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

YS/T 1050.10-2016

**Methods for chemical analysis of lead-antimony concentrate. Part 10:
Determination of thallium. Inductively coupled plasma mass spectrometry and
inductively coupled plasma atomic emission spectrometry**

铅锑精矿化学分析方法 第10部分：铊量的测定 电感耦合等离子体质谱法和电感
耦合等离子体原子发射光谱法

(English Translation)

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Foreword

YS/T 1050 "lead antimony concentrate chemical analysis method" is divided into 10 parts.

- Part 1. Determination of lead content - Na₂EDTA titration;
- Part 2. Determination of antimony content - Cerium sulfate titration;
- Part 3. Determination of arsenic content - Potassium bromate titration;
- Part 4. Determination of zinc content - Na₂EDTA titration;
- Part 5. Determination of sulfur content - Weight method;
- Part 6. Determination of iron content - Cerium sulfate titration;
- Part 7. Determination of bismuth and copper content - Flame atomic absorption spectrometric method;
- Part 8. Determination of gold and silver;

Part 9. Determination of silver content - Flame atomic absorption spectrometric method.

Part 10. Determination of thallium content - Inductively coupled plasma mass spectrometry and inductively coupled plasma atomic emission spectrometry.

This section is part 10 of the YS/T 1050.

This part is drafted in accordance with the rules given in GB/T 1.1-2009.

This part of the National Nonferrous Metals Standardization Technical Committee (SAC/TC243) proposed and centralized.

This part of the main drafting unit. Beijing Nonferrous Metals Research Institute.

This part participates in the drafting unit. Beijing Mining and Metallurgy Research Institute, Ningbo Entry-Exit Inspection and Quarantine Bureau, Kunming Metallurgical Research

Institute, Zijin Mining Group Co., Ltd., China Nonferrous Guilin Mineral Geology Research Institute Co., Ltd., Bayuquan Entry-Exit Inspection and Quarantine Bureau, Nantong Entry-Exit Inspection and Inspection Epidemic Bureau, Fangchenggang Entry - Exit Inspection and Quarantine Bureau.

1 Scope

This part of YS/T 1050 specifies the method for the determination of thallium in lead and antimony concentrates.

This part is suitable for the determination of thallium in lead antimony concentrate, the method of determination is 0.0001% ~ 0.010%; Method 2 determination range 0.010% to 0.10%.

2.1 Method Summary

Samples of hydrochloric acid, nitric acid, hydrofluoric acid, perchloric acid dissolved, hydrogen bromide volatile in addition to antimony. To iridium as the internal standard, in the hydrochloric acid medium, with the inductance coupling Determination of Thallium by Plasma Mass Spectrometry.

2.2 Reagents

Unless otherwise stated, only reagents and primary water identified as excellent grade were used in the analysis.

2.2.1

Hydrochloric acid ($\rho=1.19\text{g/mL}$).

2.2.2

nitric acid ($\rho=1.42\text{g/mL}$).

2.2.3

Hydrofluoric acid ($\rho=1.15\text{g/mL}$).

2.2.4

perchloric acid ($\rho=1.67\text{g/mL}$).

2.2.5

hydrobromic acid ($\rho=1.49\text{g/mL}$).

2.2.6

Thallium standard storage solution. Weigh 0.1000g metal thallium ($w_{\text{Tl}} \geq 99.99\%$) in 100mL beaker, add 50mL hydrochloric acid (2.2.1) dissolved, into the 1000mL volumetric flask, diluted with water to the mark, mix. This solution 1mL thallium containing 100 μg .

2.2.7

Thallium standard solution A. Remove 10.00mL thallium standard storage solution (2.2.6) In a 100mL volumetric flask, add 5mL hydrochloric acid (2.2.1), diluted with water to the mark, mix, this solution 1mL thallium containing 10 μ g.

2.2.8

Thallium standard solution B. Remove 10.00mL thallium standard solution (2.2.7) In a 100mL volumetric flask, add 5mL hydrochloric acid (2.2.1) Diluted with water to the mark, mix, this solution 1mL thallium containing 1 μ g.

2.2.9

iridium standard storage solution. Weigh 0.1000g iridium powder (wlr $\geq$ 99.99%), placed in 50mL glass tube, add 8mL hydrochloric acid (2.2.1), 2 mL of hydrogen peroxide, and sealed. Dissolved at 150 ° C for 48 h, cooled and opened. The tube test solution was washed into a 100 mL volumetric flask, Add 10mL hydrochloric acid (2.2.1), diluted with water to the mark, mix. This solution 1mL containing 1000 μ g iridium.

2.2.10

iridium internal standard solution. remove the 1.00mL iridium standard storage solution (2.2.9) in a 1000mL volumetric flask, add 50mL hydrochloric acid (2.2.1), diluted with water to the mark, mix well. This solution 1mL containing 1 μ g iridium.

2.3 Instruments

2.3.1

inductively coupled plasma mass spectrometer, the instrument quality resolution is better than (0.8 ± 0.1) amu.