

HJ

INDUSTRY STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

HJ 1193-2021

**Water quality Determination of indium Graphite furnace atomic
absorption spectrophotometry**

水质 铟的测定 石墨炉原子吸收分光光度法

(English Translation)

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Table of Contents

Foreword
1 Scope
2 Normative references
3 Terms and Definitions
4 Principles of the method
5 Interference and cancellation
6 Reagents and materials
7 Instruments and equipment
8 Samples
9 Analysis steps
10 Result calculation and representation
11 Accuracy
12 Quality Assurance and Quality Control
13 Waste Disposal
14 Notes
Appendix A (Informative Appendix) Standard Addition
Appendix B (Informative Appendix) Microwave Digestion

1 Scope of application

This standard specifies the graphite furnace atomic absorption spectrophotometry for the determination of indium in water.

This standard applies to the determination of indium in surface water, groundwater and industrial wastewater.

When the injection volume was 20 μl , the detection limit of the method was 2 $\mu\text{g/L}$, and the lower limit of determination was 8 $\mu\text{g/L}$.

2 Normative references

This standard refers to the following documents or clauses thereof. For dated references, only the dated version applies to this standard.

For undated references, the latest edition (including all amendments) applies to this standard.

HJ/T 91 Technical Specification for Surface Water and Sewage Monitoring HJ 91.1
Technical Specification for Wastewater Monitoring HJ 164 Technical Specification for
Groundwater Environmental Monitoring HJ 677 Digestion of Total Metals in Water Quality
Nitric Acid Digestion Method HJ 678 Microwave digestion method for the digestion of total
metals in water quality

3 Terms and Definitions

The following terms and definitions apply to this standard.

soluble indium

Determination of indium in unacidified samples after filtration through a 0.45 μm filter.

total indium quantity of indium Determination of indium after digestion of unfiltered samples.

4 Principles of the method

After the sample is filtered or digested, it is injected into the graphite furnace atomizer, and after drying, ashing and atomization, the indium ground state atomic vapor is formed.

The characteristic spectral line emitted by the heart cathode lamp or other light source produces selective absorption, and its absorbance is proportional to the concentration of indium within a certain range.

5 Interference and cancellation

5.1

Ag, Al, As, B, Ba, Be, Bi, Cd, Co, Cr, Cu, Mn, Mo, Ni, Determination of Pb, Se, Sr, Ti, Tl, V, Zn, K, Na, Mg, Ca, Fe below 500 mg/L and Cl-pair below 10000 mg/L Results were not significantly affected.

5.2

When the interference of the sample matrix is serious, the standard addition method can be used for determination, see Appendix A.

6 Reagents and Materials

Unless otherwise specified, analytical reagents that meet national standards are used in the analysis, and the experimental water is distilled or deionized water.

6.1

Nitric acid (HNO_3). $\rho=1.42$ g/ml.

6.2

Palladium nitrate $[\text{Pd}(\text{NO}_3)_2 \cdot 2\text{H}_2\text{O}]$.

6.3

Magnesium nitrate $[\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}]$. excellent grade.

6.4

Indium. Spectroscopically pure.

6.5

Nitric acid solution. $\phi=50\%$.

Nitric acid (6.1) and water are mixed in a volume ratio of 1.1.

6.6

Nitric acid solution. $\phi=1\%$.

Nitric acid (6.1) and water are mixed in a volume ratio of 1.99.

6.7

Matrix modifier. mixed solution of palladium nitrate-magnesium nitrate.

Weigh 0.26 g of palladium nitrate (6.2), add 2 ml of nitric acid (6.1) and dissolve in a small amount of water. Weigh 0.11 g of magnesium nitrate (6.3), use a small amount of Water dissolves. Mix the 2 solutions and make up to 100 ml with water.

6.8

Indium standard stock solution. $\rho(\text{In})=100 \text{ mg/L}$.

Accurately weigh 0.1 g (accurate to 0.0001 g) indium (6.4), add 50 ml of nitric acid solution (6.5), heat to dissolve completely, after cooling Transfer to a 1000 ml volumetric flask, make up to the mark with water, and shake well. Transfer to a polyethylene bottle and seal for 2 years. Commercially available Certified standard solution.

6.9

Indium standard intermediate solution. $\rho(\text{In})=10.0 \text{ mg/L}$.

Pipette 10.00 ml of indium standard stock solution (6.8) into a 100 ml volumetric flask, dilute to the mark with nitric acid solution (6.6), and shake well. change Sealed in polyethylene bottles, it can be stored for 6 months.

6.10

Indium standard solution. $\rho(\text{In})=500 \mu\text{g/L}$.

Pipette 5.00 ml of indium standard intermediate solution (6.9) into a 100 ml volumetric flask, dilute to the mark with nitric acid solution (6.6), and shake well. change Sealed in

polyethylene bottles, it can be stored for 1 month.

6.11

Argon. purity $\geq 99.99\%$.

6.12

Membrane. Aqueous microporous membranes such as cellulose acetate and polyethylene with a pore size of $0.45\ \mu\text{m}$.

7 Instruments and equipment

7.1

Sample bottle. 500 ml, polyethylene or equivalent.

7.2

Graphite furnace atomic absorption spectrophotometer. with background correction function.

7.3

Indium hollow cathode lamps or other light sources.

7.4

Temperature control electric heating plate. with temperature control function.

7.5

Common laboratory instruments and equipment.

8.1 Collection of samples

In accordance with the relevant provisions of HJ/T 91, HJ 91.1 and HJ 164, samples for the determination of soluble indium and total indium should be collected separately.

8.2.1 Soluble Indium

After the sample is collected, filter it with a water-based microporous membrane (6.12), discard the initial filtrate, and collect the required volume of filtrate in the sample bottle (7.1).

Add 1 ml of nitric acid (6.1) per 100 ml of filtrate to acidify, and measure within 1 month.

8.2.2 Total Indium

After sample collection, acidify with 1 ml of nitric acid (6.1) per 100 ml of sample, store in vials (7.1), and measure within 1 month.