ICS 13.060.50 SLOVENSKÁ TECHNICKÁ NORMA Február 2017

STN	**Kvalita vody. Použitie hmotnostnej spektrometrie s indukčne viazanou plazmou (ICP-MS). Časť 2: Stanovenie vybraných prvkov vrátane izotopov uránu (ISO 17294-2: 2016).**	**STN EN ISO 17294-2** 75 7478

Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS) - Part 2: Determination of selected elements including uranium isotopes (ISO 17294-2:2016)

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. 01/17

Obsahuje: EN ISO 17294-2:2016, ISO 17294-2:2016

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 17294-2

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ICS 13.060.50

Supersedes EN ISO 17294-2:2004

English Version

Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS) - Part 2: Determination of selected elements including uranium isotopes (ISO 17294-2:2016)

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 17294-2:2016)

Wasserbeschaffenheit - Anwendung der induktiv gekoppelten Plasma-Massenspektrometrie (ICP-MS) - Teil 2: Bestimmung von ausgewählten Elementen einschließlich Uran-Isotope (ISO 17294-2:2016)

This European Standard was approved by CEN on 28 February 2016.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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European foreword

This document (EN ISO 17294-2:2016) 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of an identical text or by endorsement, at the latest by February 2017, and conflicting national standards shall be withdrawn at the latest by February 2017.

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

This document supersedes EN ISO 17294-2:2004.

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Endorsement notice

The text of ISO 17294-2:2016 has been approved by CEN as EN ISO 17294-2:2016 without any modification.

INTERNATIONAL STANDARD

ISO 17294-2

Second edition
2016-07-15

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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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 documents 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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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: www.iso.org/iso/foreword.html

The committee responsible for this document is ISO/TC 147, *Water quality*, Subcommittee SC 2, *Physical, chemical and biochemical methods*.

This second edition cancels and replaces the first edition (ISO 17294-2:2003), which has been technically revised.

ISO 17294 consists of the following parts, under the general title *Water quality — Application of inductively coupled plasma mass spectrometry (ICP-MS)*:

— *Part 1: General guidelines*

— *Part 2: Determination of selected elements including uranium isotopes*

Introduction

When applying this part of ISO 17294, it is necessary in each case, depending on the range to be tested, to determine if and to what extent additional conditions are to be established.

INTERNATIONAL STANDARD ISO 17294-2:2016(E)

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

Part 2:
Determination of selected elements including uranium isotopes

WARNING — Persons using this part of ISO 17294 should be familiar with normal laboratory practice. This part of ISO 17294 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 and to ensure compliance with any national regulatory conditions.

IMPORTANT — It is absolutely essential that tests, conducted in accordance with this part of ISO 17294, be carried out by suitably qualified staff.

1 Scope

This part of ISO 17294 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, tungsten, uranium and its isotopes, vanadium, yttrium, ytterbium, zinc and zirconium in water (for example, drinking water, surface water, ground water, waste water and eluates).

Taking into account the specific and additionally occurring interferences, these elements can also be determined in digests of water, sludges and sediments (for example, 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 (xLQ) 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 pg/l and mg/l depending on the element and pre-defined 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 17294-1:2004, 8.2).

Table 1 — Lower limits of quantification (*x*LQ) for unpolluted water

Element	Isotope often used	Limit of quantification[a] µg/l	Element	Isotope often used	Limit of quantification[a] µg/l	Element	Isotope often used	Limit of quantification[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	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}K[c]	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
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	10^{-4}
Cs	^{133}Cs	0,1	Pb	^{206}Pb[b]	0,2		^{234}U	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] In order to avoid incorrect results due to the varying isotop ratios in the environment, the signal intensities of ^{206}Pb, ^{207}Pb and ^{208}Pb shall be added.

[c] In order to reach these limits, depending on interferences, the use of a collision/reaction cell is recommended

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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 and estimation of performance characteristics — Part 1: Statistical evaluation of the 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 17294-1:2004, *Water quality — Application of inductively coupled plasma mass spectrometry (ICP-MS) — Part 1: General guidelines*