

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 1388

ETHANOL FOR INDUSTRIAL USE

METHODS OF TEST

1st EDITION

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BRIEF HISTORY

The ISO Recommendation R 1388, *Ethanol for industrial use – Methods of test*, 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 to the adoption of Draft ISO Recommendation No. 1388, which was circulated to all the ISO Member Bodies for enquiry in February 1968. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Austria	Iran	Spain
Belgium	Italy	Sweden
Brazil	Japan	Switzerland
Chile	Korea, Rep. of	Thailand
Cuba	Netherlands	Turkey
Czechoslovakia	New Zealand	United Kingdom
Germany	Poland	U.S.S.R.
Hungary	Romania	
India	South Africa, Rep. of	

The following Member Bodies opposed the approval of the Draft :

France
Portugal

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

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ETHANOL FOR INDUSTRIAL USE

METHODS OF TEST

INTRODUCTION

This ISO Recommendation gives general test methods for ethanol for industrial use, and results of test methods are given, where appropriate, as percentages by mass.

In some countries, however, certain impurities are calculated as milligrammes per 100 ml or per litre of 100 % ethanol. To convert the results obtained as percentages by mass by the methods in this ISO Recommendation to this basis, they should be multiplied by the factors $\frac{10^5 \rho}{P}$ and $\frac{10^6 \rho}{P}$ respectively,

where

- ρ is the density of the sample at 20 °C, expressed in grammes per millilitre;
- P is the percentage, by mass, of ethanol in the test portion.

1. SCOPE

This ISO Recommendation describes methods of test for ethanol for industrial use.

2. SAMPLE*

The laboratory sample should be of sufficient size for carrying out all the analyses. It should be preserved in a clean, dry and airtight glass-stoppered bottle of such a size that it is nearly filled by the sample and, if indicated by certain tests, the bottle should be kept cold and stored in the dark.

If it has been necessary to seal the container, care should be taken to avoid contaminating the contents in any way.

3. DETERMINATION OF DENSITY AT 20 °C

Use the method described in ISO Recommendation R 758, *Method for the determination of density of liquids at 20 °C*.

NOTE. — Other methods or different conditions may be used in each country, if required by the local Excise regulations.

* Sampling of chemical products will form the subject of a further ISO Recommendation.

4. DETERMINATION OF RESIDUE ON EVAPORATION ON A WATER BATH

Use the method described in ISO Recommendation R 759, *Method for the determination of residue on evaporation on a water bath*.

NOTE. – If a residue of less than 0.001 % is to be determined, a 250 ml sample should be used, added to the basin in small increments.

5. DETECTION OF ALKALINITY AND DETERMINATION OF ACIDITY BY PHENOLPHTHALEIN

5.1 Principle

Titration with sodium hydroxide solution of a solution of the sample, after removal of carbon dioxide by boiling, using phenolphthalein as indicator.

5.2 Reagents

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

5.2.1 *Sodium hydroxide*, 0.1 N standard volumetric solution.

5.2.2 *Phenolphthalein*, 5 g/l ethanolic solution.

Dissolve 0.5 of phenolphthalein in 100 ml of 95 % (V/V) ethanol and make faintly pink by the addition of dilute sodium hydroxide solution.

5.3 Apparatus

Ordinary laboratory apparatus and

5.3.1 *Conical flask*, of borosilicate glass, capacity 500 ml, provided with a stopper carrying a soda-lime tube.

5.3.2 *Microburette*, graduated in 0.02 ml, or smaller divisions.

5.4 Procedure

Place 100 ml of water and a few pieces of clean porous porcelain into the flask (5.3.1) and boil gently for 5 minutes to eliminate carbon dioxide. Cool slightly and add 100 ml of the laboratory sample. Boil gently for a further 10 minutes.

At the end of this period close the neck of the flask with the stopper carrying the soda-lime tube and allow to cool. When cold remove the stopper, add 0.5 ml of the phenolphthalein solution (5.2.2) and examine for alkalinity; if not alkaline, titrate the mixture with the sodium hydroxide solution (5.2.1) until the pink colour remains for 15 seconds.

5.5 Expression of results

Acidity, expressed as acetic acid (CH_3COOH), is given, as a percentage by mass, by the following formula :

$$\frac{0.006 V}{\rho}$$

where

V is the volume, in millilitres, of the sodium hydroxide solution (5.2.1) used;

ρ is the density, in grammes per millilitre, of the sample at 20 °C.

6. ESTIMATION OF CARBONYL COMPOUNDS PRESENT IN SMALL AMOUNTS

(between 0.00025 and 0.0025 % of carbonyl compounds, calculated as acetaldehyde)

NOTE. – Although this method is used in commercial practice, it is not satisfactory for all types of carbonyl compounds.