Method to Determine the Boric Oxide Equivalent in Borate Products

A Reagents

1. Methyl Red Indicator Solution
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

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

\( W \) = Weight of sample in grams
\( V_{NaOH} \) = Volume of NaOH titrated
\( N_{NaOH} \) = Normality of NaOH