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

YS/T 990.11-2014

**Methods for chemical analysis of copper matte, Part 11:
Determination of nickel content, Atomic absorption spectrometry**

冰铜化学分析方法 第11部分：镍量的测定原子吸收光谱法

(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 990 Part 11.

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.

This section is responsible for drafting unit. Zhongtiaoshan Nonferrous Metals Group Co., Ltd. Daye Nonferrous Metals Group Holdings Limited.

This section drafted by. Smelting Co., Ltd. Hangzhou Fuchun River.

Participated in the drafting of this section. People's Republic of China Ningbo Exit Inspection and Quarantine, Yunnan Copper Co., Ltd., Tongling Nonferrous Metals Metals Group Holdings Co., Ltd., Guangzhou Nonferrous Metal Research Institute, Beijing General Research Institute of Mining and Metallurgy, Lianyungang People's Republic of China Entry-Exit Inspection Quarantine Bureau, Baiyin Nonferrous Group Co., Ltd.

1 Scope

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

This section applies to the determination of copper in ice nickel content. Measurement range of 0.05% to 1.00%.

2 Method summary

Samples with hydrochloric acid, nitric acid decomposition of sulfur removal with bromine, using air - acetylene flame atomic absorption spectrometer wavelength measured at 232.0nm the amount of nickel absorbance standard curve method to calculate the amount of nickel.

3 Reagents

Unless otherwise described, used in the analysis only identified as analytical reagents, analysis of water, deionized water or equivalent purity.

3.1

ammonium hydrogen fluoride.

3.2

bromine.

3.3

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

3.4

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

3.5

nitric acid (11).

3.6

Nickel standard stock solution. Weigh 0.5000g of nickel ($w_{\text{Ni}} \geq 99.99\%$), placed in a beaker of 200mL, 10mL of nitric acid was added (3.3), covered with a watch glass placed on a hot plate over low heat until completely dissolved, boiled to remove nitrogen oxides, cooled to room temperature. Moved to 1000mL Volumetric flask, dilute with water to volume, and mix. This solution 1mL containing 0.5mg nickel.

3.7

Nickel standard solution. Pipette 10.00mL Nickel standard stock solution (3.6) into 100mL volumetric flask, dilute with water to volume, and mix.

This solution 1mL containing 50 μg nickel.

4 Instruments and equipment

Atomic absorption spectrometer, with a nickel hollow cathode lamp.

In the atomic absorption spectrometer the best working conditions, who can be reached by the following indicators can be used.

--- Sensitivity. the substrate solution consistent with the measurement sample solution, characteristic concentration of nickel is not more than 0.05 $\mu\text{g/mL}$;

--- Precision. standard solution with the highest concentration of 11 times the absorbance measurements, the standard deviation should not exceed the average absorbance of 1.0%;

The absorbance measured 11 times the minimum concentration of the standard solution (not a "zero" standard solution), and the standard deviation should not exceed the maximum concentration 0.5% of the mean absorbance of the standard solution;

--- Linear calibration curves. the curve according to concentration divided into three

segments, the difference between the absorbance of the absorbance difference between the highest and the lowest segment the ratio shall be not less than 0.80.