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NONFERROUS METAL INDUSTRY STANDARD

OF THE PEOPLE'S REPUBLIC OF CHINA

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YS/T 710.6-2009

**Method for chemical analysis of cobalt oxide -
Part 6: Determination of calcium, cadmium, copper,
iron, magnesium, manganese, nickel, lead, zinc
content - Inductively coupled plasma-atomic emission
spectrometry**

氧化钴化学分析方法 第6部分：钙、镉、铜、铁、镁、锰、镍、铅
和锌量的测定 电感耦合等离子体发射光谱法

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Foreword

YS/T 710, Method for chemical analysis of cobalt oxide, is divided into 6 parts:

- Part 1: Determination of cobalt content - Potentiometric method;
- Part 2: Determination of sodium content - Flame atomic absorption spectrometry method;
- Part 3: Determination of sulphur content - High frequency combustion-infrared absorption method;
- Part 4: Determination of arsenic content - Atomic fluorescence spectrometry;
- Part 5: Determination of silicon content - Molybdenum blue spectrophotometry;
- Part 6: Determination of calcium, cadmium, copper, iron, magnesium, manganese, nickel, lead, zinc content - Inductively coupled plasma-atomic emission spectrometry.

This Part is Part 6 of YS/T 710.

This Part shall be under the jurisdiction of National Technical Committee 243 on Nonferrous Metals of Standardization Administration of China.

The responsible drafting organizations of this Part: Zhuzhou Smelter Group Company Limited.

The drafting organizations of this Part: Ganzhou Cobalt Tungsten Co., Ltd.

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Method for chemical analysis of cobalt oxide - Part 6: Determination of calcium, cadmium, copper, iron, magnesium, manganese, nickel, lead, zinc content - Inductively coupled plasma-atomic emission spectrometry

1 Scope

This Part of YS/T 710 specifies the determination method of calcium, cadmium, copper, iron, magnesium, manganese, nickel, lead, zinc content in cobalt oxide.

This Part applies to the determination of calcium, cadmium, copper, iron, magnesium, manganese, nickel, lead, zinc content in cobalt oxide. See Table 1 for the determination range

Table 1 -- Determination range of each element

2 Method summary

Dissolve the sample in aqua regia; in a nitric acid medium, according to the optimized working conditions of the instrument and the optimized analysis spectrum, use a standard solution, which is similar to the sample composition, that matches with the cobalt matrix; use the ICP-AES instrument to determine the Ca, Cd, Cu, Fe, Mg, Mn, Ni, Pb, Zn content in the cobalt oxide.

3 Reagents

3.1 Hydrochloric acid (ρ 1.19 g/mL), GR.

3.2 Nitric acid, (ρ 1.42 g/mL), GR.

3.3 Aqua regia: 3 parts of hydrochloric acid (3.1) + 1 part of nitric acid (3.2).

conditions, add 3 mL ~ 5 mL of perchloric acid (3.4) appropriately to smoke until it is nearly dry.

5.3.2 Blow in a small amount of water; cover the watch glass and boil; cool to room temperature; add 5 mL of nitric acid (3.2); transfer to a 100 mL volumetric flask; use water to dilute to the mark; shake well; use as a test solution for later use.

5.3.3 Measure each point mixed standard solution and test solution under the optimized working conditions of the instrument; the instrument automatically draws a working curve.

5.3.4 Test the to-be-tested solution and the blank.

6 Calculation of analysis result

6.1 The instrument, according to the standardization or calibrated standardization work curve and the set element, automatically processes the data, calculates and outputs the content of each measured element.

6.2 Keep two significant digits for the analysis result.

7 Precision

7.1 Repeatability

For the measured values of the two independent test results that are obtained under repetitive conditions, within the average range that is given below, the absolute difference between the two test results does not exceed the repeatability limit (r); the case of exceeding the repeatability limit (r) is not more than 5%; the repeatability limit (r) is obtained by linear interpolation according to the data in Table 4.

Table 4 -- Repeatability limit

$w/\%$	0.001 0	0.005 0	0.020	0.050	0.10	0.50
$r/\%$	0.000 2	0.000 5	0.001 4	0.003 0	0.005 0	0.020
Note: The repeatability limit (r) is $2.8S_r$; S_r is the repeatability standard deviation.						

7.2 Reproducibility

For the measured values of the two independent test results that are obtained under reproductive conditions, within the average range that is given below, the absolute difference between the two test results does not exceed the reproducibility limit (R); the case of exceeding the reproducibility limit (R) is not

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