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HJ

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

HJ 490-2009

Replacing GB/T 11908-1989

**Water quality. Determination of silver. Spectrophotometry with
cation 2B**

水质 银的测定 镉试剂2B分光光度法

(English Translation)

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Foreword

To protect the environment and protect the human body 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 Water Pollution Prevention and Control this standard is developed for the monitoring of health and the regulation of silver in water and wastewater.

This standard specifies the method for determining silver in water and wastewater.

This standard amends the "Measurement of mercury in water, cadmium reagent 2B spectrophotometry" (GB 11908-89), drafted the original standard the unit is China Environmental Monitoring Station, first published in 1989, this is the first revision.

The main revisions are as follows.

-- Increase coexisting ion interference and elimination and adjust and revise the standard

text.

From the date of implementation of this standard, the national environmental protection standard "Water" approved and issued by the former National Environmental Protection Agency on December 25, 1989 Determination of steric silver cadmium reagent 2B spectrophotometry (GB 11908-89) abolished.

This standard was formulated by the Science and Technology Standards Department of the Ministry of Environmental Protection.

This standard is mainly drafted by. China Environmental Monitoring Center.

This standard was approved by the Ministry of Environmental Protection on September 27, 2009.

This standard has been implemented since November 1, 2009.

This standard is explained by the Ministry of Environmental Protection.

Determination of mercury in water quality - Cadmium reagent 2B spectrophotometric method

1 Scope of application

This standard specifies the gamma reagent 2B spectrophotometric method for the determination of silver in water and wastewater.

This standard is applicable to silver in industrial wastewater from the production of surface water and photosensitive materials contaminated by silver, film printing, silver plating, smelting and other industries.

Determination.

When the test volume is 25 ml and the optical path is 10 mm cuvette, the detection limit of this method is 0.01 mg/L, and the lower limit of determination is 0.04 mg/L.

The upper limit of determination is 0.8 mg/L.

2 Principle of the method

In the sodium tetraborate buffer medium in the presence of Triton X-100, the complex ratio of cadmium reagent 2B to silver ions is a 4.1 stable magenta complex that is stable for at least 24 h and the color intensity is proportional to the concentration of silver, the complex the maximum absorption wavelength is 554 nm; cadmium reagent 2B is a brown solid powder, which exists in molecular form in a weak acid or alkaline medium.

The agent is yellow with a maximum absorption wavelength of 445 nm.

3 Reagents and materials

The reagents used in this standard are analyzed using analytical reagents in accordance with national standards, unless otherwise stated.

Deionized water or distilled water.

3.1

Nitric acid (HNO₃). rho = 1.40 g/ml.

3.2

Sulfuric acid (H₂SO₄). rho = 1.84 g/ml.

3.3

Perchloric acid (HClO₄). rho = 1.68 g/ml.

3.4

Hydrogen peroxide (H₂O₂). 30%.

3.5

Ethanol (C₂H₅OH). 95%.

3.6

Nitric acid (HNO₃) 1 1 Solution. Add 50 ml of nitric acid (3.1) to 50 ml of water and mix.

3.7

Sodium hydroxide (NaOH) solution, rho (NaOH) = 1 mol/L. Weigh 40 g of sodium hydroxide dissolved in water and dilute to 1 L.

3.8 EDTA-2Na solution, rho (EDTA-2Na)=0.05 mol/L. dissolve 1.86 g EDTA-2Na (C₁₀H₁₄N₂O₃Na₂·2H₂O)

In water, and dilute to 100 ml.

3.9 Sodium tetraborate solution, rho (Na₂B₄O₇)=50 g/L. Dissolve 10 g of sodium tetraborate (Na₂B₄O₇·10H₂O) in water and dilute to 200 ml.

3.10 Qu Li Tong X-100 solution, rho (Qu Li Tong X-100) = 5% (volume fraction). 5 ml Qu Li Tong X-100 [Triton X-100, (CH₃)₃CCCH₂C(CH₃)₂-C₆H₄(OCH₂CH₂)_nOH_n~10] is dissolved in 95 ml of water and allowed to dissolve by heating.

3.11 Cadmium reagent 2B Ethanol solution, rho (cadmium reagent 2B) = 0.4 g/L. dissolve 0.080 g cadmium reagent 2B (4-nitronaphthyl diazo amino azo) Benzene, O₂NC₁₀H₆N. NNHC₆H₄N. NC₆H₅) In.200 ml of ethanol (3.5), add 2 drops of sodium hydroxide solution (3.7), use 4 the sand core funnel was filtered to remove insolubles.

3.12 Silver standard stock solution, $\rho(\text{Ag})=1.00 \text{ mg/ml}$. accurately weigh 0.157 5 g silver nitrate (AgNO_3), dissolve in appropriate amount of water, add 2 ml nitric acid solution (3.6). After dissolving, transfer to a 100 ml volumetric flask and dilute to the mark with water. Store in a brown glass bottle, protected from light, at least one month stable.

3.13 Silver standard solution, $\rho(\text{Ag})=0.100 \text{ mg/ml}$. Transfer 10.00 ml of silver standard stock solution (3.12) to a 100 ml volumetric flask.

Add 2 ml of nitric acid solution (3.6) and dilute to the mark with water. Store in a brown glass bottle protected from light.

3.14 Silver standard solution, $\rho(\text{Ag})=4.0 \text{ }\mu\text{g/ml}$. Transfer 20.00 ml silver standard solution (3.13) to a 500 ml volumetric flask for use Dilute the water to the mark and prepare it before use.

3.15 methyl orange solution, $w(\text{methyl orange}) = 10\%$. Dissolve 0.010 g of methyl orange in water and dilute to 100 ml.

4 Instruments and equipment

4.1

Spectrophotometer and 10 mm quartz cuvette.

4.2

pH meter.

4.3

Volumetric flasks. 50, 100, 500, 1 000 ml.

5 Interference and elimination

Without the masking agent EDTA, under these conditions, Na, $\text{B}_4\text{O}_7^{2-}$, PO_3^- each 100 mg, K, Ca^{2+} , Mg^{2+} , NH_4^+ , NO_3^- , SO_4^{2-} , PO_4^{3-} , citrate 10 mg each, As_3 , WO_4^{2-} , MoO_4^{2-} , ClO_4^- , BrO_3^- , IO_3^- , $\text{S}_2\text{O}_8^{2-}$ each 1.0 mg and 0.1 mg of Be^{2+} , Cr^{6+} , SeO_3^{2-} , TeO_3^{2-} , VO_3^- does not interfere with the determination of $10 \text{ }\mu\text{g Ag}$, a small amount of Cd^{2+} , Hg^{2+} , Zn^{2+} , Ni^{2+} , There is positive interference in Cu^{2+} , etc., but adding 0.5 ml of 0.05 mol/L EDTA-2Na solution can at least mask Cd^{2+} , Cu^{2+} , Ni^{2+} , Zn^{2+} , Pb^{2+} , 1.0 mg of Mn^{2+} , Fe^{3+} , Fe^{2+} , and La^{3+} , and $100 \text{ }\mu\text{g}$ of each of Co^{2+} , Hg^{2+} , Al^{3+} , Cr^{3+} , Pd^{2+} , and Y^{3+} . $10 \text{ }\mu\text{g Ag}$ Impact.

6.1 Acquisition and preservation

The water sample of silver was measured, collected and stored in a polyethylene bottle, and the water sample was acidified to pH 1-2 with concentrated nitric acid and analyzed as soon as possible.