

Low Range Boron Analysis: 20 to 500 µg/L B Using TNT877

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Introduction

Low range boron analysis is important in:

- Desalination and production of high purity water – Issues with boron rejection on RO membranes. Boron is generally one of the first ions to break through when ion-exchange resins are depleted.
- Drinking water – The WHO has set preliminary drinking water limit at 0.5 mg/L as boron can cause reproductive issues and is a suspected teratogen.
- Agriculture – Boron is a vital trace element for plant growth, but can be problematic at concentrations over 0.3 mg/L.

Procedure

- 1) Select program (see Instrument Setup at the end of the note for programming instructions).
- 2) Pipet **1 mL** of Solution A into 2 TNT877 boron vials. Label one vial **“Sample”** and one vial **“Blank”**.
- 3) Cap the vials and invert several times to completely dissolve the freeze-dried reagent.
- 4) Pipet **2.5 mL** of the sample to be tested into the **Sample** vial. Pipet **2.5 mL** of **deionized water** into the **Blank** vial.
- 5) Cap each vial and invert several times to mix.
- 6) Start the instrument timer, a 40-minute reaction time will begin.
- 7) When the timer expires, pour the vial labeled **Blank** into the 5-cm semi micro cuvette (PN LZP341) and place it into the cell holder.
- 8) **Zero** the instrument by pressing the “zero” button.
- 9) Pour the vial labeled **Sample** into the 5-cm semi micro cuvette and insert it into the cell holder. Press **“Read”** to obtain the results in µg/L B.

Program Setup for TNT877 Method for the LR Boron Analysis

Follow the display prompts and enter commands for the boron method:

Step	Display Shows	Enter	Select
1	Main Menu	User Programs	
2	User Programs	Program Options	
3	Program Options	New	
4	Program Number	Select a Program Number	OK
5	Program Name?	Boron_LR	Next
6	Program Type	Single Wavelength	Next
7	Units	µg/L	Next
8	Wavelength (nm)	414	Next
9	Concentration Resolution	1	Next
10	Chemical Form?	B	Next
11	Calibration	Enter Formula	Next
12	Enter Formula	a = -7.43, b = 358.94, c = 53.61	OK>Done
13	User Program for number assigned	Upper Limit	Edit
14	Upper Limit	ON 500	OK>OK
15	User Program for number assigned	Timer 1	Edit
16	Timers	40.00	OK>OK>Store

Exit and select the program number assigned for boron in seawater from the User Programs menu to run the test.

Summary of Method

Borate ions react with azomethine-H to form a yellow dye, which is measured colorimetrically at a wavelength of 414 nm.

Removal of Interferences

Filter the sample if it contains suspended particles or is turbid.

Sample and Reagent Conditions

Sample pH = 4 - 9, Sample and reagent temperature = 20°C.
The colorimetric reaction of the boron analysis is temperature dependent; be sure that the temperature of the sample and reagent is at 20°C for accurate analysis. Store reagents at 2 - 8°C.

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