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# INTERNATIONAL STANDARD



# 905

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

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## Hydrochloric acid for industrial use — Evaluation of hydrochloric acid concentration by measurement of density

*Acide chlorhydrique à usage industriel — Évaluation de la concentration en acide chlorhydrique par mesurage de la masse volumique*

First edition — 1976-11-01

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UDC 661.419 : 542.3

Ref. No. ISO 905-1976 (E)

**Descriptors** : hydrochloric acid, chemical analysis, determination of content, concentration, density measurement.

## 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 905-1968 and found it technically suitable for transformation. International Standard ISO 905 therefore replaces ISO Recommendation R 905-1968, to which it is technically identical.

ISO Recommendation R 905 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            | U.S.S.R.              |
| Germany             | New Zealand            | Yugoslavia            |
| Hungary             | Poland                 |                       |

The member body of the following country had expressed disapproval of the Recommendation on technical grounds :

United Kingdom

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

# Hydrochloric acid for industrial use — Evaluation of hydrochloric acid concentration by measurement of density

## 1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method, by measurement of density, for the approximate evaluation of the hydrochloric acid (HCl) concentration of hydrochloric acid for industrial use.

## 2 PRINCIPLE

Determination of the density at 20 °C by means of a hydrometer. Evaluation of the corresponding hydrochloric acid (HCl) concentration.

## 3 APPARATUS

Ordinary laboratory apparatus and

**3.1 Hydrometer**, graduated in 0,005 g/ml, calibrated at 20 °C (see ISO/R 649).

**3.2 Glass test tube**, of capacity at least 500 ml, of diameter at least 25 mm greater than that of the hydrometer (3.1), and of height at least 25 mm greater than the immersion level of the hydrometer.

## 4 PROCEDURE

### 4.1 Determination of density

Place approximately 500 ml of the test sample in the glass test tube (3.2). Adjust the temperature of the contents of the test tube to  $20 \pm 0,5$  °C.

Plunge in the hydrometer (3.1) and, as soon as static equilibrium has been reached, verify again that the temperature of the acid is  $20 \pm 0,5$  °C. Read the density indicated on the hydrometer scale.

### 4.2 Evaluation of hydrochloric acid (HCl) content

Read from the table the concentration corresponding to the density indicated on the hydrometer.

TABLE — Relationship between density and concentration of aqueous solutions of hydrochloric acid

| Density<br>at 20 °C | HCl     | Density<br>at 20 °C | HCl     |
|---------------------|---------|---------------------|---------|
| g/ml                | % (m/m) | g/ml                | % (m/m) |
| 1,000               | 0,4     | 1,105               | 21,4    |
| 1,005               | 1,4     | 1,110               | 22,3    |
| 1,010               | 2,4     | 1,115               | 23,3    |
| 1,015               | 3,4     | 1,120               | 24,2    |
| 1,020               | 4,4     | 1,125               | 25,2    |
| 1,025               | 5,4     | 1,130               | 26,2    |
| 1,030               | 6,4     | 1,135               | 27,2    |
| 1,035               | 7,5     | 1,140               | 28,2    |
| 1,040               | 8,5     | 1,145               | 29,2    |
| 1,045               | 9,5     | 1,150               | 30,2    |
| 1,050               | 10,5    | 1,155               | 31,2    |
| 1,055               | 11,5    | 1,160               | 32,2    |
| 1,060               | 12,5    | 1,165               | 33,2    |
| 1,065               | 13,5    | 1,170               | 34,2    |
| 1,070               | 14,5    | 1,175               | 35,2    |
| 1,075               | 15,5    | 1,180               | 36,2    |
| 1,080               | 16,5    | 1,185               | 37,3    |
| 1,085               | 17,4    | 1,190               | 38,3    |
| 1,090               | 18,4    | 1,195               | 39,4    |
| 1,095               | 19,4    | 1,198               | 40,0*   |
| 1,100               | 20,4    |                     |         |

\* Saturation value at 20 °C.

NOTE — The data shown in the table have been obtained by graphic interpolation of the data given in *International Critical Tables*, Vol. 3, p. 54, rounded to the first decimal.