



Thermo Scientific™ Dionex™ Guardcap™ H Vial Caps

Finally, easy sample prep for IC

Benefits

- Removes up to 1000 mg/L of divalent cations (e.g., calcium or transition metals) from 800 μ L of sample.
- Neutralizes up to 500 μ L of 50 mM NaOH or other base.
- Filters better than 80% of particulate matter greater than 20 μ m in diameter.

Keywords

Cation removal, metal removal, neutralization, automated inline sample preparation, matrix elimination, sample filtration

Thermo Scientific™ Dionex™ Guardcap™ H vial caps are designed to be used with Thermo Scientific™ Dionex™ PolyVial™ sample vials in Thermo Scientific™ Dionex™ AS-DV autosamplers to facilitate automated inline sample preparation for ion chromatography determinations. The unique Dionex PolyVial sample vial incorporates a vial cap that acts as a simple piston to force sample out of the vial. Dionex Guardcap H vial caps fit 5 mL Dionex PolyVials and contain H⁺-form cation exchange resin embedded in a high density polyethylene filtration matrix. This vial/cap system can now be used for hassle-free sample preparation, including removal of alkaline earth and transition metals, neutralization of bases, and filtration of particulates by using Dionex Guardcap H vial caps.

- Use with any ion chromatography system that includes a Dionex AS-DV autosampler.
- Reduce time, labor, and cost required for offline sample preparation techniques.
- Increase the lifetime of your analytical columns and suppressors by removing harmful metals, matrix ions, and particulates from samples.

Convenient and Easy to Use

Dionex Guardcap H vial caps come in the familiar filter cap format used with Dionex PolyVials. If you can load a filter cap on a Dionex PolyVial, you can use Dionex Guardcap H for automated inline sample preparation. Unlike Thermo Scientific™ Dionex™ OnGuard™ II H cartridges, Dionex Guardcap H vial caps require no pretreatment procedures prior to use.

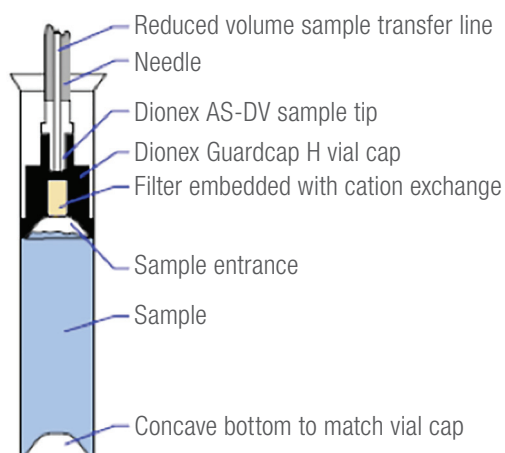


Figure 1. Dionex AS-DV PolyVial with Dionex Guardcap H vial cap for inline matrix elimination.

The Chemistry

Dionex Guardcap H vial caps contain sulfonated strong cation exchange resin in the hydronium ion form embedded in a high density polyethylene matrix. A cylinder of this composite material is incorporated into the cap as shown in Figure 1. Each Dionex Guardcap H vial cap has enough capacity to exchange cations and simultaneously neutralize base or remove high concentrations of divalent cations. Some examples are shown in Table 1. Samples with higher concentrations of base should be diluted prior to treatment with Dionex Guardcap H.

The following application examples illustrate several uses of Dionex Guardcap H for sample preparation.

Removal of Metals and Protection from Metal Contamination

Dionex Guardcap H resin is provided in the H⁺ form, meaning that alkali, alkaline earth, and transition metals in the cation form are exchanged for hydronium ion. The sample will become acidic in this mode as cations are exchanged for the hydronium ion. This application is useful for removing cations that foul the anion suppressor, which is a cation exchanger, or cations that build up by precipitation as insoluble salts on system components. This method of use is analogous to using Dionex OnGuard II H cartridges for offline sample preparation removal of metals and other higher valency cations.

Table 1. Compatible sampling volume and sample matrix concentrations for Dionex Guardcap H vial caps.

Matrix elimination application	Sampling volume (μL)	Maximum sample concentration
Divalent cations, metals	Up to 800 μL	1000 ppm (e.g., Ca ²⁺ , Pb ²⁺)
Divalent cations, metals	Up to 275 μL	1800 ppm (e.g., Ca ²⁺ , Pb ²⁺)
Monovalent cation with neutralization of base	Up to 500 μL	50 mM NaOH or other base

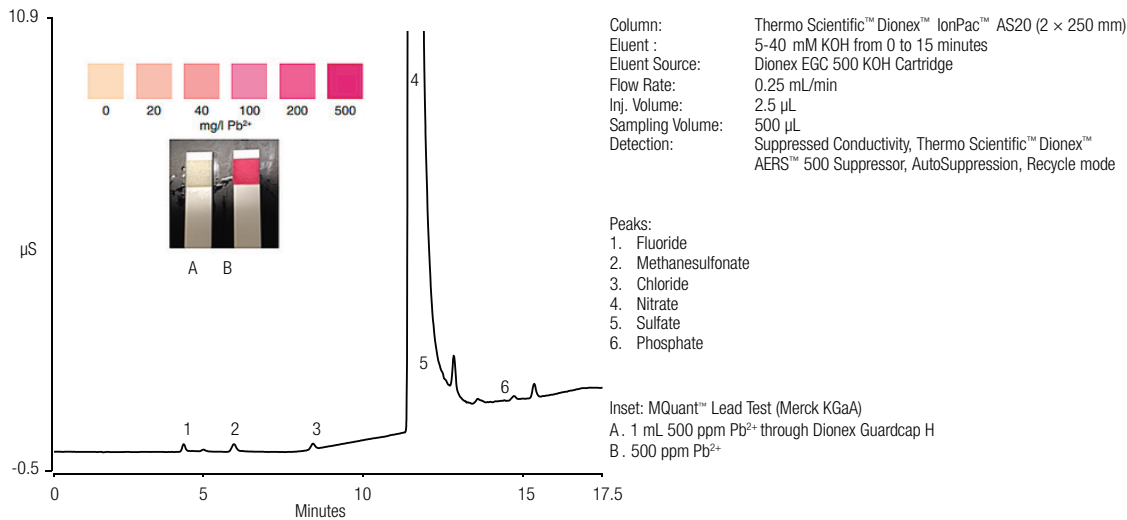


Figure 2. Determination of methanesulfonate in a lead nitrate matrix using Dionex Guardcap H sample preparation.

Figure 2 shows the determination of methanesulfonate in a lead nitrate matrix using Dionex Guardcap H sample preparation. The inset in Figure 2 shows the results of passing 1 mL of a 500 ppb Pb²⁺ standard through a Dionex Guardcap H vial cap. Dionex Guardcap H effectively removes all of the Pb²⁺ from the standard.

Neutralization of Base

The Dionex Guardcap H resin is provided in the H⁺ form. When a cation such as sodium is removed from the sample, it is replaced by the hydronium ion and this can neutralize bases that are present in the sample. This is especially useful for lowering the pH of high pH samples that will be injected into a system that determines anions with a gradient separation.

Figure 3, below, shows the effects of a high pH matrix injected onto a Dionex IonPac AS17-C column and the improvement using Dionex Guardcap H vial caps. The pH of the sample is lowered to a pH that more closely matches the initial conditions of the gradient, thus eliminating disturbances in the ion exchange equilibria.

Similarly, Figure 4 shows the baseline disturbance caused by a high pH matrix injected onto a Dionex IonPac AS23 column and the improvement using Dionex Guardcap H vial caps.

The capacity of Guardcap H for neutralization is approximately 500 µL of 50 mM NaOH or other base.

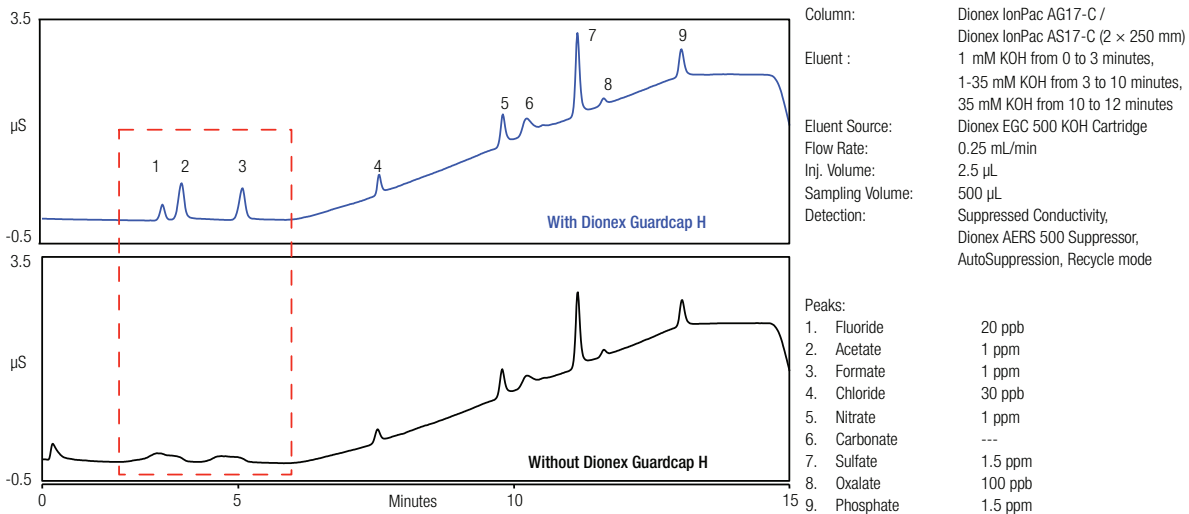


Figure 3. Neutralization of base to improve peak efficiency using Dionex Guardcap H vial caps.

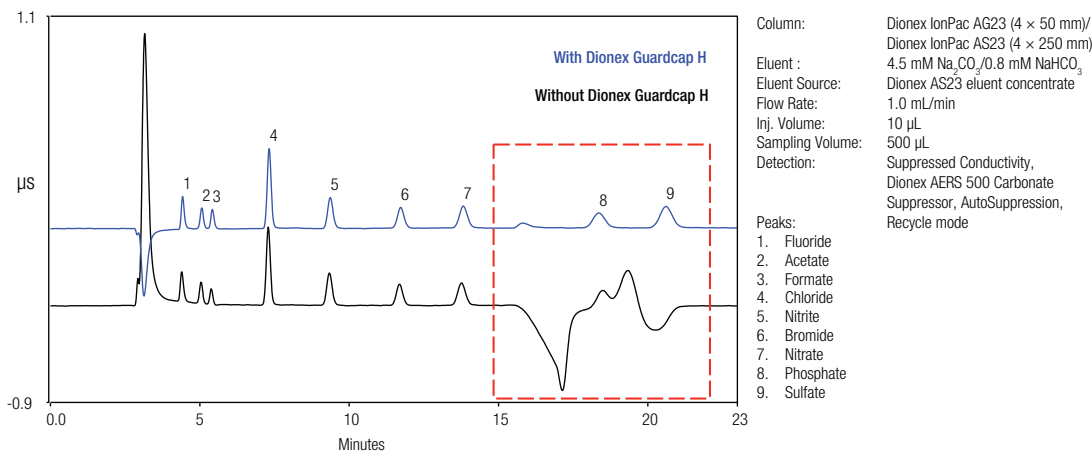


Figure 4. Neutralization of a 50 mM NaOH matrix to improve baseline and recovery of phosphate and sulfate using Dionex Guardcap H vial caps.

Filtering of particulates

Dionex Guardcap H vial caps will remove more than 80% of particulate matter greater than 20 µm in particle diameter.

Use Considerations

Sample delivery volume vs. injection volume

The Dionex AS-DV autosampler pushes sample through the vial cap and into the sample loop on the injection valve. This means that the Dionex Guardcap H vial cap is exposed to the entire sampling volume, not only the volume of the injection loop. The sample delivery volume must be sufficient to flush previous contents of

the sample transfer line to waste in order to minimize carryover between samples. A 10x volume is the usual recommended flush volume. Reduced-volume sample transfer lines have been developed for use with Dionex Guardcap H vial caps in the Dionex AS-DV autosampler in order to minimize the necessary flush volume and, therefore, the sample delivery volume. These reduced volume sample transfer lines maximize the ion exchange capacity of Dionex Guardcap H vial caps to treat samples. Table 2 shows the sample transfer line volume and sampling volume for two different lengths of sample transfer lines.

Table 2. Minimum sampling volumes.

For injection valve mounted in...	Use recommended sample transfer line length / volume	Minimum sampling volume (10x)
Dionex AS-DV autosampler	35 cm / 17.5 µL	175 µL
Dionex IC systems	70 cm / 35 µL	350 µL

Dionex Guardcap H Specifications				
Functionality	Capacity µeq/cap	Solvent Compatibility	pH Stability	Mode of Use
Cation-exchange Hydronium form	50	0–20% methanol	0–14	Removal of alkaline earth and transition metals; pH adjustment of basic samples

Ordering Information

To order in the U.S., call (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.

Description	Part Number
Dionex Guardcap H vial caps, 5 mL, Package of 125	302504
35 cm sample transfer line assembly Recommended for use with injection valves mounted in Dionex AS-DV autosamplers	22120-60051
70 cm sample transfer line assembly Recommended for use with injection valves mounted in IC systems	22120-60055
Dionex PolyVials, 5 mL, Package of 250	038008

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