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**Dentistry — Analysis of fluoride  
concentration in aqueous solutions by  
use of fluoride ion-selective electrode**

*Médecine bucco-dentaire — Analyse de la concentration en fluorure  
dans les solutions aqueuses en utilisant une électrode sélective des  
ions fluorures*



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ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva, Switzerland  
Tel. +41 22 749 01 11  
Fax +41 22 749 09 47  
copyright@iso.org  
www.iso.org

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 106, *Dentistry*, Subcommittee SC 7, *Oral care products*.

## Introduction

Fluoride is used in dentistry primarily for caries prevention. Fluoride is the active ingredient for caries prevention in many dental products such as dentifrices, gels, oral rinses, and fluoride releasing varnishes. The fluoride concentration in these products is an integral part of other standards where the product is intended to be analysed for fluoride content. This document provides methods based on the use of fluoride ion-selective electrode technology for the analysis of the total fluoride content in aqueous samples. The methods describe uses for fluoride ion-selective electrode technology and anticipate that the sample-specific preparations such as digestion, distillation, etc. have been described in the standards specific to product types.



# Dentistry — Analysis of fluoride concentration in aqueous solutions by use of fluoride ion-selective electrode

## 1 Scope

This document specifies test methods for the quantification of fluoride concentrations in dental products including dentifrices, gels, oral rinses, fluoride releasing varnishes, and other fluoride containing products. The methods are based on fluoride ion-selective electrode technology for the analysis of fluoride in aqueous samples derived from dental products.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 78-2, *Chemistry — Layouts for standards — Part 2: Methods of chemical analysis*

ISO 835, *Laboratory glassware — Graduated pipettes*

ISO 1942, *Dentistry — Vocabulary*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 78-2 and ISO 1942 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

## 4 Principle

This test method covers the determination of fluoride concentration in aqueous solutions derived from dental products. The following test methods are presupposed to use fluoride ion-selective electrodes (F-ISE).

The sensing element of the fluoride ion-selective electrode consists of a single crystal of europium (II)-doped lanthanum fluoride,  $\text{LaF}_3$ . When the sensing element is in contact with a solution containing fluoride ions, an electrode potential develops across the sensing element. This potential, which depends on the activity of free fluoride ion in solution  $\{\text{F}^-\}$ , is measured against a constant reference electrode potential with a digital pH/mV meter or ISE (concentration) potentiometer. A potential (E) is developed which is proportional to the logarithm of the activity of the fluoride ion  $\{\text{F}^-\}$  in solution following the Nernst Equation.

$$E = E_0 + S \cdot \log \{\text{F}^-\} \quad (1)$$