

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 990

POTASSIUM HYDROXIDE FOR INDUSTRIAL USE

DETERMINATION OF ALKALINITY

VOLUMETRIC METHOD

1st EDITION
February 1969

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BRIEF HISTORY

The ISO Recommendation R 990, *Potassium hydroxide for industrial use – Determination of alkalinity – Volumetric method*, was drawn up by Technical Committee ISO/TC 47, *Chemistry*, the Secretariat of which is held by the Ente Nazionale Italiano di Unificazione (UNI).

Work on this question led, in 1966, to the adoption of a Draft ISO Recommendation.

In December 1966, this Draft ISO Recommendation (No. 1099) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Austria	Israel	Spain
Belgium	Italy	Switzerland
Brazil	Japan	Thailand
Chile	Korea, Dem. P. Rep. of	Turkey
Cuba	Netherlands	U.A.R.
Czechoslovakia	New Zealand	United Kingdom
Germany	Poland	U.S.S.R.
Hungary	Portugal	Yugoslavia
India	Romania	
Ireland	South Africa, Rep. of	

Two Member Bodies opposed the approval of the Draft :

France
U.S.A.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in February 1969, to accept it as an ISO RECOMMENDATION.

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INTRODUCTION

Two expressions are commonly used for expressing the alkalinity of the product :

- *Equivalent* KOH (eq. KOH), corresponding to the total alkalinity of the product expressed as KOH;
- *Caustic* KOH (c. KOH), corresponding to the total alkalinity of the product less that due to potassium carbonate.

PART I

DETERMINATION OF TOTAL ALKALINITY

1. SCOPE

Part I of this ISO Recommendation describes a volumetric method for the determination of the total alkalinity of potassium hydroxide for industrial use, expressed as equivalent KOH (eq. KOH).

2. PRINCIPLE

Neutralization of an aliquot of the sample solution by means of a hydrochloric acid standard volumetric solution in the presence of methyl orange as indicator, or any other indicator having the same equivalence point.

3. REAGENTS

Distilled water or water of equivalent purity should be used in the test.

3.1 *Hydrochloric acid*, N standard volumetric solution (see Note in section 6).

3.2 *Methyl orange*, 0.5 g/l solution.

Dissolve 0.05 g of methyl orange in water and dilute to 100 ml.

4. APPARATUS

Ordinary laboratory apparatus.

5. PROCEDURE

5.1 Test portion

Transfer 25.0 ml of sample solution A* to a 500 ml conical flask.

5.2 Titration

Add approximately 75 ml of water and 5 drops of the methyl orange solution (3.2) to the conical flask containing the test portion (5.1) and titrate with the hydrochloric acid standard volumetric solution (3.1) until the colour of the indicator changes from yellow to orange.

6. EXPRESSION OF RESULTS

The total alkalinity, expressed as equivalent potassium hydroxide (eq. KOH), is given as a percentage, by mass, by the following formula :

$$V \times A \times \frac{500}{25} \times \frac{100}{E} = 112.218 \times \frac{V}{E}$$

where

- V is the volume, in millilitres, of the hydrochloric acid standard volumetric solution (3.1) used for the titration;
- A is the mass, in grammes, of KOH corresponding to 1 ml of N hydrochloric acid standard volumetric solution (theoretical value 1 ml $\hat{=}$ 0.056 109 g of KOH);
- E is the mass, in grammes, of the test portion used for the preparation of the sample solution A*.

NOTE. – If the hydrochloric acid standard volumetric solution (3.1) is not of exactly the strength indicated in the list of reagents, a suitable correction factor should be employed in calculating the results.

7. TEST REPORT

Give 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 ISO Recommendation or regarded as optional.

* See ISO Recommendation R 989, *Potassium hydroxide for industrial use – Preparation of sample solution*, clause 5.2.

PART II

CALCULATION OF CAUSTIC ALKALINITY

Caustic alkalinity, expressed as caustic potassium hydroxide (c. KOH), is given as a percentage, by mass, by the following formula :

$$b - c \frac{56.109}{69.107} = b - 0.8119 c$$

where

- b* is the percentage, by mass, of eq. KOH;
- c* is the percentage, by mass, of potassium carbonate determined following the procedure of ISO Recommendation R 991, *Potassium hydroxide for industrial use – Determination of the carbon dioxide content, expressed as potassium carbonate – Gas-volumetric method.*

NOTE. – In the test report state the results and the reference of the methods used for the determination of total alkalinity and potassium carbonate.