
INTERNATIONAL STANDARD



1915

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Boric oxide for industrial use — Determination of boric oxide content — Volumetric method

First edition — 1972-05-15

iTeh STANDARD PREVIEW
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UDC 661.651 : 543

Ref. No. ISO 1915-1972 (E)

Descriptors : boron oxides, chemical analysis, determination of content, volumetric analysis.

Price based on 2 pages

FOREWORD

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International Standard ISO 1915 was drawn up by Technical Committee ISO/TC 47, *Chemistry*.

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No Member Body expressed disapproval of the document.

Boric oxide for industrial use – Determination of boric oxide content – Volumetric method

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a volumetric method for the determination of the boric oxide content of boric oxide for industrial use.

2 PRINCIPLE

Titration of a dissolved test portion with a standard volumetric solution of sodium hydroxide in the presence of mannitol or sorbitol, using phenolphthalein as indicator.

3 REAGENTS

Distilled water or water of equivalent purity, free from carbon dioxide, shall be used in the test.

3.1 Mannitol, neutral, or alternatively sorbitol, neutral.

These products shall satisfy the following condition:

5.0 g, dissolved in 50 ml of carbon dioxide-free water, requires for neutralization not more than 0.3 ml of 0.02 N sodium hydroxide solution using phenolphthalein solution as indicator.

3.2 Hydrochloric acid, 0.25 N standard volumetric solution.

3.3 Sodium hydroxide, 0.5 N standard volumetric solution, free from carbonate.

3.4 Screened methyl red, indicator solution.

Dissolve 0.01 g of methyl red and 0.01 g of bromocresol green in 95 % (V/V) ethanol and dilute to 100 ml with the same ethanol.

3.5 Phenolphthalein, 10 g/l ethanolic solution.

Dissolve 1 g of phenolphthalein in 95 % (V/V) ethanol, dilute to 100 ml with the same ethanol and add 0.02 N sodium hydroxide solution until the first appearance of a pink colour.

4 APPARATUS

Ordinary laboratory apparatus.

5 SAMPLING

Follow the principles described in ISO ...¹⁾, minimizing exposure during sampling to avoid absorption of atmospheric moisture.

6 PROCEDURE

6.1 Test portion

Weigh, to the nearest 0.000 5 g, about 0.5 g of the laboratory sample. Weighing shall be carried out as rapidly as possible to minimize absorption of atmospheric moisture.

6.2 Determination

Transfer the test portion (6.1) to a beaker and dissolve in about 120 ml of water by heating, avoiding boiling. Cool the solution to ambient temperature, add 0.4 ml of the screened methyl red indicator solution (3.4) and slightly acidify with the hydrochloric acid solution (3.2). Add the sodium hydroxide solution (3.3) from a burette until the solution is just yellow. Add approximately 15 g of the mannitol or sorbitol (3.1) and 0.4 ml of the phenolphthalein solution (3.5). Titrate the solution with the sodium hydroxide solution (3.3) to a distinct pink colour.

NOTE – To ensure that the correct titration end point is obtained, the following standard colour matching solution may be used for comparison with the solution being titrated.

Mix

- 50 ml of a 3.81 g/l solution of disodium tetraborate decahydrate ($\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$),
- 100 ml of water,
- 2.0 ml of the hydrochloric acid solution (3.2),
- 0.4 ml of the screened methyl red indicator solution (3.4),
- 0.4 ml of the phenolphthalein solution (3.5).

Equal volumes of this solution and of the titrand shall be compared in similar beakers.

1) Under study.

7 EXPRESSION OF RESULTS

Boric oxide content (B_2O_3) is given, as a percentage by mass, by the formula :

$$\frac{V}{m} \times 1.741$$

where

V is the volume, in millilitres, of the sodium hydroxide solution (3.3) used in the titration, after addition of the mannitol or sorbitol (3.1);

m is the mass, in grams, of the test portion.

8 TEST REPORT

The test report shall include the following particulars :

- a) the reference of the method used;
- b) the results and the method of expression used;
- c) any unusual features noted during the determination;
- d) any operation not included in this International Standard or regarded as optional.

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