
Kakovost vode - Določevanje raztopljenega bromata - Metoda z ionsko kromatografijo (ISO 15061:2001)

Water quality - Determination of dissolved bromate - Method by liquid chromatography of ions (ISO 15061:2001)

Wasserbeschaffenheit - Bestimmung von gelöstem Bromat - Verfahren mittels Ionenchromatographie (ISO 15061:2001)

Qualité de l'eau - Dosage du bromate dissous - Méthode par chromatographie des ions en phase liquide (ISO 15061:2001)

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Preiskava vode na kemikalije
snovi

Examination of water for
chemical substances

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 15061

July 2001

ICS 13.060.01

English version

**Water quality - Determination of dissolved bromate - Method by
liquid chromatography of ions (ISO 15061:2001)**

Qualité de l'eau - Dosage du bromate dissous - Méthode
par chromatographie des ions en phase liquide (ISO
15061:2001)

Wasserbeschaffenheit - Bestimmung von gelöstem Bromat
- Verfahren mittels Ionenchromatographie (ISO
15061:2001)

This European Standard was approved by CEN on 28 June 2001.

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 Management Centre 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 Management Centre 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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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

EN ISO 15061:2001 (E)**Foreword**

The text of the International Standard ISO 15061:2001 has been prepared by Technical Committee ISO/TC 147 "Water quality" in collaboration with 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 January 2002, and conflicting national standards shall be withdrawn at the latest by January 2002.

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.

NOTE FROM CMC: The foreword is susceptible to be amended on reception of the German language version. The confirmed or amended foreword, and when appropriate, the normative annex ZA for the references to international publications with their relevant European publications will be circulated with the German version.

Endorsement notice

The text of the International Standard ISO 15061:2001 was approved by CEN as a European Standard without any modification.

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INTERNATIONAL STANDARD

**ISO
15061**

First edition
2001-07-01

Water quality — Determination of dissolved bromate — Method by liquid chromatography of ions

*Qualité de l'eau — Dosage du bromate dissous — Méthode par
chromatographie des ions en phase liquide*

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ISO 15061:2001(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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 15061 was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 2, *Physical, chemical and biochemical methods*.

Annexes A, B, C, D and E of this International Standard are for information only.

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Introduction

The essential minimum requirements of an ion chromatographic system applied within the scope of this International Standard for the determination of dissolved bromate are given in clause 5.

The diversity of the appropriate and suitable assemblies, and the procedural steps depending on them, permit a general description only.

Further information on the analytical technique can be found in the normative references (clause 2) and the bibliography.

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Water quality — Determination of dissolved bromate — Method by liquid chromatography of ions

1 Scope

This International Standard specifies a method for the determination of dissolved bromate in water (e.g. drinking water, raw water, surface water, partially treated water or swimming pool water).

Appropriate pretreatment of the sample, for example by elimination of chloride, sulfate, metals, preconcentration or dilution, gives a range of applicability of 0,5 µg/l to 1 000 µg/l dissolved bromate.

The working range is restricted by the ion-exchange capacity of any preconcentration columns used and that of the separator column. Dilution of the sample to the working range may be necessary.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 3696:1987, *Water for analytical laboratory use — Specification and test methods*.

ISO 5667-1:1980, *Water quality — Sampling — Part 1: Guidance on the design of sampling programmes*.

ISO 5667-2:1991, *Water quality — Sampling — Part 2: Guidance on sampling techniques*.

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

ISO 8466-1:1990, *Water quality — Calibration and evaluation of analytical methods and estimation of performance characteristics — Part 1: Statistical evaluation of the linear calibration function*.

ISO 8466-2:1993, *Water quality — Calibration and evaluation of analytical methods and estimation of performance characteristics — Part 2: Calibration strategy for non-linear second order calibration functions*.

3 Interferences

3.1 The presence of nitrate, chloride, carbonate and sulfate may affect the capacity of the concentrator column and lead to poor recovery of bromate (9.2.1).

3.2 The presence of chloride, sulfate, carbonate and hydrogen carbonate can cause interference with the determination of bromate (9.2.1). Depending on the column utilized, other ions may interfere; this should be checked.

3.3 Metals present (e.g. barium and silver ions released from sample pretreatment steps) will bind to the resin material of concentrator and separator columns, resulting in a loss of performance. Metal ions may be eliminated with the aid of a metal clean-up column or special exchangers (see Figure 1 and clause 9).

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3.4 The interference of some organic acids with the determination of bromate was checked and found not to be significant to the concentrations tested (annex E).

3.5 Solid particles and organic compounds such as mineral oils, detergents and humic acids shorten the life-time of the concentrator and separator column.

4 Principle

4.1 Sample pretreatment is carried out in order to remove ozone (9.1.3) and solids, and to reduce chloride, sulfate, carbonate, hydrogen carbonate and metals present by use of cation exchangers (9.2).

4.2 Measurement of bromate is made in the range 0,5 µg/l to 1 000 µg/l, with or without preconcentration (10.3).

4.3 Liquid chromatographic separation of bromate is carried out either by means of a separator column or after elution of bromate from a concentrator column, if used. An anion exchange resin is used as the stationary phase, and usually, aqueous solutions of salts of weak mono- and dibasic acids as eluent (see 6.10 and annex A).

4.4 A conductivity detector (CD) with chemical suppression is used. A UV detector ($\lambda = 190 \text{ nm}$ to 205 nm) is suitable to confirm the CD results only.

NOTE When using conductivity detectors it is essential that the eluents have a sufficiently low conductivity. For this reason, conductivity detectors are combined with a suppressor device (cation exchanger) which reduces the conductivity of the eluent and transforms the sample species into their respective acids. UV detection measures absorbance directly.

4.5 Strongly retained ions (e.g. nitrate, phosphate, sulfate) are removed from the separator column, e.g. by flushing the separator column with a more concentrated eluent.

4.6 The concentration of bromate is determined after calibration of the overall procedure.

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5 Essential minimum requirements**a) Preconcentration**

For low bromate concentrations the use of a concentrator column may be required. On-line techniques can be used (see 10.3 and annex C). Ensure that recovery is within 80 % to 120 %.

b) Resolution power of the column

It is essential that the peak resolution R shall not fall below 1,3 (clause 8, Figure 4) between bromate and the nearest peak, which is usually chloride.

c) Method of detection

Measurement of the electrical conductivity (CD) with a chemical suppressor device, and UV if confirmation is required.

d) Applicability of the method: 0,5 µg/l to 1 000 µg/l.**e) Calibration shall be carried out in accordance with ISO 8466-1 or ISO 8466-2 (10.2).****f) Guarantee of analytical quality**

Control is necessary for the validity of the calibration function (10.5). Replicate determinations may be necessary. Use of the method of standard addition may be required when matrix interferences are expected (10.3).