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ISO RECOMMENDATION

R 908

HYDROCHLORIC ACID FOR INDUSTRIAL USE

DETERMINATION OF OXIDIZING OR REDUCING SUBSTANCES

Volumetric method

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BRIEF HISTORY

The ISO Recommendation R 908, *Hydrochloric acid for industrial use – Determination of oxidizing or reducing substances – 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).

Based on detailed work on this question carried out by the Technical Committee, a Draft ISO Recommendation was adopted in 1965.

In June 1967, this Draft ISO Recommendation (No. 1178) 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	Iran	South Africa, Rep. of
Belgium	Ireland	Spain
Bulgaria	Israel	Switzerland
Chile	Italy	Thailand
Cuba	Japan	Turkey
Czechoslovakia	Korea, Dem. P. Rep. of	U.A.R.
France	Netherlands	United Kingdom
Germany	New Zealand	U.S.S.R.
Hungary	Poland	Yugoslavia
ICAITI*	Portugal	
India	Romania	

No Member Body opposed the approval of the Draft.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council which decided, in December 1968, to accept it as an ISO RECOMMENDATION.

* Instituto Centroamericano de Investigación y Tecnologia Industrial (Costa Rica, Guatemala, Honduras, Nicaragua, El Salvador, Panama).

ISO Recommendation R 908 December 1968

HYDROCHLORIC ACID FOR INDUSTRIAL USE

DETERMINATION OF OXIDIZING OR REDUCING SUBSTANCES

Volumetric method

1. SCOPE

This ISO Recommendation describes a volumetric method for the determination of oxidizing or reducing substances in hydrochloric acid for industrial use.

2. PRINCIPLE

Preliminary qualitative test to detect the presence of either oxidizing or reducing substances.

Iodometric determination directly (in the case of oxidizing substances) or indirectly (in the case of reducing substances).

3. REAGENTS

Distilled water or water of equivalent purity recently boiled and cooled should be used in the test.

3.1 *Potassium iodide,* crystals.

3.2 *Potassium iodide,* 100 g/l solution.

Dissolve 10 g of potassium iodide in water and dilute to 100 ml.

3.3 *Sodium thiosulphate,* 0.1 N standard volumetric solution.

(see Note, section 6).

3.4 *Iodine,* 0.1 N standard volumetric solution, containing at least 25 g/l of potassium iodide.

(see Note, section 6).

3.5 *Starch solution*

Make a paste of 0.5 g of starch with 2.5 ml of water.

Pour the paste in small quantities at a time into 200 ml of water.

Boil for 15 minutes with constant stirring. Preserve in small containers previously sterilized in boiling water for 2 hours.

4. APPARATUS

Ordinary laboratory apparatus and

4.1 **Weighing bottle**, with ground-glass stopper, capacity approximately 60 ml.

4.2 **Conical flasks with ground-glass stopper**, capacity 500 ml.

5. PROCEDURE

5.1 Preliminary test

Place about 20 ml of the test sample in a 100 ml conical flask, add 50 ml of water, one crystal of potassium iodide (3.1), 0.5 ml of the starch solution (3.5) and stir.

If a blue colour appears indicating iodine liberation, follow the procedure described in clause 5.3; if no colour appears, follow the procedure of clause 5.4.

5.2 Test portion

Fill the weighing bottle (4.1) with the test sample and take a portion of approximately 50 g, weighing by difference to the nearest 10 mg.

5.3 Determination of oxidizing substances

Transfer the test portion (5.2) to a conical flask (4.2) containing 100 ml of water. Stopper the flask and cool.

Add to the conical flask (4.2) 10.0 ml of the potassium iodide solution (3.2); stopper the flask and shake. Allow to stand for 2 minutes and then add 1 ml of the starch solution (3.5).

By means of the sodium thiosulphate solution (3.3), titrate the iodine liberated until the blue colour disappears.

5.4 Determination of reducing substances

With cooling, transfer the test portion (5.2) to a conical flask (4.2) containing 100 ml of water and an exact quantity of the iodine solution (3.4) (10.0 ml for example). Stopper the flask and shake.

Titrate the excess of iodine with the sodium thiosulphate solution (3.3). When the colour of the solution becomes pale yellow, add 1 ml of the starch solution (3.5) and carry on titrating until the blue colour disappears.

6. EXPRESSION OF RESULTS

6.1 Oxidizing substances

Oxidizing substances conventionally expressed as chlorine (Cl), are given as a percentage, by mass, by the following formula :

$$\frac{V \times A \times 100}{E}$$

where

V is the volume, in millilitres, of the 0.1 N sodium thiosulphate solution (3.3) used in the titration (see Note below),

A is the mass, in grammes, of chlorine corresponding to 1 ml of 0.1 N sodium thiosulphate solution (theoretical value 1 ml $\triangleq$ 0.00355 g of Cl).

E is the mass, in grammes, of the test portion.

6.2 Reducing substances

Reducing substances, conventionally expressed as sulphur dioxide (SO_2), are given as a percentage, by mass, by the following formula :

$$\frac{(V - V_1) \times A \times 100}{E}$$

where

V is the volume, in millilitres, of the iodine solution (3.4) added before titration (see Note below),

V_1 is the volume, in millilitres, of the sodium thiosulphate standard volumetric solution (3.3) used for the titration (see section 6),

A is the mass, in grammes, of sulphur dioxide corresponding to 1 ml of 0.1 N iodine solution (theoretical value 1 ml $\triangleq$ 0.003203 g of SO_2 , see Note below)

E is the mass, in grammes, of the test portion.

NOTE. – If the sodium thiosulphate (3.3) and iodine (3.4) standard volumetric solutions are 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.