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HJ

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

HJ 542-2009

**Ambient air. Determination of mercury and its compounds. Cold
atomic fluorescent spectrophotometry after sulfhydryl cotton
preconcentration**

环境空气 汞的测定 巯基棉富集-冷原子荧光分光光度法(暂行) 含2018年第1号修
改单

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Foreword

To protect the environment and protect people 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 Air Pollution this standard is established for the health of the body and the monitoring methods for the regulation of mercury and its compounds in the ambient air.

This standard specifies the enthalpy-based cotton enrichment cold atomic fluorescence spectrophotometry for the determination of mercury and its compounds in ambient air.

Appendix A and Appendix B of this standard are informative annexes.

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

This standard was drafted. Beijing Environmental Protection Monitoring Center.

This standard was approved by the Ministry of Environmental Protection on December 30, 2009.

This standard has been implemented since April 1, 2010.

This standard is explained by the Ministry of Environmental Protection.

Determination of mercury in ambient air Sulfhydryl Cotton Enrichment-Cold Atomic Fluorescence Spectrophotometry (Provisional)

1 Scope of application

This standard specifies the sulfhydryl cotton enrichment-cold atomic fluorescence spectrophotometry for the determination of mercury and its compounds in ambient air.

This standard applies to the determination of mercury and its compounds in ambient air.

The detection limit of this standard method is 0.1 ng/10 ml sample solution. When the sampling volume is 15 L, the detection limit is 6.6×10^{-6} mg/m³.

The lower limit is 2.6×10^{-5} mg/m³.

2 Normative references

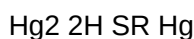
The contents of this standard refer to the terms in the following documents. For undated references, the valid version applies to this standard.

HJ/T 194 Technical Specifications for Manual Air Quality Monitoring GB/T 6682 Analytical laboratory water specifications and test methods

3 Principle of the method

In a slightly acidic medium, mercapto cotton is used to enrich mercury and its compounds in ambient air.

The inorganic mercury reaction formula is as follows.



The organic mercury reaction formula is as follows.

$\text{CH}_3\text{HgCl} + \text{H-SR} \rightarrow \text{CH}_3\text{Hg-SR} + \text{HCl}$ when elemental mercury passes through the sulfhydryl cotton sampling tube, it is mainly physical adsorption and chemical adsorption of

monolayers.

After sampling, total mercury was desorbed with a 4.0 mol/L hydrochloric acid-sodium chloride saturated solution, reduced to metallic mercury by stannous chloride, and measured by cold atomic fluorescence.

The mercury meter measures the total mercury content.

4 Reagents and materials

Unless otherwise stated, analytically pure reagents that meet national standards were used for the analysis. Water, GB/T 6682, two.

4.1

High purity nitrogen. $\phi = 99.999\%$.

4.2

Potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$). excellent grade pure.

4.3

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

4.4

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

4.5

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

4.6

Potassium dichromate solution. $w(\text{K}_2\text{Cr}_2\text{O}_7) = 1.0\%$.

Weigh 1.0 g of potassium dichromate (4.2), dissolve in water, and dilute to 100 ml.

4.7

Sulfuric acid solution. $\phi(\text{H}_2\text{SO}_4) = 10\%$.

Measure 10 ml of concentrated sulfuric acid (4.3) and slowly add 90 ml of water.

4.8

Hydrochloric acid solution. $c(\text{HCl}) = 4.0 \text{ mol/L}$.

Measure 123 ml of hydrochloric acid (4.4), dilute to 1 000 ml with water, and mix.

4.9

Hydrochloric acid solution. $c(\text{HCl}) = 2.0 \text{ mol/L}$.

Measure 12 ml of hydrochloric acid (4.4), dilute to 1 000 ml with water, and mix.

4.10

Hydrochloric acid solution. pH=3.

Pipette 2.0 mol/L hydrochloric acid (4.9) 0.50 ml, dilute with water to 1 000 ml, and mix.

4.11

Nitric acid solution. phi (HNO₃) = 10%.

Measure 10 ml of concentrated nitric acid (4.5), dilute to 100 ml with water, and mix.

4.12 Hydrochloric acid-sodium chloride saturated solution

Add an appropriate amount of solid sodium chloride (NaCl) to a 4.0 mol/L hydrochloric acid solution (4.8) and heat to boiling until the sodium chloride is supersaturated.

until.

4.13 Potassium bromate-potassium bromide solution

Weigh 2.8 g of potassium bromate (KBrO₃) and 10.0 g of potassium bromide (KBr), dissolve in water, and dilute to 1 000 ml.

4.14 Hydroxylamine Hydrochloride-Sodium Chloride Solution

Weigh 12.0 g of hydroxylamine hydrochloride (NH₂OH·HCl) and 12.0 g of sodium chloride, dissolve in water, and dilute to 100 ml.

4.15 Stannous chloride hydrochloride solution. w = 10%.

Weigh 11.9 g of stannous chloride (SnCl₂·2H₂O) in a 150 ml beaker, add 10 ml of concentrated hydrochloric acid (4.4), and heat until completely dissolved.

Thereafter, it was diluted with water to 100 ml, and high-purity nitrogen (4.1) was introduced at a flow rate of 1.0 L/min to remove background mercury.

4.16 Standard stock solution of mercury chloride. rho (HgCl₂) = 1 000 µg/ml.

Accurately weigh 0.135 3 g of mercuric chloride (HgCl₂), dissolved in 5.0 ml of 10% sulfuric acid solution (4.7) and 1.0 ml of 1.0% weight in a potassium chromate solution (4.6), transfer to a 100 ml volumetric flask and dilute to the mark with water. This solution contains 1 000 µg of mercury per ml.

4.17 Standard use of mercury chloride. rho (HgCl₂) = 0.50 µg/ml.

Pipette 1.00 ml of standard stock solution of mercuric chloride (4.16), place in a 200 ml volumetric flask, add 10.0 ml of 10% sulfuric acid solution (4.7) and 2.0 ml of 1.0% potassium dichromate solution (4.6), diluted with water to the mark, this solution contains 5 µg of mercury per ml. Before use, suck Take 10.00 ml of the above solution in a 100 ml