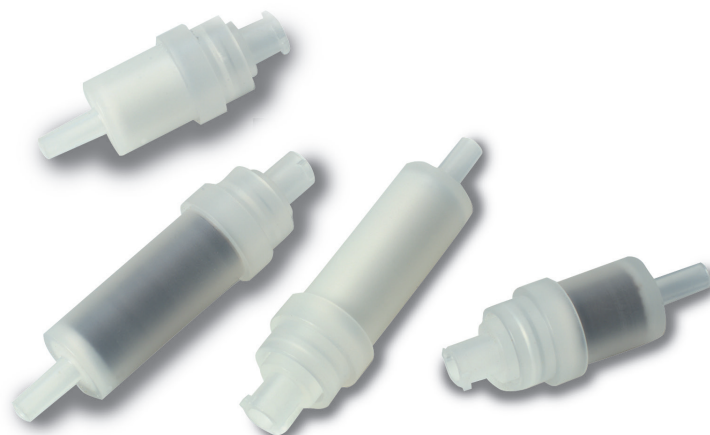


Thermo Scientific Dionex OnGuard II Sample Pretreatment Cartridges and Workstation

The Thermo Scientific™ Dionex™ OnGuard™ II line of disposable sample pretreatment cartridges is designed to remove matrix interferences such as phenols, metals, cations, anions, or hydrophobic substances that are encountered in many ion chromatography applications. These cartridges have wide pH stability and allow low-level ion analysis.



Solve Tough Applications Problems

- Facilitate better separations
- Increase lifetimes of analytical columns
- Solve major matrix problems
- Achieve reproducible trace-level determinations in concentrated matrices

Optimized Design and Manufacture

The Dionex OnGuard II hardware, illustrated in Figure 1, is designed with Luer inlets for easy and secure connections. The cartridge design eliminates leaks and channeling. The unique sample distribution frit maximizes complete resin bed usage. The cartridge hardware is optimized for the best possible performance in matrix removal or concentration applications.

Guaranteed Performance

All Dionex OnGuard II cartridges are shipped with a Certificate of Analysis verifying product capacity, performance, and cleanliness.

Convenient and Easy to Use

Samples are easy to process. Samples can be passed through the cleanup cartridge directly into the LC injector valve loop using a Luer-style syringe. Alternatively, samples can be processed in parallel using the Dionex OnGuard Sample Prep Station shown in Figure 7.

Versatile Selection of Resins

- Dionex OnGuard II A
- Dionex OnGuard II Ag
- Dionex OnGuard II Ba
- Dionex OnGuard II H
- Dionex OnGuard II Na
- Dionex OnGuard II M
- Dionex OnGuard II P
- Dionex OnGuard II RP
- Dionex OnGuard II Ag/H
- Dionex OnGuard II Ba/Ag/H

The Dionex OnGuard II family of sample pretreatment cartridges are available in a wide range of packings and in two sizes (1-cc and 2.5-cc) to fit your sample pretreatment needs. In addition, resins are available in the Thermo Scientific™ Dionex™ Auto OnGuard™ syringe barrel format for robotic processing as custom order products. Table 1 summarizes the Dionex OnGuard products and their typical applications.

Cartridges can be used singly or in series depending on the matrix interferences to be removed. Figure 3 illustrates the Dionex OnGuard Ba, OnGuard Ag, and OnGuard H cartridges used in series to remove sulfate, chloride, and carbonate from a water sample prior to trace-level determination of bromate.

Solve Your Matrix Problems

Dionex OnGuard II A

For the removal of:

- Inorganic anions
- Strong organic acids
- Low pH (neutralize)

The Dionex OnGuard II A cartridge contains styrene-based strong anion-exchange resin in the bicarbonate form. This cartridge is ideal for the removal of anionic contaminants from sample matrices. It is also effective for the neutralization of highly acidic samples.

Figure 2 demonstrates the use of a Dionex OnGuard II A, 1-cc cartridge for the neutralization of an acid-preserved water sample prior to determination of Group I and Group II cations and ammonium by cation-exchange chromatography with suppressed conductivity detection.

Dionex OnGuard II Ag

For the removal of:

- Chloride
- Bromide
- Iodide

The Dionex OnGuard II Ag resin is a styrene-based sulfonic acid resin in the silver form. This cartridge easily removes chloride, bromide, and iodide from concentrated sample matrices such as brines. Samples treated with the Dionex OnGuard II Ag cartridge should be passed through a Dionex OnGuard II H cartridge to remove silver counter ions. As an alternative, a Thermo Scientific™ Dionex™ MetPac™ CC-1 chelating column can be used to remove silver counter ions online in an IC system.

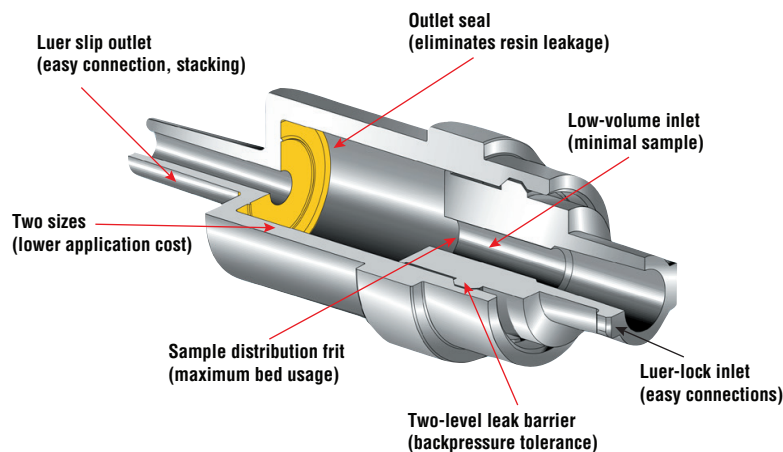


Figure 1. Dionex OnGuard II cartridge hardware design.

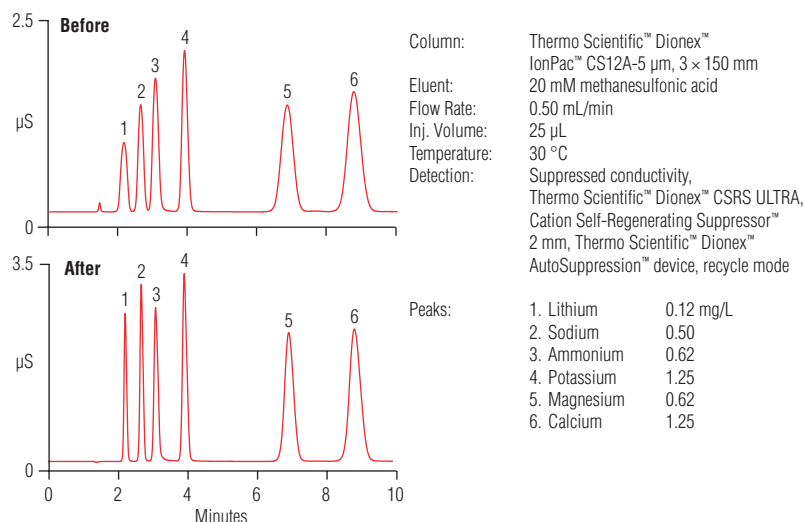


Figure 2. Pretreatment of low-pH samples for cation analysis using the Dionex OnGuard II A cartridge.

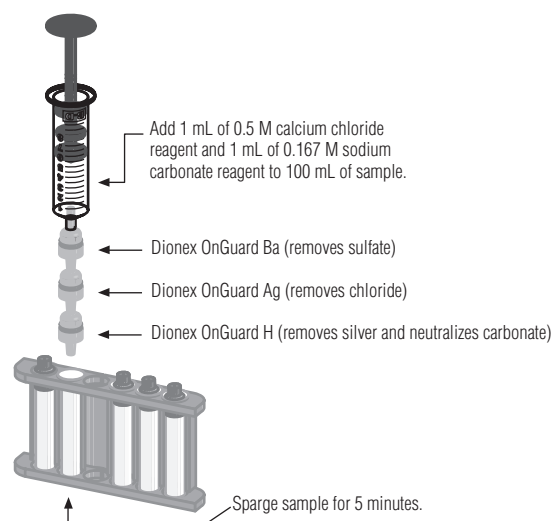


Figure 3. Used in series, the Dionex OnGuard Ba, OnGuard Ag, and OnGuard H cartridges successfully remove sulfate, chloride, and neutralizes carbonate from a drinking water sample prior to the determination of bromate.

Table 1. Dionex OnGuard II cartridge chemistries and typical applications.

Cartridge	Functionality	Capacity (meq/ cartridge)		Solvents	pH Stability	Mode of Use
		1-cc	2.5-cc			
OnGuard A	Anion-exchange bicarbonate form	0.7	1.75	0–100% HPLC solvents	0–14	Removal of anions; pH adjustment of acidic samples
OnGuard Ag	Cation-exchange silver form	2.0–2.2	5.0–5.5	0–100% HPLC solvents	0–14	Removal of chloride, bromide, iodide by precipitation
OnGuard Ba	Cation-exchange barium form	2.0–2.2	5.0–5.5	0–100% HPLC solvents	0–14	Removal of sulfate by precipitation
OnGuard H	Cation-exchange hydronium form	2.0–2.2	5.0–5.5	0–100% HPLC solvents	0–14	Removal of alkaline earth and transition metals; pH adjustment of basic samples
OnGuard Na	Cation-exchange sodium form	2.0–2.2	5.0–5.5	0–100% HPLC solvents	0–14	Removal of alkaline earth and transition metals
OnGuard M	Iminodiacetate ammonium form	0.4	1.0	0–100% HPLC solvents	0–14*	Concentration of transition metals by chelation (2.5-cc format); removal of transition metals (1-cc format)
OnGuard P	Polyvinylpyrrolidone	6.0	Format not available	0–100% HPLC solvents	1–10	Removal of phenols, azo dyes, humic acids by complexation
OnGuard RP	Polydivinylbenzene	0.3 g resin	0.75 g resin	0–100% HPLC solvents	0–14	Removal of surfactants, high MW carboxylic acids, aromatic dyes by adsorption
OnGuard Ag/H	Cation-exchange silver form; cation-exchange hydronium form	Format not available	4.6 (Ag) 0.8 (H)	0–100% HPLC solvents	0–14	Removal of chloride, bromide, iodide by precipitation; removal of alkaline earth and transition metals; pH adjustment of basic samples
OnGuard Ba/Ag/H	Cation-exchange silver form; cation-exchange barium form; cation-exchange hydronium form	Format not available	2.2–2.6 (Ba) 2.2–2.6 (Ag) 0.8 (H)	0–100% HPLC solvents	0–14	Removal of chloride, bromide, iodide by precipitation; removal of alkaline earth and transition metals; pH adjustment of basic samples; removal of sulfate by precipitation

* Resin shrinks in acid form.

Dionex OnGuard II H

For the removal of:

- Alkaline earth metals
- Transition metals
- High pH (neutralizes)

The Dionex OnGuard II H cartridge contains sulfonated polystyrene resin in the hydrogen form. This resin is designed to have very high selectivity for polyvalent cations such as calcium and transition metals. The cartridge is ideal for the removal of high levels of alkaline earth metals and transition metals from sample matrices. It is also used for the neutralization of highly alkaline samples such as sodium hydroxide or sodium carbonate. Carbonate can be reduced to very low levels following this pH reduction by sparging the sample.

Dionex OnGuard II Na

For the removal of:

- Alkaline earth metals
- Transition metals

The Dionex OnGuard II Na cartridge contains 16% crosslinked, styrene-based, sulfonic acid in the sodium form. The Dionex OnGuard II Na cartridge is used to remove alkaline earths and transition metals from sample matrices without acidifying the sample. This attribute ensures good recovery of acid labile analytes such as nitrite. This resin is designed to have very high selectivity for multivalent cations such as calcium, magnesium, and transition metals.

Dionex OnGuard II Ag/H

For the removal of:

- Chloride
- Bromide
- Iodide
- Alkaline earth metals
- Transition metals
- High pH (neutralizes)

The Dionex OnGuard II Ag/H is a layered cartridge that contains Dionex OnGuard II Ag and H resins. The Dionex OnGuard II Ag/H cartridge contains a styrene-based sulfonic acid resin in the silver form that easily removes chloride, bromide, and iodide from concentrated sample matrices such as brines.

The Dionex OnGuard II Ag/H cartridge also contains sulfonated polystyrene resin in the hydrogen form that has a very high selectivity for polyvalent cations such as calcium and transition metals. The cartridge is ideal for the removal of alkaline earths and transition metals from sample matrices, for the neutralization of caustic samples, and for the removal of carbonate.

The Dionex OnGuard H resin is placed after the Ag resin residual to trap silver and other cations in the sample. This two-layer cartridge can be used in place of two single cartridges used in series and has the added advantage of the higher silver-capacity.

Dionex OnGuard II Ba

For the removal of:

- High concentrations of sulfate from sample matrices
- Sample prep in analysis of trace-level bromate

The Dionex OnGuard II Ba resin is a styrene-based sulfonic acid resin in the barium form for the removal of high concentrations of sulfate from sample matrices. For reproducible, quantitative determinations in low-ionic-strength samples, the Dionex OnGuard II Ba cartridge should be activated with a calcium chloride solution. Samples treated with a calcium chloride-activated cartridge should be passed through a Dionex OnGuard II Ag cartridge to remove the chloride from the activating solution and then passed through a Dionex OnGuard II H cartridge or a Dionex MetPac CC-1 chelating column to remove silver counter ions.

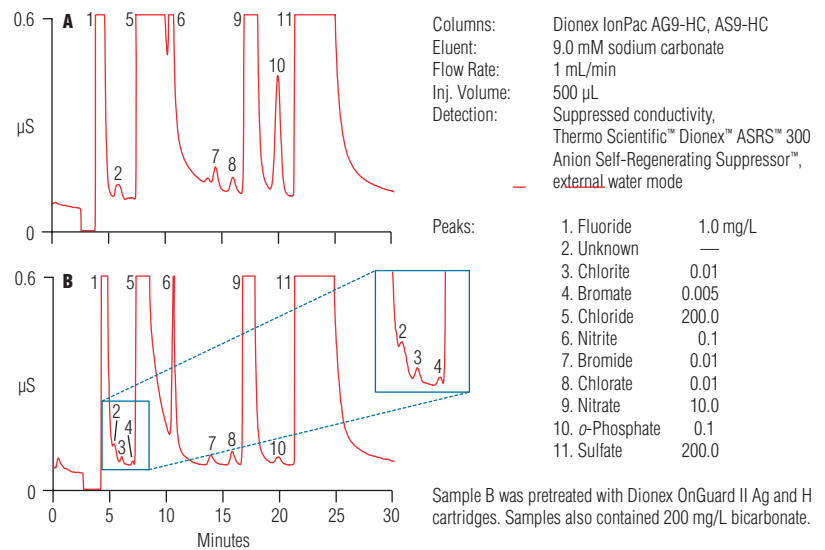


Figure 4. Following the Dionex OnGuard sample matrix removal shown in Figure 3, bromate can easily be quantified at 5 ppb.

Cartridges can be used in series to remove multiple matrix interferences. Figure 3 demonstrates the use of the Dionex OnGuard II Ba, Ag, and H cartridges in series to remove sulfate, chloride, and carbonate (respectively) from a water sample prior to trace-level determination of bromate. Figure 4 illustrates the determination of trace-level bromate following Dionex OnGuard cartridge matrix elimination by using anion exchange chromatography with suppressed conductivity detection.

Dionex OnGuard II Ba/Ag/H

For the removal of:

- Chloride
- Bromide
- Iodide
- Alkaline earth metals
- Transition metals
- High pH (neutralizes)
- High concentrations of sulfate from sample matrices
- Sample prep in analysis of trace-level bromate

The Dionex OnGuard II Ba/Ag/H is a layered cartridge that contains Dionex OnGuard II Ba, Ag, and H resins. The Dionex OnGuard II Ba/Ag/H cartridge contains a styrene-based sulfonic acid resin in the barium form for the removal of high concentrations of sulfate from sample matrices, a styrene-based sulfonic acid resin in the silver form for the removal of chloride, bromide, and iodide from concentrated sample matrices such as brines, and a 16% crosslinked, styrene-based, sulfonic acid resin in the hydrogen form with very high selectivity for polyvalent cations such as calcium and transition metals.

The cartridge is ideal for the removal of high levels of alkaline earths and transition metals from sample matrices, for the neutralization of caustic samples, and for the removal of carbonate. The Dionex OnGuard II H resin is placed at the outlet of the three-layer cartridge to trap soluble silver and other cations in the sample. This three-layer cartridge can be used in place of three single cartridges used in series and has the added advantage of the higher silver capacity.

Dionex OnGuard II M

For the removal of:

- Transition metals
- Matrix elimination of alkali and alkaline earth metals

The Dionex OnGuard M cartridge contains iminodiacetate resin in the ammonium form. This resin is designed to have very high selectivity for polyvalent cations such as transition metals. The cartridge is ideal for the removal or concentration of high levels of transition metals from sample matrices.

The Dionex OnGuard II M cartridges are shipped in the ammonium form, pH 5.5 and are ready to use for either matrix elimination or for transition metal concentration. For matrix elimination of transition metals, samples should be buffered to pH greater than 4. This technique allows the recovery of alkali and alkaline earth metals while retaining the transition metals on the Dionex OnGuard II M cartridge. The 1-cc cartridge is best suited for this application.

For concentration of transition metals, the transition metals are concentrated at pH greater than 4 and eluted at pH 2. High purity 2.0 M nitric acid (P/N 033442) and 2.0 M ammonium acetate (P/N 033440) are available from Thermo Fisher Scientific for pH control. The 2.5-cc cartridge is ideal for concentrating transition metals for quantification by chelation IC or by ICP-MS. Metal chelating agents such as EDTA will interfere with transition metal concentration on the Dionex OnGuard II M cartridge. These samples must be digested using EPA Method 200.8 to achieve good recoveries of transition metals such as cadmium, copper, cobalt, iron, nickel, lead, titanium, vanadium, and zinc. Manganese and chromium (as chromate) are not recovered.

Dionex OnGuard II P

For the removal of:

- Phenols
- Humic acids
- Lignins
- Anthocyanins
- Azo dyes

The Dionex OnGuard II P cartridge contains polyvinylpyrrolidone (PVP) polymer that has very high selectivity for phenolics, azo-containing compounds, aromatic carboxylic acids and aromatic aldehydes. The Dionex OnGuard II P cartridge is recommended for removing the phenolic fraction of humic acids, tannic acids, lignins, anthocyanins, and azo dyes from samples prior to analysis by anion or cation exchange. The Dionex OnGuard II P cartridge resin has very high selectivity for iodine as the triiodide complex.

Figure 5 illustrates the decrease in absorbance of a ground water containing humic acids after treatment with a Dionex OnGuard II P cartridge.

Dionex OnGuard II RP

For the removal of:

- Surfactants
- Hydrocarbons
- High MW carboxylic acids
- Aromatic dyes
- Lipids

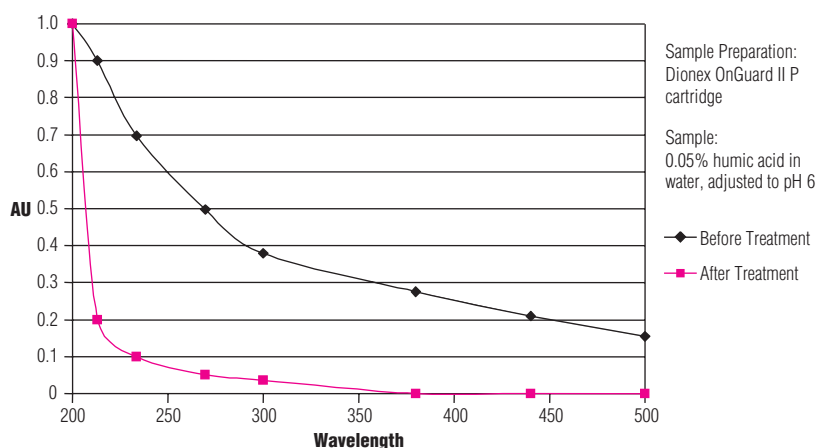


Figure 5. Use of the Dionex OnGuard II P cartridge to remove humic acid from water.

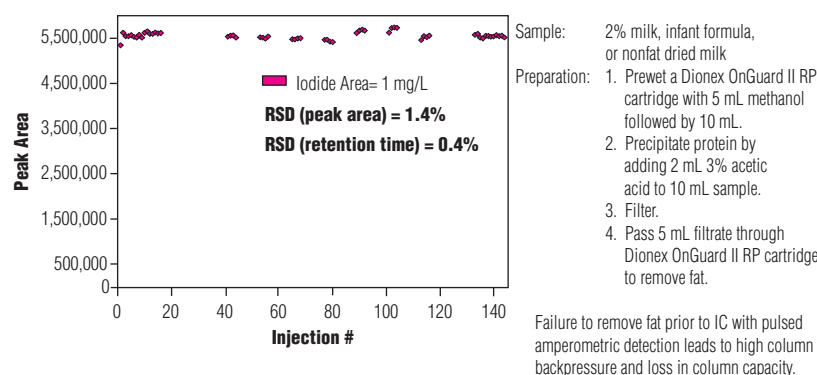


Figure 6. Use of Dionex OnGuard II RP cartridge for the removal of fat from milk.

The Dionex OnGuard II RP cartridge contains macroporous divinylbenzene resin that has a very high selectivity for hydrophobic substances, including unsaturated or aromatic organic substances. The Dionex OnGuard II RP cartridges can be used in the ion-pairing mode to remove high molecular weight ions such as surfactants. Surfactants such as sodium lauryl sulfate can be removed from samples by adding ammonium hydroxide or tetramethyl ammonium hydroxide to the sample. The Dionex OnGuard II RP cartridge is also ideal for the removal of lipids, which can foul ion-exchange columns, from food or physiological samples. Figure 6 illustrates the long-term performance of

a method for the determination of iodide in milk using amperometric detection. The blank spaces in the graph correspond to injections of 2% milk and the data points show the reproducibility of iodide standards that were injected among the milk samples. The high reproducibility of the iodide standards shows that electrode fouling was not a problem when sample pretreatment with the Dionex OnGuard II RP cartridge was included in the method.

Failure to remove the fat in milk prior to anion exchange analysis also leads to high column backpressure and loss in column capacity.

Syringe Loading

By using a standard Luer-tip syringe, samples can easily be treated individually. Samples can be injected through the cartridge directly into the LC injector loop or into autosampler vials.

Dionex OnGuard Sample Prep Station

The Dionex OnGuard Sample Prep Station, shown in Figure 7, is a vacuum-driven accessory for simultaneous pretreatment of multiple samples with the Dionex OnGuard sample pretreatment cartridges. The Dionex OnGuard Sample Prep Station has individual stopcock valves for each 5-cc sample reservoir to allow control of individual flow rates.

When used with the 0.5 mL Thermo Scientific™ Dionex™ PolyVials™ and a vacuum source, the Dionex OnGuard Sample Prep Station permits semiautomated pretreatment of up to 12 samples. Samples can be transferred directly to the Thermo Scientific™ Dionex™ AS40 Autosampler. The station also allows you to use six 10 mL volumetric flasks as sample collection containers.



Figure 7. Samples can be processed in parallel using the Dionex OnGuard Sample Prep Station.

References

Dionex OnGuard II A

1. Dionex Corporation (Now Part of Thermo Fisher Scientific). Determination of Sialic Acids Using UHPLC with Fluorescence Detection. Application Notes 266; LPN 2662. Sunnyvale, CA, 2011.
2. Thermo Fisher Scientific. Determination of Trace Sodium in Cranberry Powder. Application Note 1003; LPN 3080. Sunnyvale, CA, 2012.
3. Dionex Corporation (Now Part of Thermo Fisher Scientific). Application Note 87, Determination of Sugar Alcohols in Confections and Fruit Juices by HPAEC with Pulsed Amperometric Detection.
4. van den Hoop, Marc A. G. T.; Cleven, Rob F. M. J.; van Staden, Johannes J.; Neele, Jos. "Analysis of Fluoride in Rain Water—Comparison of Capillary Electrophoresis with Ion Chromatography and Ion-Selective Electrode Potentiometry". *J. Chromatogr., A*. **1996**, *739*, 241–248.
5. Rohrer, Jeffrey; Thayer, Jim; Avdalovic, Nebojsa; Weitzhandler, Michael. "HPAEC-PAD Analysis of Monoclonal Antibody Glycosylation". *Techniques in Protein Chemistry VI*, Academic Press, **1995**, 65–73.

Dionex OnGuard II Ag

1. Dionex Corporation (Now Part of Thermo Fisher Scientific). Determination of Perchlorate in Drinking Water by Ion Chromatography. Application Update 145; LPN 1540. Sunnyvale, CA, 2004.

2. Dionex Corporation (Now Part of Thermo Fisher Scientific). Determination of Perchlorate in Vegetation Samples Using Accelerated Solvent Extraction and Ion Chromatography. Application Note 356; LPN 1830. Sunnyvale, CA, 2006.
3. Dionex Corporation (Now Part of Thermo Fisher Scientific). Application Note 101, Trace Level Determination of Bromate in Ozonated Drinking Water Using Ion Chromatography.
4. Slingsby, R. W.; Pohl, C. A. "Approaches to Sample Preparation for IC-Sulfate Precipitation on Barium-Form Ion Exchangers". *J. Chromatogr., A*. **1996**, *739*, 49–55.
5. Charles, L.; Pepin, D. "Analysis of Oxyhalides in Water by Ion Chromatography—Ionspray Mass Spectrometry". *J. Chromatogr., A*. **1998**, *804*, 105–111.
6. Sarzanini, Corrado; Bruzzoniti, Maria Concetta; Mentasti, Edoardo. "Preconcentration and Separation of Halocetic Acids by Ion Chromatography". *J. Chromatogr., A*. **1999**, *850*, 197–211.
7. Wicks, Richard J.; Moran, Mary Ann; Pittman, Laura J.; Hodson, Robert E. "Carbohydrate Signatures of Aquatic Macrophytes and Their Dissolved Degradation Products as Determined by a Sensitive High-Performance Ion Chromatography Method". *Applied and Environmental Microbiology*. Nov. 1991, 3135–3143.
8. Shotyk, William; Immenhauser-Potthast, Ina; Vogel, Hubert A. "Determination of Nitrate, Phosphate and Organically Bound Phosphorus in Coral Skeletons by Ion Chromatography". *J. Chromatogr., A*. **1995**, *706*, 209–213.
9. Adam, Luke C.; Gordon, Gilbert. "Direct and Sequential Potentiometric Determination of Hypochlorite, Chlorite and Chlorate Ions when Hypochlorite Ion is Present in Large Excess". *Anal. Chem.* **1995**, *67*, 535–540.
10. Joyce, Robert J.; Dhillon, Harpreet S. "Trace Level Determination of Bromate in Ozonated Drinking Water Using Ion Chromatography". *J. Chromatogr., A*. **1994**, *671*, 165–171.
11. Stratford, Michael R. L.; Dennis, Madeleine; Cochrane, Ralph; Parkins, Charles S.; Everett, Steven A. "The Role of Nitric Oxide in Cancer, Improved Methods for Measurement of Nitrite and Nitrate by High-Performance Ion Chromatography". *J. Chromatogr., A*. **1997**, *770*, 151–155.
12. Weinberg, Howard. "Pre-Concentration Techniques for Bromate Analysis in Ozonated Waters". *J. Chromatogr., A*. **1994**, *671*, 141–149.

Dionex OnGuard II Ba

1. Dionex Corporation (Now Part of Thermo Fisher Scientific). Determination of Perchlorate in Drinking Water by Ion Chromatography. Application Update 145; LPN 1540. Sunnyvale, CA, 2004.
2. Dionex Corporation (Now Part of Thermo Fisher Scientific). Determination of Perchlorate in Vegetation Samples Using Accelerated Solvent Extraction. Application Note 356; LPN 1830. Sunnyvale, CA, 2006.
3. Accelerated Solvent Extraction and Ion Chromatography. Application Note 356; LPN 1830. Sunnyvale, CA, 2006.
4. Dionex Corporation (Now Part of Thermo Fisher Scientific). Application Note 101, Trace Level Determination of Bromate in Ozonated Drinking Water Using Ion Chromatography.
5. Slingsby, R. W.; Pohl, C. A. "Approaches to Sample Preparation for IC-Sulfate Precipitation on Barium-Form Ion Exchangers". *J. Chromatogr., A.* **1996**, *739*, 49–55.
6. Charles, L.; Pepin, D. "Analysis of Oxyhalides in Water by Ion Chromatography-Ionspray Mass Spectrometry". *J. Chromatogr., A.* **1998**, *804*, 105–111.

Dionex OnGuard II H

1. Dionex Corporation (Now Part of Thermo Fisher Scientific). Determination of Chelating Agents in Drinking Water and Wastewater Samples. Application Note 268; LPN 2664. Sunnyvale, CA, 2011
2. Dionex Corporation (Now Part of Thermo Fisher Scientific). Application Note 101, Trace Level Determination of Bromate in Ozonated Drinking Water Using Ion Chromatography.
3. Slingsby, R. W.; Pohl, C. A. "Approaches to Sample Preparation for IC-Sulfate Precipitation on Barium-Form Ion Exchangers". *J. Chromatogr., A.* **1996**, *739*, 49–55.
4. Charles, L.; Pepin, D. "Analysis of Oxyhalides in Water by Ion Chromatography-Ionspray Mass Spectrometry". *J. Chromatogr., A.* **1998**, *804*, 105–111.
5. Kuo, Cing-Yuan. "Improved Application of Ion Chromatographic Determination of Carboxylic Acid in Ozonated Drinking Water". *J. Chromatogr., A.* **1998**, *804*, 265–272.
6. Chen, Sau Soon; Spiro, Michael. "Rose-hip Tea: Equilibrium and Kinetic Study of Mineral Ion Extraction". *Food Chemistry* **1993**, *48*, 47–50.

7. Grinnell, Brian W.; Hermann, Robert B.; Yan, S. Betty. "Human Protein C Inhibits Selectin-Mediated Cell Adhesion: Role of Unique Fucosylated Oligosaccharide". *Glycobiology* **1994**, *4* (2), 221–115

Dionex OnGuard II M

1. Slingsby, R. W. "Sample Preparation for Ion Chromatography—New Developments, Considerations and Options". International Ion Chromatography Symposium 1999, Paper #33.
2. Slingsby, R. W. "When It's Not Just "Dilute and Shoot": Developments in Sample Preparation for Ion Chromatography". Pittsburgh Conference 2000, Paper #145.

Dionex OnGuard II P

1. Dionex Corporation (Now Part of Thermo Fisher Scientific). Determination of Hexavalent Chromium in Dyes. Application Brief 107; LPN 2323. Sunnyvale, CA, 2009.
2. Shotyk, William. "Ion Chromatography of Organic-Rich Natural Waters from Peat Lands, I". *J. Chromatogr.* **1993**, *640*, 309–322.
3. Van Nifterik, L.; Xu, J.; Laurent, J. L.; Mathieu, J. "Analysis of Cellulose and Kraft Pulp Ozonolysis Products by Anion-Exchange Chromatography with Pulsed Amperometric Detection". *J. Chromatogr.* **1993**, *640*, 335–343.
4. Steinmann, P.; Shotyk, William. "Ion Chromatography of Organic-Rich Natural Waters from Peat Lands, III. Improvements for Measuring Anions and Cations". *J. Chromatogr., A.* **1995**, *706*, 281–286.
5. Steinmann, P.; Shotyk, William. "Ion Chromatography of Organic-Rich Natural Waters from Peat Lands, IV. Dissolved Free Sulfide and Acid-Volatile Sulfur". *J. Chromatogr., A.* **1995**, *706*, 287–292.
6. Steinmann, P.; Shotyk, William. "Ion Chromatography of Organic-Rich Natural Waters from Peat Lands, V. Fe²⁺ and Fe³⁺". *J. Chromatogr., A.* **1995**, *706*, 293–299.
7. Wicks, Richard J.; Moran, Mary Ann; Pittman, Laura J.; Hodson, Robert E. "Carbohydrate Signatures of Aquatic Macrophytes and Their Dissolved Degradation Products as Determined by a Sensitive High-Performance Ion Chromatography Method". *Appl. and Environ. Microbiol.* Nov. 1991, 3135–3143.
8. Blank, Robert R.; Allen, Fay; Young, James A. "Extractable Anions in Soils Following Wildfire in a Sagebrush-Grass Community". *Soil Sci. Soc. Am. J.* **1994**, *58*, 564–570.

Dionex OnGuard II RP

1. Dionex Corporation (Now Part of Thermo Fisher Scientific). Determination of Perchlorate in Vegetation Samples Using Accelerated Solvent Extraction and Ion Chromatography. Application Note 356; LPN 1830. Sunnyvale, CA, 2006.
2. Dionex Corporation (Now Part of Thermo Fisher Scientific). Higher Resolution Separation of Organic Acids and Common Inorganic Anions in Wine. Application Notes 273; LPN 2727. Sunnyvale, CA, 2011.
3. Dionex Corporation (Now Part of Thermo Fisher Scientific). Determination of Inorganic Counterions in Pharmaceutical Drugs Using Capillary IC. Application Brief 136; LPN 2917. Sunnyvale, CA, 2011.
4. Dionex Corporation (Now Part of Thermo Fisher Scientific). Application Note 140, Determination of Iodide in Urine.
5. Dionex Corporation (Now Part of Thermo Fisher Scientific). Application Note 37, Determination of Iodide in Milk Products.
6. Kadnar, P.; Rieder, J. "Determination of Anions in Oilfield Waters by Ion Chromatography". *J. Chromatogr., A.* **1995**, *706*, 301–305.
7. Chen, Jian. "Determination of Organic Acids in Industrial Streams by Ion Chromatography After Solid-Phase Extraction". *J. Chromatogr., A.* **1996**, *739*, 273–280.
8. Kadnar, Rainer. "Determination of Alkali and Alkaline Earth Metals in Oilfield Waters by Ion Chromatography". *J. Chromatogr., A.* **1998**, *804*, 217–221.
6. Wicks, Richard J.; Moran, Mary Ann; Pittman, Laura J.; Hodson, Robert E. "Carbohydrate Signatures of Aquatic Macrophytes and Their Dissolved Degradation Products as Determined by a Sensitive High-Performance Ion Chromatography Method". *Appl. and Environ. Microbiol.* Nov. 1991, 3135–3143.

Dionex OnGuard II Na

Dionex Corporation (Now Part of Thermo Fisher Scientific). HPAE-PAD Determination of Infant Formula Sialic Acids. Application Notes 253; LPN 2561. Sunnyvale, CA, 2011.

Dionex OnGuard Ag/H

Dionex Corporation (Now Part of Thermo Fisher Scientific). Determination of Phytic Acid in Soybeans and Black Sesame Seeds. Application Note 295; LPN 3028. Sunnyvale, CA, 2012.

Ordering Information

In the U.S., call (800) 346-6390 or contact the Thermo Fisher Scientific Regional Office nearest you. Outside the U.S., order through your local Thermo Fisher Scientific office or distributor. Refer to the following part numbers.

Description	Part Number
Dionex OnGuard Cartridges (1-cc)	
Dionex OnGuard II A, 1c.c, Pkg of 12	088355
Dionex OnGuard II M, 1c.c, Pkg of 12	088356
Dionex OnGuard II Na, 1cc, Pkg of 12	088357
Dionex OnGuard II P, 1cc, Pkg of 12	088358
Dionex OnGuard II RP, 1-cc, pkg of 12	082760
Dionex OnGuard II H, 1-cc, pkg of 12	082761
Dionex OnGuard II Ag, 1-cc, pkg of 12	082762
Dionex OnGuard II Ba, 1-cc, pkg of 12	082763
Dionex OnGuard II A, 1-cc, pkg of 48	057091
Dionex OnGuard II Ag, 1-cc, pkg of 48	057089
Dionex OnGuard II Ba, 1-cc, pkg of 48	057093
Dionex OnGuard II H, 1-cc, pkg of 48	057085
Dionex OnGuard II Na, 1-cc, pkg of 48	062948
Dionex OnGuard II M, 1-cc, pkg of 48	057137
Dionex OnGuard II P, 1-cc, pkg of 48	057087
Dionex OnGuard II RP, 1-cc, pkg of 48	057083
Dionex OnGuard Cartridges (2.5-cc)	
Dionex OnGuard II, Ba/Ag/H, 2.5-cc, pkg of 12	082764
Dionex OnGuard II Ag/H, 2.55-cc, pkg of 12	082756
Dionex OnGuard II A, 2.5-cc, pkg of 48	057092
Dionex OnGuard II Ag, 2.5-cc, pkg of 48	057090
Dionex OnGuard II Ba, 2.5-cc, pkg of 48	057094
Dionex OnGuard II H, 2.5-cc, pkg of 48	057086
Dionex OnGuard II Na, 2.5-cc, pkg of 48	062962
Dionex OnGuard II M, 2.5-cc, pkg of 48	057095
Dionex OnGuard II RP, 2.5-cc, pkg of 48	057084
Dionex OnGuard II Ag/H, 2.5-cc, pkg of 48	057410
Dionex OnGuard II Ba/Ag/H, 2.55-cc, pkg of 48	063955
Dionex OnGuard II Cartridges with Multiple Resin Layers All Dionex OnGuard resins are available custom packed with up to three different resin layers stacked in the 2.5-cc Dionex OnGuard format.	Inquire
Auto Dionex OnGuard II Barrels All Dionex OnGuard resins are available custom packed in 3 mL or 6 mL syringe-style barrels. These configurations are ideal for robotic processing.	Inquire
Bulk Dionex OnGuard Resins All Dionex OnGuard resins are available as custom orders in bulk in 50 g quantities.	Inquire
Dionex OnGuard Sample Prep Station	
Dionex OnGuard Sample Prep Station	039599
Dionex OnGuard Needle, 18-gauge, 1.25 Luer	039996
Dionex OnGuard Sample Reservoir, 5-cc, pkg of 250	041233
Dionex OnGuard Valve, Luer stopcock	040896

www.thermoscientific.com/samplepreparation

©2015 Thermo Fisher Scientific Inc. All rights reserved. ISO is a trademark of the International Standards Organization. All other trademarks are the property of Thermo Fisher Scientific and its subsidiaries. Specifications, terms and pricing are subject to change. Not all products are available in all countries. Please consult your local sales representative for details.



Thermo Fisher Scientific,
Sunnyvale, CA USA is
ISO 9001 Certified.

Africa +43 1 333 50 34 0	Denmark +45 70 23 62 60	Japan +81 6 6885 1213	Russia/CIS +43 1 333 50 34 0
Australia +61 3 9757 4300	Europe-Other +43 1 333 50 34 0	Korea +82 2 3420 8600	Singapore +65 6289 1190
Austria +43 810 282 206	Finland +358 9 3291 0200	Latin America +1 561 688 8700	Sweden +46 8 556 468 00
Belgium +32 53 73 42 41	France +33 1 60 92 48 00	Middle East +43 1 333 50 34 0	Switzerland +41 61 716 77 00
Brazil +55 11 3731 5140	Germany +49 6103 408 1014	Netherlands +31 76 579 55 55	Taiwan +886 2 8751 6655
Canada +1 800 530 8447	India +91 22 6742 9494	New Zealand +64 9 980 6700	UK/Ireland +44 1442 233555
China 800 810 5118 (free call domestic) 400 650 5118	Italy +39 02 950 591	Norway +46 8 556 468 00	USA +1 800 532 4752

Thermo

SCIENTIFIC

A Thermo Fisher Scientific Brand