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Formaldehyde solutions for industrial use — Determination of formaldehyde content

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FOREWORD

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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.

International Standard ISO 2227 was drawn up by Technical Committee ISO/TC 47, *Chemistry*.

It was approved in July 1971 by the Member Bodies of the following countries :

Austria	Ireland	Sweden
Belgium	Israel	Switzerland
Czechoslovakia	Italy	Turkey
Egypt, Arab Rep. of	Netherlands	United Kingdom
France	New Zealand	U.S.A.
Germany	Romania	U.S.S.R.
Hungary	South Africa, Rep. of	

No Member Body expressed disapproval of the document.

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Formaldehyde solutions for industrial use – Determination of formaldehyde content

WARNING

Formaldehyde is toxic. It is therefore necessary to avoid inhaling its vapour during sampling and testing.

1 SCOPE

This International Standard specifies a volumetric method for the determination of the formaldehyde content of formaldehyde solutions for industrial use.

2 FIELD OF APPLICATION

The method as described is applicable to formaldehyde solutions with formaldehyde contents between 25 % and 45 %, but the field of application may be extended by suitably modifying the mass of the test portion.

NOTE – This method of test is applicable to samples that are clear or only slightly cloudy. If the test sample contains a precipitate, then even if it is thoroughly mixed the results obtained by this method will not be correct, the amount of error being dependent upon the amount of precipitate present.

3 PRINCIPLE

Reaction of the formaldehyde present with a neutral sodium sulphite solution, and acidimetric titration of the liberated sodium hydroxide using thymolphthalein as indicator.

4 REAGENTS

Distilled water, or water of equivalent purity, freshly boiled and cooled, shall be used in the test.

4.1 Sodium sulphite, 130 g/l solution.

Dissolve approximately 130 g of anhydrous sodium sulphite, or approximately 250 g of hydrated sodium sulphite ($Na_2SO_3.7H_2O$), in water and dilute to 1 000 ml.

Prepare this solution just before use.

4.2 Sodium hydroxide, approximately 0,1 N solution.

4.3 Hydrochloric acid, approximately 0,1 N solution.

4.4 Hydrochloric acid, N standard volumetric solution.

4.5 Thymolphthalein, 2 g/l ethanolic solution.

Dissolve 0,2 g of thymolphthalein in 60 ml of 95 % (*V/V*) ethanol, add the sodium hydroxide solution (4.2) until a pale blue coloration is produced and then dilute to 100 ml with water.

5 APPARATUS

Ordinary laboratory apparatus and

5.1 Weighing pipette, capacity approximately 3 ml.

6 SAMPLING

Follow the principles given in ISO . . .[1].

Attention is drawn to the following recommendation. Place the laboratory sample, representative of the material taken from the bulk, in a clean, dry, and air-tight glass bottle, fitted with a ground glass stopper, of such a size that it is nearly filled by the sample.

If it is necessary to seal this bottle care shall be taken to avoid the risk of contamination.

Owing to polymerization, paraformaldehyde will tend to be deposited on standing and this will occur more rapidly if the temperature is allowed to fall below 25 °C. Accordingly the material shall be sampled as soon as possible after receipt.

7 PROCEDURE

7.1 Test portion

By means of the weighing pipette (5.1), weigh by difference, to the nearest 0,001 g, approximately 3 g of the laboratory sample.

7.2 Determination

Measure 75 ml of the sodium sulphite solution (4.1) into a 250 ml conical flask. Add 2 drops (approximately 0,1 ml) of the thymolphthalein solution (4.5), followed by the hydrochloric acid solution (4.3) until the blue colour just disappears.

1) Sampling from the consignment of the product will form the subject of a future International Standard.

Place approximately 10 ml of water in a second 250 ml conical flask and rapidly run in the test portion (7.1) from the weighing pipette. Cover immediately with a watch glass to avoid loss by evaporation. Add 2 drops (approximately 0,1 ml) of the thymolphthalein solution (4.5), followed by the sodium hydroxide solution (4.2), drop by drop, until a faint blue colour is just perceptible.

Add the neutralized sodium sulphite solution contained in the first flask. Mix the two solutions by swirling the flask for 2 min, and then titrate with the standard volumetric hydrochloric acid solution (4.4) until the blue colour just disappears.

8 EXPRESSION OF RESULTS

Formaldehyde content, expressed as formaldehyde (HCHO), is given, as a percentage by mass, by the formula

$$\frac{3{,}003 \times V}{m}$$

where

V is the volume, in millilitres, of the standard volumetric hydrochloric acid solution (4.4) used for the titration;

m is the mass, in grams, of the test portion.

9 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.