



SLOVENSKI STANDARD

SIST EN ISO 7980:2000

01-december-2000

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SIST ISO 7980:1997

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gdY_hfca Yf]g_Ua YlcXUfGC`+- , \$.% , * Ł

Water quality - Determination of calcium and magnesium - Atomic absorption
spectrometric method (ISO 7980:1986)

Wasserbeschaffenheit - Bestimmung von Calcium und Magnesium - Verfahren mittels
Atomabsorptionsspektrometrie (ISO 7980:1986)

Qualité de l'eau - Dosage du calcium et du magnésium - Méthode par spectrométrie
d'absorption atomique (ISO 7980:1986)

Ta slovenski standard je istoveten z: EN ISO 7980:2000

ICS:

13.060.50 Ú!^ã\ æã[â^Á æÁ{ ã}^ Examination of water for
•}[çã chemical substances

SIST EN ISO 7980:2000

en

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 7980

January 2000

ICS 13.060

English version

Water quality - Determination of calcium and magnesium -
Atomic absorption spectrometric method (ISO 7980:1986)

Qualité de l'eau - Dosage du calcium et du magnésium -
Méthode par spectrométrie d'absorption atomique (ISO
7980:1986)

Wasserbeschaffenheit - Bestimmung von Calcium und
Magnesium - Verfahren mittels
Atomabsorptionsspektrometrie (ISO 7980:1986)

This European Standard was approved by CEN on 20 January 2000.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Foreword

The text of the International Standard from Technical Committee ISO/TC 147 "Water quality" of the International Organization for Standardization (ISO) has been taken over as an European Standard by Technical Committee CEN/TC 230 "Water analysis", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2000, and conflicting national standards shall be withdrawn at the latest by July 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 7980:1986 has been approved by CEN as a European Standard without any modification.

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WATER QUALITY
Determination of nitrate
by flow injection
spectrophotometry
with cadmium
reduction
ISO 7980:1986
INTERNATIONAL
STANDARD
FOR
PREVIEW

International Standard



7980

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Water quality — Determination of calcium and magnesium — Atomic absorption spectrometric method

Qualité de l'eau — Dosage du calcium et du magnésium — Méthode par spectrométrie d'absorption atomique

First edition — 1986-05-01

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UDC 543.3 : 543.422 : 546.41 : 546.46

Ref. No. ISO 7980-1986 (E)

Descriptors : water, quality, chemical analysis, determination of content, calcium, magnesium, spectrochemical analysis.

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.

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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 7980 was prepared by Technical Committee ISO/TC 147, *Water quality*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Water quality — Determination of calcium and magnesium — Atomic absorption spectrometric method

1 Scope and field of application

This International Standard specifies a method for the determination of dissolved calcium and magnesium by flame atomic absorption spectrometry. It is intended for the analysis of raw and drinking waters and can be used for waters having a calcium content of up to 50 mg/l and a magnesium content of up to 5 mg/l. For samples containing higher concentrations of calcium or magnesium a smaller volume of the sample must be taken for the analysis.

When using the air/acetylene flame and the dilution factor 1 in 10, as described in 6.1, the optimum range is 3 to 50 mg/l for calcium and 0,9 to 5 mg/l for magnesium.

2 Principle

Measurement by flame atomic absorption spectrometry after adding lanthanum chloride (if an air/acetylene flame is used) or caesium chloride (if a nitrous oxide/acetylene flame is used) to reduce interferences. For calcium the absorbance is measured at 422,7 nm and for magnesium at 285,2 nm.

3 Reagents and materials

During the analysis, use only reagents of recognized analytical grade and only distilled water or water of equivalent purity. (Commercially available, ready-made solutions may be used.)

3.1 Hydrochloric acid (HCl), $\rho = 1,18$ g/ml.

3.2 Hydrochloric acid (HCl), 0,1 mol/l.

Dilute 8 ml of hydrochloric acid (3.1) to 1 litre.

3.3 Lanthanum chloride (LaCl₃) solution, containing 20 g of La per litre.

To a 1 litre one-mark volumetric flask add 24 g of lanthanum oxide (La₂O₃) (atomic absorption spectrometry grade). Slowly and cautiously add 50 ml of hydrochloric acid (3.1) while stirring to dissolve the lanthanum oxide. Make up to the mark with water.

3.4 Caesium chloride (CsCl) solution, containing 20 g of Cs per litre.

Dissolve 25 g of caesium chloride in 1 litre of hydrochloric acid (3.2).

3.5 Calcium, stock solution, 1 000 mg/l.

Dry a portion of calcium carbonate (CaCO₃) at 180 °C for 1 h and allow it to cool in a desiccator. Weigh $2,50 \pm 0,01$ g of the dried material and suspend this in 100 ml of water. Add slowly the minimum amount of hydrochloric acid (3.2) necessary to dissolve the calcium carbonate (approximately 250 ml). Boil briefly to expel dissolved carbon dioxide, then cool. Transfer the solution quantitatively to a 1 000 ml one-mark volumetric flask and make up to the mark with hydrochloric acid (3.2).

Store the solution in a polyethylene or polypropylene bottle.

3.6 Magnesium, stock solution, 1 000 mg/l.

Dry a portion of magnesium oxide (MgO) at 180 °C for 1 h. Weigh $1,66 \pm 0,01$ g and dissolve in hydrochloric acid (3.2). Dilute with the same acid to 1 000 ml in a one-mark volumetric flask.

Store the solution in a polyethylene bottle.

3.7 Calcium-magnesium, standard solution corresponding to 20 mg of Ca and 2 mg of Mg per litre.

With pipettes, transfer 20,0 ml of the calcium stock solution (3.5) and 2,0 ml of the magnesium stock solution (3.6) to a 1 000 ml one-mark volumetric flask. Make up to the mark with hydrochloric acid (3.2).

ISO 7980-1986 (E)

4 Apparatus

Usual laboratory equipment, and

Atomic absorption spectrometer, set up and operated according to the manufacturer's instructions, equipped with an appropriate burner for air/acetylene flame or nitrous oxide/acetylene flame and a hollow cathode lamp for calcium and magnesium determination.

NOTES

1 Clean all glassware with warm, dilute (1 + 1) hydrochloric acid and rinse with water.

2 The choice of flame to be used is left to the user of this International Standard. It has been claimed that the nitrous oxide/acetylene flame is to be preferred for samples with a high content of dissolved matter, or which contain phosphate, sulfate, aluminium or silica. In general the nitrous oxide/acetylene flame should be used if the composition of the sample is complex or unknown.

5 Sampling

Samples shall be collected in clean polyethylene or polypropylene bottles. As soon as possible after collection, acidify them with 8 ml of hydrochloric acid (3.1) per litre of sample, in order to reduce their pH value and prevent precipitation of calcium carbonate. Samples shall be analysed as soon as possible after collection.

6 Procedure

6.1 Preparation of test solution for presentation to instrument

Samples containing particulate material after acidification shall be filtered to prevent clogging of the nebulizer and burner systems.

Prepare a relevant number of 100 ml one-mark volumetric flasks. To each of these add 10 ml of the lanthanum chloride solution (3.3) if an air/acetylene flame is to be used, or 10 ml of the caesium chloride solution (3.4) if a nitrous oxide/acetylene flame is to be used.

With a pipette, add 10,0 ml of the sample, and make up to the mark with hydrochloric acid (3.2).

If the concentrations of calcium or magnesium in the original sample are above the ranges listed in table 2 then an appropriately smaller volume of the sample shall be used.

6.2 Blank test

Carry out a blank test simultaneously with the determination, using the same reagents in the same quantities and following the same procedure, but replacing the volume of the test sample used in 6.1 by an identical volume of water.

6.3 Preparation of the set of calibration solutions

To a series of seven 100 ml one-mark volumetric flasks, add to each either 10 ml of the lanthanum chloride solution (3.3) if an air/acetylene flame is to be used, or 10 ml of the caesium chloride solution (3.4) if a nitrous oxide/acetylene flame is to be used.

With the aid of pipettes add 0; 2,5; 5; 10; 15; 20; and 25 ml of the calcium-magnesium standard solution (3.7) and make up to the mark with hydrochloric acid (3.2).

The calibration solutions will have the concentrations shown in table 1.

Table 1 — Concentration of calibration solutions

Volume of Ca-Mg standard solution (ml)	0	2,5	5	10	15	20	25
Calcium content (mg/l)	0	0,5	1	2	3	4	5
Magnesium content (mg/l)	0	0,05	0,1	0,2	0,3	0,4	0,5

NOTE — These concentrations apply when using the air/acetylene flame. When the nitrous oxide/acetylene flame is used, it may be appropriate to use other concentrations.

Table 2 — Wavelength and optimum concentration ranges

		Calcium	Magnesium
Wavelength (nm)		422,7	285,2
Analyte content (mg/l)	Air/acetylene flame	3 to 50	0,9 to 5
	Nitrous oxide/acetylene flame	2 to 20	0,2 to 2