

STN	Kvalita vody Použitie hmotnostnej spektrometrie s indukčne viazanou plazmou (ICP-MS) Časť 2: Stanovenie vybraných prvkov vrátane izotopov uránu (ISO 17294-2: 2023)	STN EN ISO 17294-2 75 7478
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Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS) - Part 2: Determination of selected elements including uranium isotopes (ISO 17294-2:2023)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 01/24

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EN ISO 17294-2

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English Version

Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS) - Part 2: Determination of selected elements including uranium isotopes (ISO 17294-2:2023)

Qualité de l'eau - Application de la spectrométrie de masse avec plasma à couplage inductif (ICP-MS) - Partie 2: Dosage des éléments sélectionnés y compris les isotopes d'uranium (ISO 17294-2:2023)

Wasserbeschaffenheit - Anwendung der induktiv gekoppelten Plasma-Massenspektrometrie (ICP-MS) - Teil 2: Bestimmung von ausgewählten Elementen einschließlich Uran-Isotope (ISO 17294-2:2023)

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN ISO 17294-2:2023 (E)

Contents	Page
European foreword.....	3

European foreword

This document (EN ISO 17294-2:2023) 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of an identical text or by endorsement, at the latest by April 2024, and conflicting national standards shall be withdrawn at the latest by April 2024.

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

This document supersedes EN ISO 17294-2:2016.

Any feedback and questions on this document should be directed to the users' national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

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Endorsement notice

The text of ISO 17294-2:2023 has been approved by CEN as EN ISO 17294-2:2023 without any modification.

**INTERNATIONAL
STANDARD****ISO
17294-2**Third edition
2023-10

**Water quality — Application of
inductively coupled plasma mass
spectrometry (ICP-MS) —****Part 2:
Determination of selected elements
including uranium isotopes***Qualité de l'eau — Application de la spectrométrie de masse avec
plasma à couplage inductif (ICP-MS) —**Partie 2: Dosage des éléments sélectionnés y compris les isotopes
d'uranium*Reference number
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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	2
3 Terms, definitions and symbols	3
3.1 Terms and definitions.....	3
3.2 Symbols.....	6
4 Principle	7
5 Interferences	7
5.1 General.....	7
5.2 Spectral interferences.....	9
5.2.1 General.....	9
5.2.2 Isobaric elemental.....	9
5.2.3 Polyatomic interferences.....	9
5.3 Non-spectral interferences.....	10
6 Reagents	11
7 Apparatus	14
8 Sampling	15
9 Sample pre-treatment	16
9.1 Determination of the mass concentration of dissolved elements without digestion.....	16
9.2 Determination of the total mass concentration after digestion.....	16
10 Procedure	17
10.1 General.....	17
10.2 Calibration of the ICP-MS system.....	17
10.3 Measurement of the matrix solution for evaluation of the correction factors.....	17
10.4 Measurement of the samples.....	18
11 Calculation	18
12 Test report	18
Annex A (normative) Determination of the mass concentration of uranium isotopes	20
Annex B (informative) Description of the matrices of the samples used for the interlaboratory trial	29
Annex C (informative) Performance data	32
Bibliography	35

ISO 17294-2:2023(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.

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 document 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).

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This document was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 2, *Physical, chemical and biochemical methods*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 230, *Water analysis*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 17294-2:2016), which has been technically revised.

The main changes are as follows:

- with the incorporation of mercury in the previous edition, mercury has now been excluded as a hydrolysable and has now become a non-hydrolysable element because it was not in line with the other existing standards for the determination of mercury;
- the addition of a modifier has been clarified;
- titanium has been added to the scope.

A list of all parts in the ISO 17294 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Water quality — Application of inductively coupled plasma mass spectrometry (ICP-MS) —

Part 2: Determination of selected elements including uranium isotopes

WARNING — Persons using this document should be familiar with normal laboratory practice. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices.

IMPORTANT — It is absolutely essential that tests, conducted in accordance with this document, be carried out by suitably qualified staff.

1 Scope

This document specifies a method for the determination of the elements aluminium, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, caesium, calcium, cerium, chromium, cobalt, copper, dysprosium, erbium, gadolinium, gallium, germanium, gold, hafnium, holmium, indium, iridium, iron, lanthanum, lead, lithium, lutetium, magnesium, manganese, mercury, molybdenum, neodymium, nickel, palladium, phosphorus, platinum, potassium, praseodymium, rubidium, rhenium, rhodium, ruthenium, samarium, scandium, selenium, silver, sodium, strontium, terbium, tellurium, thorium, thallium, thulium, tin, titanium, tungsten, uranium and its isotopes, vanadium, yttrium, ytterbium, zinc and zirconium in water (e.g. drinking water, surface water, ground water, waste water and eluates).

Taking into account the specific and additionally occurring interferences, these elements can be determined in water and digests of water and sludge (e.g. digests of water as described in ISO 15587-1 or ISO 15587-2).

The working range depends on the matrix and the interferences encountered. In drinking water and relatively unpolluted waters, the limit of quantification (L_{0Q}) lies between 0,002 µg/l and 1,0 µg/l for most elements (see [Table 1](#)). The working range typically covers concentrations between several ng/l and mg/l depending on the element and specified requirements.

The quantification limits of most elements are affected by blank contamination and depend predominantly on the laboratory air-handling facilities available on the purity of reagents and the cleanliness of glassware.

The lower limit of quantification is higher in cases where the determination suffers from interferences (see [Clause 5](#)) or memory effects (see ISO 17294-1).

Elements other than those mentioned in the scope can also be determined according to this document provided that the user of the document is able to validate the method appropriately (e.g. interferences, sensitivity, repeatability, recovery).

ISO 17294-2:2023(E)

Table 1 — Lower limits of quantification for unpolluted water

Element	Isotope often used	L_{0Q}^a µg/l	Element	Isotope often used	L_{0Q}^a µg/l	Element	Isotope often used	L_{0Q}^a µg/l				
Ag	¹⁰⁷ Ag	0,5	Hf	¹⁷⁸ Hf	0,1	Ru	¹⁰² Ru	0,1				
	¹⁰⁹ Ag	0,5	Hg	²⁰² Hg	0,05	Sb	¹²¹ Sb	0,2				
Al	²⁷ Al	1		²⁰¹ Hg	0,1		¹²³ Sb	0,2				
As	⁷⁵ As ^c	0,1	Ho	¹⁶⁵ Ho	0,1	Sc	⁴⁵ Sc	5				
Au	¹⁹⁷ Au	0,5	In	¹¹⁵ In	0,1	Se	⁷⁷ Se ^c	1				
B	¹⁰ B	1	Ir	¹⁹³ Ir	0,1		⁷⁸ Se ^c	0,1				
	¹¹ B	1	K	³⁹ KC	5		⁸² Se	1				
Ba	¹³⁷ Ba	3	La	¹³⁹ La	0,1	Sm	¹⁴⁷ Sm	0,1				
	¹³⁸ Ba	0,5	Li	⁶ Li	10	Sn	¹¹⁸ Sn	1				
Be	⁹ Be	0,1		⁷ Li	1		¹²⁰ Sn	1				
Bi	²⁰⁹ Bi	0,5	Lu	¹⁷⁵ Lu	0,1	Sr	⁸⁶ Sr	0,5				
Ca	⁴³ Ca	100	Mg	²⁴ Mg	1		⁸⁸ Sr	0,3				
	⁴⁴ Ca	50		²⁵ Mg	10	Tb	¹⁵⁹ Tb	0,1				
	⁴⁰ Ca	10	Mn	⁵⁵ Mn	0,1	Te	¹²⁶ Te	2				
Cd	¹¹¹ Cd	0,1	Mo	⁹⁵ Mo	0,5	Th	²³² Th	0,1				
	¹¹⁴ Cd	0,5		⁹⁸ Mo	0,3	Tl	²⁰³ Tl	0,2				
Ce	¹⁴⁰ Ce	0,1	Na	²³ Na	10		Ti	²⁰⁵ Tl	0,1			
						Nd		¹⁴⁶ Nd	0,1	Ti	⁴⁷ Ti	10
											⁴⁸ Ti	1
											⁴⁹ Ti	10
Co	⁵⁹ Co	0,2	Ni	⁵⁸ Ni	0,1	Tm	¹⁶⁹ Tm	0,1				
Cr	⁵² Cr ^c	0,1		⁶⁰ Ni	0,1	U	²³⁸ U	0,1				
	⁵³ Cr	5	P	³¹ P	5		²³⁵ U	1,10 ⁻⁴				
Cs	¹³³ Cs	0,1	Pb	²⁰⁶ Pb ^b	0,2		V	²³⁴ U	1,10 ⁻⁵			
Cu	⁶³ Cu	0,1		²⁰⁷ Pb ^b	0,2	⁵¹ V ^c		0,1				
	⁶⁵ Cu	0,1		²⁰⁸ Pb ^b	0,1	W	¹⁸² W	0,3				
Dy	¹⁶³ Dy	0,1	Pd	¹⁰⁸ Pd	0,5		¹⁸⁴ W	0,3				
Er	¹⁶⁶ Er	0,1	Pr	¹⁴¹ Pr	0,1	Y	⁸⁹ Y	0,1				
Fe	⁵⁶ Fe ^c	5	Pt	¹⁹⁵ Pt	0,5	Yb	¹⁷² Yb	0,2				
Ga	⁶⁹ Ga	0,3	Rb	⁸⁵ Rb	0,1		¹⁷⁴ Yb	0,2				
	⁷¹ Ga	0,3	Re	¹⁸⁵ Re	0,1	Zn	⁶⁴ Zn	1				
Gd	¹⁵⁷ Gd	0,1		¹⁸⁷ Re	0,1		⁶⁶ Zn	1				
	¹⁵⁸ Gd	0,1	Rh	¹⁰³ Rh	0,1		⁶⁸ Zn	1				
Ge	⁷⁴ Ge	0,3	Ru	¹⁰¹ Ru	0,2	Zr	⁹⁰ Zr	0,2				

^a Depending on the instrumentation, significantly lower limits can be achieved.

^b Lead (Pb) is reported as the sum of the signal intensities of ²⁰⁶Pb, ²⁰⁷Pb and ²⁰⁸Pb.

^c These limits are achieved by the use of a collision/reaction cell.

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 5667-1, *Water quality — Sampling — Part 1: Guidance on the design of sampling programmes and sampling techniques*

ISO 5667-3, *Water quality — Sampling — Part 3: Preservation and handling of water samples*

ISO 8466-1, *Water quality — Calibration and evaluation of analytical methods — Part 1: Linear calibration function*

ISO 15587-1, *Water quality — Digestion for the determination of selected elements in water — Part 1: Aqua regia digestion*

ISO 15587-2, *Water quality — Digestion for the determination of selected elements in water — Part 2: Nitric acid digestion*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

ISO 17294-1:2004, *Water quality — Application of inductively coupled plasma mass spectrometry (ICP-MS) — Part 1: General guidelines*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN