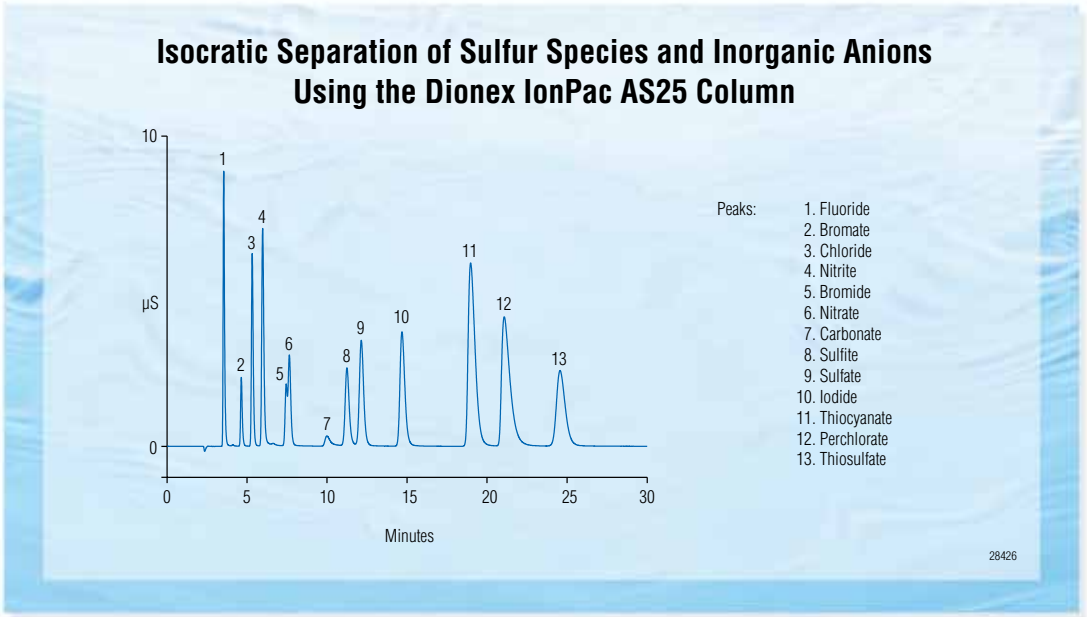
columns

Thermo Scientific Dionex IonPac AS25 Anion-Exchange Column



The Thermo Scientific Dionex IonPac™ AS25 is a high-capacity, hydroxide-selective, anion-exchange column optimized for the separation of multivalent anions and polarizable anions (perchlorate), including sulfur speciation (sulfite, sulfate, thiocyanate and thiosulfate). Using an isocratic hydroxide eluent, these analytes can be determined in approximately 25 minutes without the use of solvent. The Dionex IonPac AS25 is ideal for the determination of sulfur species in wastewater effluents from industrial, chemical and petrochemical industries as well as food and beverage samples. The Dionex IonPac AS25 column is available in 0.4 × 250, 2 × 250 mm, and 4 × 250 mm formats, supporting flow rates from 0.010 to 3 mL/min.

Now sold under the Thermo Scientific brand

Thermo SCIENTIFIC

Recommended for Multivalent Anions in Diverse Sample Matrices

- Municipal wastewater
- Food processing samples
- Paper and pulp effluents
- Refinery waste products
- Industrial wastewaters
- Industrial scrubber solutions
- Geothermal power plant samples

Superior Chromatographic Performance

- Optimized hydrophilic resin for the gradient separation of multivalent anions and polarizable anions.
- Recommended for sulfur speciation in process effluents, wastewater and scrubber solutions.

DIONEX

Part of Thermo Fisher Scientific

- Use with an eluent generator for simplified Thermo Scientific Dionex Reagent-Free™ Ion Chromatography (RFIC™) system operation. Requires only a deionized water source to produce hydroxide eluent.
- Eluent suppression using the Thermo Scientific Dionex ASRS™ 300 Anion Self-Regenerating Suppressor™ or the Thermo Scientific Dionex ACES™ 300 Anion Capillary Electrolytic Suppressor, provides RFIC system operation with low backgrounds and enhanced analyte sensitivity.
- High capacity: 350 µeq per column (4 × 250 mm column).
- Compatible with organic solvents to enhance analyte solubility, modify column selectivity, and effectively clean the column.
- The capillary and microbore formats require less eluent consumption, thereby reducing operating costs.

High-Efficiency Particle Structure

The Dionex IonPac AS25 column was developed using a unique polymer bonding technology. The stationary phase consists of a novel, hyperbranched, anion-exchange condensation polymer electrostatically attached to the surface of a wide-pore polymeric substrate. The substrate is surface-sulfonated in exactly the same manner as Dionex latex-coated, anion-exchange materials. However, in this anion-exchange resin, alternating treatments of epoxy monomer and amines produce a coating that grows directly off the substrate surface, as illustrated in Figure 1. Resin capacity is controlled through the number of alternating coating cycles. The resulting polymer is extremely hydrophilic and, therefore, has excellent selectivity for hydroxide eluents, allowing the use of lower eluent concentrations. The Dionex IonPac AS25 column uses a high-capacity resin with optimized selectivity for sulfur speciation in complex matrices.

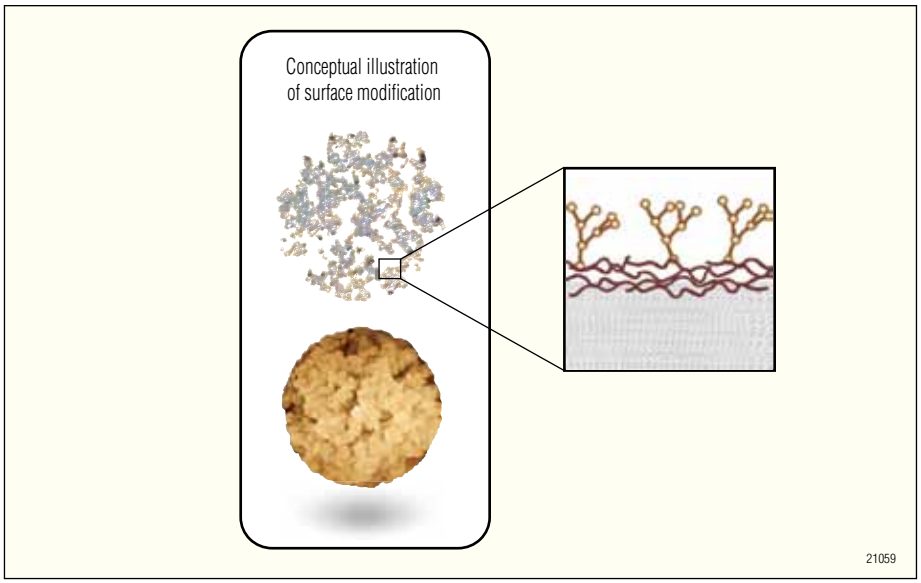


Figure 1. Structure of a Dionex IonPac AS25 packing particle.

Isocratic Separation of Multivalent and Polarizable Anions

Sulfur-containing inorganic anions are commonly encountered in soil sediments, hot springs, and lake waters. They are also frequently encountered in many industrial settings, such as the monitoring of process liquors and wastewaters from paper mills, mining sites, off-shore oil drilling operations, and alkaline scrubber solutions, and in the analysis of foods and beverages. Due to their redox chemistry, many sulfur-containing species can readily react with each other, decompose over time, or be oxidized in the presence of air. They are also very sensitive to the solution pH, which would affect the distribution of the species over time. All these make the determination of the sulfur-containing species a very challenging task.

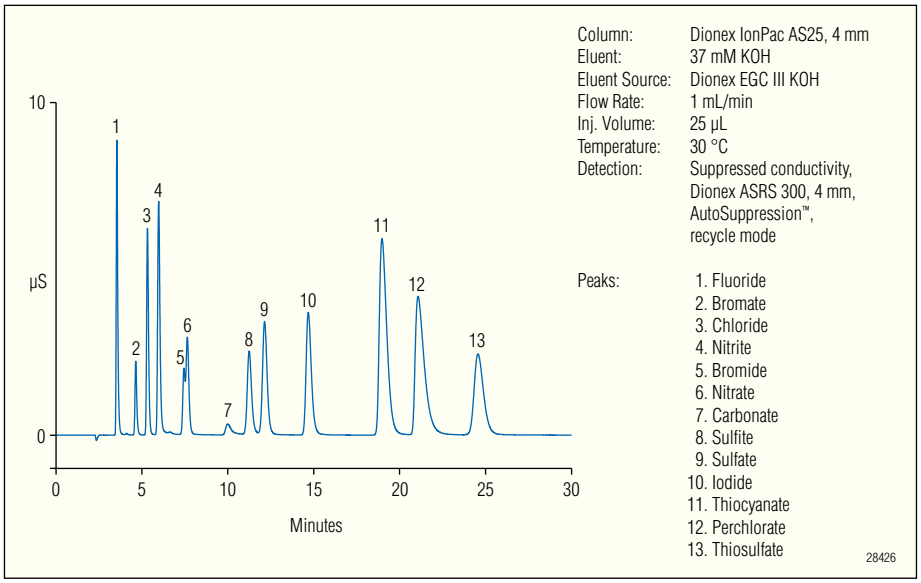


Figure 2. Isocratic separation of sulfur species and inorganic anions using a hydroxide eluent on the 4 mm Dionex IonPac AS25 column.

The Dionex IonPac AS25 column has been optimized for the fast, isocratic determination of multivalent and polarizable anions such as thiosulfate, iodide, thiocyanate, and perchlorate in less than 25 minutes without the use of solvent, as shown in Figure 2.

For the best peak shape of polarizable anions, including perchlorate, the Dionex IonPac AS16 or the Dionex IonPac AS20 columns are recommended.

Gradient Separations as Simple as Isocratic Runs with Eluent Generation

An eluent generator produces high purity potassium hydroxide eluent electrolytically from water, eliminating the need for eluent preparation. The hydroxide eluent produced is free of carbonate contamination. The use of carbonate-free hydroxide eluents results in minimal baseline shifts during hydroxide gradients yielding lower background conductivities and lower detection limits for target analytes.

Figure 3 shows the separation of common anions and polarizable anions using the Dionex IonPac AS25 4 mm column and gradient elution. No solvent is required to achieve the separation of these highly polarizable anions in less than 37 minutes.

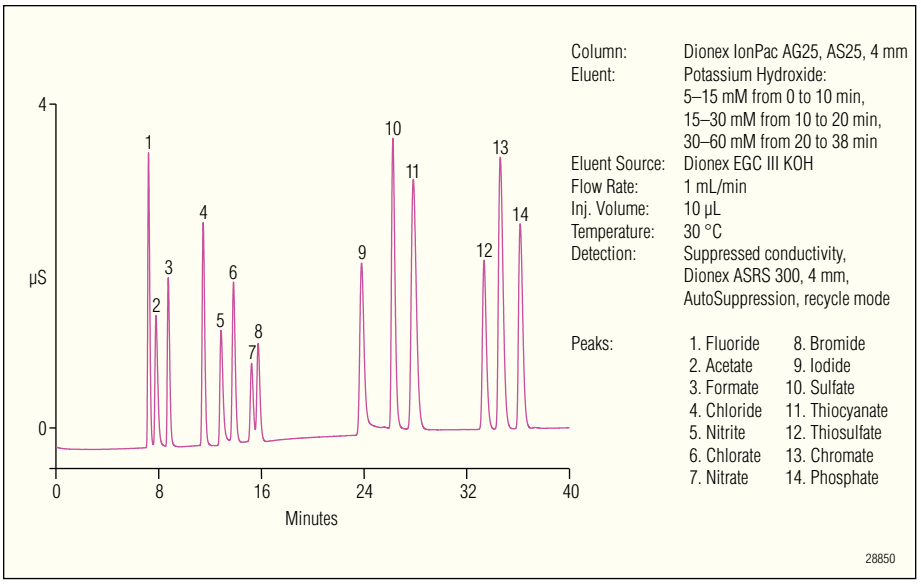


Figure 3. Separation of common anions and polarizable anions using the Dionex IonPac AS25 column with gradient elution.

Fast Analysis Using the Dionex IonPac AS25

The Dionex IonPac AS25 column is a high capacity column, 350 µeq/column for the 4 mm column, which allows for the analysis of complex sample matrices and generally produces longer run times. However, by increasing the flow rate, polarizable anions can be resolved isocratically in less than 13 minutes as shown in Figure 4.

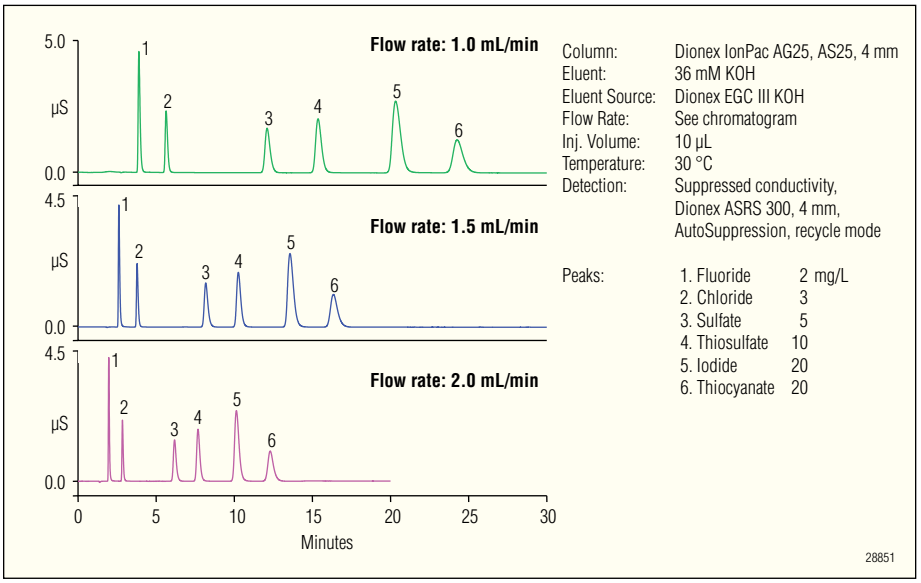


Figure 4. Fast analysis using the Dionex IonPac AS25 column with increased flow rates.

Dionex IonPac AS25 Capillary Format

The Dionex IonPac AS25 capillary column (0.4 × 250 mm) is packed with the same material as the equivalent analytical scale version, thus producing the same performance as a 4 mm column, but requires only 1/100th the eluent flow rate. The capillary format offers the advantages of less eluent consumption, providing reduced eluent costs and the ability to operate your system in the Always On, Always Ready mode. Figure 5 illustrates the separation of anions using the Dionex IonPac AS25 capillary column. Excellent retention time reproducibility can be achieved using the capillary format.

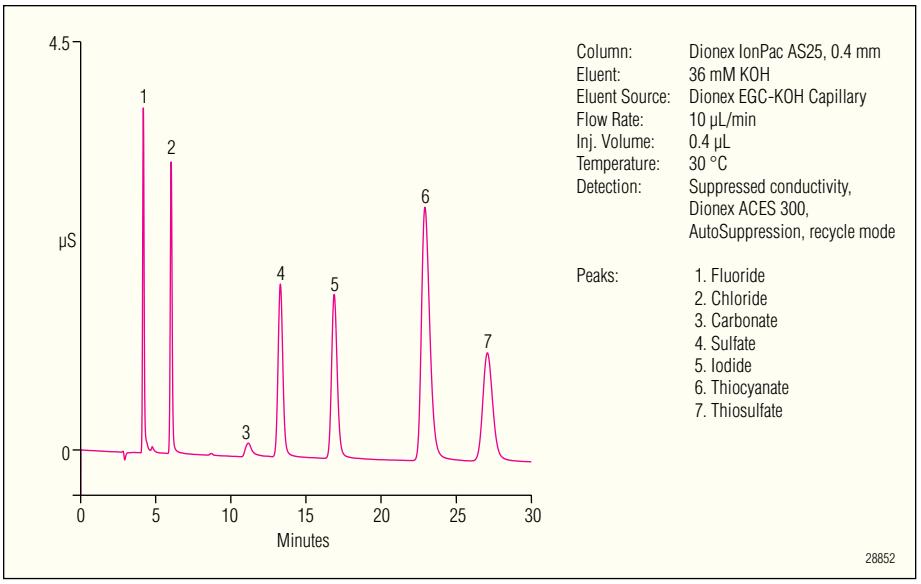


Figure 5. Analysis of polarizable anions using the Dionex IonPac AS25 capillary column.

Determination of Sulfur Species in Wastewater Samples

The high capacity of the Dionex IonPac AS25 column makes it ideal for the analysis of sulfur species in wastewater samples. Figure 6 shows the analysis of a wastewater sample containing common anions, including phosphate, with a run time of less than 30 minutes. The column produces excellent resolution of carbonate from sulfate. The Sample B chromatogram in Figure 6 shows the wastewater spiked with sulfite and thiosulfate. With an optimized hydroxide gradient, these species can easily be determined in less than 30 minutes.

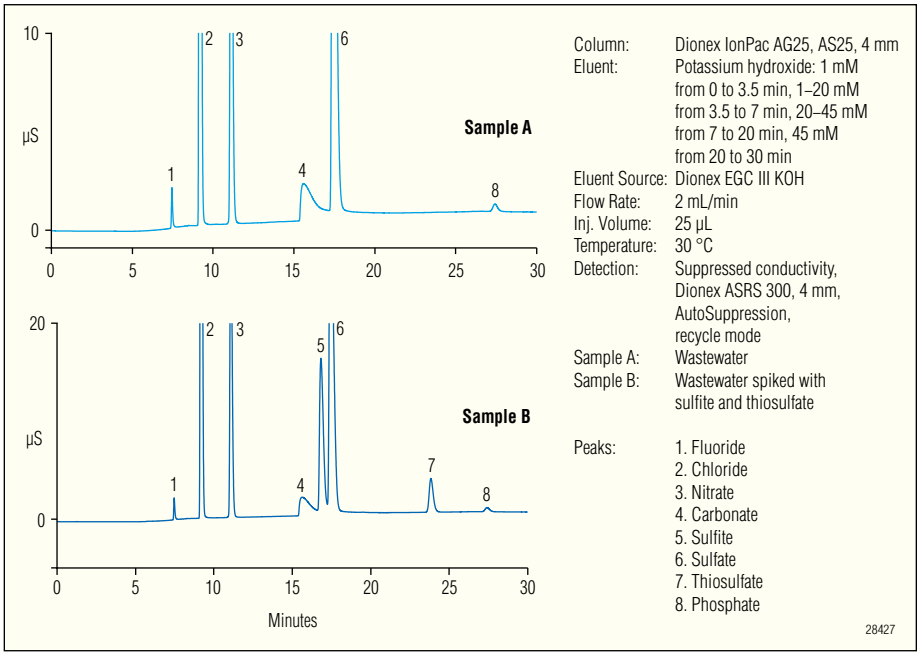


Figure 6. Determination of inorganic anions and sulfur species in wastewater samples using the Dionex IonPac AS25 column.

Analysis of Gas Scrubber Solutions

Acid gases such as hydrochloric acid (HCl), hydrofluoric acid (HF), phosgene ($COCl_2$), chlorine (Cl_2), and hydrogen sulfide (H_2S) are removed from caustic scrubbers in industrial processes. The purpose of the caustic scrubber is to prevent exposure of the acid gases to the environment. Effectiveness of these scrubbers are established by frequent analysis. Figure 7 shows the application of the analysis of a simulated acid-gas scrubber sample consisting of 3% base. The sample was diluted 10-fold in the above application. For higher concentration of scrubber solutions, a Thermo Scientific Dionex ASRN™ 300 neutralizer can be used to neutralize the alkaline samples.

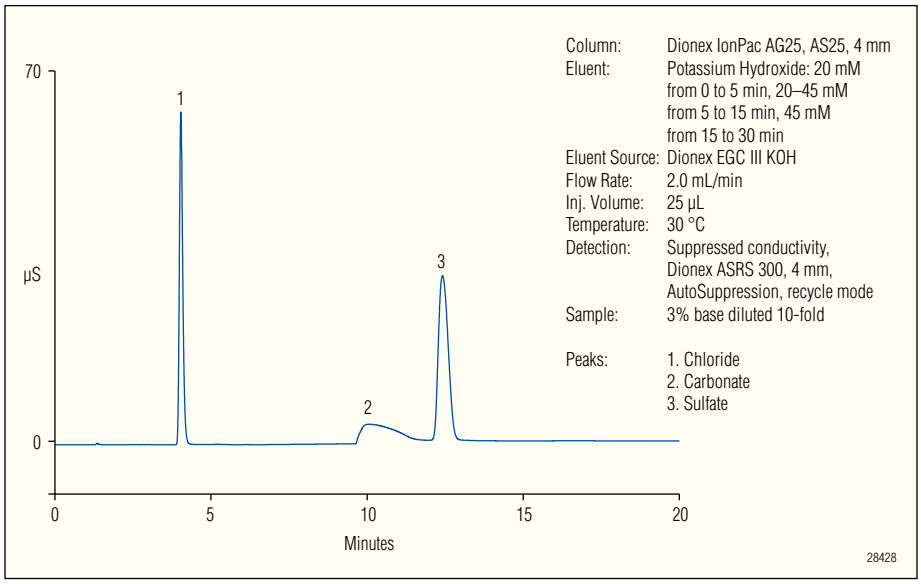


Figure 7. Sulfur species analysis of a simulated acid-gas scrubber solution using the Dionex IonPac AS25 column.

Analysis of Volcanic Gas Samples

Gases that are released from volcanic vents are collected and analyzed for sulfur-containing species and polarizable anions. The gases are collected in a concentrated sodium hydroxide solution having high levels of carbonate and sulfate present. Figure 8 shows the analysis of a simulated sample of volcanic gas condensate on the Dionex IonPac AS25 column. The sample was spiked with fluoride, chloride, bromide, sulfite, iodide, thiocyanate, thiosulfate and phosphate, which are eluted isocratically in approximately 30 minutes.

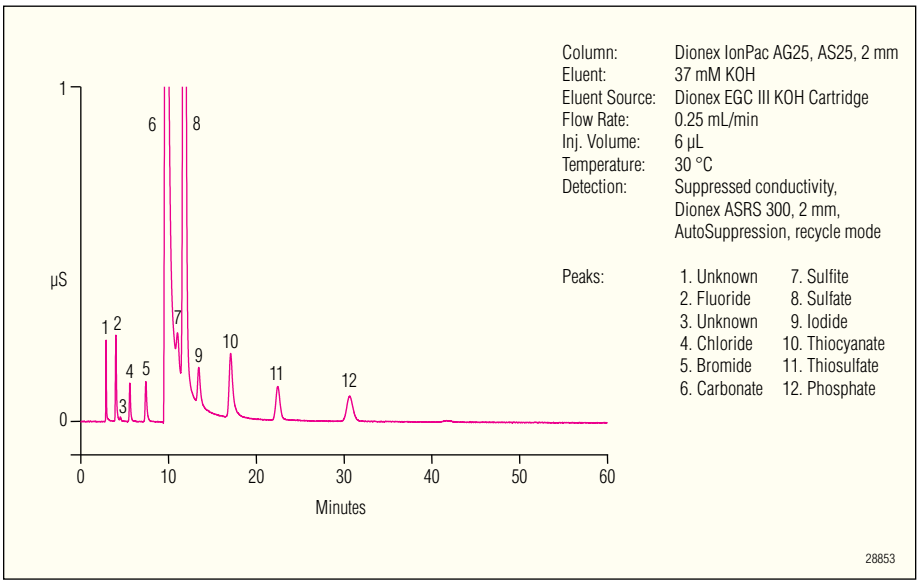


Figure 8. Simulated sample of volcanic gas condensate separated using the Dionex IonPac AS25 column.

System Recommendations

The Dionex IonPac AS25 column is recommended for use with the Thermo Scientific Dionex ICS-2100 or ICS-5000 RFIC systems equipped with an eluent generator. The Dionex IonPac AS25 can also be used with older Dionex IC systems equipped with an eluent generator or an RFC-30 Reagent-Free Controller. The eluent generator is used to automatically produce potassium hydroxide gradients from deionized water.

Suppressor Recommendations

For optimum ease-of-use and performance, the Dionex IonPac AS25 column should be used with the Dionex ASRS 300 or Dionex ACES 300 supressors. Operate the Dionex IonPac AS25 column at an elevated temperature (30 °C) to ensure reproducible retention times.

Anion Trap Columns

When using an eluent generator for eluent delivery, a Thermo Scientific Dionex CR-ATC Continuously Regenerated Anion Trap Column should be installed between the eluent generator cartridge and the degas module. As an alternative for 4 mm and 2 mm systems, a Thermo Scientific Dionex ATC-HC column can be installed between the pump outlet and inlet of the eluent generator cartridge. Alternatively, when using a manually prepared sodium hydroxide gradient with the Dionex IonPac AS25, the Thermo Scientific Dionex ATC-3 Anion Trap Column should be installed between the gradient pump and the injection valve to remove anionic contaminants from the eluent.

Concentrator Columns

For concentrator work with a 2 mm or 4 mm Dionex IonPac AS25 column, use the: Dionex IonPac AG25 guard column; Thermo Scientific Dionex Ultra Trace Anion Concentrator Column (UTAC-ULP1, UTAC –XLP1, UTAC-ULP2, or UTAC-XLP2); or Thermo Scientific Dionex Trace Anion Concentrator Column (TAC-ULP1) when a single-piston pump, e.g., the Thermo Scientific Dionex AXP pump (pulse damper required), is used for sample delivery. In addition to the concentrator columns listed above, use the Thermo Scientific Dionex UTAC-LP1, UTAC-LP2 or TAC-LP1 when the sample is delivered with a syringe or with a low-pressure autosampler, e.g., the Thermo Scientific Dionex AS-DV. For concentrator work with a 0.4 mm capillary column, use the Dionex IonPac AG25 capillary guard column or the Thermo Scientific Dionex IonSwift™ MAC-100 concentrator column.

SPECIFICATIONS

Dimensions:
Dionex IonPac AS25 Analytical Column: 2 × 250 mm and 4 × 250 mm
Dionex IonPac AG25 Guard Column: 2 × 50 mm and 4 × 50 mm
Dionex IonPac AS25 Capillary Column: 0.4 × 250 mm
Dionex IonPac AG25 Capillary Guard Column: 0.4 × 50 mm

Maximum Operating Pressure:
3000 psi (Standard and Microbore)
5000 psi (Capillary)

Mobile Phase Compatibility:
pH 0–14; 0–100% HPLC solvents

Substrate Characteristics:
Analytical Column:
- Supermacroporous Resin
- Bead Diameter (µm): 7.5
- Pore Size: 2000 Å
- Cross-Linking (%DVB): 55%

Guard Column:
- Microporous Resin
- Bead Diameter (µm): 13.0
- Pore Size: <10 Å
- Cross-Linking (%DVB): 55%

Ion Exchange Group:
Functional Group: Alkanol quaternary ammonium ion
Hydrophobicity: Ultralow

Capacity:
87.5 µeq (2 × 250 mm)
0.875 µeq* (2 × 50 mm)
350 µeq (4 × 250 mm)
3.5 µeq* (4 × 50 mm)
3.5 µeq (0.4 × 250 mm)
0.035 µeq* (0.4 × 50 mm)
*Guards are packed with a low-capacity microporous resin.

Column Construction:
PEEK™ with 10–32 threaded ferrule-style end fittings.
All components are nonmetallic.

ORDERING INFORMATION

To order in the U.S., call (800) 346-6390 or contact the Dionex Products Regional Office nearest you. Outside the U.S., order through your local Dionex Products office or distributor. Refer to the following part numbers.

Analytical and Guard Columns	Part Number
Dionex IonPac AS25 Capillary Column (0.4 × 250 mm)	076012
Dionex IonPac AG25 Capillary Guard Column (0.4 × 50 mm)	076013
Dionex IonPac AS25 Analytical Column (4 × 250 mm)	076014
Dionex IonPac AG25 Guard Column (4 × 50 mm)	076015
Dionex IonPac AS25 Analytical Column (2 × 250 mm)	076016
Dionex IonPac AG25 Guard Column (2 × 50 mm)	076017

Trap Columns

Dionex CR-ATC Continuously Regenerated Anion Trap Column (for use with systems equipped with an eluent generator or the Dionex RFC-30 Reagent-Free Controller)	060477
Dionex CR-ATC Continuously Regenerated Anion Trap Column (Capillary) (for use with Capillary Anion Columns)	072078
Dionex ATC-3 Anion Trap Column (9 × 24 mm) (for use with 4 mm columns)	059660
Dionex ATC-3 Anion Trap Column (4 × 35 mm) (for use with 2 mm columns)	059661
Dionex ATC-HC Anion Trap Column (for use with an eluent generator)	059604

Trace Anion Concentrator Columns

Dionex MAC-100 Monolith Anion Concentrator Column (0.5 × 80 mm)	074702
Dionex TAC-LP1 Trace Anion Concentrator (4 × 35 mm)	046026
Dionex TAC-ULP1 Trace Anion Concentrator (5 × 23 mm)	061400
Dionex UTAC-LP1 Ultra Trace Anion Concentrator Low Pressure (4 × 35 mm)	063079
Dionex UTAC-ULP1 Ultra Trace Anion Concentrator Ultra Low Pressure (5 × 23 mm)	063475
Dionex UTAC-XLP1 Ultra Trace Anion Concentrator Extremely Low Pressure (6 × 16 mm)	063459
Dionex UTAC-LP2 Ultra Trace Anion Concentrator Low Pressure (4 × 35 mm)	072779
Dionex UTAC-ULP2 Ultra Trace Anion Concentrator Ultra Low Pressure (5 × 23 mm)	072780
Dionex UTAC-XLP2 Ultra Trace Anion Concentrator Extremely Low Pressure (6 × 16 mm)	072781

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