Method to Determine the Boric Oxide Equivalent in Borate Products

A Reagents

1. *Methyl Red Indicator Solution*
2. *Mannitol*, (Commercial EDIBLE No. 10).
3. *Sodium Hydroxide, Standard Solution* (0.5 *N*)-prepared and standardize a 0.5 *N* sodium hydroxide (NaOH) solution. The solution should be protected from carbon dioxide in the air.
4. *Hydrochloric Acid* (sp gr 1.19)-Concentrated hydrochloric acid (HCl).
5. *Phenolphthalein Indicator Solution* (1 g/L)-Dissolve 0.1 g of phenolphthalein in 50 mL of ethyl alcohol and mix with 50 mL of water.

B Procedure

6. In a clean dry pan, weigh 1g (± 10%) sample and record the weight to the nearest 0.0001 g,
7. Transfer sample into a 400 mL beaker.
8. Add approximately 100 mL hot water and 2 drops methyl red solution to the sample.
   a) **For Sodium Borates and Anhydrous Boric Acid:** Acidify with HCl (1.19), and reflux for 2 min. Cool the solution to room temperature and neutralize with 0.5 *N* NaOH solution. This point is indicated by a change in color from red to yellow.
   b) **For Boric Acid:** Dissolve the sample and cool to room temperature.
9. Add 12 g of mannitol and 2 or 3 drops of phenolphthalein indicator solution.
10. Titrate the mixture with 0.5 *N* NaOH solution until the solution color changes from yellow to pink.
11. Add more mannitol; if the pink color does not fade, the results are final.
12. If the solution does change to yellow, repeat steps 5 and 6 until the end point does not fade due to the addition of more mannitol.

B Calculation

$$\%B_2O_3 = \frac{V_{NaOH} \times N_{NaOH}}{W} \times 3.481$$

Where:

W = Weight of sample in grams

V_{NaOH} = Volume of NaOH titrated

N_{NaOH} = Normality of NaOH