

INTERNATIONAL STANDARD

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Water quality — Determination of selenium — Atomic absorption spectrometric method (hydride technique)

*Qualité de l'eau — Dosage du sélénium — Méthode par spectrométrie
d'absorption atomique (technique hydruure)*



Reference number
ISO 9965:1993(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 9965 was prepared by Technical Committee ISO/TC 147, *Water quality*, Sub-Committee SC 2, *Physical, chemical, biochemical methods*.

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Water quality — Determination of selenium — Atomic absorption spectrometric method (hydride technique)

1 Scope

This International Standard specifies a method for the determination of selenium and organically bonded selenium in drinking waters, ground waters and surface waters, in a concentration range of 1 µg/l and 10 µg/l.

Higher concentrations can be determined by a suitable dilution of the water sample.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 5667-1:1980, *Water quality — Sampling — Part 1: Guidance on the design of sampling programmes*.

ISO 5667-2:1991, *Water quality — Sampling — Part 2: Guidance on sampling techniques*.

ISO 5667-3:—¹⁾, *Water quality — Sampling — Part 3: Guidance on the preservation and handling of samples*.

3 Principle

The method is based on the atomic absorption spectrometric measurement of selenium generated by the thermal decomposition of selenium hydride.

Under the conditions of this method, only Se(IV) is quantitatively converted to the hydride. To avoid errors in determination, other oxidation states need to be converted to Se(IV) prior to the determination. Se(IV) is reduced to gaseous selenium dihydride (SeH₂) by reaction with sodium tetrahydroborate in a hydrochloric acid medium.

The absorbance is measured at a wavelength of 196,0 nm.

4 Reagents

During the analysis, use only reagents of recognized analytical grade.

The selenium content of the water and the reagents shall be negligibly low, compared with the lowest concentration to be determined.

4.1 Sulfuric acid, $\rho = 1,84$ g/ml.

4.2 Hydrochloric acid, $\rho = 1,16$ g/ml.

4.3 Hydrogen peroxide, $w(\text{H}_2\text{O}_2) = 30 \%$ (m/m).

4.4 Sodium hydroxide.

4.5 Sodium tetrahydroborate, solution.

Dissolve 1 g of sodium hydroxide (4.4) in about 20 ml of water. Add 3 g of sodium tetrahydroborate (NaBH₄). Dilute to 100 ml with water.

The solution shall be prepared daily.

4.6 Selenium, stock solution, corresponding to 1 000 mg of Se per litre.

Place 1,405 3 g of selenium dioxide in a volumetric flask of nominal capacity 1 000 ml. Add 2 g of sodium hydroxide (4.4) and dissolve in a small quantity of water. Dilute to volume with water.

1) To be published. (Revision of ISO 5667-3:1985)