

CCS Z 16

HJ

**INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

HJ 807-2016

**Water quality - Determination of molybdenum and titanium by
graphite furnace atomic absorption spectrophotometry**

水质 钼和钛的测定 石墨炉原子吸收分光光度法

(English Translation)

Issued on: June 24, 2016

Implemented on: August 1, 2016

Issued by: Ministry of Ecology and Environment

Table of Contents

Foreword

1 Scope of application

2 Normative reference documents

3 Terms and definitions

3.1 Soluble molybdenum, soluble titanium

3.2 Total molybdenum, total titanium

4 Principle of the method

5 Interference and elimination

5.1 Sample SO₄²⁻

6 Reagents and materials

6.13 Molybdenum standard solution

6.14 Titanium standard solution

37 Instruments and equipment

Foreword

In order to implement the Environmental Protection Law of the People's Republic of China and the Law of the People's Republic of China on the Prevention and Control of Water Pollution, Protection of human health, regulate the determination of molybdenum and titanium in water, the development of this standard.

This standard specifies the graphite furnace atomic absorption spectrophotometric method for the determination of molybdenum and titanium in water.

This standard is the first release.

Appendix A and Appendix B of this standard are informative.

This standard is organized by the Ministry of Environmental Protection Science and Technology Standards Division.

The main drafting of this standard. Nanjing Environmental Monitoring Center Station.

The standard verification unit. Jiangsu Province Environmental Monitoring Center, Jiangsu Province, physical and chemical testing center, Nanjing Water Company water quality Monitoring center, Changzhou City Environmental Monitoring Center, Zhenjiang City Environmental Monitoring Center Station, Taizhou City Environmental Monitoring Center Station.

This standard is approved by the Ministry of Environmental Protection on June 24, 2016.

This standard has been implemented since August 1, 2016.

This standard is explained by the Ministry of Environmental Protection.

Determination of molybdenum and titanium in water - Graphite furnace atomic absorption spectrophotometric method

1 Scope of application

This standard specifies the graphite furnace atomic absorption spectrophotometric method for the determination of molybdenum and titanium in water.

This standard applies to the determination of molybdenum and titanium in surface water, groundwater, domestic sewage and industrial waste water.

The detection limit of molybdenum was 0.6 µg/L, the lower limit of determination was 2.4 µg/L, the detection limit of titanium was 7 µg/L, for 28 µg/L.

2 Normative reference documents

The contents of this standard refer to the following documents or their terms. Any unspecified date of the reference file, the effective version of the appropriate for this standard.

Technical specification for surface water and wastewater monitoring Technical specification for groundwater environmental monitoring

3 Terms and definitions

The following terms and definitions apply to this standard.

3.1 Soluble molybdenum, soluble titanium

Refers to the content of molybdenum or titanium as determined by filtration of a non-acidified sample through a 0.45 µm pore size filter.

3.2 Total molybdenum, total titanium

Refers to the content of molybdenum or titanium as determined by the digestion of the unfiltered sample.

4 Principle of the method

After the sample is filtered or digested, it is injected into a graphite furnace atomizer, dried, ashed and atomized to become a ground state atom Vapor, selective absorption of the

characteristic lines emitted by the elemental hollow cathode lamp or the electrodeless discharge lamp. In a certain concentration range, its absorbance is proportional to the mass concentration of the element.

5.1 Sample SO42

- When the concentration is greater than or equal to 500 mg/L, the negative molybdenum is measured. Adding palladium nitrate - magnesium nitrate Substrate modifier or reference to Appendix A Standard addition method eliminates interference.

5.2 Ag, Al, As, B, Ba, Be, Bi, Cd, Co in the sample containing 10 mg/L or less in the sample, Cr, Cs, Cu, Fe, Hg, Mn, Ni, Pb, Sb, Se, Sn, Sr, Tl, Zn and 1000 mg /Na, Ca and Mg had no significant effect on the measurement.

6 Reagents and materials

Unless otherwise stated, analytical reagents conforming to national standards are used for analysis. Experimental water is a newly prepared deionized Water or water of the same purity.

6.1

nitric acid. $\rho(\text{HNO}_3) = 1.42 \text{ g/ml}$, excellent grade pure.

6.2

hydrochloric acid. $\rho(\text{HCl}) = 1.19 \text{ g/ml}$, excellent grade pure.

26.3 sulfuric acid. $\rho(\text{H}_2\text{SO}_4) = 1.84 \text{ g/ml}$, excellent grade pure.

6.4

Hydrogen peroxide. $\omega(\text{H}_2\text{O}_2) = 30\%$.

6.5

palladium nitrate $[\text{Pd}(\text{NO}_3)_2 \cdot 2\text{H}_2\text{O}]$. excellent grade pure.

6.6

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

6.7

Ammonium heptamolybdate $[(\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}]$. Excellent grade pure.

6.8

Titanium. Spectral purity, mass fraction $\geq 99.99\%$.

6.9

Nitric acid solution. 1 1 (v/v), prepared with (6.1).

6.10

nitric acid solution. 1 99 (v/v), prepared with (6.1).

6.11

hydrochloric acid solution. 1 1 (v/v), prepared with (6.2).

6.12

mixed solution of palladium nitrate-magnesium nitrate.

Weigh 0.5 g (exact to 0.01 g) of palladium nitrate (6.5) and dissolve with 1 ml of nitric acid (6.1). Weigh 0.2 g (exact to 0.01 g) of magnesium nitrate (6.6), dissolved in the appropriate amount of water. The two solutions were mixed and bound to 100 ml with experimental water.

6.13 Molybdenum standard solution

6.13.1

molybdenum standard stock solution. $\rho(\text{Mo}) = 1000 \text{ mg/L}$.

Accurately weigh 1.840 g (accurate to 0.0001 g) ammonium heptamolybdate (6.7), with the appropriate amount of water dissolved after the experiment 1000 ml volumetric flask, diluted with experimental water volume to the mark, shake. Transferred to the polyethylene bottle, refrigerated at 4 °C below can be saved for 2 years. A commercially available standard solution may also be used.

6.13.2

molybdenum standard intermediate liquid. $\rho(\text{Mo}) = 50.0 \text{ mg/L}$.

Remove the 5.00 ml molybdenum standard stock solution (6.13.1) in a 100 ml volumetric flask and dilute with nitric acid solution (6.10) Capacity to mark, shake. Transferred to the polyethylene bottle, frozen at 4 °C can be stored for 1 year.

6.13.3

molybdenum standard use of liquid. $\rho(\text{Mo}) = 500 \text{ } \mu\text{g/L}$.

Remove 1.00 ml of molybdenum standard intermediate (6.13.2) in a 100 ml volumetric flask and dilute with nitric acid solution (6.10) Capacity to mark, shake. Transferred to the polyethylene bottle, refrigerated at 4 °C can be stored for 6 months.

6.14 Titanium standard solution

6.14.1

titanium standard stock solution. $\rho(\text{Ti}) = 1000 \text{ mg/L}$.

Accurately weigh 1 g (accurate to 0.0001 g) titanium (6.8), add.200 ml hydrochloric acid