

INTERNATIONAL STANDARD

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Water quality — Determination of aluminium — Spectrometric method using pyrocatechol violet

Sample Document

*Qualité de l'eau — Dosage de l'aluminium — Méthode par spectrométrie
à l'aide du violet de pyrocatechol*

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Reference number
ISO 10566:1994(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 10566 was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 2, *Physical, chemical, biochemical methods*.

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Introduction

Aluminium occurs in a variety of types of compounds in nature, and can be found in acid, neutral and alkaline solutions. It can also form colloidal polymeric solutions and gels, as well as flocculant precipitates, all based on aquated positive ions or hydroxylated aluminates.

In addition, it can form complexes with organic acids and with ions such as fluoride, chloride and sulfate, most but not all of which are soluble.

Aluminium can also form lattice compounds with oxygen (and hydroxyl species), silicon, and some metals. Although insoluble, some of these compounds, notably the clays, micas and zeolites, can be found as fine suspended particles in rivers. Although they contain aluminium, these insoluble lattice compounds are not usually considered as aluminium compounds in the context of the water cycle.

The method described in this International Standard is restricted to the determination of the aquated cations and other forms of aluminium readily converted to that cationic form by acidification. The pretreatment with nitric acids is identical to that described in other International Standards using spectrometric methods with an electrothermal atomization or inductively coupled plasma procedure (methods of preparation).

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1 Scope

1.1 Type of sample

The method is applicable to the analysis of potable waters, ground waters, and lightly polluted surface and sea waters.

1.2 Substance determined

The method determines filterable (dissolved) and acid-soluble aluminium.

1.3 Range

The method includes low range determination up to 100 µg/l Al with 50 mm cells and high range determination up to 500 µg/l Al with 10 mm cells. The effective range depends on the sensitivity of the spectrometer and can be extended upwards by taking smaller test portions.

1.4 Limit of detection

The limit of detection is 2 µg/l when cells of optical path length 50 mm and a 25 ml test portion are used.

1.5 Sensitivity

An aluminium concentration of 100 µg/l gives an absorbance of about $0,20 \pm 0,05$ optical absorption units, using a 25 ml test portion and cells of optical path length 10 mm.

1.6 Precision

If not specified, the precision of volumes and masses mentioned in this International Standard is ± 1 % of the value.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was 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 edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 5667-3:1994, *Water quality — Sampling — Part 3: Guidance on the preservation and handling of samples*.

3 Principle

For dissolved aluminium, the sample is filtered through membrane filters with 0,45 µm pore size and then acidified with nitric acid to obtain a pH of 1,2 to 1,5.

For acid-soluble aluminium, the untreated sample is acidified with nitric acid to obtain a pH of 1,2 to 1,5, kept for at least 1 h at room temperature to dissolve the aluminium and then filtered.

Aluminium is reacted with pyrocatechol violet at a pH of $5,9 \pm 0,1$ followed by spectrometric measurement of the resulting coloured complex at a wavelength of 580 nm (the blue colour is visible only at high aluminium concentrations).

NOTE 1 For other kinds of determination, e.g. digestions, the sample is pretreated accordingly, using nitric acid at a pH of 1,2 to 1,5 in the final sample.