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

YS/T 990.2-2014

**Methods for chemical analysis of copper matte. Part 2:
Determination of gold and silver contents. Atomic absorption
spectrometry and fire assay method**

冰铜化学分析方法 第2部分：金量和银量的测定原子吸收光谱法和火试金法
(English Translation)

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Foreword

YS/T 990 "Methods for chemical analysis of copper matte" is divided into 18 parts.

- Part 1. Determination of copper content iodometry;
- Part 2. Determination of gold and silver atomic absorption spectroscopy and fire assay;
- Part 3. Determination of sulfur content - Gravimetric method and combustion titration method;
- Part 4. Determination of the amount of bismuth atomic absorption spectrometry;
- Part 5. Determination of the amount of fluorine ion selective electrode method;
- Part 6. Determination of lead content - Atomic absorption spectrometry and Na₂EDTA titration;
- Part 7. Determination of cadmium content - Atomic absorption spectrometry;
- Part 8. Determination of arsenic content by hydride generation - atomic fluorescence spectrometry, diethyl dithiocarbamate spectrophotometry silver and potassium bromate titration;
- Part 9. Determination of iron content dichromate method;
- Part 10. Determination of silicon dioxide content molybdenum blue spectrophotometric method and silicon potassium fluoride titration;
- Part 11. Determination of the amount of nickel atom absorption spectrometry;
- Part 12. Determination of the amount of chromium oxide of aluminum Azure S Spectrophotometry;
- Part 13. Determination of magnesium oxide content - Atomic absorption spectrometry;
- Part 14. Determination of the amount of zinc atomic absorption spectrometry and

Na₂EDTA titration;

--- Part 15. Determination of antimony content - Atomic absorption spectrometry;

--- Part 16. Determination of mercury content - Cold atomic absorption spectrometry;

--- Part 17. Determination of the amount of cobalt atomic absorption spectrometry;

--- Part 18. lead, zinc, nickel, arsenic, bismuth, antimony, calcium, magnesium, cadmium, cobalt content - Inductively coupled plasma atomic emission spectrometry.

This section YS/T Part 2 990.

The silver content of the cross-section part 1 for arbitration.

This section drafted in accordance with GB/T 1.1-2009 given rules.

The non-ferrous metal part by the National Standardization Technical Committee (SAC/TC243) centralized.

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The unit participated in the drafting Part 1. In the mountains of Nonferrous Metals Group Co., Ltd., Beijing General Research Institute of Mining and Metallurgy, Tongling Nonferrous Metals collection Group Holdings Ltd., Yunnan Copper Co., Ltd., Zijin Mining Co., Ltd., Shandong Yoshimitsu Copper Co., Ltd., Hunan Nonferrous Metals RESEARCH Hospital study, Baiyin Nonferrous Group Co., Ltd., Guangzhou Nonferrous Metal Research Institute, Shandong constant state Smelting Co., Ltd., the gold Lingnan Shaoguan Smelter Refinery, Smelting Co., Ltd. Hangzhou Fuchun River.

This section participated in the drafting Method 2. In the mountains of Nonferrous Metals Group Co., Ltd., Beijing General Research Institute of Mining and Metallurgy, Tongling Nonferrous Metals collection Group Holdings Ltd., Yunnan Copper Co., Ltd., Zijin Mining Co., Ltd., Hunan Nonferrous Metal Research Institute, Baiyin Nonferrous Metals Group shares Ltd., Guangzhou Nonferrous Metal Research Institute, Shandong constant state Smelting Co., Ltd., the gold Lingnan Shaoguan smelter, smelting Fuchun River in Hangzhou has Limited.

1 Scope

This section YS/T 990 specifies the method for determination of copper matte silver content.

This section applies to the determination of copper in ice silver content. The method of measurement in the range of 1 Ag20.0g/t ~ 500.0g/t; Method 2 measurement range it is Au1.00g/t ~ 50.00g/t; Ag50.0g/t ~ 3700.0g/t.

2.1 Method summary

Sample with nitric acid, perchloric acid dissolved in dilute hydrochloric acid medium, by atomic absorption spectrometer wavelength at 328.1nm, air - acetylene fire Flame measuring the absorbance of silver, net of background absorption, according to the standard curve method to calculate the amount of silver.

2.2 Reagents

Unless otherwise indicated in the analysis using only recognized as analytical grade reagents and distilled or deionized water or equivalent purity.

2.2.1

Ammonium hydrogen fluoride.

2.2.2

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

2.2.3

hydrochloric acid (19).

2.2.4

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

2.2.5

nitric acid (11).

2.2.6

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

2.2.7

Silver standard stock solution. Weigh 0.5000g metallic silver ($w_{\text{Ag}} \geq 99.99\%$) in 200mL beaker, add 20mL of nitric acid (2.2.5), heated until completely dissolved, cooled to room temperature and transferred to 1000mL brown volumetric flask, diluted with water, no chlorine ions to the mark, and mix.

This solution 1mL containing 500 μg silver.

2.2.8

Silver standard solution. Pipette 5.00mL silver standard stock solution (2.2.7) in 250mL flask, diluted with hydrochloric acid (2.2.3) to Volume, and mix. This solution 1mL containing 10 μg silver.

2.3 Instrument

Atomic absorption spectrometer, with a silver hollow-cathode lamp.

Under optimum working conditions for those who can reach the following indicators can be used.

--- Characteristic concentration. in the measurement sample solution matrix consistent solution, features silver concentration should be less than 0.018 μ g/mL.

--- Precision. measuring the absorbance of 11 with the highest concentration of the standard, the standard deviation should not exceed the average absorbance of 1.0%, with the lowest concentration of standard solution (not "zero" standard solution) measuring the absorbance of 11 times, the standard deviation should not exceed the maximum concentration standard 0.5% average standard solution absorbance.

--- Linear curve. The curve is divided into five sections according to concentration, than the absorbance difference between the highest and the lowest segment of the segment absorbance difference not less than 0.85.