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

YS/T 252.3-2007

**Methods for chemical analysis of nickel matte. Determination of
cobalt content. Flame atomic absorption spectrometric method**

高镍钨化学分析方法钴量的测定火焰原子吸收光谱法

(English Translation)

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Foreword

YS/T 252 "Methods for chemical analysis of nickel matte" is divided into five parts:

YS/T 252.1 Methods for chemical analysis of nickel matte - Determination of nickel content - Dimethylglyoxime gravimetric method

YS/T 252.2 Methods for chemical analysis of nickel matte - Determination of iron content - Sulfosalicylic acid photometric method

YS/T 252.3 Methods for chemical analysis of nickel matte - Determination of cobalt content - Flame atomic absorption spectrometric method

YS/T 252.4 Methods for chemical analysis of nickel matte - Determination of cobalt content - Sodium thiosulphate titrimetric method

YS/T 252.5 Methods for chemical analysis of nickel matte - Determination of sulfur content - Combustion-neutralization titrimetric method

This Part is Part 3.

This Part replaces YS/T 252.3-1994 "Determination of cobalt content by sulfosalicylic acid photometric method". Compared with YS/T 252.3-1994, this Part mainly has the following changes:

- CHANGE the measurement method from sulfosalicylic acid photometric method

to flame atomic absorption spectrometry;

- ADJUST the measurement range from 0.30% ~ 1.50% to 0.1% ~ 2%;
- ADD the repeatability limits, supplementing quality assurance and control terms.

This Part was proposed by AND shall be under the jurisdiction of the National Technical Committee for Standardization of Nonferrous Metals.

Responsible drafting organization of this Part: Jinchuan Group Co., Ltd.

Participated drafting organization of this Part: Beijing General Research Institute of Mining and Metallurgy, Guangzhou Nonferrous Metals Research Institute.

1 Scope

This Part specifies the method for determination of cobalt content in high nickel matte.

This Part is applicable to the determination of cobalt content in high-nickel matte.

Measuring range: 0.1% ~ 2%.

2 Method summary

Decompose the sample with hydrochloric acid, nitric acid-potassium chlorate saturated solution. Use air-acetylene flame in hydrochloric acid (2 + 98) medium, to measure the absorbance at the wavelength of 240.7 nm of atomic absorption spectrometer, after subtracting the background. Calculate the cobalt content according to the standard curve method.

3.5 Nitric acid-potassium chlorate saturated solution: Dissolve potassium chlorate in

nitric acid (3.2) until saturated.

3.6 Cobalt standard storage solution: Weigh 1.0000 g of metallic cobalt (mass fraction

of cobalt $\geq 99.95\%$). Slowly add 20 mL of nitric acid (3.3) into a 400 mL beaker. Cover with a watch glass. Heat at low temperature to completely dissolve. Remove it. Use water to rinse the watch glass and cup wall. Heat and boil to remove nitrogen oxides. Remove it. Cool to room temperature. Transfer it into a 1000 mL volumetric flask. Use

water to wash the watch glass and cup wall. Combine the washing liquid into the volumetric flask. Use water to make the volume reach to the mark. 1 mL of this solution contains 1 mg of cobalt.

3.7 Cobalt standard solution: Pipette 20.00 mL of cobalt standard storage solution (3.6)

into a 200 mL volumetric flask. Make the volume reach to the mark. 1 mL of this solution contains 100 µg of cobalt.

4 Instruments

Atomic absorption spectrometer (with background subtraction function), equipped with cobalt hollow cathode lamp.

Under the best working conditions of the instrument, those that can meet the following indicators can be used.

Characteristic concentration: In a solution that is basically consistent with the measurement test solution, the characteristic concentration of cobalt shall not be greater than 0.06 µg/mL.

Precision: Use the highest concentration standard solution to make 10 measurements of the absorbance; the standard deviation shall not exceed 1.0% of the average absorbance. Use the lowest concentration standard solution (not the "zero" standard solution) to make 10 measurements of the absorbance; the standard deviation shall not exceed 0.5% of the average absorbance of the highest concentration standard solution.

Linearity of the working curve: Divide the working curve into five equal segments according to concentration. The ratio -- of the absorbance difference of the highest segment to the absorbance difference of the lowest segment -- shall not be less than 0.85.

5.1 Sample

Weigh 0.400 g of specimen, accurate to 0.0001 g.

5.2 Blank test

Do a blank test along with the sample.

5.3.1 Place the sample (5.1) in a 400 mL beaker. Moisten it with a small amount of water. Add 10 mL of hydrochloric acid (3.1). Cover with a watch glass. Dissolve at low temperature and evaporate to a volume of about 2 mL. Cool it. Add 20 mL of saturated nitric acid-potassium chlorate solution (3.5). Continue to heat to dissolve and evaporate to a volume of 2 mL ~ 3 mL. Cool it. Wash the watch glass and cup wall with about 20

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