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**Kakovost vode - Določevanje 33 elementov z atomsko emisijsko spektroskopijo z induktivno sklopljeno plazmo (ISO 11885:1996)**

Water quality - Determination of 33 elements by inductively coupled plasma atomic emission spectroscopy (ISO 11885:1996)

Wasserbeschaffenheit - Bestimmung von 33 Elementen durch induktiv gekoppelte Plasma-Atom-Emissionsspektrometrie (ISO 11885:1996)

Qualité de l'eau - Dosage de 33 éléments par spectroscopie d'émission atomique avec plasma couplé par induction (ISO 11885:1996)

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**Ta slovenski standard je istoveten z: EN ISO 11885:1997**

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**ICS:**

13.060.50	Preiskava vode na kemične snovi	Examination of water for chemical substances
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**SIST EN ISO 11885:1998****en**

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EUROPEAN STANDARD  
 NORME EUROPÉENNE  
 EUROPÄISCHE NORM

**EN ISO 11885**

November 1997

ICS 13.060.01

Descriptors: see ISO document

English version

**Water quality - Determination of 33 elements by inductively  
 coupled plasma atomic emission spectroscopy (ISO  
 11885:1996)**

Qualité de l'eau - Dosage de 33 éléments par  
 spectroscopie d'émission atomique avec plasma couplé par  
 induction (ISO 11885:1996)

Wasserbeschaffenheit - Bestimmung von 33 Elementen  
 durch induktiv gekoppelte Plasma-Atom-  
 Emissionsspektrometrie (ISO 11885:1996)

This European Standard was approved by CEN on 30 October 1997.

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.



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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EN ISO 11885:1997

## 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 month of May 1998, and conflicting national standards shall be withdrawn at the latest by May 1998.

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 11885:1996 has been approved by CEN as a European Standard without any modification.

NOTE: Normative references to International Standards are listed in annex ZA (normative).

[SIST EN ISO 11885:1998  
https://standards.iteh.ai/catalog/standards/sist/06d6be8f-c0d7-4f1b-9a4a-24fa611cbd3/sist-en-iso-11885-1998](https://standards.iteh.ai/catalog/standards/sist/06d6be8f-c0d7-4f1b-9a4a-24fa611cbd3/sist-en-iso-11885-1998)

**Annex ZA (normative)**  
**Normative references to international publications**  
**with their relevant European publications**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN</u>	<u>Year</u>
ISO 5667-3	1994	Water quality - Sampling - Part 3: Guidance on the preservation and handling of samples	EN ISO 5667-3	1995

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**Water quality — Determination of  
33 elements by inductively coupled  
plasma atomic emission spectroscopy**

*Qualité de l'eau — Dosage de 33 éléments par spectroscopie  
d'émission atomique avec plasma couplé par induction*

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Reference number  
ISO 11885:1996(E)

**ISO 11885:1996(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.

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.

International Standard ISO 11885 was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 2, *Physical, chemical and biochemical methods*.

Annex A of this International Standard is for information only.

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# Water quality — Determination of 33 elements by inductively coupled plasma atomic emission spectroscopy

## 1 Scope

### 1.1 Field of application

This International Standard specifies a method for the determination of dissolved, particulate or total elements in raw, potable and waste water for the following elements:

aluminium, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, lithium, magnesium, manganese, molybdenum, nickel, phosphorus, potassium, selenium, silicon, silver, sodium, strontium, sulfur, tin, titanium, tungsten, vanadium, zinc, zirconium.

Table 1 lists these elements along with the recommended wavelengths and typical estimated instrumental detection limits using conventional pneumatic nebulization. Actual working detection limits are sample-dependent and as the sample matrix varies, these concentrations can also vary.

Because of the differences between various makes and models of satisfactory instruments, no detailed instrumental operating instructions can be provided. Instead, the analyst will need to refer to the instructions provided by the manufacturer of the particular instrument.

### 1.2 Interferences

Table 2 lists elements and the most important spectral interferences at the wavelengths recommended for analysis.

Several types of interference effects can contribute to inaccuracies in the determination of trace elements. They can be summarized as follows.

a) Spectral interferences, categorized as:

- 1) overlap of a spectral line from another element; these effects can be compensated by utilizing computer correction of the raw data;
- 2) unresolved overlap of molecular band spectra; these effects can possibly be overcome by selection of an alternative wavelength.

If the appropriate equipment is available, wavelength scanning can be performed to detect potential spectral interferences.

b) Background influences, categorized as:

- 2) background contribution from continuous or recombination phenomena;
- 3) background contribution from stray light from the line emission of elements in high concentration.

The effect of background interferences can usually be compensated by background correction adjacent to the analyte line.

Table 1 — Recommended wavelengths and typical detection limits

Element	Wavelength nm	Limit of detection mg/l	Element	Wavelength nm	Limit of detection mg/l
Ag	328,068	0,02	Mo	202,030	0,03
	338,289	0,02		204,598	0,05
Al	308,215	0,1	Na	589,592	0,1
	396,152	0,1		588,995	0,02
	167,08	0,04		330,237	0,02
As	193,696	0,1	Ni	231,604	
	197,197	0,1			
	189,042	0,08	P	178,287	0,5
B	208,959	0,005		213,618	0,1
	249,678	0,006		214,914	0,1
	247,773	0,01		177,428	0,5
			Pb	220,353	0,2
Ba	233,527	0,004		283,306	0,07
	455,403	0,002	S	182,036	0,5
	493,409	0,003		180,669	0,5
	313,042	0,002	Sb	206,833	0,1
	234,861	0,005		217,581	0,1
	313,107		Se	196,026	0,1
Bi	223,061	0,04		203,985	0,1
	306,772	0,08	Si	251,611	0,02
Ca	315,887	0,1	S	212,412	0,02
	317,933	0,01		212,412	0,02
	393,366	0,002		288,158	0,03
Cd	214,438	0,01	Sn	235,848	0,1
	226,502	0,01		189,980	0,1
	228,802	0,01	Sr	407,771	0,0005
		421,552		0,01	
		460,733		0,1	
Co	228,616	0,01	Ti	334,941	0,005
				336,121	0,01
				337,280	0,01
				368,520	0,01
Cu	324,754	0,01	V	290,882	0,01
	327,396	0,01		292,402	0,01
Fe	259,940	0,02		310,230	0,01
	238,20			311,071	0,01
K	766,490		W	207,911	0,03
	769,90	2		209,860	0,06
Li	460,286	0,9		239,709	0,06
	670,784	0,002		222,589	0,06
				202,998	0,06
Mg	279,079	0,03	Zn	206,191	0,01
	279,553	0,0005		213,856	0,005
	285,213	0,001	Zr	343,823	0,01
		354,262		0,05	
		339,198			
Mn	257,610	0,002			
	293,306	0,02			

Table 2 — Spectral interferences

Element	Wavelength nm	Interfering elements	Element	Wavelength nm	Interfering elements
Ag	328,068 338,289	Cr	Mo	202,030 204,598	Al, Fe
Al	308,215 396,152 167,08	Mn, V, Fe Mo, Cu Fe	Na	589,592 588,995 330,237	Ar
As	193,696 197,197 189,042	Fe, Al Fe, Al Al	Ni	231,604	Co
B	208,959 249,678 247,773	Al, Mo Fe, Cr Fe	P	178,287 213,618 214,914 177,428	I Cu, Fe, Mo, Zn Cu, Al, Mg Cu
Ba	233,527 455,403 493,409 313,042 234,861 313,107	Fe, V  V Fe	Pb	220,353 283,306	Al, Co, Ti
Bi	223,061 306,772	Cu Fe, V	Se	196,026 203,985	Cr, Mo Ca
Ca	315,887 317,933 393,366	Co Fe, V	Si	251,611 212,412 288,158	Cr, Mg, Co, Mn
Cd	214,438 226,502 228,802	Fe Fe As, Co	Sn	235,848 189,980	Mo, Co
Co	228,616	Ti	Sr	407,771 421,552 460,733	
Cr	205,552 267,716 283,563 284,325	Fe, Mo Mn, V Fe, Mo Fe	Ti	334,941 336,121 337,280 368,520	Ca, Cr, Si
Cu	324,754 327,396	Ti, Fe	V	290,882 292,402 310,230 311,071	Co, Cr Fe, Mo Fe, Mo, Cr
Fe	259,940 238,20	Co	W	207,911 209,860 239,709 222,589 202,998	Fe, Mn, Ti, Cr
K	766,490 769,90	Mg, Ar	Zn	206,191 213,856	Cr Cu, Ni, Fe
Li	460,286 670,784	Fe	Zr	343,823 354,262 339,198	
Mg	279,079 279,553 285,213	Fe			
Mn	257,610 293,306	Fe, Mo, Cr Al, Fe			