S*PURE

Data Sheet 30268U

IC-Ba and IC-Ba Plus Devices

Introduction

Maxi-Clean™ and Extract-Clean™ IC Devices are solid-phase extraction devices used to eliminate matrix interferences from samples prior to analyses by ion chromatography. Each device consists of either 0.5mL or 1.5mL of polystyrene-based packing sandwiched between polyethylene frits within an injection-molded medical-grade polypropylene housing (**Figure 1**).
Samples and wash solvents are passed through the packing using a luer hub syringe (for Maxi-Clean™ devices) or a vacuum manifold (for Extract-Clean™ devices). As sample comes in contact with the packing, specific chemical interactions take place which selectively retain certain components of the matrix in the device while the remaining components pass through the device outlet. The chemical characteristics of the packing dictate which sample components are retained. Seven chemistries are currently available.

Successful application of IC devices requires:

1) proper conditioning of the device prior to sample application,
2) application of the sample at a rate slow enough to allow the chemical interaction to take place while the sample is in the device, and
3) control of sample size to keep within the device's capacity.

The following information provides general recommendations for the use of IC-Ba devices. This procedure may be modified to accommodate samples with different characteristics.

General Information

Maxi-Clean™ and Extract-Clean™ IC-Ba devices provide a reliable method for the removal of sulfate prior to the analysis of anions by ion chromatography. IC-Ba devices contain either 0.5mL or 1.5mL of sulfonic acid cation exchange resin in the Ba^{2+} form.
The barium contained on the packing reacts with sulfate from the sample to form an insoluble salt (barium sulfate). In this process, cations from the sample are taken up by the resin to replace the barium consumed in the precipitation reaction. The net result is removal of sulfate (and an equivalent amount of sample cations) from the matrix. This process has little or no effect on sample anions that form soluble barium salts. Thus, the amounts of fluoride, chloride, bromide, nitrite, and nitrate are not changed.
The recovery for phosphate may be reduced due to the formation of sparingly-soluble barium phosphate.

When a large concentration of sulfate is present in a sample, low levels of other anions may be lost during pretreatment with IC-Ba. This is probably due to the inclusion of the other ions in the precipitating barium sulfate. A study of the recovery of ions of interest in each sample matrix should be determined before quantitative results are obtained.

For more information on the use of Maxi-Clean™ IC cartridges and the recovery obtained with each please see:

R. Saari-Nordhaus, J.M. Anderson, Jr. and I.K. Anderson, *Am. Lab*., August (1990) 18.

I.K. Anderson, R. Saari-Nordhaus and J.M. Anderson, Jr., *J. of Chromatography*, 546 (1991) 61-71.

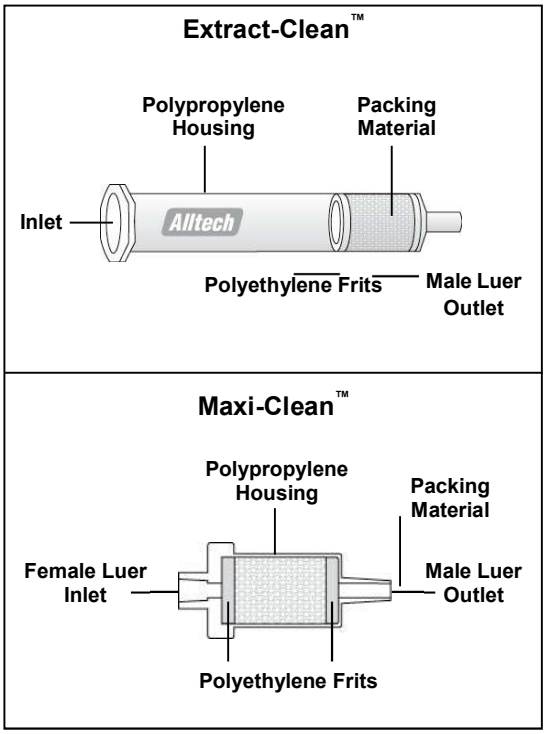


Figure 1

Flow Rate

The devices have a number of flow-dependent parameters that may affect results. In general, high flow rates, particularly in the sample loading step, will decrease the performance while low flow rates will improve the extraction process. Low flow rates allow the sample to diffuse into the packing thus increasing capacity and improving the efficiency. The recommended flow rate for sample loading is 1mL/minute or less.

Sample Mass

Each device contains either 0.8 or 2.0 milliequivalents of Ba^{2+} (for the 0.5mL or 1.5mL device, respectively), which under ideal conditions will remove an equal amount of sulfate from the sample. In practice, this maximum capacity may not be realized. The nature of the sample (concentration, ionic strength, solvent) and the rate at which the sample is loaded into the device will affect the capacity. Where possible, adjust sample size to use 50% or less of the device's absolute capacity. Larger amounts of sulfate may be removed by using two or more Maxi-Clean™ cartridges in series. If the amount of sulfate in the sample is unknown, a test extraction should be performed to determine the correct sample size.

Sample Volume

The internal volumes of the different devices include the flow passages and interstitial packing volume. Although it is possible to recover all but 100µL (for the 0.5mL devices) or 150µL (for the 1.5mL devices) of sample with an air purge, best results are obtained when the sample volume greatly exceeds the internal volume of the cartridge.

Device	Bed Size	Internal Volume
Maxi-Clean™:	0.5mL	300µL
Maxi-Clean™ Plus:	1.5mL	650µL
Extract-Clean™:	0.5mL	2.5mL
Extract-Clean™ Plus:	1.5mL	1.5mL

General Procedure

1. **Precondition the Device.** Pass 5 to 10mL of IC grade water through the device. This removes interstitial contaminants and wets the packed bed. For trace analysis work, repeat the rinsing procedure until the eluant is free from interferences.
2. **Load the Sample**. Load the entire sample at 1mL/minute or less. The total amount of sulfate contained in the sample should not exceed the device capacity and preferably should be below 50% of total capacity. Discard the first 1mL of eluate. Collect the remaining eluate for analysis.

Other IC Devices

Device	Retains
IC-RP:	Hydrophobic Components
IC-OH:	Anions (pH increase)
IC-H:	Cations (pH reduction)
IC-Ag:	Chloride, Iodide, Bromide
IC-Ba:	Sulfate
IC-Na:	Cations (no pH change)
IC-Chelate:	Polyvalent Metal Ions
IC-Mixed Mode RP-OH:	Hydrophobic Components and Anions (pH increase)
IC-Mixed Mode RP-H:	Hydrophobic Components and Cations (pH reduction)

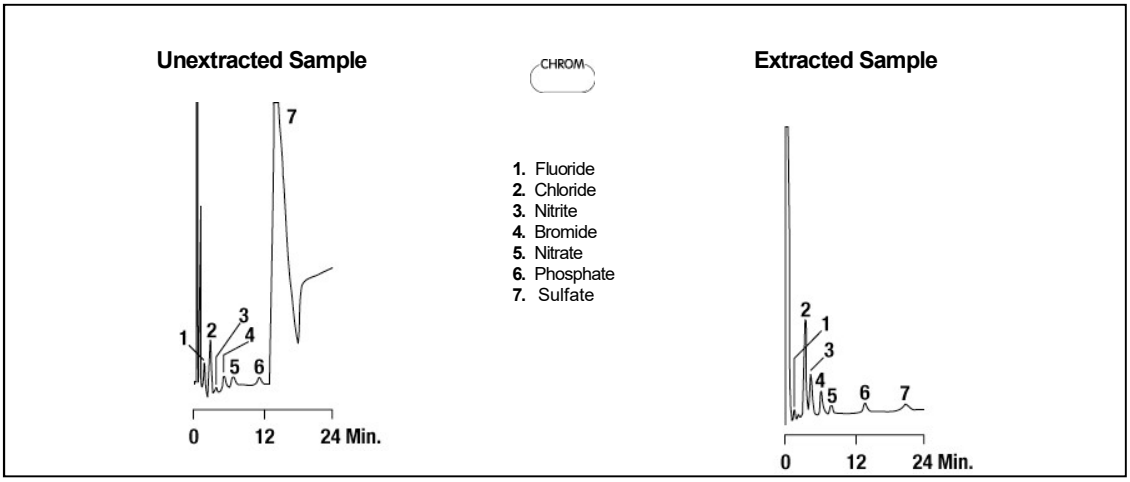
IC-Ba Devices

Description	Volume	Qty	Part No.
Maxi-Clean™ IC-Ba	0.5mL	50	**5122579**
Maxi-Clean™ IC-Ba Plus	1.5mL	25	**5122572**
Extract-Clean™ IC-Ba	0.5mL	50	**5122911**

Example
Trace Anions in Battery Acid

Procedure:

1. Dilute battery acid 400:1 with IC grade water.
2. Apply 4mL of sample to a preconditioned Cartridge.
3. Discard first 1mL of eluate.
4. Collect and analyze remaining eluate.



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