

---

**INTERNATIONAL STANDARD**



**2226**

---

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

---

**Formaldehyde solutions for industrial use – Determination  
of iron content – 2,2'-bipyridyl photometric method**

First edition – 1972-12-01

## 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.

International Standard ISO 2226 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.

# Formaldehyde solutions for industrial use – Determination of iron content – 2,2'-bipyridyl photometric method

## WARNING

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

## 1 SCOPE

This International Standard specifies a 2,2'-bipyridyl photometric method for the determination of iron content of formaldehyde solutions for industrial use.

## 2 FIELD OF APPLICATION

The method as described is applicable to the determination of iron contents less than 0,000 4 %.

NOTE – The field of application may be extended to iron contents greater than 0,000 4 % by reducing the mass of the test portion in a suitable manner.

## 3 PRINCIPLE

Conversion of any iron present into the sulphate by evaporation to dryness in the presence of sulphuric acid, and reduction of trivalent iron by means of hydroxylammonium chloride.

Formation of a bivalent iron 2,2'-bipyridyl complex. Photometric measurement of the coloured complex at a wavelength of about 522 nm.

NOTE – Although this method specifies the use of a spectrophotometer or photoelectric absorptiometer, it is permissible to employ, as an alternative procedure, a visual method (see Note to 7.4.3).

## 4 REAGENTS

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

**4.1 Sulphuric acid**,  $\rho$  1,84 g/ml, approximately 96 % (m/m) solution, diluted 1 + 6 by volume.

**4.2 Hydrogen peroxide**, 150 g/l solution.

**4.3 Hydroxylammonium chloride**, 100 g/l solution.

Dissolve 10 g of hydroxylammonium chloride ( $\text{NH}_2\text{OH}\cdot\text{HCl}$ ) in water and dilute to 100 ml.

**4.4 Ammonium acetate**, 500 g/l solution.

Dissolve 50 g of ammonium acetate ( $\text{CH}_3\text{COONH}_4$ ) in water and dilute to 100 ml.

**4.5 2,2'-bipyridyl**, 5 g/l hydrochloric acid solution.

Dissolve 0,5 g of 2,2'-bipyridyl in 10 ml of approximately N hydrochloric acid solution and dilute to 100 ml.

**4.6 Iron (II) standard solution**, containing 2,00 g of Fe per litre.

Weigh, to the nearest 0,001 g, 7,022 g of ammonium iron(II) sulphate hexahydrate and place in a beaker of suitable capacity. Add 25 ml of the sulphuric acid solution (4.1) and transfer quantitatively to a 500 ml one-mark volumetric flask. Dilute to the mark and mix thoroughly.

1 ml of this standard solution contains 2,00 mg of Fe.

**4.7 Iron (II) standard solution**, containing 0,200 g of Fe per litre.

Transfer 50,0 ml of the iron standard solution (4.6) to a 500 ml one-mark volumetric flask, add 2,5 ml of the sulphuric acid solution (4.1), dilute to the mark and mix thoroughly.

1 ml of this standard solution contains 0,20 mg of Fe.

The solution shall be prepared just before use.

**4.8 Iron (II) standard solution**, containing 0,010 g of Fe per litre.

Transfer 50,0 ml of the iron standard solution (4.7) to a 1 000 ml one-mark volumetric flask. Dilute to the mark and mix thoroughly.

1 ml of this standard solution contains 0,01 mg of Fe.

The solution shall be prepared just before use.

## 5 APPARATUS

Ordinary laboratory apparatus and

**5.1 Spectrophotometer** or, alternatively

**5.2 Photoelectric absorptiometer** or, alternatively

**5.3 Two matched Nessler cylinders.**