

International Standard



6332

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Water analysis — Determination of iron — 1,10-phenanthroline photometric method

Analyse de l'eau — Dosage du fer — Méthode spectrométrique à la phénanthroline-1,10

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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 6332 was developed by Technical Committee ISO/TC 147, *Water quality*, and was circulated to the member bodies in April 1981.

It has been approved by the member bodies of the following countries :

Australia	India	Philippines
Austria	Iran	Poland
Belgium	Iraq	Romania
Brazil	Italy	South Africa, Rep. of
Czechoslovakia	Japan	Spain
Egypt, Arab Rep. of	Korea, Dem. P. Rep. of	Sweden
Finland	Korea, Rep. of	United Kingdom
France	Mexico	USA
Germany, F.R.	New Zealand	USSR
Hungary	Norway	

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Netherlands
Switzerland

Water analysis — Determination of iron — 1,10-phenanthroline photometric method

1 Scope and field of application

This International Standard specifies a 1,10-phenanthroline photometric method for the determination of iron in water and waste water. Procedures are described for the determination of total iron, total acid soluble iron, total dissolved iron and, if required, acid soluble and dissolved iron(II) and iron(III).

The method is applicable to the determination of iron concentrations between 0,01 and 5 mg/l. Iron concentrations above 5 mg/l may be determined after suitable dilution of the sample.

2 Reference

ISO 5667/1, *Water quality — Sampling — Part 1: Guidance on the design of sampling programmes*.

3 Principle¹⁾

Addition of 1,10-phenanthroline solution to a test portion and photometric measurement of the orange-red complex at a wavelength of about 510 nm.

If determining total iron, total acid soluble iron and total dissolved iron, hydroxylammonium chloride is added to reduce iron(III) to iron(II). If undissolved iron, iron oxides or iron complexes are present, pretreatment is necessary to bring such compounds into solution.

The iron(II)-1,10-phenanthroline complex is stable in the pH range from 2,5 to 9 and the intensity of the colour is proportional to the amount of iron(II) present. The relationship between concentration and absorbance is linear up to a concentration of 5,0 mg of iron per litre. Maximum absorbance occurs at about 510 nm [molar absorption coefficient $11 \times 10^3 \text{ l}/(\text{mol}\cdot\text{cm})$].

4 Reagents

Use only reagents of recognized analytical grade.

The water used shall have as low an iron concentration as possible; a measurable iron concentration in the reagents is permissible provided that the lowest concentration to be determined is at least three times the standard deviation of the predetermined results of blank tests. Deionized water or water distilled from an all-glass apparatus has been found to be suitable.

4.1 Acetate buffer.

Dissolve 40 g of ammonium acetate ($\text{CH}_3\text{COONH}_4$) and 50 ml of glacial acetic acid (CH_3COOH) ($\rho = 1,06 \text{ g/ml}$) in water and dilute to 100 ml with water.

4.2 Di-isopropyl ether [$(\text{CH}_3)_2\text{CH} - \text{O} - \text{CH}(\text{CH}_3)_2$]. ($\rho = 0,72 \text{ g/ml}$), alcohol free, boiling point between 67 and 69 °C.

4.3 Hydrochloric acid solution, $\rho = 1,125 \text{ g/ml}$, $c(\text{HCl}) \approx 7,7 \text{ mol/l}$.

1) For possible sources of interference and methods for their removal, see 7.2.1.2 and clause 10.