SLOVENSKI STANDARD
SIST EN ISO 17294-2:2024

01-februar-2024

Nadomešča:
SIST EN ISO 17294-2:2017

Kakovost vode - Uporaba masne spektrometrije z induktivno sklopljeno plazmo (ICP-MS) - 2. del: Določevanje izbranih elementov, vključno z izotopi urana (ISO 17294-2:2023)

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

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)

Ta slovenski standard je istoveten z: **EN ISO 17294-2:2023**

ICS:

13.060.50	Preiskava vode na kemične snovi	Examination of water for chemical substances

SIST EN ISO 17294-2:2024 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

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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)

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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 CEN-CENELEC Management Centre has the same status as the official versions.

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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

Ref. No. EN ISO 17294-2:2023 E

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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of an identical text or by endorsement, at the latest by April 2024, and conflicting national standards shall be withdrawn at the latest by April 2024.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.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

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

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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 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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For an explanation of 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 www.iso.org/iso/foreword.html.

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_{OQ}) 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).

Table 1 — Lower limits of quantification for unpolluted water

Element	Isotope often used	L_{OQ} [a] µg/l	Element	Isotope often used	L_{OQ} [a] µg/l	Element	Isotope often used	L_{OQ} [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
				^{201}Hg	0,1			
Al	^{27}Al	1	Ho	^{165}Ho	0,1		^{123}Sb	0,2
As	^{75}As[c]	0,1	In	^{115}In	0,1	Sc	^{45}Sc	5
Au	^{197}Au	0,5	Ir	^{193}Ir	0,1	Se	^{77}Se[c]	1
B	^{10}B	1	K	^{39}KC	5		^{78}Se[c]	0,1
	^{11}B	1	La	^{139}La	0,1		^{82}Se	1
Ba	^{137}Ba	3	Li	^{6}Li	10	Sm	^{147}Sm	0,1
	^{138}Ba	0,5		^{7}Li	1	Sn	^{118}Sn	1
Be	^{9}Be	0,1	Lu	^{175}Lu	0,1		^{120}Sn	1
Bi	^{209}Bi	0,5	Mg	^{24}Mg	1	Sr	^{86}Sr	0,5
Ca	^{43}Ca	100		^{25}Mg	10		^{88}Sr	0,3
	^{44}Ca	50	Mn	^{55}Mn	0,1	Tb	^{159}Tb	0,1
	^{40}Ca	10	Mo	^{95}Mo	0,5	Te	^{126}Te	2
Cd	^{111}Cd	0,1		^{98}Mo	0,3	Th	^{232}Th	0,1
	^{114}Cd	0,5	Na	^{23}Na	10	Tl	^{203}Tl	0,2
Ce	^{140}Ce	0,1	Nd	^{146}Nd	0,1		^{205}Tl	0,1
						Ti	^{47}Ti	10
							^{48}Ti	1
							^{49}Ti	10
Co	^{59}Co	0,2	Ni	^{58}Ni[c]	0,1	Tm	^{169}Tm	0,1
Cr	^{52}Cr[c]	0,1		^{60}Ni[c]	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		^{234}U	$1,10^{-5}$
Cu	^{63}Cu	0,1		^{207}Pb[b]	0,2	V	^{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 ^{206}Pb, ^{207}Pb and ^{208}Pb.

[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.

