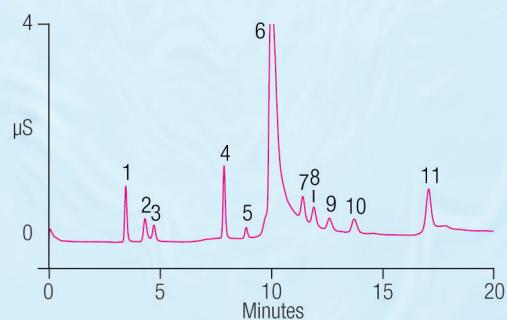


Figure 1 illustrates a typical IC trace-enrichment system configuration using a concentrator column. The sample is pumped across the concentrator column, as shown in Figure 1A. After the analytes from the sample are concentrated, the valve is switched. The concentrated analytes are then swept by the eluent from the concentrator column onto the analytical column, as shown in Figure 1B.

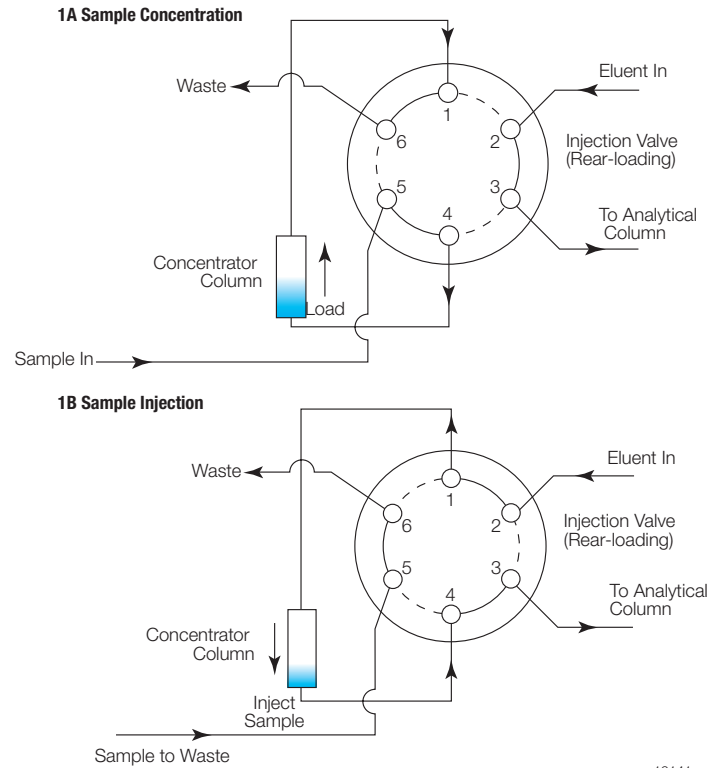
Figure 2 illustrates the configuration of a 2D-IC system using a capillary concentrator column on an analytical-capillary hybrid system. The concentrator column is placed between the first and second dimension of the 2D system set-up; a cut volume then is focused on the capillary concentration column, then eluted onto a second dimension column.

Figures 3-11 show trace-level anion determinations using a concentrator column. This concentrator system can also be used for the determination of trace cations and transition metals, as shown in Figures 12 and 13.

Ordering information

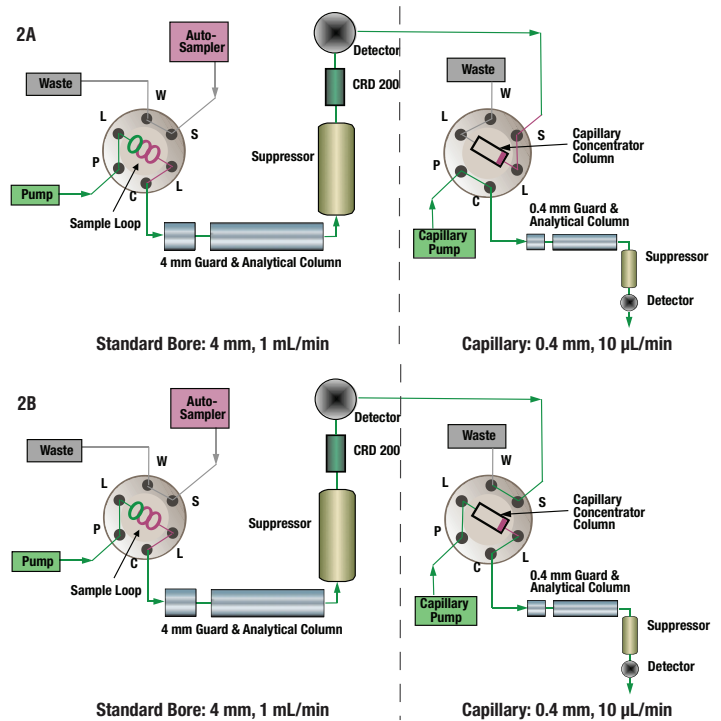
**Monolith anion concentrator
(Dionex IonSwift MAC-100 concentrator column)
(0.5 × 80 mm).....P/N 074702**

The Thermo Scientific™ Dionex™ IonSwift™ MAC-100 monolith anion concentrator column is designed primarily for high-purity water analysis. The Dionex IonSwift MAC-100 concentrator column is a general purpose, ultra-low-pressure anion concentrator designed for use with Thermo Scientific™ Dionex™ IonPac™ anion capillary columns and Thermo Scientific™ Dionex™ IonSwift™ anion columns. The Dionex IonSwift MAC-100 concentrator columns strips ions from a measured volume of aqueous sample, concentrating the analyte species and thereby lowering detection limits. This concentrator column is available in a 0.5 × 80 mm format for ultra-low-pressure applications using a pressurized bottle, syringe, and Thermo Scientific™ Dionex™ AS-AP Autosampler, or a single piston sample delivery pump (Thermo Scientific™ Dionex™ AXP auxiliary pump) for sample loading.



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Figure 1. Process for ion chromatography trace enrichment: (A) sample concentration step and (B) sample injection step



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Figure 2. Configuration of a 2D-IC system using a capillary concentrator column

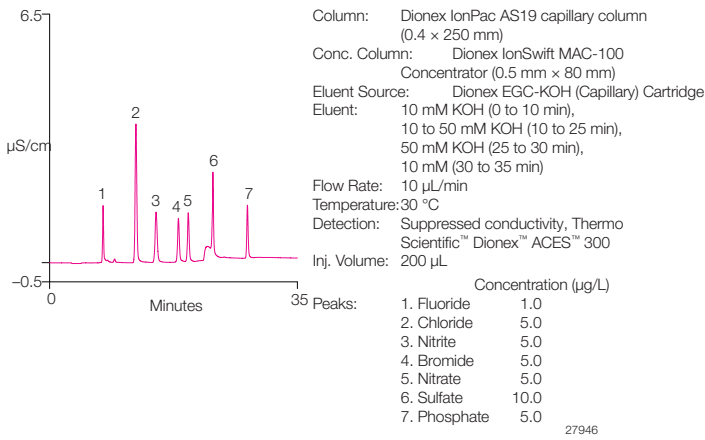


Figure 3. Separation of inorganic anions at trace concentrations using a Thermo Scientific™ Dionex™ IonPac™ AS19 capillary column with 200 µL injection

Monolith anion concentrator (Dionex IonSwift MAC-200 concentrator column) (0.75 × 80 mm).....P/N 075461

The Thermo Scientific™ Dionex™ IonSwift™ MAC-200 monolith anion concentrator column is designed primarily for 2D-IC capillary applications including trace bromate or perchlorate in drinking water matrices. This concentrator column can also be used to preconcentrate trace anions in high-purity water matrices. The Dionex IonSwift MAC-200 concentrator column is available in a 0.75 × 80 mm format designed specifically for concentrating trace anions such as bromate or perchlorate. It is placed between the first and second dimension of the 2D-IC system set-up and a cut volume is focused on the concentrator, then eluted onto a second dimension column such as a Dionex IonPac AS19 or Thermo Scientific™ Dionex™ IonPac™ AS20 capillary column.

A. First-Dimension Conditions
 Column: Dionex IonPac AG19, AS19, 4 mm
 Flow Rate: 1.0 mL/min
 Eluent Source: Dionex EGC III KOH Cartridge
 Eluent: 10 mM KOH (0 to 12 min), 65 mM KOH (12 to 35 min), and 10 mM KOH (35 to 40 min)
 Detection: Suppressed conductivity, Dionex ASRS 300 4 mm
 Inj. Volume: 1000 µL
 Temperature: 30 °C

B. Second-Dimension Conditions
 Column: Dionex IonPac AS20 (0.4 mm × 250 mm)
 Flow Rate: 10 µL/min
 Eluent Source: Dionex EGC-KOH (Capillary) Cartridge
 Eluent: 8 mM KOH (0 to 12 min), 8 to 65 mM KOH (12 to 35 min), and 8 mM KOH (35 to 40 min)
 Detection: Suppressed conductivity, Dionex ACES 300 anion capillary electrolytic suppressor
 Temperature: 30 °C
 Concentrator Column: Dionex IonSwift MAC-200 capillary concentrator, (0.75 × 80 mm) 2500 µL of 1st dimension suppressed effluent (7.5 to 10 min)

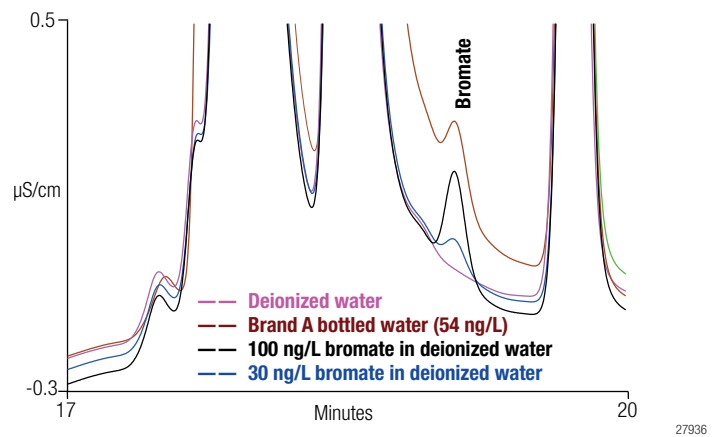


Figure 4. Determination of trace concentrations of bromate using a Dionex IonPac AS20 column with 2D-IC system

Anion concentrators

Anion Micro Concentrator (Dionex IonPac AMC-1 concentrator column)

(2 × 15 mm).....P/N 051760

The Thermo Scientific™ Dionex™ IonPac™ AMC-1 concentrator column is a low void volume microconcentrator column designed for the concentration of inorganic and low-molecular-weight organic anions from ultrapure water. The novel solvent-compatible resin technology ensures a low sulfate background during the concentration step. The Dionex IonPac AMC-1 concentrator column can be loaded with either a loop or sample loading pump. The low column void volume (approximately 15 µL) allows improved determination of early-eluting anions such as fluoride, glycolate, acetate, and formate. This low void volume is ideal for 2 mm concentration methods, reduces the “system dip”, and improves anion determinations for trace anion determinations in the power generation and semiconductor industries. Dionex IonPac AMC-1 concentrator columns can be used in 2 mm or 4 mm i.d. anion-exchange systems with carbonate/bicarbonate or borate eluents.

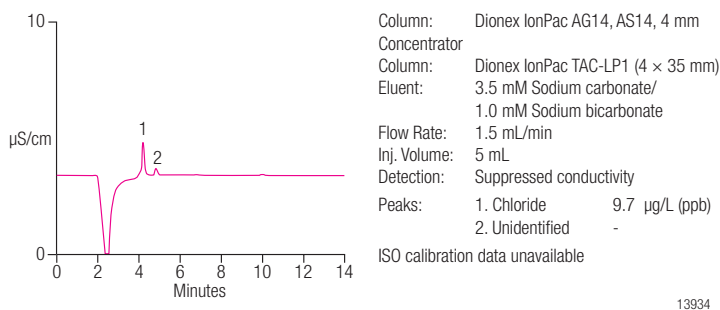


Figure 5. Determination of trace-level chloride using a Dionex IonPac TAC-LP1 concentrator column

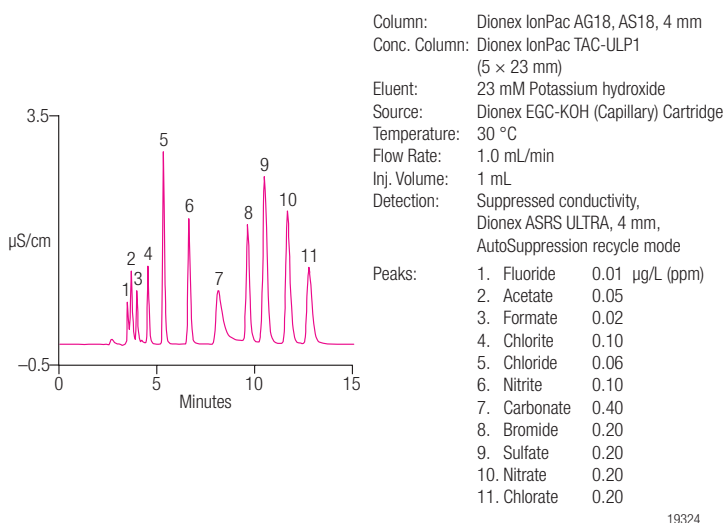


Figure 6. Determination of trace anions using a Dionex IonPac TAC-ULP1 concentrator column

Trace Anion Concentrator (Dionex IonPac TAC-LP1 concentrator column)

(4 × 35 mm).....P/N 046026

The Thermo Scientific™ Dionex™ IonPac™ TAC-LP1 low-pressure trace anion concentrator column is designed primarily for high-purity water analysis. The Dionex IonPac TAC-LP1 concentrator column strips ions from a measured volume of aqueous sample matrix, concentrating the analyte species and thereby lowering detection limits. The Dionex IonPac TAC-LP1 concentrator column is a general purpose, low-pressure concentrator for use with syringe or autosampler loading (Thermo Scientific™ Dionex™ AS-DV Autosampler). It can be used in anion-exchange systems using hydroxide, carbonate/bicarbonate, or borate eluent systems. This concentrator column has a capacity of 25.0 µeq/column and a void volume of approximately 145 µL.

Ultra-Low-Pressure Trace Anion Concentrator (Dionex IonPac TAC-ULP1 concentrator column)

(5 × 23 mm).....P/N 061400

The Thermo Scientific™ Dionex™ IonPac™ TAC- ULP1 ultra low pressure trace anion concentrator column is designed primarily for high-purity water analysis. The Dionex IonPac TAC-ULP1 concentrator column strips ions from a measured volume of aqueous sample matrix, concentrating the analyte species and thereby lowering detection limits. The Dionex IonPac TAC-ULP1 concentrator column is a general purpose, ultra-low-pressure concentrator for use with syringe or autosampler loading (Dionex AS-DV and AS-AP Autosamplers). The Dionex IonPac TAC-ULP1 (5 × 23 mm) concentrator column can be used with single-piston sample delivery pumps, including the Dionex AXP auxiliary pump. It can be used with carbonate/bicarbonate, borate, or hydroxide eluents.

Ultra Trace Anion Concentrator Low-Pressure (Dionex IonPac UTAC-LP1 concentrator column)

(4 × 35 mm).....P/N 063079

The Thermo Scientific™ Dionex™ IonPac™ UTAC-LP1 (4 × 35 mm) ultra trace anion concentrator column is designed primarily for high-purity water analysis. The Dionex IonPac UTAC-LP1 concentrator column is an ultraclean (low sulfate) column that strips ions from a measured volume of aqueous sample matrix, concentrating the analyte species thereby lowering detection limits. The Dionex IonPac UTAC-LP1 concentrator column is a general purpose, low-pressure anion concentrator column for use with syringe or autosampler loading (Dionex AS-DV Autosampler). The Dionex IonPac UTAC-LP1 concentrator column can be used with carbonate/bicarbonate, borate, or hydroxide eluents.

Ultra Trace Anion Concentrator Low-Pressure 2 (Dionex IonPac UTAC-LP2 concentrator column) (4 × 35 mm).....P/N 079917

The Thermo Scientific™ Dionex™ IonPac™ UTAC-LP2 (4 × 35 mm) ultra trace anion concentrator column is designed primarily for high-purity water analysis. The Dionex IonPac UTAC-LP2 concentrator column is a general purpose, low-pressure anion concentrator column with similar features to the Dionex IonPac UTAC-LP1 concentrator column, but backpressure resilience has been improved to eliminate the need for a pulse dampener on the loading pump, and matrix resilience has been improved to allow direct injection of samples containing polyacrylic acid additives used in the power industry. This concentrator column is available in a 4 × 35 mm format for low-pressure applications including loading pump, syringe or Dionex AS-DV Autosampler loading.

Ultra Trace Anion Concentrator-Ultra-Low-Pressure (Dionex IonPac UTAC-ULP1 concentrator column) (5 × 23 mm).....P/N 063475

The Thermo Scientific™ Dionex™ IonPac™ UTAC-ULP1 (5 × 23 mm) ultra trace anion concentrator column is designed primarily for high-purity water analysis. The Dionex IonPac UTAC-ULP1 concentrator column is an ultra clean (low sulfate) concentrator column. The Dionex IonPac UTAC-ULP1 concentrator column strips ions from a measured volume of aqueous sample matrix, concentrating the analyte species thereby lowering detection limits.

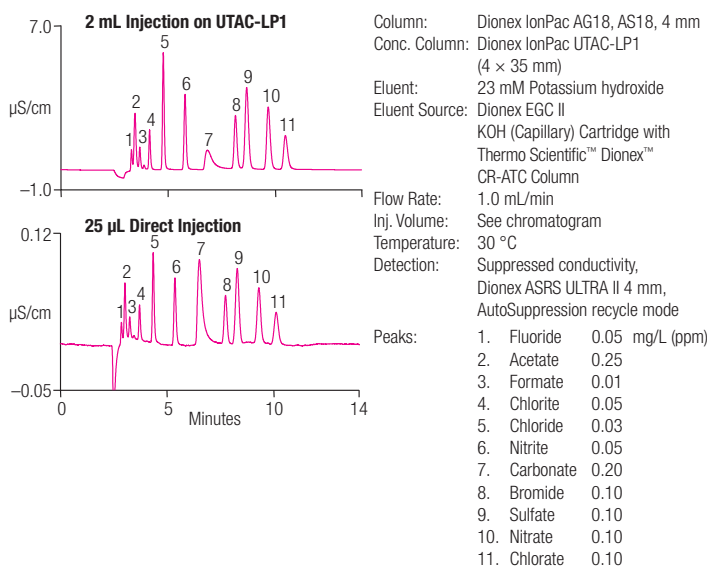


Figure 7. Comparison of direct injection and preconcentration using a Dionex IonPac UTAC-LP1 concentrator column for the determination of trace anions

This concentrator column is a general purpose, ultra-low-pressure concentrator column for use with syringe or autosampler loading (Dionex AS-DV and AS-AP Autosamplers). The Dionex IonPac UTAC-ULP1 concentrator column can be used with single-piston sample delivery pumps including the Dionex AXP Auxiliary Pump. It can also be used with carbonate/bicarbonate, borate, or hydroxide eluents.

Ultra Trace Anion Concentrator Ultra-Low-Pressure 2 (Dionex IonPac UTAC-ULP2 concentrator column) (5 × 23 mm).....P/N 079918

The Thermo Scientific™ Dionex™ IonPac™ UTAC-ULP2 (5 × 23 mm) ultra trace anion concentrator column is designed primarily for high-purity water analysis. The Dionex IonPac UTAC-ULP2 concentrator column is a general purpose, ultra-low-pressure anion concentrator column with similar features to the Dionex IonPac UTAC-ULP1 concentrator column, but backpressure resilience has been improved to eliminate the need for a pulse dampener on the loading pump, and matrix resilience has been improved to allow direct injection of samples containing polyacrylic acid additives. This concentrator column is available in a 5 × 23 mm format for ultra-low-pressure applications including loading pump, syringe, and Dionex AS-DV or AS-AP Autosampler loading.

Ultra Trace Anion Concentrator, Extremely Low-Pressure (Dionex IonPac UTAC-XLP1 concentrator column) (6 × 16 mm).....P/N 063459

The Thermo Scientific™ Dionex™ IonPac™ UTAC-XLP1 (6 × 16 mm) ultra trace anion concentrator column is designed primarily for high-purity water analysis. The Dionex IonPac UTAC-XLP1 concentrator column is an ultra clean (low sulfate) concentrator column. The Dionex IonPac UTAC-XLP1 concentrator column strips ions from a measured volume of aqueous sample matrix, concentrating the analyte species thereby lowering detection limits. This concentrator column is a general purpose, extremely low-pressure concentrator column for use with syringe or autosampler loading (Dionex AS-DV and AS-AP Autosamplers). The Dionex IonPac UTAC-XLP1 concentrator column can be used with single-piston sample delivery pumps including the Dionex AXP auxiliary pump. It can be used with carbonate/bicarbonate, borate, or hydroxide eluents.

Ultra Trace Anion Concentrator, Extremely Low-Pressure 2 (Dionex IonPac UTAC-XLP2 concentrator column) (6 × 16 mm).....P/N 072781

The Thermo Scientific™ Dionex™ IonPac™ UTAC-XLP2 (6 × 16 mm) ultra trace anion concentrator column is designed primarily for high-purity water analysis. It is a general purpose, extremely low-pressure anion concentrator column with similar features to the Dionex IonPac UTAC-XLP1 concentrator column, but back pressure resilience has been improved to eliminate the need for a pulse dampener on the loading pump, and matrix resilience has been improved to allow direct injection of samples containing polyacrylic acid additives used in the power industry. This concentrator column is available in a 6 × 16 mm format for extremely low-pressure applications including Dionex AS-DV and AS-AP Autosampler loading.

Trace Anion Concentrator (Dionex IonPac TAC-2 concentrator column) (3 × 35 mm).....P/N 043101

The Thermo Scientific™ Dionex™ IonPac™ TAC-2 trace anion concentrator column is a pellicular anion-exchange concentrator column with a capacity of 3.4 µeq/column and a moderately low void volume (approximately 50 µL). This concentrator column can be used in anion-exchange systems using carbonate/bicarbonate or borate eluent systems. Note that the Dionex IonPac TAC-2 concentrator column should not be used with organic solvents.

Dionex IonPac AC10 Anion Concentrator (4 × 50 mm).....P/N 043133

For use with Thermo Scientific™ Dionex™ IonPac™ AS10 4 mm hydroxide-selective anion-exchange columns.

Dionex IonPac AC10 Anion Concentrator (2 × 50 mm).....P/N 043134

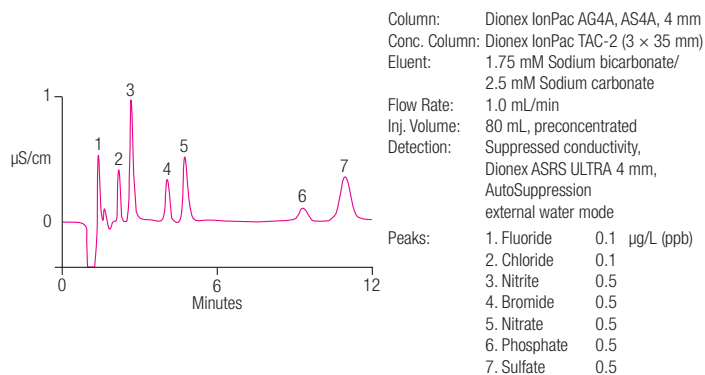
For use with Thermo Scientific™ Dionex™ IonPac™ AS10 2 mm hydroxide-selective anion-exchange columns.

Dionex IonPac AC15 Anion Concentrator (4 × 50 mm).....P/N 079970

For use with Thermo Scientific™ Dionex™ IonPac™ AS15 4 mm hydroxide-selective anion-exchange columns.

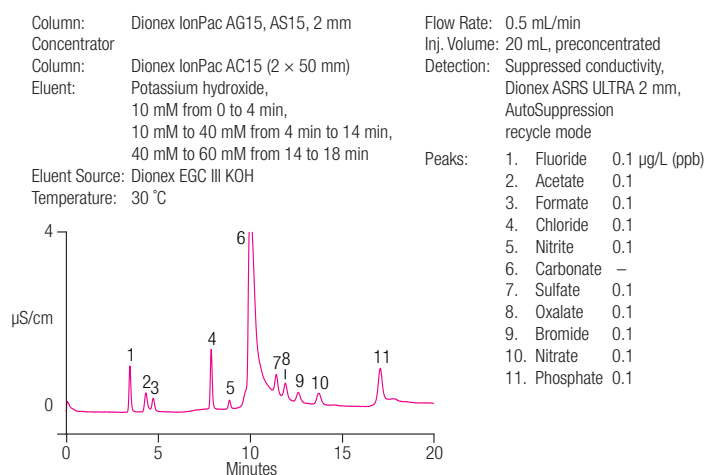
Dionex IonPac AC15 Anion Concentrator (2 × 50 mm).....P/N 055695

For use with Thermo Scientific™ Dionex™ IonPac™ AS15 2 mm and 3 mm hydroxide-selective anion-exchange columns.



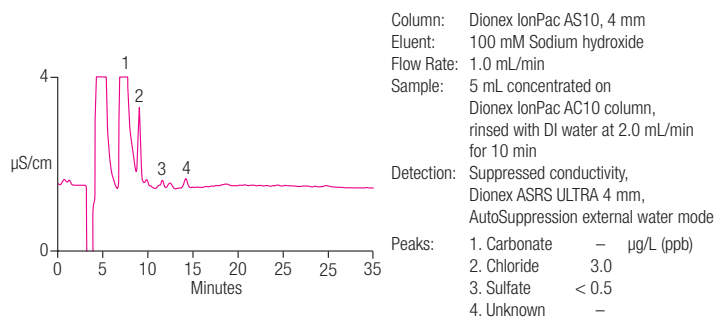
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Figure 8. Trace-level anion determination using a Dionex IonPac TAC-2 concentrator column



14871

Figure 9. Determination of inorganic anions and low molecular weight organic acids with sample preconcentration using a 2 mm Dionex IonPac AC15 column



10854

Figure 10. Determination of anions in semiconductor-grade isopropyl alcohol using a Dionex IonPac AC10 concentrator column

Cation Concentrators

Monolith Cation Concentrator

(Dionex IonSwift MCC-100 concentrator column) (0.5 × 80 mm).....P/N 075462

The Thermo Scientific™ Dionex™ IonSwift™ MCC-100 Monolith cation concentrator column is designed primarily for high-purity water analysis. This concentrator column is a general purpose, ultra-low-pressure cation concentrator designed for use with Dionex IonPac cation capillary columns. The Dionex IonSwift MCC-100 concentrator columns strips ions from a measured volume of aqueous sample, concentrating the analyte species and thereby lowering detection limits. It is available in a 0.5 × 80 mm format for ultra-low-pressure applications using a pressurized bottle, syringes, Dionex AS-AP Autosampler, or a single-piston sample delivery pump (Dionex AXP auxiliary pump) for sample loading.

Monolith Cation Concentrator

(Dionex IonSwift MCC-200 concentrator column) (0.75 × 80 mm).....P/N 075463

The Thermo Scientific™ Dionex™ IonSwift™ MCC-200 Monolith cation concentrator column is designed primarily for 2D-IC capillary applications including trace ammonium and amines in high salt matrices. This concentrator column can also be used to preconcentrate trace cations in high-purity water matrices. The Dionex IonSwift MCC-200 Monolith cation concentrator column is available in a 0.75 × 80 mm format designed specifically for concentrating trace cations such as ammonium or amines. The Dionex IonSwift MCC-200 concentrator column is placed between the first and second dimension of the 2D-IC system set-up and a cut volume is focused on it, then eluted onto a second dimension column such as the Dionex IonPac CS16 or Thermo Scientific™ Dionex™ IonPac™ CS17 capillary column.

Low-Pressure Trace Cation Concentrator (Dionex IonPac TCC-LP1 concentrator column) (4 × 35 mm).....P/N 046027

The Thermo Scientific™ Dionex™ IonPac™ TCC-LP1 (4 × 35 mm) low-pressure trace cation concentrator column is designed primarily for high-purity water analysis. The Dionex IonPac TCC-LP1 concentrator column strips ions from a measured volume of aqueous sample matrix, concentrating the analyte species thereby lowering detection limits.

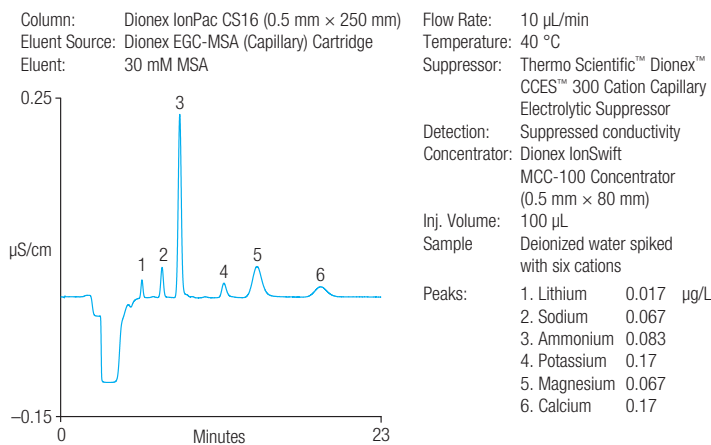


Figure 11. Separation of inorganic cations at trace concentrations using a Dionex IonPac CS16 capillary column and Dionex IonSwift MCC-100 concentrator column with 100 µL injection

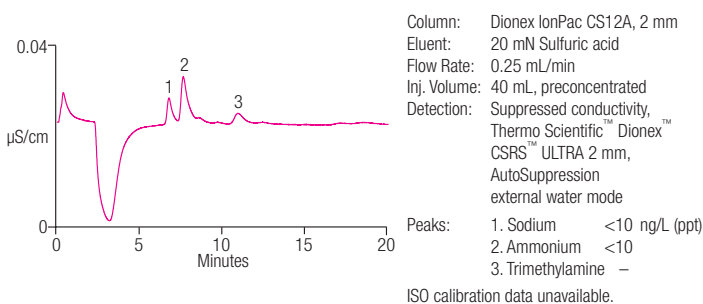


Figure 12. Determination of trace cations using sample preconcentration

This concentrator column is a general purpose, low-pressure concentrator for use with syringe or autosampler loading (Dionex AS-DV Autosampler). It is designed for use with carboxylated cation-exchange systems such as the Thermo Scientific™ Dionex™ IonPac™ CS12, CS12A, CS14, CS15, CS16, CS17, or CS18 columns with monovalent eluents (sulfuric acid, methanesulfonic acid, or hydrochloric acid).

Ultralow-Pressure Trace Cation Concentrator (Dionex IonPac TCC-ULP1 concentrator column) (5 × 23 mm).....P/N 063783

The Thermo Scientific™ Dionex™ IonPac™ TCC-ULP1 (5 × 35 mm) ultralow-pressure trace cation concentrator column is designed primarily for high-purity water analysis. The Dionex IonPac TCC-ULP1 concentrator column strips ions from a measured volume of aqueous sample matrix, concentrating the analyte species thereby lowering

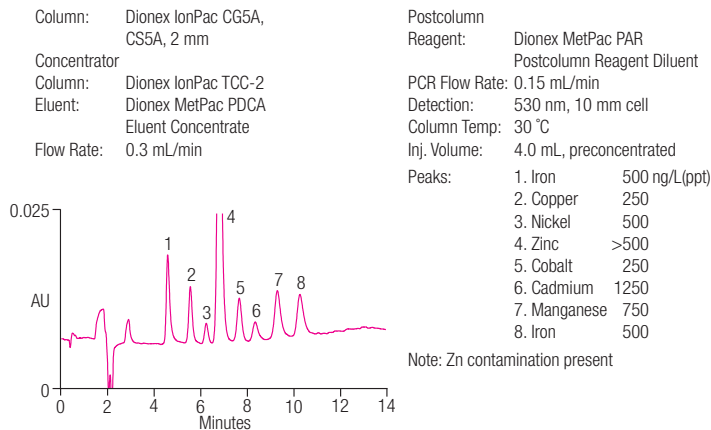
detection limits. This concentrator column is a general purpose, ultra-low-pressure concentrator for use with syringe or autosampler loading (Dionex AS-DV or AS-AP Autosamplers). The Dionex IonPac TCC-ULP1 concentrator column can also be used with single-piston sample delivery pumps including the Dionex AXP auxiliary pump. It is recommended for use with carboxylated columns such as the Dionex IonPac CS12, CS12A, CS14, CS15, CS16, CS17, and CS18 columns. The Dionex IonPac TCC-ULP1 concentrator column can be used with sulfuric acid, methanesulfonic acid, and hydrochloric acid eluents.

Extremely Low-Pressure Trace Cation Concentrator (Dionex IonPac TCC-XLP1 concentrator column) (6 x 16 mm).....P/N 063889

The Thermo Scientific™ Dionex™ IonPac™ TCC-XLP1 (6 x 16 mm) extremely low-pressure trace cation concentrator column is designed primarily for high-purity water analysis. The Dionex IonPac TCC-XLP1 concentrator column strips ions from a measured volume of aqueous sample matrix, concentrating the analyte species thereby lowering detection limits. This concentrator column is a general purpose, extremely low-pressure concentrator for use with syringe or autosampler loading (Dionex AS-DV or AS-AP Autosamplers). The Dionex IonPac TCC-XLP1 concentrator column can also be used with single-piston sample delivery pumps including the Dionex AXP auxiliary pump. It is recommended for use with carboxylated columns such as the Dionex IonPac CS12, CS12A, CS14, CS15, CS16, CS17, and CS18 columns. The Dionex IonPac TCC-XLP1 concentrator column can be used with sulfuric acid, methanesulfonic acid, and hydrochloric acid eluents.

Trace Cation Concentrator (Dionex IonPac TCC-2 concentrator column) (3 x 35 mm).....P/N 043103

The Thermo Scientific™ Dionex™ IonPac™ TCC-2 trace cation concentrator column is a surface-sulfonated cation-exchange concentrator column with a capacity of approximately 10 µeq/column and a low void volume of approximately 50 µL. It is ideal for use with sulfonated cation-exchange columns such as the Dionex IonPac CS3, CS10, and CS11 columns. The Dionex IonPac TCC-2 concentrator column can also be used as concentrator column for transition metals.



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Figure 13. Determination of trace transition metals using sample preconcentration

Chelation Ion Chromatography Concentrators Thermo Scientific™ Dionex™ MetPac™ CC-1 chelating column

(4 x 50 mm) (pkg. of 2).....P/N 042156

A chelating column is ideal for concentration of cationic transition metals from high ionic strength matrices.

Trace Metal Concentrator (Dionex IonPac TMC-1 concentrator column)

(3 x 25 mm).....P/N 049000

A high-capacity cation concentration column used for coupling the Dionex MetPac CC-1 chelating column to the Thermo Scientific™ Dionex™ IonPac™ CS5A analytical column when performing chelation IC.

Trap Columns

Thermo Scientific™ Dionex™ IonPac™ trap columns contain high-capacity, low-efficiency, ion-exchange resin. The column strips trace contaminants from the eluent, preventing concentration on the guard and analytical columns. The trap column is installed in the eluent line prior to the injection valve to prevent spurious peaks during gradient chromatography.

Metal-Free Trap Columns

(Dionex IonPac MFC-1 trap column)

(3 x 27 mm).....P/N 037017

(Dionex IonPac MFC 500 trap column)

(3 x 27 mm) P/N 079017

The Thermo Scientific™ Dionex™ IonPac™ MFC-1 trap column is packed with a special chelating resin and is used in the eluent line prior to the injection valve to remove transition metals from high-pH eluents. The Thermo Scientific™ Dionex™ IonPac™ MFC 500 trap column is identical to the Dionex IonPac MFC-1 trap column, but is packed in a column body that is compatible with continuous operation up to 5,000 psi.

Continuously Regenerated Trap Columns

(Dionex CR-TC 500 and CR-TC 600 trap columns)

The Thermo Scientific™ Dionex™ Continuously Regenerated Trap Column (CR-TC) is a high-pressure electrolytically regenerated trap column designed for use with eluent generator devices. The trap columns are electrolytically regenerated devices that remove ionic contaminants from the eluent without the need for offline chemical regeneration. They are available in two versions for anion and cation applications.

CR-ATC Continuously Regenerated Anion Trap Column.....P/N 060477

CR-CTC III Continuously Regenerated Cation Trap Column.....P/N 104-60001

CR-ATC 500 Continuously Regenerated Anion Trap Column 500.....P/N 075550

CR-CTC 500 Continuously Regenerated Cation Trap Column 500.....P/N 075551

CR-ATC 600 Continuously Regenerated Anion Trap Column 600.....P/N 088662

CR-CTC 600 Continuously Regenerated Cation Trap Column 600.....P/N 088663

CR-ATC (Capillary) Continuously Regenerated Anion Trap Column (Capillary).....P/N 072078

CR-CTC (Capillary) Continuously Regenerated Cation Trap Column, (Capillary).....P/N 072079

The Thermo Scientific™ Dionex™ CR-TC 600 and CR-CTC III trap columns can be used at pressures up to 5,000 psi and are only compatible with high pressure ion chromatography (HPIC) systems equipped with Consumables Monitoring such as the Thermo Scientific™ Dionex™ ICS-6000 HPIC and the Thermo Scientific™ Dionex™ Integriion™ HPIC Systems.

The Thermo Scientific Dionex CR-TC 500 can also be used at pressures up to 5,000 psi and is compatible with high pressure IC systems not equipped with Consumables Monitoring such as the Thermo Scientific™ Dionex™ ICS-5000+ or the Thermo Scientific™ Dionex™ ICS-2100 System.

Thermo Scientific™ Dionex™ EGC III KOH cartridge customers must first order the Thermo Scientific™ Dionex™ CR-TC Add-on Kit (P/N 060476). Dionex CR-TC 600 trap columns are compatible with eluent generators in newer IC systems that feature consumables device monitoring, including the Thermo Scientific™ Dionex™ Integriion™ and Dionex™ ICS-6000 HPIC™ systems. A single format is used with 2, 3, 4, and 5 mm i.d. separator column applications, while a second format is available for capillary column applications.

When plumbed after the EGC cartridge, the Dionex CR-ATC 500 trap column removes all anionic contaminants, for example carbonate, from the deionized feed water and provides low drift during gradient operation.

The Dionex CR-ATC 500 and CR-ATC 600 trap columns are identical to the Dionex CR-ATC trap column but packed in column bodies that are compatible with continuous operation up to 5,000 psi. The Dionex CR-ATC 600 trap column is consumables monitoring enabled and developed for use with Dionex Integriion and ICS-6000 systems.

The Thermo Scientific™ Dionex™ CR-CTC III, CR-CTC 500, and CR-CTC 600 trap columns remove cationic contaminants, for example ammonium and sodium, from deionized feed water and provide low drift during gradient operation. The Dionex CR-CTC 500 and CR-CTC 600 trap columns are identical in that they contain a small layer of sulfonated resin to aid in monovalent removal, and are packed in a column body that supports continuous operation up to 5,000 psi. Use the Dionex CR-CTC 600 trap column with Dionex Integriion and ICS-6000 systems. The Dionex CR-CTC III trap column uses only carboxylated resin and is packed in a column body that supports continuous operation up to 5,000 psi. It designed for use with Dionex Integriion and ICS-6000 systems, and is consumables monitoring enabled.

Anion trap columns (Dionex IonPac ATC)

The Dionex IonPac Anion trap columns are high-capacity, low-efficiency, anion-exchange columns used to remove trace anion contamination from eluents.

Thermo Scientific™ Dionex™ ATC-3 anion trap column (9 × 24 mm).....P/N 059660
 For use with 4 mm anion-exchange columns.

Thermo Scientific™ Dionex™ ATC-3 anion trap column (4 × 35 mm).....P/N 079932
 For use with 2 mm and 3 mm anion-exchange columns.

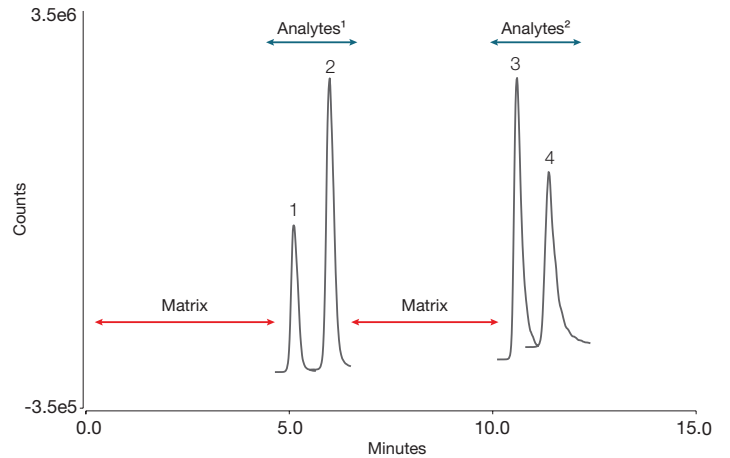
Thermo Scientific™ Dionex™ ATC 500 anion trap column (9 × 24 mm).....P/N 075976
 Identical to the Dionex ATC-3 trap column but packed in a column body that is compatible with continuous operation up to 5,000 psi.

Thermo Scientific™ Dionex™ ATC 500 anion trap column (4 × 35 mm)..... P/N 079018
 Identical to the Dionex ATC-3 trap column but packed in a column body that is compatible with continuous operation up to 5,000 psi.

Thermo Scientific™ Dionex™ ATC-HC anion trap column (9 × 75 mm).....P/N 059604
 For use with Dionex EGC-KOH (Capillary), EGC III KOH, EGC III NaOH, EGC III LiOH, or EGC 500 K₂CO₃ eluent generator cartridges.

Thermo Scientific™ Dionex™ ATC-HC 500 anion trap column (9 × 75 mm).....P/N 075978
 Identical to the Dionex ATC-HC trap column but packed in a column body that is compatible with continuous operation up to 5,000 psi.

Thermo Scientific™ Dionex™ ATC-HC Borate Form trap column (9 × 75 mm).....P/N 064755
 For use with EG generated borate eluents or with manually prepared borate eluents.



Peak	Concentration
1	Chlormequat 10 µg/L
2	Mepiquat 10 µg/L
3	Paraquat 10 µg/L
4	Diquat 10 µg/L

Figure 14. Chromatographic separation of the four quats – CQ and MQ (Analyte Zone 1), and PQ and DQ (Analyte Zone 2) using the Thermo Scientific™ Dionex™ IonPac™ CS21-Fast-4µm column along with the Thermo Scientific™ Dionex™ CR-CTC III Continuously Regenerated Cation Trap Column (See [TN 73990](#) for method details)

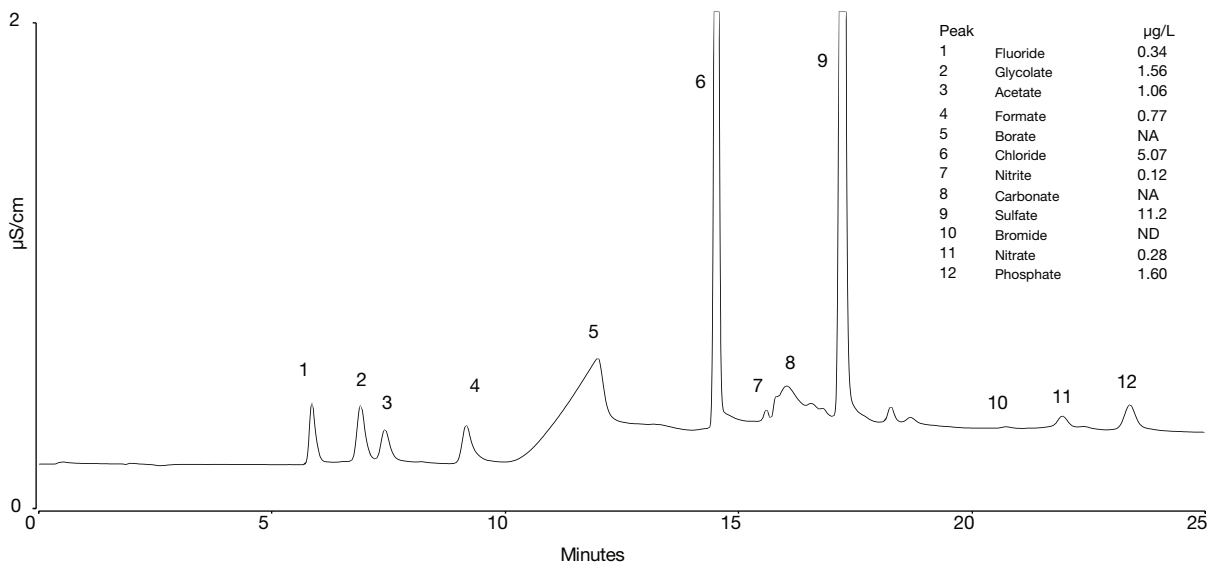


Figure 16. Determination of trace anions in boric acid-treated water (1000 mg/L boron + 2.0 mg/L lithium) using the Dionex IonPac AS28-Fast-4µm column and the Dionex CR-CTC III trap column (used for removal of lithium) on a Dionex ICS-6000 system (See [AN 185 Update](#) for method details).

Thermo Scientific™ Dionex™ ATC-HC 500 Borate Form trap column

(9 × 75 mm)P/N 075979

Identical to the Dionex ATC-HC Borate Form trap column but packed in a column body that is compatible with continuous operation up to 5,000 psi.

Cation trap columns (CTC)

The Thermo Scientific™ Dionex™ IonPac™ cation trap column is a high-capacity cation-exchange column packed with sulfonated resin. The Dionex IonPac CTC trap column is used to remove trace cation contamination from the eluent.

Thermo Scientific™ Dionex™ IonPac™ cation trap column-1

(9 × 24 mm).....P/N 040192

For use with 4 mm and 5 mm cation-exchange columns.

Thermo Scientific™ Dionex™ IonPac™ cation trap column 500

(9 × 24 mm).....P/N 075977

Identical to the Dionex IonPac CTC-1 trap column but packed in a column body that is compatible with continuous operation up to 5,000 psi.

Thermo Scientific™ Dionex™ IonPac™ cation trap column

(4 × 35 mm).....P/N 043132

For use with 2 mm and 3 mm cation-exchange columns.

Thermo Scientific™ Dionex™ IonPac™ cation trap column 500

(4 × 35 mm) P/N 079019

Identical to the Dionex IonPac CTC (2 mm) trap column, but packed in a column body that is compatible with continuous operation up to 5,000 psi.

Cation Polisher Columns

Thermo Scientific™ Dionex™ IonPac™ cation polisher CP1 and CP2 columns are designed for removal of metallic contaminants and other cations such as calcium and magnesium from the sample stream while performing anion analysis. The columns improve the performance of IC systems, particularly with phosphate analysis in the presence of metallic contaminants.

Samples that contain high levels of metals or cations can be deposited on the guard/analytical columns or the suppressor, which can lead to performance issues such as poor peak shapes or poor recoveries for some anions such as phosphate. These contaminants can adversely affect the operation of the guard/analytical columns or suppressor. The Dionex IonPac cation polisher columns address the potential precipitation issue of these contaminants and aid in extending the column and suppressor lifetimes when pursuing anion analysis and when the matrix ions contain multivalent cations.

In some cases the Dionex IonPac cation polisher columns aid removal of matrix cations when pursuing anion analysis with sample preconcentration. The matrix cations can elute species of interest from the concentrator column and lead to poor peak shapes and recovery. Removing the matrix cations using the Dionex IonPac cation polisher columns helps ensure good chromatographic performance.

The Dionex IonPac CP1 (6 × 16 mm) column is a cation-exchange column in the sodium form and packed in a low-pressure format and is specifically designed for autosampler operation. The void volume of this column is approximately 250 µL. The Dionex IonPac CP2 (9 × 24 mm) column is a higher capacity version in the hydronium form and has a void volume of approximately 825 µL. The Dionex IonPac CP2 cation polisher column is recommended for large volume sample preconcentration applications using an external pump. Both columns can be regenerated off-line approximately every 2–3 months (depending on the level of contamination and usage).

Thermo Scientific™ Dionex™ IonPac™ cation polisher CP1 Na+ Form
(6 × 16 mm).....P/N 064930

Thermo Scientific™ Dionex™ IonPac™ cation polisher CP2 H+ Form
(9 × 24 mm).....P/N 064931

Anion concentrator column selection table

Anion columns	Capacity (µeq/column)	Void volume (µL)	Recommended applications	Recommended sample delivery method
MAC-100	0.17	10	Hydroxide, carbonate/bicarbonate and borate eluents	Pressurized bottle, syringes, Dionex AS-AP Autosampler, and single-piston sample delivery pump (Dionex AXP auxiliary pump)
MAC-200	0.24	23	Hydroxide, carbonate/bicarbonate and borate eluents	Pressurized bottle, syringes, Dionex AS-AP Autosampler, and single-piston sample delivery pump (Dionex AXP auxiliary pump)
AMC-1	3.0	15.0	Carbonate/bicarbonate and borate eluents	Dionex AXP auxiliary pump*
TAC-LP1	25.0	145.0	Hydroxide, carbonate/bicarbonate and borate eluents	Pressurized bottles, syringes, low-pressure autosamplers (Dionex AS-DV Autosampler), SP10 AutoNeutralization™ module
TAC-ULP1	25.0	145.0	Hydroxide, carbonate/bicarbonate and borate eluents	Pressurized bottles, syringes autosamplers (Dionex AS-DV and AS-AP) single-piston sample delivery pumps (Dionex AXP auxiliary pump).
UTAC-LP1	25.0	145.0	Hydroxide, carbonate/bicarbonate	Pressurized bottles, syringes, low-pressure autosamplers (Dionex AS-DV and AS-HV Autosamplers)
UTAC-LP2	25.0	145.0	Hydroxide, carbonate/bicarbonate and borate eluents	Pressurized bottles, syringes, autosamplers (Dionex AS-DV, AS-AP, and, AS-HV Autosamplers), single-piston sample delivery pumps (Dionex AXP auxiliary pump)
UTAC-ULP1	25.0	145.0	Hydroxide, carbonate/bicarbonate and borate eluents	Pressurized bottles, syringes, autosamplers (Dionex AS-DV, AS-AP and, AS-HV Autosamplers), single-piston sample delivery pumps (Dionex AXP auxiliary pump)
UTAC-ULP2	25.0	145.0	Hydroxide, carbonate/bicarbonate and borate eluents	Pressurized bottles, syringes, autosamplers (Dionex AS-DV, AS-AP and, AS-HV Autosamplers), single-piston sample delivery pumps (Dionex AXP auxiliary pump)
UTAC-XLP1	25.0	145.0	Hydroxide, carbonate/bicarbonate and borate eluents	Pressurized bottles, syringes, low-pressure autosamplers (Dionex AS-DV, AS-AP and, AS-HV Autosamplers), single-piston sample delivery pumps (Dionex AXP auxiliary pump)
UTAC-XLP2	25.0	145.0	Hydroxide, carbonate/bicarbonate and borate eluents	Pressurized bottles, syringes, low-pressure autosamplers (Dionex AS-DV, AS-AP, and, AS-HV Autosamplers), single-piston sample delivery pumps (Dionex AXP auxiliary pump)
TAC-2	3.4	50.0	Carbonate/bicarbonate and	Dionex AXP auxiliary pump*
AC10 (4 mm)	4.0	207.0	Hydroxide and borate eluents	Dionex AXP auxiliary pump*
AC10 (2 mm)	0.8	52.0	Hydroxide and borate eluents	Dionex AXP auxiliary pump*
AC15 (4 mm)	9.0	210.0	Hydroxide and borate eluents	Dionex AXP auxiliary pump*
AC15 (2 mm)	2.2	53.0	Hydroxide and borate eluents	Dionex AXP auxiliary pump*

* Dionex AXP auxiliary pumps should use a pressurized sample source.

Cation concentrator column selection table

Cation columns	Capacity (µeq/column)	Void volume (µL)	Recommended applications	Recommended sample delivery method
MCC-100	0.72	10	Use with carboxylated columns; MSA and sulfuric acid eluents	Pressurized bottle, syringes, Dionex AS-AP Autosampler, and single-piston sample delivery pump (Dionex AXP auxiliary pump)
MCC-200	1.57	23	Use with carboxylated columns; MSA and sulfuric acid eluents	Pressurized bottle, syringes, Dionex AS-AP Autosampler, and single-piston sample delivery pump (Dionex AXP auxiliary pump)
TCC-LP1	260.0	145.0	Use with carboxylated columns;	Pressurized bottles, syringes, low-pressure autosamplers, (Dionex AS-DV Autosampler) SP10 AutoNeutralization module
TCC-ULP1	260.0	145.0	Use with carboxylated columns; MSA and sulfuric acid eluents	Pressurized bottles, syringes, autosamplers (Dionex AS-DV, and AS-AP Autosamplers), single-piston sample delivery pump (Dionex AXP auxiliary pump)
TCC-XLP1	260.0	145.0	Use with carboxylated columns; MSA and sulfuric acid eluents	Pressurized bottles, syringes, autosamplers (Dionex AS-DV and AS-AP Autosamplers), single-piston sample delivery pump Dionex AXP auxiliary pump)
TCC-2	10.0	50.0	Use with sulfonated columns; HCl/DAP•HCl eluents	Dionex AXP auxiliary pump*

* Dionex AXP auxiliary pumps should use a pressurized sample source.

Concentrator column specifications

Column	Particle diameter	Substrate X-linking	Latex diameter	Latex X-linking	Capacity (per column)	Functional group	Hydrophobicity
Concentrator							
MAC-100	Monolithic backbone	55%	85 nm	6%	0.17 µeq	Alkanol quaternary ammonium	Very low
MAC-200	Monolithic backbone	55%	85 nm	6%	0.24 µeq	Alkanol quaternary ammonium	Very low
AMC-1	10 µm	55%	None ^a	NA	3.0 µeq	Alkanol quaternary ammonium	Very low
TAC-LP1	18 µm	55%	85 nm	6%	25.0 µeq	Alkanol quaternary ammonium	Very low
TAC-ULP1	18 µm	55%	85 nm	6%	25.0 µeq	Alkanol quaternary ammonium	Very low
UTAC-LP1	17 µm	55%	85 nm	6%	25 µeq	Alkanol quaternary ammonium	Very low
UTAC-LP2	20 µm	55%	N/A	N/A	25 µeq	Alkanol quaternary ammonium	Very low
UTAC-ULP1	17 µm	55%	85 nm	6%	25 µeq	Alkanol quaternary ammonium	Very low
UTAC-ULP2	20 µm	55%	N/A	N/A	25 µeq	Alkanol quaternary ammonium	Very low
UTAC-XLP1	17 µm	55%	85 nm	6%	25 µeq	Alkanol quaternary ammonium	Very low
UTAC-XLP2	20 µm	55%	N/A	N/A	25 µeq	Alkanol quaternary ammonium	Very low
TAC-2	30 µm	2%	250 nm	5%	3.4 µeq	Alkanol quaternary ammonium	Medium
AC10 (4 mm)	13 µm	55%	160 nm	5%	4.0 µeq	Alkanol quaternary ammonium	Low
AC10 (2 mm)	13 µm	55%	160 nm	5%	0.8 µeq	Alkanol quaternary ammonium	Low
AC15 (4 mm)	13 µm	55%	85 nm	6%	9.0 µeq	Alkanol quaternary ammonium	Very low
AC15 (2 mm)	13 µm	55%	85 nm	6%	2.2 µeq	Alkanol quaternary ammonium	Very low
MCC-100	Monolithic backbone	55%	85 nm	6%	0.17 µeq	Fully functionalized with carboxylic acid	Very low
MCC-200	Monolithic backbone	55%	85 nm	6%	0.24 µeq	Fully functionalized with carboxylic acid	Very low
TCC-LP1	20 µm	55%	None ^a	N/A	260.0 µeq	Fully functionalized with carboxylic acid	Very low
TCC-ULP1	20 µm	55%	None ^a	N/A	260.0 µeq	Fully functionalized with carboxylic acid	Very low
TCC-XLP1	20 µm	55%	None ^a	N/A	260.0 µeq	Fully functionalized with carboxylic acid	Very low
TCC-2	30 µm	2%	None ^a	N/A	10 µeq	Sulfonic acid	High

^aSurface-functionalized resin.

Trap column specifications

Column	Particle diameter	Substrate X-linking	Latex diameter	Latex X-linking	Capacity (per column)	Functional group	Hydrophobicity
Trap							
ATC-3 (4 mm)	55 µm	8%	None ^b	NA	1.5 meq	Quaternary ammonium	Low
ATC 500 (4 mm)	55 µm	8%	None ^b	NA	1.5 meq	Quaternary ammonium	Low
ATC-3 (2 mm)	55 µm	8%	None ^b	NA	0.35 meq	Quaternary ammonium	Low
ATC 500 (2 mm)	55 µm	8%	None ^b	NA	0.35 meq	Quaternary ammonium	Low
ATC-HC (9 × 75 mm)	750 µm	8%	None ^b	NA	4.0 meq	Quaternary ammonium	Low
ATC-HC 500 (9 × 75 mm)	750 µm	8%	None ^b	NA	4.0 meq	Quaternary ammonium	Low
ATC-HC Borate Form (9 × 75 mm)	750 µm	8%	None ^b	N/A	4.0 meq	Quaternary ammonium	Low
ATC-HC 500 Borate Form (9 × 75 mm)	750 µm	8%	None ^b	NA	4.0 meq	Quaternary ammonium	Low
CTC (4 mm)	500 µm	8%	None ^b	N/A	3.0 meq	Sulfonic acid	Low
CTC 500 (4 mm)	500 µm	8%	None ^b	NA	3.0 meq	Sulfonic acid	Low
CTC (2 mm)	500 µm	8%	None ^b	N/A	0.8 meq	Sulfonic acid	Low
CTC 500 (2 mm)	500 µm	8%	None ^b	NA	0.8 meq	Sulfonic acid	Low
MFC-1	200 µm	20%	None ^b	NA	170.0 µeq	Iminodiacetate	Medium
MFC 500	200 µm	20%	None ^b	NA	170.0 µeq	Iminodiacetate	Medium
Transition metal							
MetPac CC-1	18 µm	20%	None ^b	NA	0.4 meq	Iminodiacetate	Medium
TMC-1	17 µm	8%	None ^b	N/A	0.3 meq	Sulfonic acid	Medium
Cation polisher							
CP1 Na ⁺ Form (6 × 16 mm)	Monolithic backbone	55%	None ^b	NA	0.24 µeq	Carboxylic acid	Very low
CP2 H ⁺ Form (19 × 24 mm)	20 µm	55%	None ^b	N/A	260.0 µeq	Carboxylic acid	Very low

^bFully-functionalized resin.

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