

# INTERNATIONAL STANDARD

**ISO**  
**10359-2**

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## **Water quality — Determination of fluoride —**

### **Part 2:**

Determination of inorganically bound total  
fluoride after digestion and distillation

*Qualité de l'eau — Dosage des fluorures —*

*Partie 2: Dosage des fluorures totaux liés inorganiquement après digestion  
et distillation*



Reference number  
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## 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 10359-2 was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 2, *Physical, chemical, biochemical methods*.

ISO 10359 consists of the following parts, under the general title *Water quality — Determination of fluoride*:

- *Part 1: Electrochemical probe method for potable and lightly polluted water*
- *Part 2: Determination of inorganically bound total fluoride after digestion and distillation*

Annex A of this part of ISO 10359 is for information only.

## Introduction

Fluoride ions occur in almost all ground and surface waters. Their concentration depends primarily on the hydrogeological conditions and is generally below 1 mg/l. Certain industrial waste waters may also contain fluoride ions in higher concentrations.

The fluoride concentration is also dependant on the type and concentration of cations present at the same time in water, such as  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Al}^{3+}$  or  $\text{Fe}^{3+}$ , which may form sparingly soluble compounds with fluoride ions or complexes of low dissociation grade. In addition, stable boron-fluoride complexes exist. Several different methods are available for determining fluoride and the choice of method depends on the type of problem posed as follows.

- a) Direct measurement using fluoride ion selective electrodes. This method is suitable for the determination of fluoride in drinking and surface water. It is included in ISO 10359-1.
- b) Determination of inorganically bound total fluoride using decomposition, distillation and potentiometric measurement. This method is included in this part of ISO 10359.

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# Water quality — Determination of fluoride —

## Part 2:

## Determination of inorganically bound total fluoride after digestion and distillation

### 1 Scope

#### 1.1 Field of application

This part of ISO 10359 specifies a method for the determination of inorganically bound total fluoride. The method is applicable to waste waters which are highly contaminated inorganically, with a fluoride ion concentration of more than 0,2 mg/l.

#### 1.2 Interferences

Interferences caused by certain cations (see introduction) or boron, which may occur in the determination of fluoride, need to be eliminated by distillation.

### 2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 10359. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 10359 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

Evaporation of the water sample to dryness in an alkaline medium. Fusing of the residue with sodium hydroxide. Separation of the fluoride by steam distillation in the presence of a phosphoric acid/sulfuric acid mixture. Determination of the fluoride concentration in the distillate by means of a fluoride ion-selective electrode (see ISO 10359-1).

### 4 Reagents

During the analysis, use only reagents of recognized analytical grade and only distilled water or water of equivalent purity.

**4.1 Hydrochloric acid** (HCl),  $\rho = 1,12$  g/ml.

**4.2 Phosphoric acid** (H<sub>3</sub>PO<sub>4</sub>),  $\rho = 1,71$  g/ml.

**4.3 Sulfuric acid** (H<sub>2</sub>SO<sub>4</sub>),  $\rho = 1,64$  g/ml; 72,5 % (V/V).

**4.4 Sodium hydroxide** (NaOH), solid.

**4.5 Sodium hydroxide solution**  
 $c(\text{NaOH}) = 5$  mol/l.

Dissolve cautiously 100 g  $\pm$  0,5 g of sodium hydroxide in water, cool and dilute to 500 ml.

**4.6 Methyl red solution.**

Dissolve 0,2 g of the sodium salt of methyl red (C<sub>15</sub>H<sub>14</sub>N<sub>3</sub>NaO<sub>2</sub>) in 100 ml of ethanol.