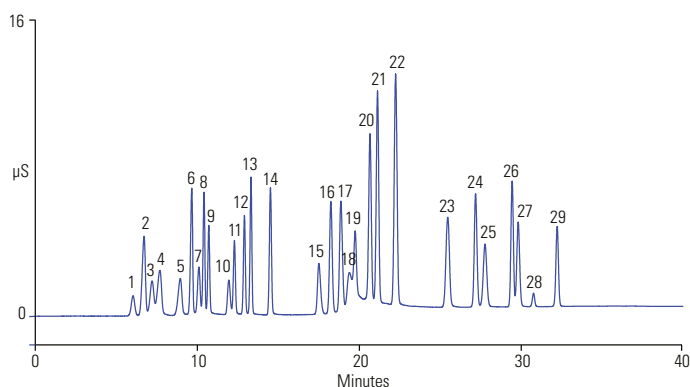


Separate a wide variety of inorganic anions and organic acids using the Dionex IonPac™ AS11 and AS11-HC Anion-Exchange Columns with potassium hydroxide gradients.

Thermo Scientific Dionex IonPac AS11 and AS11-HC Anion-Exchange Column



Column: Dionex IonPac AG11-HC/AS11-HC (0.4 × 250 mm)
 Eluent Source: Thermo Scientific Dionex EGC-KOH (Capillary)
 Eluent: Potassium hydroxide (EGC)
 1 mM from 0 to 5 min,
 1 mM to 15 mM
 from 5 to 14 min,
 15 mM to 30 mM
 from 14 to 23 min,
 30 mM to 60 mM
 from 23 to 31 min
 Flow Rate: 0.015 mL/min
 Inj. Volume: 0.4 µL
 Temperature: 30 °C
 Detection: Suppressed conductivity,
 Thermo Scientific
 Dionex ACES 300,
 AutoSuppression recycle mode

Peaks:

1. Quinate	5.0 mg/L	8. Methylsulfonate	5.0	15. Trifluoroacetate	5.0	22. Oxalate	7.5
2. Fluoride	1.5	9. Pyruvate	5.0	16. Bromide	5.0	23. Tungstate	10.0
3. Lactate	5.0	10. Valerate	5.0	17. Nitrate	5.0	24. Phosphate	10.0
4. Acetate	5.0	11. Monochloroacetate	5.0	18. Carbonate	—	25. Phthalate	10.0
5. Propionate	5.0	12. Bromate	5.0	19. Malonate	7.5	26. Citrate	10.0
6. Formate	5.0	13. Chloride	2.5	20. Maleate	7.5	27. Chromate	10.0
7. Butyrate	5.0	14. Nitrite	5.0	21. Sulfate	7.5	28. cis-Aconitate	—
						29. trans-Aconitate	10.0

The Dionex IonPac AS11 and AS11-HC anion-exchange columns are designed for the separation of organic acids and inorganic anions in various matrices. Simpler matrices can quickly be profiled using the AS11 while the AS11-HC is best for more complex, higher ionic strength matrices.

The Dionex IonPac AS11 anion-exchange column provides fast profiling of inorganic anions and organic acid anions using sodium hydroxide or potassium hydroxide gradient elution. The AS11 column is available in 2 mm and 4 mm formats. The Dionex IonPac AS11-HC is a high-capacity anion-exchange column with selectivity similar to the AS11 column.

This high-capacity column is designed to resolve a large number of organic acids and inorganic anions in complex matrices, using potassium hydroxide gradient elution. The Dionex IonPac AS11-HC is ideal for the determination of trace components and for profiling organic acids in uncharacterized samples, and is available in 4 mm, 2 mm, and 0.4 mm formats.

Highlights

- Separation of a wide variety of organic acids and inorganic anions in various matrices
- Faster profiling of simple matrices using the Dionex IonPac AS11
- Injection of more concentrated samples without overloading and peak broadening using the high-capacity Dionex IonPac AS11-HC column

Dionex IonPac AS11 Features

Using a hydroxide gradient of 0.2 to 38 mM sodium hydroxide, the AS11 column separates a large number of inorganic anions and organic acids in approximately 15 min, as illustrated in Figures 1A and 1B.

Peak broadening and overloading can occur when higher concentrations of analytes are injected onto the AS11 column, as shown in Figure 1A. These problems can be eliminated by diluting the sample before injection, as shown in Figure 1B. Conversely, the high-capacity AS11-HC column allows more concentrated samples to be directly injected without overloading the column or affecting peak shape, as illustrated in Figure 1C.

The AS11 also provides rapid elution of strongly retained ions such as iodide, thiocyanate, and thiosulfate in complex matrices.

Dionex IonPac AS11-HC Features

The high-capacity AS11-HC column allows the injection of more concentrated samples without overloading and peak broadening. The AS11-HC provides improved separation over the AS11 column for monovalent carboxylic acids, including quinate, lactate, acetate, propionate, formate, and butyrate. A wide range of organic acids and inorganic anions can be separated in approximately 40 min using a sodium hydroxide gradient at a controlled temperature of 30 °C, as illustrated in Figure 1C.

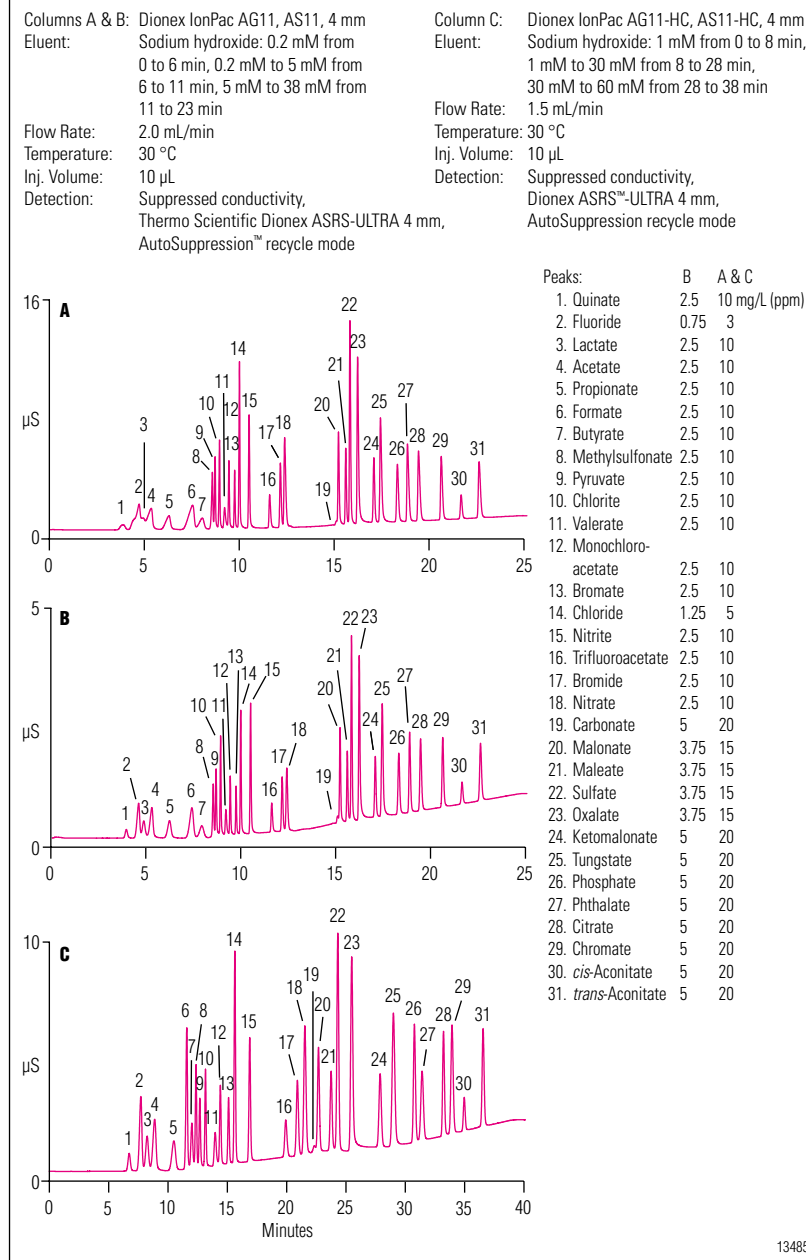


Figure 1. Comparison of the Dionex IonPac AS11 and AS11-HC columns for the separation of a wide range of organic acids and inorganic anions using sodium hydroxide gradient elution. The high capacity AS11-HC provides excellent peak shape for early-eluting anions.

Key Applications

The Dionex IonPac AS11 and AS11-HC columns are solvent-compatible, which allows for anion-exchange selectivity control and easy column cleanup after the analysis of complex matrices. Typical applications include the determination of organic acids and inorganic anions in diverse sample matrices including:

- Fruit juices and wines
- Foods and beverages
- Fermentation and process solutions
- Chemical additives
- Chemical process solutions
- Wastewater
- Brines
- Power plant waters

Economical Capillary Operation

The Dionex IonPac AS11-HC column is also available in the 0.4 mm format for capillary operation to offer the advantage of reduced operating costs.

- Ideal for limited sample volumes due to higher mass sensitivity.
- One hundred fold reduction in eluent consumption and waste disposal.
- 4 mm applications can be directly transferred to the 0.4 mm format by reducing flow rate by one hundred fold.

Figure 2 is an example of the separation of inorganic anions and organic acids using the Dionex IonPac AS11-HC capillary column.

High-Efficiency Particle Structure

The Dionex IonPac AS11 and AS11-HC column packings have unique structures composed of a highly crosslinked core and a MicroBead™ anion-exchange layer attached to the surface, as shown in Figures 3 and 4. The substrate for the Dionex IonPac AS11 is a 13 µm diameter microporous resin bead. The Dionex IonPac AS11-HC column substrate is a 9 µm diameter macroporous resin bead. Both columns are composed of ethylvinylbenzene crosslinked with 55% divinylbenzene.

The anion-exchange layer is functionalized with quaternary ammonium groups. This anion-exchange layer has a controlled thickness, which results in excellent mass-transfer characteristics and, consequently, very high efficiency peaks.

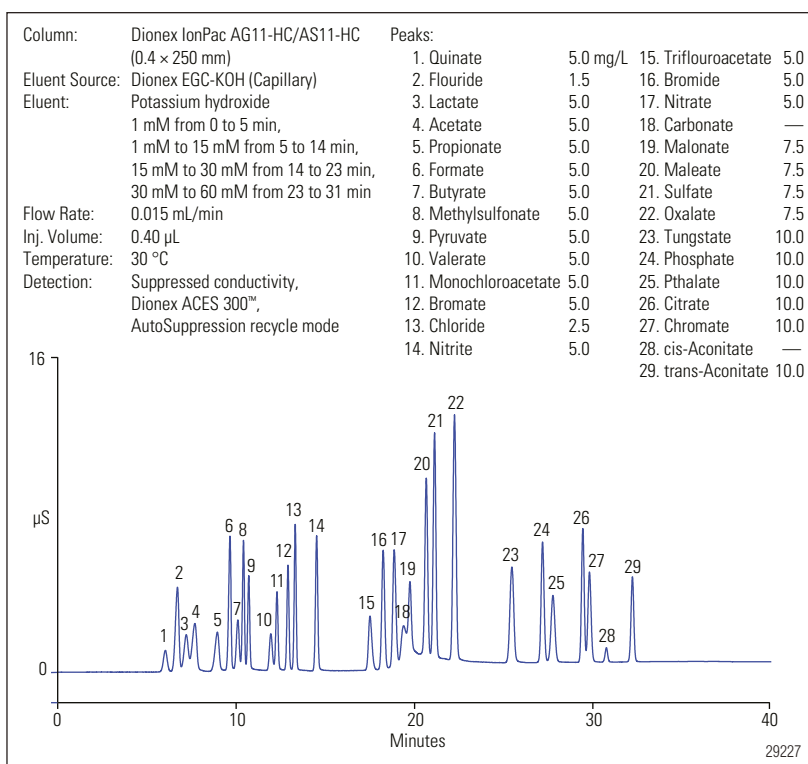


Figure 2. Gradient separation of inorganic anions and organic acids using the Dionex IonPac AS11-HC capillary column.

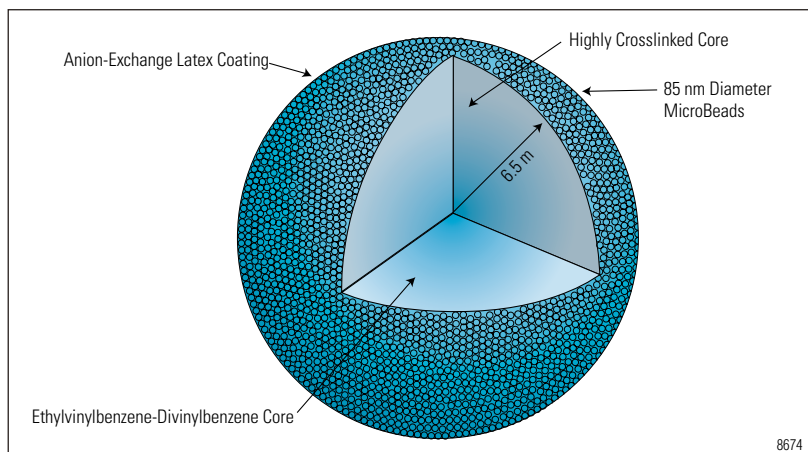


Figure 3. Structure of a Dionex IonPac AS11 packing particle.

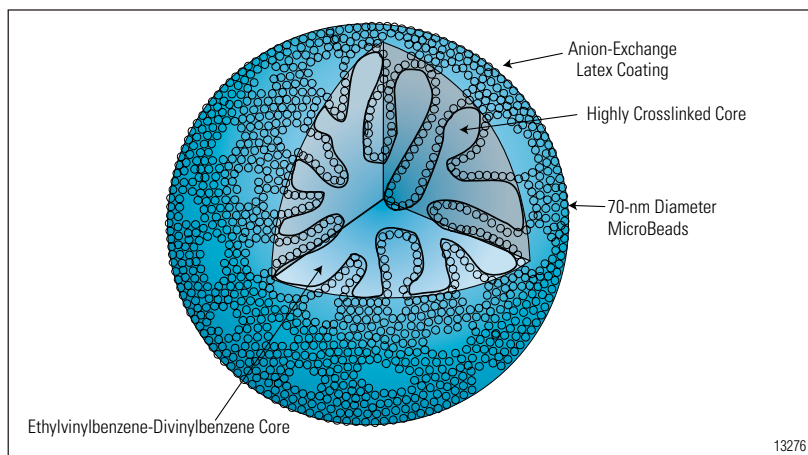


Figure 4. Structure of an Dionex IonPac AS11-HC packing particle.

Solvent-Compatible Packing

Because the Dionex IonPac AS11 and AS11-HC columns are 100% HPLC solvent compatible, organic solvents can be used for efficient column cleanup or to enhance sample solubility. Time and expense can be saved through the elimination of time-consuming sample preparation steps. This feature allows complex matrices to be analyzed with minimal sample preparation and extends the utility of the column to new applications requiring solvents. Adding organic solvents to the eluent modifies column selectivity and enables the elution of nonpolar analytes or contaminants from the column.

Dionex IonPac AS11 Column for Fast Gradient Profile of Organic Acid Anions

The Dionex IonPac AS11 column provides fast profiling of organic acids and inorganic anions using sodium or potassium hydroxide gradient elution. The column is ideal for the determination of organic acids and inorganic anions at similar concentrations or organic acids in well-characterized samples. Mono-, di-, and trivalent organic acids as well as inorganic anions can be separated in approximately 15 min using a sodium or potassium hydroxide gradient.

Determination of Short-Chain Organic Acids

Weakly retained organic acids and inorganic anions commonly encountered in the food, beverage, biopharmaceutical, chemical, and power industries can be determined in a single run using the Dionex IonPac AS11-HC column. Resolution of monovalent organic acids and improved peak shape are two benefits of the high capacity of the Dionex IonPac AS11-HC.

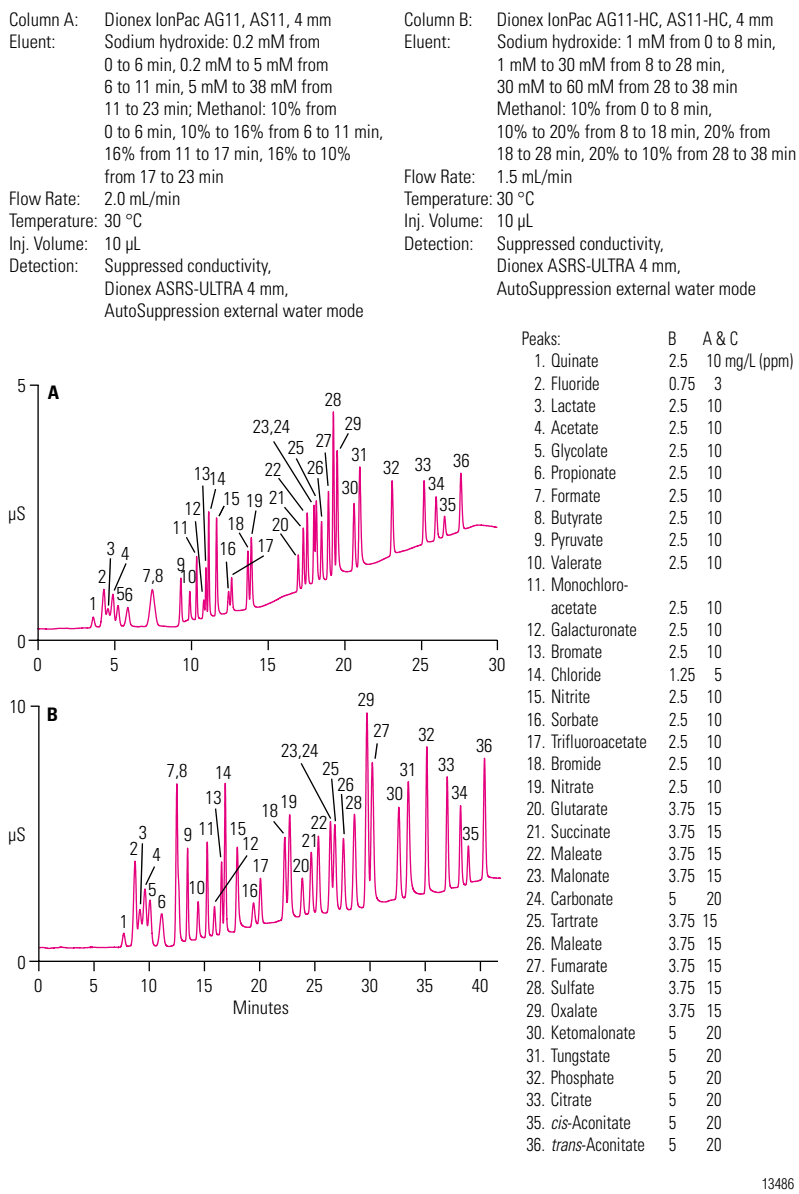


Figure 5. Effect of solvent on Dionex IonPac AS11 and AS11-HC selectivity.

Increased Flexibility for Methods Development

The solvent compatibility of the Dionex IonPac AS11 and AS11-HC columns permits the use of HPLC organic solvents in the eluent to modify ion-exchange selectivity. Both hydroxide concentration gradients and organic solvent gradients combined with elevated temperature can be used to achieve optimum resolution of closely eluting analyte pairs. The retention of the

more hydrophobic member of the unresolved pair is decreased more by the addition of solvent, which improves resolution. Figure 5 illustrates the effect of solvent on selectivity of monovalent and divalent organic acids on the Dionex IonPac AS11 and AS11-HC columns. The columns can be operated at ambient or elevated temperatures. The use of a controlled column temperature ensures reproducible results.

Dionex IonPac AS11-HC for Monovalent and Divalent Organic Anions

The Dionex IonPac AS11-HC column provides improved separation of monovalent and divalent organic acids and inorganic anions using a sodium or potassium hydroxide gradient at a controlled temperature of 30 °C. Because higher eluent concentrations can be used to separate monovalent anions, the higher capacity allows injection of more concentrated samples without overloading and provides improved peak shapes for monovalent organic acids in complex matrices, as illustrated in Figure 1.

IonPac AS11-HC for Trace Inorganic and Organic Acid Anions Using a Large-Loop Injection

The high-capacity Dionex IonPac AS11-HC allows large injections of high ionic strength samples without loss of peak efficiencies and eliminates the need for sample dilution. High capacity allows for the determination of trace inorganic anions and organic acids using a large-loop injection. Figure 6 illustrates the separation of inorganic anions and organic acids using a large-loop injection with a sodium hydroxide gradient at a controlled temperature of 30 °C. Low ppb levels of these analytes can easily be determined using a 1.0 mL injection loop on a 2 mm microbore system.

Determination of Carboxylic Acids in Complex Matrices

The Dionex IonPac AS11-HC column can be used to monitor the organic acid and inorganic anion content in the quality control of foods, wines, and beverages. The high capacity of the column makes it ideal for the analysis of organic acids and inorganic anions in complex matrices. Samples high in ionic strength can be injected directly onto the Dionex IonPac AS11-HC and do not cause overloading problems or poor peak shapes for monovalent organic acids (e.g., lactate, acetate, propionate, formate, and butyrate). Figure 7 compares the Dionex IonPac AS11 and the AS11-HC columns for the analysis of beer. The Dionex IonPac AS11-HC column shows improved peak shapes for the monovalent organic acids. Butyrate is an important indicator of deterioration of foods and beverages and can be easily separated from formate on the Dionex IonPac AS11-HC column with a sodium hydroxide gradient/methanol gradient step change.

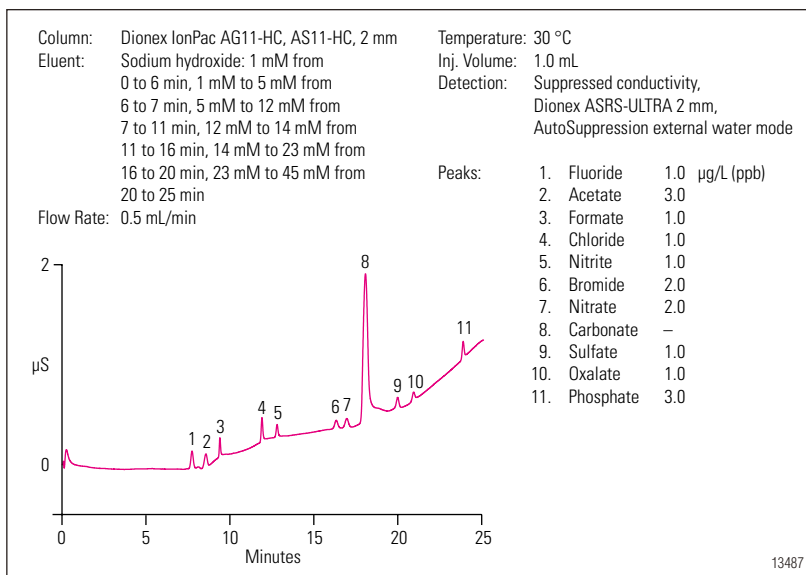


Figure 6. Separation of inorganic anions and organic acids using a large-loop injection on the microbore (2 mm) Dionex IonPac AS11-HC column.

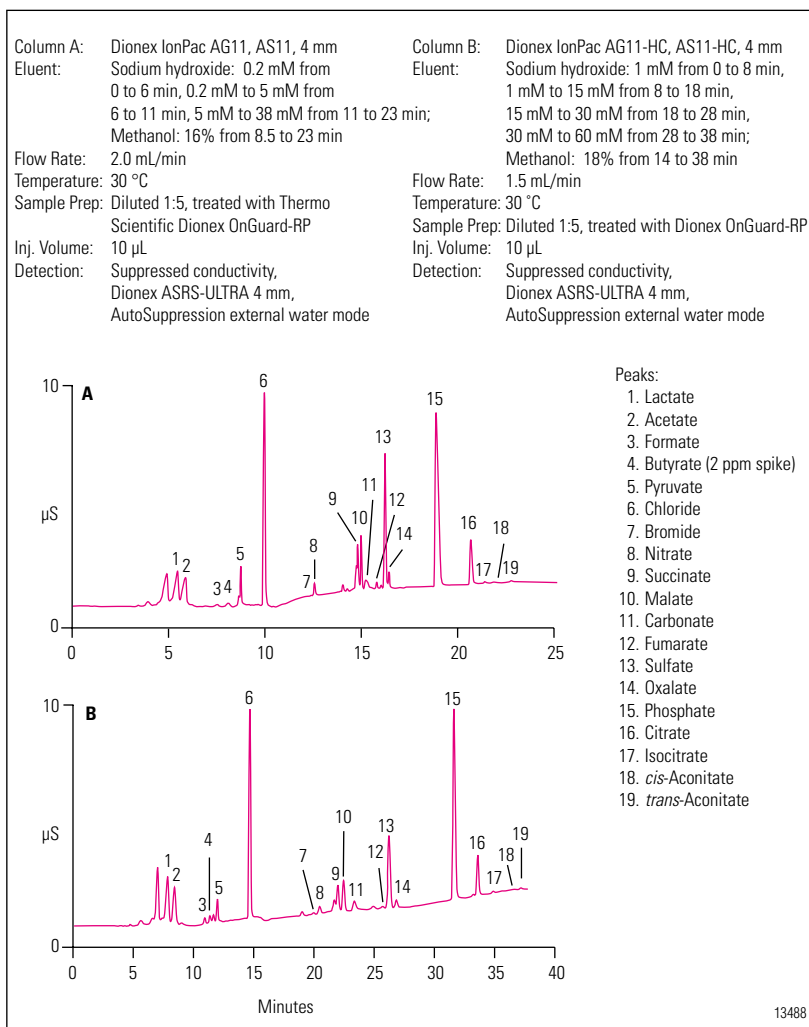


Figure 7. Comparison of the Dionex IonPac AS11 and AS11-HC columns for the analysis of beer spiked with 2 mg/L (ppm) butyrate.

Figures 8 and 9 illustrate the separation of organic acids and inorganic anions in red wine and apple juice using the Dionex IonPac AS11-HC column. This column provides improved resolution over the AS11 column for components with widely varying concentration ratios. The Dionex IonPac AS11-HC column resolves succinate and malate, even at very different concentrations, as shown in Figure 9.

Dionex IonPac AS11-HC for Organic Acids and Inorganic Anions in Fermentation Broths

Monitoring fermentation broths is necessary for process control, because many ingredients resulting from metabolic processes affect yield or quality of the desired fermentation products. Inorganic anions maintain osmolarity and provide co-factors for biosynthesis. Certain organic acids are waste products, and their accumulation inhibits cell growth or product yields.

The high capacity of the Dionex IonPac AS11-HC column allows for the determination of a number of inorganic anions and organic acids in fermentation broths. Figure 10 illustrates the separation of common fermentation broth anions using the Dionex IonPac AS11-HC column with a sodium hydroxide gradient at a controlled temperature of 30 °C.

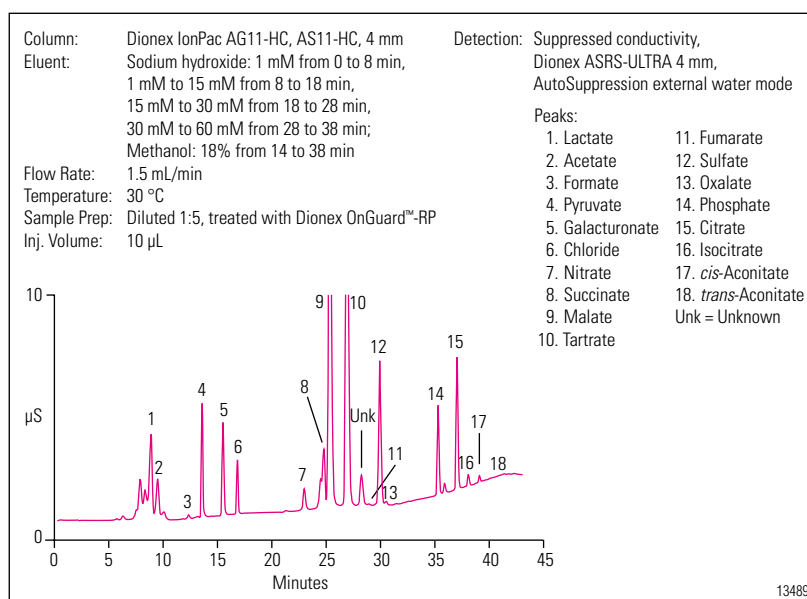


Figure 8. Analysis of red wine using the Dionex IonPac AS11-HC column.

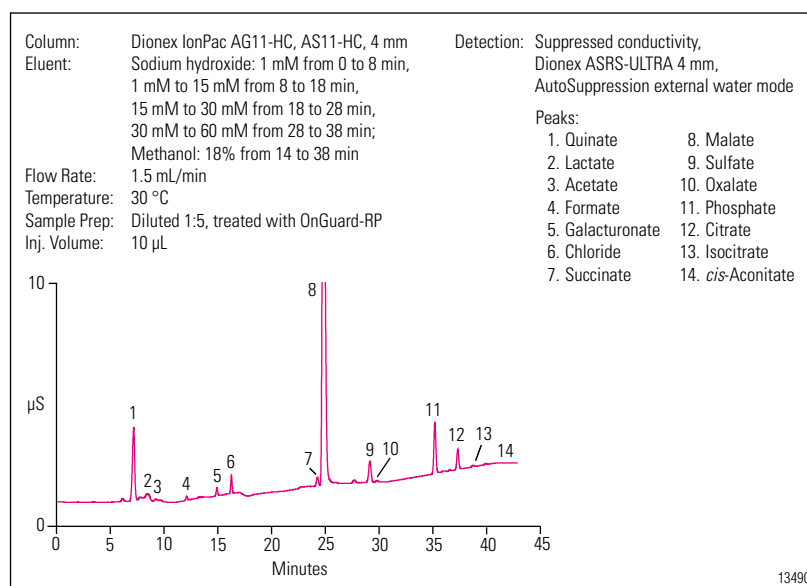


Figure 9. Analysis of apple juice using the Dionex IonPac AS11-HC column.

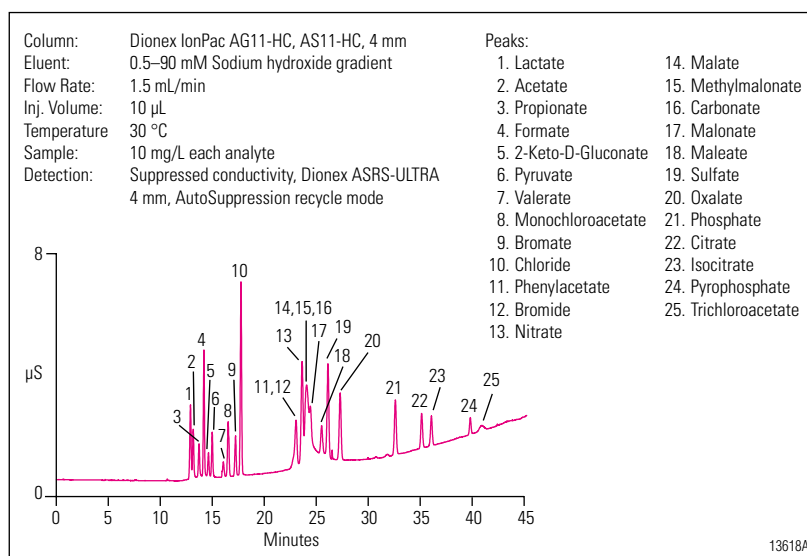


Figure 10. Separation of common fermentation broth anions using the Dionex IonPac AS11-HC column.

Gradient Separations as Simple as Isocratic Runs with Eluent Generation

The Eluent Generator produces high-purity potassium hydroxide eluent electrolytically, eliminating the need for eluent preparation. Only a source of deionized water is required. The potassium hydroxide eluent produced is free of carbonate contamination. The use of carbonate-free hydroxide eluents minimizes baseline shifts during hydroxide gradients which provides greater retention time reproducibility, lower background conductivity, and lower detection limits for target analytes.

Figure 11 illustrates the gradient separation of inorganic anions and organic acids in grape juice using a Dionex IonPac AS11-HC using a potassium hydroxide gradient delivered by an Eluent Generator.

Figure 12 illustrates the use of the Dionex IonPac AS11 column with the Eluent Generator for an application of interest to the food industry, determination of sorbate, a sweetener used in cake frosting. In this example, a potassium hydroxide gradient is used to elute sorbate in less than 6 min and also resolve other inorganic anions and organic acids present in cake frosting.

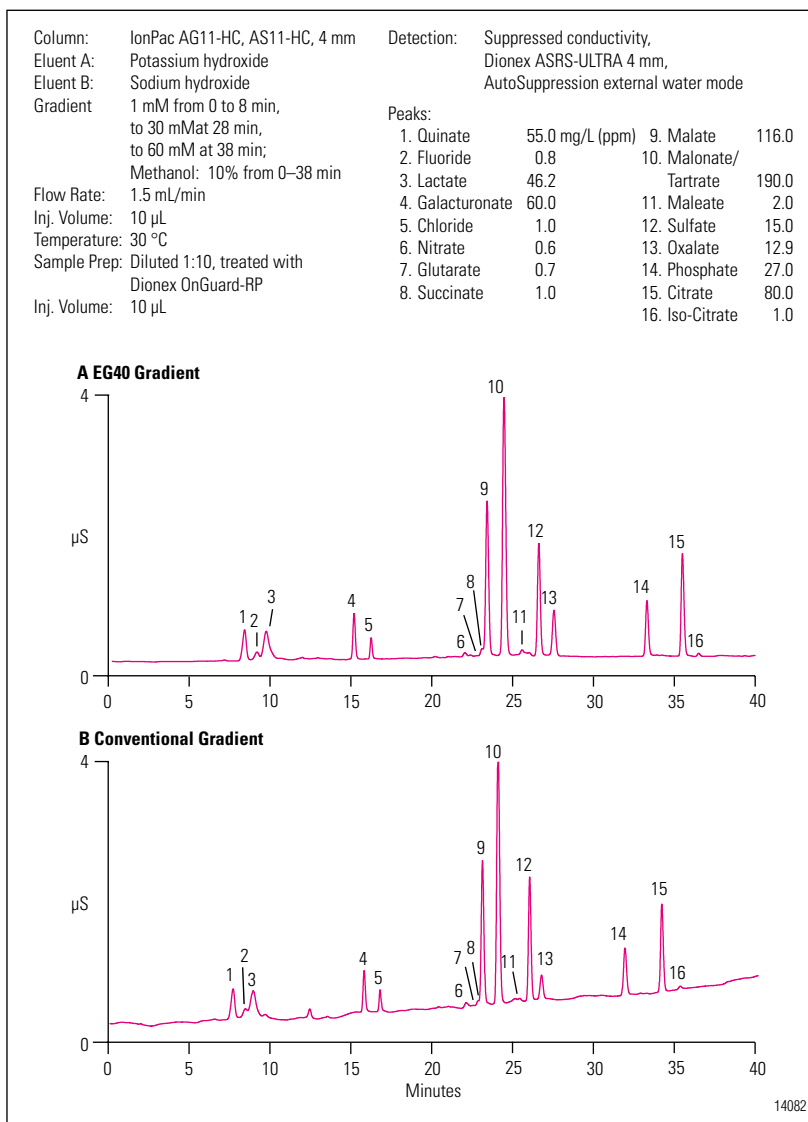


Figure 11. Analysis of grape juice on a Dionex IonPac AS11-HC column using a potassium hydroxide gradient delivered by an Eluent Generator.

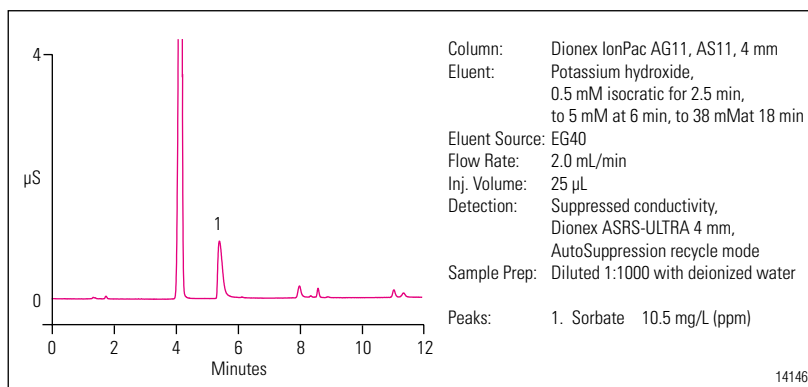


Figure 12. Analysis of sorbate in cake frosting using a Dionex IonPac AS11 column using a potassium hydroxide gradient delivered by an Eluent Generator.

Dionex IonPac AS11 for Anions in Hydrogen Peroxide

Fabricators of electronic components use hydrogen peroxide during the manufacturing process. Monitoring chemical reagents for anionic impurities is important because the anionic contaminants can cause corrosion when present in manufacturing solutions. A method has been developed using the Dionex IonPac AS11 column to determine inorganic anions in stabilized hydrogen peroxide. Figure 13 illustrates the separation of the anionic contaminants in hydrogen peroxide using a large-loop injection with a sodium hydroxide gradient.

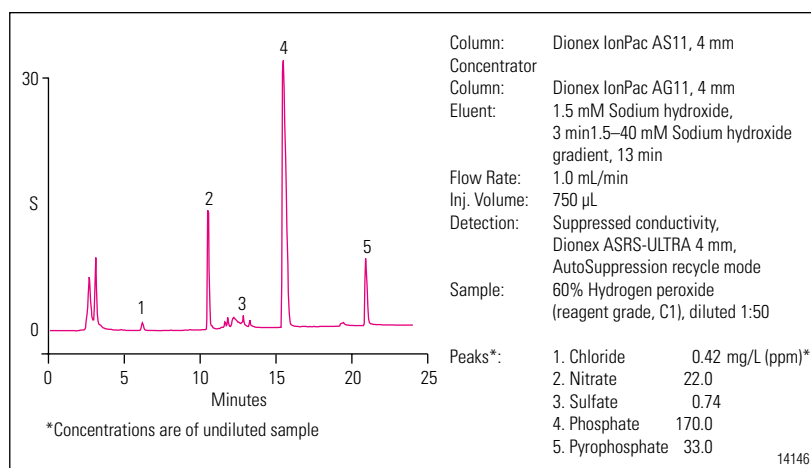


Figure 13. Determination of anions in 60% stabilized hydrogen peroxide using the Dionex IonPac AS11 column.

Dionex AS11-HC for Trace Anions in Methanesulfonic Acid

Monitoring anionic contaminants in chemical reagents is an important quality control function for specialty chemical manufacturers. The high-capacity Dionex IonPac AS11-HC column is ideal for determining trace anions in concentrated acids. Figure 14 illustrates the separation of trace chloride and sulfate in concentrated methanesulfonic acid using the Dionex IonPac AS11-HC column. Chloride and sulfate can easily be determined down to the low ppb level with good peak shape even in the presence of high concentrations of methanesulfonic acid.

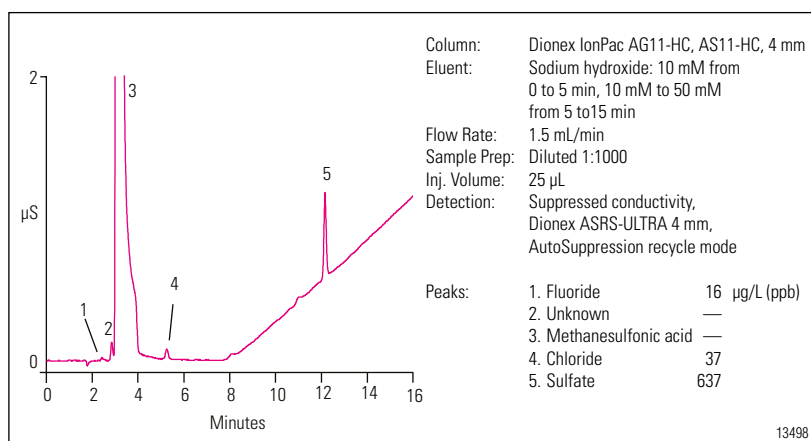


Figure 14. Dionex IonPac AS11-HC for trace anions in concentrated methanesulfonic acid.

Dionex AS11 Column for Polarizable Anions

The Dionex AS11 column separates polarizable anions in complex matrices. As shown in Figure 15, for highly retained hydrophobic anions such as iodide, perchlorate, thiosulfate, and thiocyanate, retention times can be significantly decreased and peak efficiencies improved by using eluents containing organic solvents. This approach is ideal for the determination of iodide, perchlorate, thiocyanate, and thiosulfate. The Dionex IonPac AS16 column is recommended for this separation without the use of solvents in the eluent.

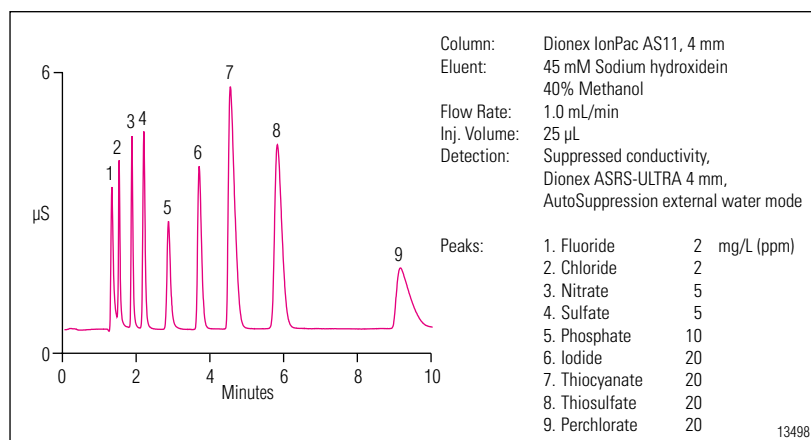


Figure 15. Separation of common inorganic anions, including iodide, perchlorate, thiocyanate, and thiosulfate, using the Dionex IonPac AS11 column.

Dionex IonPac AS11 Column for Highly Charged Anions

The determination of highly charged anions such as polyphosphates or polycarboxylates is possible using gradient elution on a 2 mm or 4 mm Dionex IonPac AS11 column. As shown in Figure 16, the high hydroxide selectivity on the Dionex IonPac AS11 resin permits elution of these ions at lower hydroxide concentrations than are possible on the Thermo Fisher Scientific OmniPac PAX-100, permitting the use of either 2 mm or 4 mm columns. The Dionex IonPac AS11 column is ideal for the determination of polyphosphates, polycarboxylates, and polysulfonates.

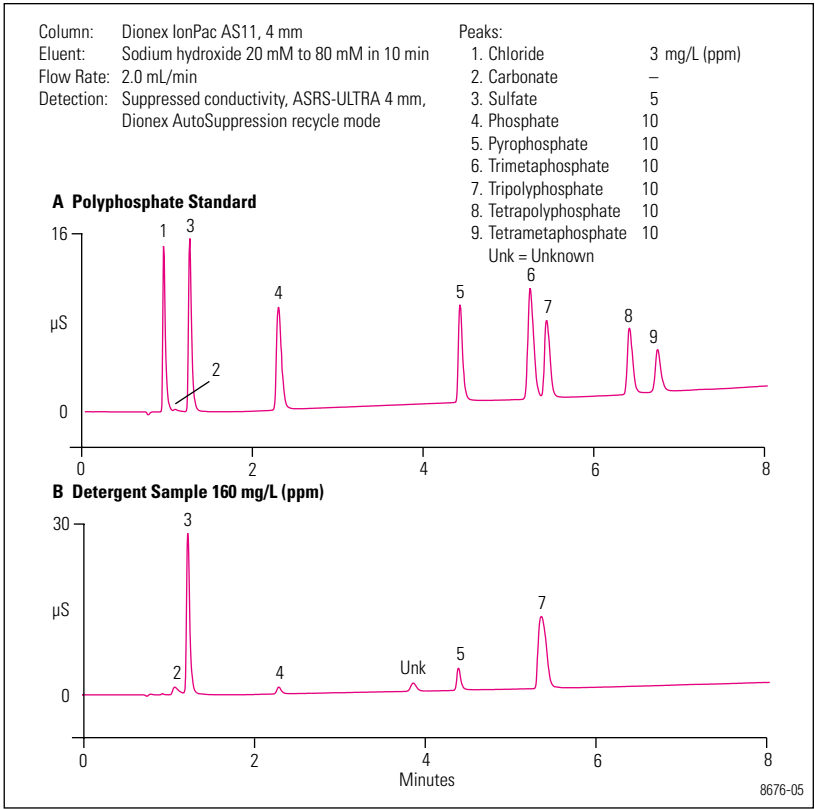


Figure 16. Separation of polyphosphates in detergent.

Table 1. Column selection table.

Analyte	Recommended Column
Fast profiling of mono-, di-, and trivalent organic acids and inorganic anions in well-characterized samples	AS11
High resolution of mono- and divalent organic acids	AS11-HC
Monovalent organic acids (lactate, acetate, propionate, formate, butyrate)	AS11-HC
Trace components in complex matrices using large loop injection	AS11-HC
Organic acids and inorganic anions in high ionic strength matrices	AS11-HC
Organic acids in high ionic strength matrices (inorganic anions elute in void)	ICE-AS6 or ICE-AS1
Aromatic acids with conductivity detection	AS11
Polarizable anions (iodide, thiocyanate, thiosulfate, perchlorate)	AS11 or AS16
Polyphosphates, polycarboxylates, and polysulfonates	AS11 or AS16
Preservatives (benzoate, citrate, sorbate)	AS11-HC

SPECIFICATIONS

<i>Dimensions</i>	Dionex IonPac AS11 Analytical: 2 × 250 mm and 4 × 250 mm Dionex IonPac AG11 Guard: 2 × 50 mm and 4 × 50 mm Dionex IonPac AS11-HC Analytical: 2 × 250 mm and 4 × 250 mm Dionex IonPac AG11-HC Guard: 2 × 50 mm and 4 × 50 mm Dionex IonPac AS11-HC Capillary: 0.4 × 250 mm Dionex IonPac AS11-HC Capillary Guard: 0.4 × 50 mm	
<i>Maximum Operating Pressure</i>	27 MPa (4000 psi)	
<i>Mobile Phase Compatibility</i>	pH 0–14; 0–100% HPLC solvents	
<i>Substrate Characteristics</i>	Dionex IonPac AS11 Bead diameter: 13 µm Dionex IonPac AS11 Pore size: Microporous, <10 Å Crosslinking: (%DVB): 55%	Dionex IonPac AS11-HC Bead diameter: 9.0 µm Dionex IonPac AS11-HC Pore size: 2000 Å Crosslinking: (%DVB): 55%
<i>Latex Characteristics</i>	Dionex IonPac AS11 Functional Group: Alkanol quaternary ammonium ion Latex Crosslinking: 6% Latex Diameter: 85 nm Hydrophobicity: Very Low	Dionex IonPac AS11-HC Functional Group: Alkanol quaternary ammonium ion Latex Crosslinking: 6% Latex Diameter: 70 nm Hydrophobicity: Medium Low
<i>Capacity</i>	Dionex IonPac AS11 11 µeq (2 × 250 mm Analytical) 2.2 µeq (2 × 50 mm Guard)	Dionex IonPac AS11-HC 72.5 µeq (2 × 250 mm Analytical) 1.75 µeq (2 × 50 mm Guard)
	Dionex IonPac AS11 45 µeq (4 × 250 mm Analytical) 9 µeq (4 × 50 mm Guard)	Dionex IonPac AS11-HC 290 µeq (4 × 250 mm Analytical) 7 µeq (4 × 50 mm Guard) 2.90 µeq (0.4 × 250 mm Capillary Column) 0.07 µeq (0.4 × 50 mm Capillary Guard)
<i>Column Construction</i>	PEEK™ with 10–32 threaded ferrule-style end fittings. All components are nonmetallic.	

System Requirements

The Dionex IonPac AS11-HC Capillary Column is recommended for use with the Thermo Scientific Dionex ICS-5000 or ICS-4000 Capillary HPLC system. The Dionex IonPac AS11 and AS11-HC Analytical Columns are recommended for use with the Dionex ICS-2100 or ICS-5000 RFIC system equipped with an eluent generator.

The Dionex IonPac AS11 and AS11-HC Analytical Columns can also be used with older Dionex IC systems equipped with an eluent generator or a Thermo Scientific Dionex 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 AS11 and AS11-HC columns should be used with the Dionex ASRS 300 Anion Self-Regenerating Suppressor or the Dionex ACES™ 300 Anion Capillary Electrolytic Suppressor.

Anion Trap Columns

When using the eluent generator for eluent delivery, a Thermo Scientific Dionex CR-ATC Continuously Regenerated Anion Trap Column should be installed between the eluent generator cartridge (EGC) and the degas module. As an alternative for 4 mm and 2 mm systems, a Dionex IonPac ATC-HC column can be installed between the pump outlet and the EGC inlet. Alternatively, when using a manually-prepared sodium hydroxide gradient with the Dionex IonPac AS11 and AS11-HC, the Dionex IonPac 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 AS11 or AS11-HC column, use the: Dionex IonPac AS11 or AS11-HC guard column; Ultratrace Anion Concentrator Columns (Dionex IonPac UTAC-ULP1, UTAC-XLP1, UTAC-ULP2, or UTAC-XLP2) or Trace Anion Concentrator Column (Dionex IonPac TAC-ULP1) when a single piston pump such as the Thermo Scientific Dionex AXP pump (pulse damper required) is used for sample delivery.

In addition to the concentrator columns listed above, use the Dionex IonPac UTAC-LP1, UTAC-LP2 or TAC-LP1 when the sample is delivered using a syringe or 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 AG11-HC Capillary Guard Column or the Thermo Scientific Dionex IonSwift MAC-100 concentrator column.

ORDERING INFORMATION

To order in the U.S., call 1-800-346-6390, or contact the Thermo Fisher Scientific office nearest you. Outside the U.S., order through your local Thermo Fisher Scientific office or distributor. Refer to the following part numbers.

Dionex IonPac AS11 Columns	Part Number
Dionex IonPac AS11 Analytical Column (4 × 250 mm)	044076
Dionex IonPac AG11 Guard Column (4 × 50 mm)	044078
Dionex IonPac AS11 Analytical Column (2 × 250 mm)	044077
Dionex IonPac AG11 Guard Column (2 × 50 mm)	044079
Dionex IonPac AS11-HC Columns	Part Number
Dionex IonPac AS11-HC Analytical Column (4 × 250 mm)	052960
Dionex IonPac AG11-HC Guard Column (4 × 50 mm)	052962
Dionex IonPac AS11-HC Analytical Column (2 × 250 mm)	052961
Dionex IonPac AG11-HC Guard Column (2 × 50 mm)	052963
Dionex IonPac AS11-HC Capillary Column (0.4 × 250 mm)	078429
Dionex IonPac AG11-HC Capillary Guard Column (0.4 × 50 mm)	078430
Anion Trap Columns	Part Number
Dionex CR-ATC Continuously Regenerated Anion Trap Column (for use with systems equipped with an eluent generator or RFC-30 Reagent-Free Control)	060477
Dionex CR-ATC Continuously Regenerated Anion Trap Column (for use with capillary anion columns)	072078
Dionex IonPac ATC-3 Anion Trap Column (9 × 24 mm)	
Dionex IonPac ATC-3 4 mm (9 × 24 mm) Anion Trap Column (for use with 4 mm columns)	059660
Dionex IonPac ATC-3 2 mm (4 × 3 5 mm) Anion Trap Column (for use with 2 mm columns)	079932
Dionex IonPac ATC-HC (9 × 75 mm) Anion Trap Column (for use with the Dionex EG40 Eluent Generator)	059604
Trace Anion Concentrator Columns	Part Number
Dionex IonPac TAC-2 Trace Anion Concentrator (3 × 35 mm)	043101
Dionex IonPac TAC-LP1 Trace Anion Concentrator (4 × 35 mm)	046026
Dionex IonSwift MAC-100 Monolith Anion Concentrator (0.5 × 80 mm) (for use with capillary IC)	074702
Dionex IonPac TAC-LP1 Trace Anion Concentrator (4 × 35 mm)	046026
Dionex IonPac TAC-ULP1 Trace Anion Concentrator (5 × 23 mm)	061400
Dionex IonPac UTAC-LP1 Ultra Trace Anion Concentrator Low Pressure (4 × 35 mm)	063079
Dionex IonPac UTAC-ULP1 Ultra Trace Anion Concentrator Ultra Low Pressure (5 × 23 mm)	063475
Dionex IonPac UTAC-XLP1 Ultra Trace Anion Concentrator Extremely Low Pressure (6 × 16 mm)	063459
Dionex IonPac UTAC-LP2 Ultra Trace Anion Concentrator Low Pressure (4 × 35 mm)	079917
Dionex IonPac UTAC-ULP2 Ultra Trace Anion Concentrator Ultra Low Pressure (5 × 23 mm)	079918
Dionex IonPac UTAC-XLP2 Ultra Trace Anion Concentrator Extremely Low Pressure (6 × 16 mm)	072781

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Thermo Scientific Dionex products are designed, developed, and manufactured under an ISO 9001 Quality System.

PS70024_E 03/12S

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