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

YS/T 775.2-2011

**Methods for chemical analysis of lead anode slime. Part 2:
Determination of bismuth content. Flame atomic absorption
spectrophotometry and Na₂EDTA titrimetric method**

铅阳极泥化学分析方法 第2部分：铋量的测定火焰原子吸收光谱法和Na₂EDTA滴
定法

(English Translation)

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Foreword

YS/T 775-2011 "lead anode mud chemical analysis method" is divided into seven parts.

- Part 1. Determination of lead content - Na₂EDTA titration;

Part 2. Determination of Bismuth Flame Atomic Absorption Spectrometry and Na₂EDTA Titration;

- Part 3. Determination of arsenic content - Potassium bromate titration;

- Part 4. Determination of antimony content - Flame atomic absorption spectrometry and cerium sulphate titration;

- Part 5. Determination of gold and silver;

- Part 6. Determination of copper content - Iodometric method;

Part 7. Determination of arsenic, copper and selenium - Inductively coupled plasma atomic emission spectrometric method.

This section is part 2.

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

The arbitration analysis of this part of the overlapping content range adopts the method II.

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Methods for chemical analysis of lead anodes Part 2. determination of bismuth content
Method A Flame Atomic Absorption Spectrometry

1 Scope

This method specifies the determination method of the amount of bismuth in lead anode mud.

The method is suitable for the determination of bismuth in lead anode mud, and the determination range is 5.00% ~ 13.00%.

2 Method summary

The sample was decomposed with a mixed acid of hydrochloric acid and nitric acid, and tartaric acid was added to the antimony. In the hydrochloric acid medium, at the atomic absorption spectrometer wavelength 223.1 nm, the absorbance of bismuth was measured using an air-acetylene flame.

3 Reagent

Unless otherwise stated, only the reagents identified as analytical reagents and distilled or deionized water or comparable purity were used in the analysis.

3.1

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

3.2

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

3.3

Hydrochloric acid (1 19).

3.4

nitric acid (1 1).

3.5

nitric acid (1 25).

3.6

mixed acid. hydrochloric acid nitric acid (3 1).

3.7

tartaric acid solution (200 g/L).

3.8

bismuth standard storage solution. Weigh 1.0000g metal bismuth ($w_{Bi} \geq 99.99\%$), placed in 250mL beaker, add 50mL nitric acid (3.4), low temperature heating to dissolve completely, boil nitrogen removal of the oxide, cooling, with nitric acid (3.5) washing dish and cup wall, into the 1000mL Capacity bottle, diluted with water to the mark, mix. This solution 1mL containing 1mg bismuth.

3.9

Bismuth standard solution. Remove 20.00mL bismuth standard storage solution (3.8) In a.200mL volumetric flask, add 40mL hydrochloric acid (3.1), 10mL tartaric acid solution (3.7), diluted with water to the mark, mix. This solution 1mL containing 100 μ g bismuth.

4 Instruments

Atomic absorption spectrometer, with bismuth hollow cathode lamp.

In the best working conditions of the instrument, where to achieve the following indicators can be used.

Sensitivity. bismuth characteristic concentration should not be greater than 0.20 μ g/mL.

Precision. 10 times the standard solution with the highest concentration of 10 absorbance, the standard deviation should not exceed 1.0% of the average absorbance, with the most Low concentration of standard solution (not "zero" concentration solution) measured 10 times the absorbance, the standard deviation does not exceed the maximum concentration of standard solution average suction 0.5% of the luminosity.

The linearity of the working curve. the working curve is divided into five segments according to the concentration, and the ratio of the absorbance value of the highest section to the minimum absorbance difference should not