

**INTERNATIONAL STANDARD****2223**

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

**Formaldehyde solutions for industrial use — Limit test for heavy metals (excluding iron)**

First edition — 1972-11-15

UDC 661.727.1 : 542.61 : 546.3

Ref. No. ISO 2223-1972 (E)

Descriptors : formaldehyde, chemical analysis, determination of content, copper, lead (metal).

Price based on 2 pages

## FOREWORD

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International Standard ISO 2223 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	Hungary	South Africa, Rep. of
Belgium	Ireland	Sweden
Chile	Israel	Switzerland
Czechoslovakia	Italy	Turkey
Egypt, Arab Rep. of	Netherlands	United Kingdom
France	New Zealand	U.S.A.
Germany	Romania	U.S.S.R.

No Member Body expressed disapproval of the document.

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Printed in Switzerland

# Formaldehyde solutions for industrial use – Limit test for heavy metals (excluding iron)

## WARNING

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

## 1 SCOPE

This International Standard specifies a limit test for heavy metals (excluding iron) in formaldehyde solutions for industrial use.

## 2 FIELD OF APPLICATION

The method detects only the heavy metals present in non-complex form, the sulphides of which are precipitated in acid solution. The method is not specific for any one heavy metal.

## 3 PRINCIPLE

Conversion of heavy metals, such as lead and copper, in acid solution to their sulphides, and comparison of the colour produced with that given by an agreed volume of standard lead solution treated with hydrogen sulphide in the same way.

## 4 REAGENTS

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

**4.1 Hydrochloric acid**, approximately N solution.

**4.2 Hydrogen sulphide**.

**4.3 Lead**, standard solution, 0,010 g of Pb per litre.

Weigh, to the nearest 0,2 mg, 0,016 g of lead nitrate, place in a 1 000 ml one-mark volumetric flask, dissolve in water, dilute to the mark and mix.

1 ml of this standard solution contains 10 µg of Pb.

Prepare this solution immediately before use.

## 5 APPARATUS

Ordinary laboratory apparatus and

**5.1 Two matched Nessler cylinders**, capacity 100 ml.

## 6 SAMPLING

Follow the principles given in ISO ...<sup>1)</sup>.

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

### WARNING

Saturation of the solutions with hydrogen sulphide shall be carried out in an adequately ventilated fume cupboard.

### 7.1 Test portion and preparation of the comparison solution

Place  $20 \pm 0,2$  g of the laboratory sample in one of the Nessler cylinders (5.1). Add about 2,5 ml of the hydrochloric acid solution (4.1) and 60 ml of water. Saturate with the hydrogen sulphide (4.2), rinse down the gas inlet tube, dilute to the mark and mix.

### 7.2 Preparation of agreed colorimetric solution

To 80 ml of water contained in the second Nessler cylinder (5.1) add an agreed volume of the standard lead solution (4.3) followed by 2,5 ml of the hydrochloric acid solution (4.1). Saturate with the hydrogen sulphide (4.2), rinse down the gas inlet tube, dilute to the mark and mix.

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

### 7.3 Comparison

Compare the colour of the comparison solution (7.1) with that of the agreed colorimetric solution (7.2), viewing vertically against a white background.

### 8 EXPRESSION OF RESULTS

Report the colour produced in the comparison solution (7.1) as greater than, equal to, or less than that of the agreed colorimetric solution (7.2), stating the lead content of the latter.

### 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.