QuantiChrom™ Boron Assay Kit (DBOR-100)

Quantitative Colorimetric Determination of Boron

DESCRIPTION

BORON is an essential micronutrient in plants and is involved in maintaining robust cell walls, cell membranes, and reproductive tissues. Although boron is common in the soil in its natural state as a borate mineral, the amount of boron available to plants is actually quite small. As a result, boron deficiency is the second most common micronutrient deficiency among crop plants. In order to keep plant boron levels in a healthy range, supplementation to the soil via fertilizers and additives is often required. If not regulated, a lack of or excess of boron may significantly lower crop yield. In the biotech industry, sodium borohydride is commonly used to conjugate antibodies and typically needs to be removed from the final product, especially for therapeutic antibodies.

BioAssay Systems' boron detection kit provides a convenient and reliable means to measure boron. In the assay borate complexes with azomethine-H to create a colored compound that can be measured at 420 nm. This assay can be used with a variety of samples and is simple, sensitive, and adaptable to high-throughput screening.

KEY FEATURES

Fast and sensitive. Linear detection range: 0.05 to 10 µg/mL (0.05-10 ppm) boron with 100 µL sample (96-well).

Convenient. The procedure involves adding a single working reagent.

High-throughput. "Add-mix-read" type assay. Can be readily automated as a high-throughput 96-well or 384-well plate assay for thousands of samples per day.

APPLICATIONS

Direct Assays: Boron in water, plant tissues, soil samples, and antibody conjugation solutions.

KIT CONTENTS (100 TESTS IN 96-WELL PLATES)

Reagent A:	250 mg	**Standard:**	150 µL (500 µg/mL boron)
Reagent B:	20 mL		

Storage conditions. The kit is shipped at room temperature. Store all components at 2-8ºC upon receiving. Shelf life: 12 months after receipt.

Precautions: Reagents are for research use only. Briefly centrifuge Standard tube before opening. Normal precautions for laboratory reagents should be exercised while using the reagents. Please refer to Material Safety Data Sheet for detailed information.

Samples: Samples should be transparent and precipitate-free. If samples are cloudy or have precipitates, centrifuge 5 min at 14,000 x g and use clear supernatant for assay. See Product FAQ for soil and plant sample preparation procedures.

PROCEDURES

Procedure using 96-well plate

1. *Standards*. Prepare 500 µL of 10 µg/mL Premix by mixing 10 µL of the 500 µg/mL Standard and 490 µL of dH_2O. Dilute standards in 1.5-mL centrifuge tubes as described in the Table below.

No	Premix + dH_2O	Boron (µg/mL)
1	150 µL + 0 µL	10
2	90 µL + 60 µL	6
3	45 µL + 105 µL	3
4	0 µL + 150 µL	0

2. Transfer 100 µL of standards into separate wells of a clear, flat-bottom 96-well plate. Transfer 100 µL of each sample into two separate wells: one Sample well and one Sample Background well.
3. Add 150 µL dH_2O to all Sample Background wells.
4. Add 250 µL dH_2O to a separate well on the plate (Water Blank Well).
5. Working Reagent (WR). Working Reagent should be prepared fresh for each assay run and used within 15 minutes of reconstitution. For each Standard and Sample well, weigh out 2 mg of Reagent A powder and dissolve in 160 µL Reagent B.
6. Add 150 µL of WR to each Standard and Sample well. Tap plate lightly to ensure the contents of the wells are mixed evenly. Incubate for 40 min at room temperature, protected from light.
7. Read optical density at 420 nm.

CALCULATION

Subtract the Blank value (Standard #4) from the standard values and plot the ΔOD against standard concentrations. Determine the slope and calculate the boron concentration of Sample as follows:

$$[\text{Boron}] = \frac{(OD_{SAMPLE} - OD_{BLANK}) - (OD_{SAMPLE\ BG} - OD_{H2O})}{\text{Slope } (\mu g/mL^{-1})} \times n \quad (\mu g/mL)$$

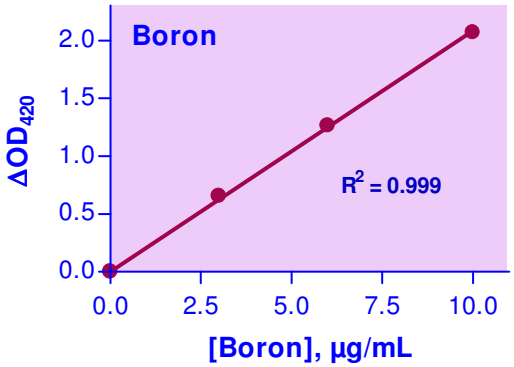
OD_{SAMPLE}, $OD_{SAMPLE\ BG}$, and OD_{BLANK} are optical density readings of the Sample, Sample Background, and Blank (Standard #4) respectively. OD_{H2O} is the OD of the Water Blank Well.

Note: If the calculated boron concentration of a sample is higher than 10 µg/mL, dilute sample in water and repeat the assay. Multiply the result by the dilution factor *n*.

Conversions: 1 µg/mL Boron equals 1 ppm or 92.5 µM.

MATERIALS REQUIRED, BUT NOT PROVIDED

Pipetting devices, centrifuge tubes, clear flat-bottom 96-well plates (e.g. VWR cat# 82050-760 or VWR cat # 82051-298), and plate reader.



Boron Standard Curve in dH_2O.

LITERATURE

1. Ziaeyan, A. H., & Rajaie, M. (2012). Combined effect of zinc and boron on yield and nutrients accumulation in corn. Int. J. Plant Prod., *3*(3), 35-44.
2. Uluisik, I., et al (2018). The importance of boron in biological systems. J Trace Elem Med Biol, *45*, 156-162.
3. Shireen, F., et al (2018). Boron: functions and approaches to enhance its availability in plants for sustainable agriculture. Int. J. Mol. Sci., *19*(7), 1856.