INTERNATIONAL STANDARD 904

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Hydrochloric acid for industrial use — Determination of total acidity — Titrimetric method

Acide chlorhydrique à usage industriel — Détermination de l'acidité totale — Méthode titrimétrique

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

Prior to 1972, the results of the work of the technical committees were published as ISO Recommendations; these documents are in the process of being transformed into International Standards. As part of this process, Technical Committee ISO/TC 47, *Chemistry*, has reviewed ISO Recommendation R 904-1968 and found it technically suitable for transformation. International Standard ISO 904 therefore replaces ISO Recommendation R 904-1968, to which it is technically identical.

ISO Recommendation R 904 had been approved by the member bodies of the following countries :

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

No member body had expressed disapproval of the Recommendation.

No member body disapproved the transformation of the Recommendation into an International Standard.

Printed in Switzerland

Hydrochloric acid for industrial use — Determination of total acidity — Titrimetric method

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a titrimetric method for the determination of the total acidity of hydrochloric acid for industrial use, conventionally expressed as HCl.

2 PRINCIPLE

Titration of the total acidity in a test portion by means of a standard volumetric sodium hydroxide solution, in the presence of bromocresol green as indicator.

3 REAGENTS

During the analysis, use only reagents of recognized analytical grade and only distilled water or water of equivalent purity, neutral to bromocresol green.

3.1 Sodium hydroxide, 1 N standard volumetric solution.

3.2 Bromocresol green, 1 g/l solution in 95 % (*V*/*V*) ethanol.

4 APPARATUS

Ordinary laboratory apparatus and

4.1 Flask, of capacity approximately 500 ml, with neck of diameter about 30 mm, with ground glass stopper.

4.2 Spherical glass ampoule, of suitable shape and capacity, for example of diameter 20 mm, having one capillary end of length about 50 mm (see example indicated in the figure).

4.3 Conical flask, of capacity 500 ml, with ground glass stopper.

5 PROCEDURE

5.1 Test portion

Nearly fill the flask (4.1) with the test sample. Slightly heat in a flame the bulb of the glass ampoule (4.2), previously weighed to the nearest 0,000 1 g.

Immerse the capillary end of the ampoule into the flask containing the test sample and ensure that the bulb is filled up to about two-thirds of its volume during cooling (2 to 3 ml approximately).

Withdraw the ampoule and carefully wipe the capillary end with filter paper.

Seal the capillary end in an oxidizing flame, **without loss of glass.** Remove from the flame and allow to cool. Wash the capillary and wipe carefully with filter paper.

Weigh the ampoule to the nearest 0,000 1 g and calculate, by difference, the mass of the test portion.

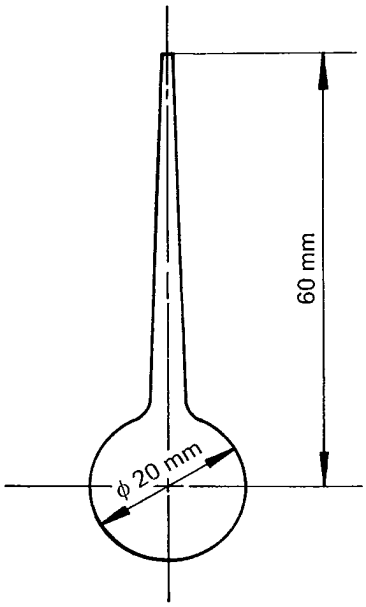

FIGURE — **Spherical glass ampoule**

5.2 Determination

Carefully place the ampoule containing the test portion (5.1) into the conical flask (4.3) containing 200 ml of cold water. Stopper the flask and while cooling, shake to break the ampoule containing the test portion.

Keep cooling and shaking until the vapours are completely absorbed.

Remove the stopper and rinse it with water, collecting the washings in the same flask. By means of a glass rod, grind the fragments of the ampoule, and in particular the capillary, which may have remained entire in spite of shaking.

Withdraw the glass rod and wash it with water, collecting the washings in the same flask.

Add 2 drops of the bromocresol green solution (3.2) and titrate with the standard volumetric sodium hydroxide solution (3.1) until the colour changes from yellow to blue.

6 EXPRESSION OF RESULTS

The total acidity, expressed as a percentage by mass of hydrochloric acid (HCl), is given by the formula

$$\frac{V \times 0{,}036\,46 \times 100}{m} = \frac{3{,}646 \times V}{m}$$

where

V is the volume, in millilitres, of the standard volumetric sodium hydroxide solution (3.1) used for the titration;

m is the mass, in grams, of the test portion (5.1);

0,036 46 is the mass, in grams, of hydrochloric acid corresponding to 1 ml of exactly 1 N sodium hydroxide solution.

NOTE – If the concentration of the standard volumetric sodium hydroxide solution used is not exactly as specified in the list of reagents, a correction factor should be applied.

7 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.

ANNEX

ISO PUBLICATIONS RELATING TO HYDROCHLORIC ACID FOR INDUSTRIAL USE

ISO 904 – Determination of total acidity – Titrimetric method.

ISO 905 – Evaluation of hydrochloric acid concentration by measurement of density.

ISO 906 – Determination of sulphate content – Barium sulphate gravimetric method.

ISO 907 – Determination of sulphated ash – Gravimetric method.

ISO 908 – Determination of oxidizing or reducing substances – Titrimetric method.

ISO/R 909 – Determination of iron content – 2,2′-Bipyridyl spectrophotometric method.

ISO 2762 – Determination of soluble sulphates – Turbidimetric method.

ISO 5785 – Determination of arsenic content – Silver diethyldithiocarbamate photometric method.