International Standard ISO 5666/2

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Water quality — Determination of total mercury by flameless atomic absorption spectrometry — Part 2 : Method after pretreatment with ultraviolet radiation

Qualité de l'eau — Dosage du mercure total par spectrométrie d'absorption atomique sans flamme — Partie 2 : Méthode après minéralisation par irradiation aux rayons ultraviolets

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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 5666/2 was developed by Technical Committee ISO/TC 147, *Water quality*, and was circulated to the member bodies in December 1981.

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

Australia	Germany, F.R.	Romania
Belgium	Hungary	South Africa, Rep. of
Brazil	India	Spain
Canada	Italy	Sweden
Chile	Mexico	Switzerland
Czechoslovakia	Netherlands	United Kingdom
Egypt, Arab Rep. of	New Zealand	USSR
France	Poland	

The member body of the following country expressed disapproval of the document on technical grounds :

Japan

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Water quality — Determination of total mercury by flameless atomic absorption spectrometry — Part 2 : Method after pretreatment with ultraviolet radiation

0 Introduction

This document constitutes the second part of an International Standard specifying methods for the determination of total mercury in water by flameless atomic absorption spectrometry.

Since various types of water may be tested for the presence of mercury, it has been considered preferable to standardize several methods of determination, which, although they are all based on the same instrumental technique (atomic absorption spectrometry), involve, nevertheless, sufficiently important procedural differences so that their respective fields of application differ significantly.

Thus, this part (part 2) specifies a method of determination after pretreatment with ultraviolet radiation and is applicable to drinking water and to water used for food and drink processing.

Part 1 specifies a method of determination after digestion with permanganate-peroxodisulfate and is applicable, in particular, to surface waters and domestic and industrial wastewaters.

Part 3, at present under study, will specify a method of determination after digestion with bromine and will apply to soft waters and brines, to drinking water and to other types of water containing only small amounts of organic matter.

Each of the three parts describes the method in its entirety and can therefore be used independently of the others.

1 Scope and field of application

This part of ISO 5666 specifies a flameless atomic absorption spectrometric method for the determination of total mercury in drinking water and in water used for food and drink processing.

The method permits determination of as little as 0,02 µg of mercury in the test portion used for the analysis. For a test portion of volume 100 ml, the lower limit of determination is 0,2 µg/l.

2 Reference

ISO 5725, *Precision of test methods — Determination of repeatability and reproducibility by inter-laboratory tests.*

3 Principle

Pretreatment of a test portion by exposure to ultraviolet radiation for a period of 10 min, in order to decompose organic matter and organic mercury compounds and to convert all the mercury present to mercury(II).

Reduction of mercury(II) to metallic mercury by tin(II) chloride.

Entrainment of the mercury in a current of gas and determination of the mercury, as the monatomic vapour, by flameless atomic absorption spectrometry at a wavelength of 253,7 nm.

4 Reagents

During the analysis, use only the water (4.1) and reagents of recognized analytical quality, the mercury contents of which are as low as possible[1].

4.1 Demineralized-distilled water, or water of equivalent quality, free from mercury.

4.2 Sulfuric acid, ϱ_{20} = 1,84 g/ml.

4.3 Nitric acid, ϱ_{20} = 1,42 g/ml.

4.4 Hydrochloric acid, ϱ_{20} = 1,19 g/ml.

4.5 Hydrochloric acid, approximately 0,3 mol/l solution.

Dilute 10 ml of the hydrochloric acid (4.4) to 1 litre with water.

4.6 Tin(II) chloride, solution containing 100 g of $SnCl_2.2H_2O$ per litre.

Prepare this solution on the day of use by one of the following two methods :

a) Dissolve 25 g of tin(II) chloride dihydrate in 50 ml of warm hydrochloric acid (4.4). If cloudy, filter and add a small granule of tin to the filtrate. Cool and transfer quantitatively to a 250 ml one mark volumetric flask. Dilute to the mark with water and mix.

1) If the reagents used lead to high results in blank tests, it is necessary to use products of better quality.