

The IonPac TBC-1 Borate Concentrator Column and IonPac ICE-Borate Analytical Column are designed for monitoring trace-levels of borate in high-purity water.

This ion-exclusion method coupled with suppressed conductivity detection offers an integrated solution for the determination of trace-level boron as borate.

- Selective polyol TBC-1 Borate Concentrator Column
- Specially designed ion-exclusion ICE-Borate Analytical Column
- Sensitive and trouble-free suppressed conductivity detection
- Sensitive detection using a borate-mannitol anion complex
- Detection limits at low ng/L
- Compatible with benchtop or on-line analysis

## DETERMINE TRACE-LEVEL BORON IN ULTRAPURE WATER

Borate is one of the most weakly retained anions on anion-exchange materials, and is the first to break through many water purification systems. In the power generation and semiconductor industries, monitoring trace-levels of boron as borate in high-purity waters is a measure of the efficiency of the water purification systems. The TBC-1 Trace Borate Concentrator Column and ICE-Borate Analytical Column are designed for this application.

## NOVEL AND SELECTIVE CONCENTRATION AND SEPARATION CHEMISTRIES

The TBC-1 Borate Concentrator Column is optimized for trace analysis. The concentrator has a low void volume and is packed with a unique resin, surface grafted with polyol groups. This resin is highly selective for borate, so even at high flow rates, borate is retained from large volumes of water. Other potentially interfering anions such as carbonate are excluded during the concentration process.

The TBC-1 is coupled to ion-exclusion chromatography with conductivity detection for the determination of borate at ng/L (ppt) concentrations. The eluent, containing mannitol, quantitatively elutes the borate from the TBC-1 concentrator.

The analytical separation is performed using a specially designed ICE-Borate ion-exclusion column. Mannitol forms anionic species with borate, which is more highly retained and conductive than borate itself. This eluent chemistry enhances the analytical separation and the sensitivity of the conductivity detection. The AMMS®-ICE MicroMembrane™ Suppressor is used to suppress the eluent background conductance prior to detection.

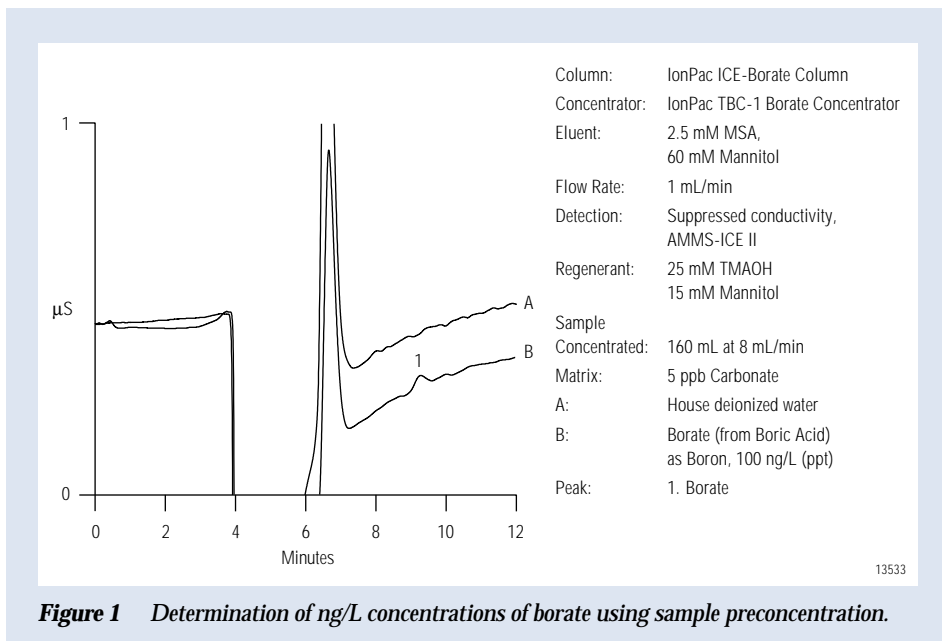
Figure 1 illustrates the system conditions employed for the determination of borate using the IonPac TBC-1 Concentrator Column coupled with the IonPac ICE-Borate ion-exclusion column.

## PRACTICAL, CONTINUOUS MONITORING

The borate chromatographic system shown in Figure 2 is easy to use and significantly improves the practicality and reliability of trace borate determinations. The sample is first passed over the TBC-1 Concentrator Column. Note that the volume of sample concentrated can be adjusted to meet the required method detection limit. After sample concentration is completed, the concentrator column is switched in-line with the analytical column for elution and detection.

## MONITOR BORON BREAKTHROUGH

Figure 3 illustrates the use of the IonPac TBC-1 Concentrator Column coupled with the IonPac ICE-Borate ion-exclusion column for the determination of borate in ultra high-purity water samples from the power generation and semiconductor industries.



**Figure 1** Determination of ng/L concentrations of borate using sample preconcentration.

## SPECIFICATIONS

### ICE-Borate Column

**Analytical Column Dimensions:**

9 x 250 mm

**Maximum Operating Pressure:**

9.65 MPa (1400 psi)

**Eluent Compatibility:**

pH 0–7 (Use eluents containing only mannitol and hydronium ions as the cations. Avoid eluents containing sodium, potassium, etc.). Columns are compatible with 0–50% HPLC solvents.

**Column Construction:**

PEEK (polyetheretherketone) with 10–32 threaded ferrule-style end fittings. All components are nonmetallic.

**Resin Composition:**

**Bead Diameter:** 7.5 µm

**Bead Type:** Microporous

**Crosslinking (%DVB):** 8%

**Capacity (meq/column):**

27 meq (9 x 250 mm)

**Ion-Exchange Group:**

Sulfonic acid

**Surface Characteristics:**

Hydrophilic

### TBC-1 Borate Concentrator

**Column Dimensions:**

3 x 35 mm

**Resin Composition:**

10-µm diameter; polyol-functionalized high-capacity resin, with high selectivity for borate.

**Maximum Operating Pressure:**

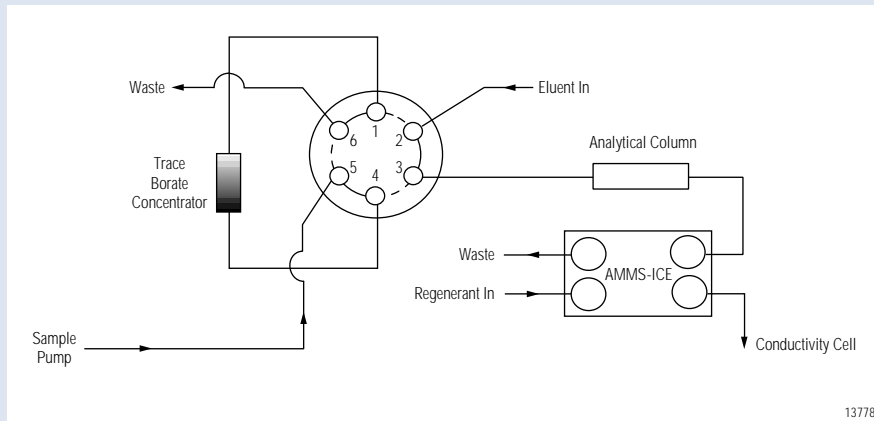
27.6 MPa (4000 psi)

**Mobile Phase Compatibility:**

pH 0–14, up to 90% of common HPLC solvents

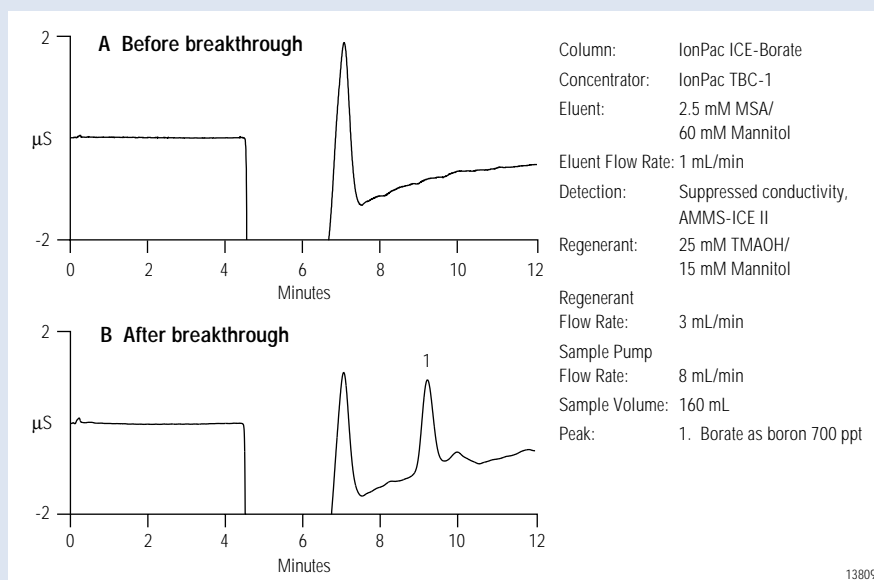
**Column Construction:**

PEEK (polyetheretherketone) with 10–32 threaded ferrule-style end fittings. All components are nonmetallic.



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**Figure 2** IC preconcentration system for trace-level borate determination.



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**Figure 3** Trace borate IC system used to monitor breakthrough of borate from deionization cartridges. (A) Absence of borate in the water deionization effluent, (B) Determination of the breakthrough borate in the effluent upon failure of the deionization system.

## ORDERING INFORMATION

In the U.S., call 1-800-346-6390, or contact the Dionex Regional Office nearest you. Outside the U.S., order through your local Dionex office or distributor. Refer to the following part numbers.

**IonPac TBC-1 Borate Concentrator Column**  
(3 x 35 mm) ..... P/N 53944

**IonPac ICE-Borate Analytical Column**  
(9 x 250 mm) ..... P/N 53945

**AMMS-ICE II Suppressor** ..... P/N 37107

**MMS™/SRS® Regenerant**  
**Installation Kit** ..... P/N 38018

Required for first installation of the AMMS-ICE II suppressor.

Printed on recycled and recyclable paper with soy-based inks.

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