ICS 71.060.01
CCS G 10

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 23834.7-2026

Chemical analysis methods for stannous sulfate - Part 7: Determination of copper, lead, arsenic, iron, antimony, potassium, sodium, calcium and magnesium contents - Inductively coupled plasma optical emission spectrometry

硫酸亚锡化学分析方法 第7部分：铜、铅、砷、铁、锑、钾、钠、钙、镁含量的测定 电感耦合等离子体发射光谱法（ICP-OES）

Issued on: May 25, 2026 **Implemented on: December 1, 2026**

Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. This document is Part 7 of GB/T 23834, "Chemical Analysis Methods for Stannous Sulfate". GB/T 23834 has already published the following parts.

1.Determination of Stannous Sulfate Content by Potassium Dichromate Titration;

2.Determination of hydrochloric acid insoluble matter by gravimetric method;

3.Determination of total alkali metal and alkaline earth metal sulfates by gravimetric method;

4.Determination of Lead and Copper Content by Flame Atomic Absorption Spectrometry;

5.Determination of Arsenic Content. Silver Diethyldithiocarbamate Spectrophotometric Method;

6.Determination of Iron Content using the o-phenanthroline spectrophotometric method;

7.Determination of Copper, Lead, Arsenic, Iron, Antimony, Potassium, Sodium, Calcium, and Magnesium Contents by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP- OES). Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents. This document was proposed by the China Petroleum and Chemical Industry Federation. This document is under the jurisdiction of the National Technical Committee on Chemical Standardization (SAC/TC63). This document was drafted by: Fine Chemicals Group Co., Ltd., Yunnan Tin Industry Tin Chemical Materials Co., Ltd., and Lanbao (Xiamen) Water Treatment Plant. Li Technology Co., Ltd., Beijing Institute of Technology, Yiyang Shengli Materials Technology Co., Ltd., Zhejiang Luye Water Purifier Technology Co., Ltd. CNOOC

Tianjin Chemical Research and Design Institute Co., Ltd. The main drafters of this standard are. Wang Zhouhui, Han Hongli, Lian Liwei, Chen Bangkuan, Tang Lei, Tang Libo, He Yingying, Chen Qian, Zhang Niu, and Huang Yanyu. Xue Lifan, Li Xia, Guo Fengxin.

Industrial stannous sulfate is mainly used as an electroplating additive, an aluminum alloy surface oxidation colorant, a lead-acid battery additive, a cement additive, and in printing and dyeing. Industrial mordants, other industrial reducing agents, etc. GB/T 23834, "Chemical Analysis Methods for Stannous Sulfate," specifies the methods for analyzing different compounds in stannous sulfate. The series of test method standards for the determination of chemical components are proposed to consist of 7 parts.

1.Determination of Stannous Sulfate Content by Potassium Dichromate Titration. The aim is to achieve accurate determination of stannous sulfate content using potassium dichromate titration. Determine the stannous sulfate content.

2.Determination of Hydrochloric Acid Insoluble Matter by Gravimetric Method. The aim is to achieve accurate determination of the content of hydrochloric acid insoluble matter by gravimetric method.

3.Determination of Total Alkali Metal and Alkali Earth Metal Sulfates by Gravimetric Method. The aim is to achieve accurate determination by gravimetric method. Total amount of alkali metal and alkaline earth metal sulfates.

4.Determination of Lead and Copper Content by Flame Atomic Absorption Spectrometry. The aim is to achieve accurate determination of lead and copper content using flame atomic absorption spectrometry. Accurately determine the lead and copper content.

5 General Provisions

Unless otherwise specified, all impurity standard solutions, preparations, and products used shall comply with the provisions of HG/T 3696.2 and HG/T 3696.3. Preparation.

6 Reagents or materials

6.1 Hydrochloric acid. Superior grade or higher.

6.2 Nitric acid solution. 1 1. Prepared using reagents of superior purity or higher.

6.3 Mixed standard solution of copper, lead, arsenic, iron, antimony, potassium, sodium, calcium, and magnesium I. Copper (Cu), Lead (Pb), Arsenic (As), Iron (Fe), Antimony (Sb) The mass concentrations of potassium (K), sodium (Na), calcium (Ca), and magnesium (Mg) were

0.1 mg/mL. Transfer

10.00 mL of each of the following standard stock solutions (concentrated by mass) prepared according to HG/T 3696.2.copper, lead, arsenic, iron, antimony, potassium,

sodium, calcium, and magnesium. The concentrations were 1 mg/mL, and the solution was placed in a 100 mL volumetric flask. 4 mL of nitric acid solution was added, and the solution was diluted to the mark with water and shaken well. Alternatively, the concentrations could be... It is prepared using certified reference materials.

6.4 Mixed Standard Solution II of Copper, Lead, Arsenic, Iron, Antimony, Potassium, Sodium, Calcium, and Magnesium. Copper (Cu), Lead (Pb), Arsenic (As), Iron (Fe), Antimony (Sb) The mass concentrations of potassium (K), sodium (Na), calcium (Ca), and magnesium (Mg) were

0.01 mg/mL. Transfer

10.00 mL of a mixed standard solution I containing copper, lead, arsenic, iron, antimony, potassium, sodium, calcium, and magnesium to a 100 mL volumetric flask, and add 4 mL of nitrate. The acid solution was diluted with water to the mark and then shaken well.

6.5 Water. Water that meets the Class II standard as specified in GB/T 6682.

6.6 Argon. Purity (volume fraction) not less than 99.996%.

7 Instruments and Equipment

7.1 Inductively Coupled Plasma Emission Spectrometer (ICP-OES). The instrument shall comply with the provisions of JJG768.

7.2 Electronic balance. sensitivity 0.0001g.

8 Test Procedure

8.1 Instrument Operating Conditions Optimize the instrument's operating conditions according to its requirements. Recommended instrument operating conditions are shown in Table B.1 of Appendix B.

8.2 Preparation of test solutions Perform two parallel tests. Weigh approximately

1.0 g of the sample, accurate to 0.0002 g, and place it in a 100 mL beaker. Add 4 mL of hydrochloric acid. After dissolving, transfer the entire solution to a 100mL volumetric flask, add 4mL of nitric acid solution, dilute with water to the mark, and shake well. Simultaneously prepare a blank test solution by adding 4 mL of hydrochloric acid and 4 mL of nitric acid solution to a 100 mL volumetric flask, and diluting with water to the mark. Shake well.

8.3 Plotting the Standard Curve Transfer

0.00 mL,

0.50 mL,

5.00 mL of copper, lead, arsenic, iron, antimony, potassium, sodium, calcium, and magnesium, respectively. Mix standard solution II into six 100mL volumetric flasks, add 4mL of nitric acid solution, dilute to the mark with water, and mix well. This standard series... The mass concentrations of each element in the solution were

0.00 mg/L,

0.05 mg/L,

0.10 mg/L,

0.20 mg/L, and

0.30 mg/L, respectively.

0.50 mg/L. Under optimal instrument conditions, the recommended analytical spectral wavelengths for the analytes are shown in Table B.2, in order of increasing mass concentration. The levels of copper, lead, arsenic, iron, antimony, potassium, sodium, calcium, and magnesium in a series of standard solutions were determined, with the mass concentration (mg/L) of the analyte as the horizontal axis. Plot a standard curve with the corresponding emission spectral intensity as the ordinate.

8.4 Experiment Under optimal instrument conditions, the recommended analytical spectral wavelengths for the analytes are shown in Table B.2.The determination should be performed on the test solution (see 8.2) and in the air. The emission spectral intensity of the white test solution (see 8.2) is used to determine the mass concentration of each analyte in both the test solution and the blank test solution, as provided by the instrument. (mg/L). If the mass concentration of the analyte in the sample exceeds the range of the standard curve, it should be re-diluted before measurement, and the dilution factor should be entered into the calculation.

9.Experimental Data Processing The content of the element to be tested is expressed as a mass fraction w< sub>i< /sub>, and is calculated according to formula (1).