

BORAX

PRINCIPLE

Boric acid reacts neutral to methyl orange, but is acid to phenolphthalein. It can be quantitatively titrated in the presence of polyhydroxy compounds, such as mannitol or glycerol, which prevent the hydrolysis of sodium borate. The alkali present is neutralized first in the presence of methyl orange and the liberated boric acid is titrated with sodium hydroxide using phenolphthalein indicator.

SCOPE

This method is applicable to all dextrin (Note 1) and starch products.

REAGENTS

1. Mannitol, Reagent Grade
2. Methyl Orange Indicator
3. Phenolphthalein Indicator
4. Sodium Hydroxide Solution, 0.1 *N*: Standard
5. Sulfuric Acid Solution, 0.1 *N*: Standard

PROCEDURE

Weigh accurately about 1 g of sample and transfer quantitatively to a 250 mL beaker. Add 100 mL of purified water to the sample and heat on a steam bath to 90 °C while stirring continuously. Remove from steam bath and titrate while hot with 0.1 *N* sulfuric acid solution to an orange-red end point using methyl orange indicator.

Add phenolphthalein indicator and titrate with 0.1 *N* sodium hydroxide solution to a pink end point. Add about 1 g of mannitol to the solution (Note 2). If the pink color disappears, continue the titration until the pink color reappears. Again add

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BORAX — continued

about 1 g of mannitol and titrate to a pink end point. Continue this process until the addition of mannitol does not change the pink color of the solution (Note 3).

Run a blank determination using a sample of dextrin known to contain no borax.

CALCULATION

$$\% \text{ Borax (as is)} = \frac{(\text{mL } 0.1 \text{ } N \text{ NaOH} - \text{Blanks})(0.00955)(100)}{(\text{Wt. of Sample, g})}$$

NOTES AND PRECAUTIONS

1. Dextrins are modified starches prepared from starch by heat treatment in the dry state with or without the addition of small quantities of reagents.
2. Mannitol may be replaced with 10 mL of glycerol neutralized previously with sodium hydroxide to a phenolphthalein end point.
3. If preferred, the sample solution may be titrated electrometrically. In this case, a pH of 3.8 is substituted for the methyl orange end point and a pH of 8.3 for the phenolphthalein end point.