

ICS 73.060
CCS D 42

YS

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

YS/T 1115.12-2016

**Methods for chemical analysis of copper ores and tailings-Part 12: Determination
of copper, lead, zinc, nickel, cobalt, cadmium, magnesium and manganese
contents-Inductively coupled plasma atomic emission spectrometric method**

铜原矿和尾矿化学分析方法 第12部分：铜、铅、锌、镍、钴、镉、镁和锰量的测定 电感耦合等离子体原子发射光谱法

(English Translation)

Issued on: July 11, 2016

Implemented on: January 1, 2017

Issued by: Ministry of Industry and Information Technology

Table of Contents

- Foreword
- 1 Scope
- 2 Method summary
- 3 Reagent

Foreword

YS/T 1115-2016 "Copper ore and tailings chemical analysis method" is divided into the following 14 sections.

- Part 1. Determination of copper content by flame atomic absorption spectrometry;
- Part 2. Determination of lead content by flame atomic absorption spectrometry;
- Part 3. Determination of zinc content by flame atomic absorption spectrometry;
- Part 4. Determination of nickel content by flame atomic absorption spectrometry;
- Part 5. Determination of cobalt content by flame atomic absorption spectrometry;
- Part 6. Determination of cadmium content by flame atomic absorption spectrometry;
- Part 7. Determination of manganese content by flame atomic absorption spectrometry;
- Part 8. Determination of magnesium content by flame atomic absorption spectrometry;
- Part 9. Determination of sulfur content by high-frequency infrared absorption and combustion - potassium iodate titration;
- Part 10. Determination of phosphorus content molybdenum blue spectrophotometry;
- Part 11. Determination of molybdenum content thiocyanate spectrophotometry;
- Part 12. Determination of copper, lead, zinc, nickel, cobalt, cadmium, magnesium and manganese content; Inductively coupled plasma atomic emission spectrometry;
- Part 13. Determination of fluorine content ion selective electrode method and ion chromatography;
- Part 14. Determination of arsenic hydride generation atomic fluorescence spectrometry and potassium bromate titration.

This section is YS/T 1115-2016 part 12.

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

This part of the National Non-ferrous Metal Standardization Technical Committee (SAC/TC243) centralized.

This section mainly drafted unit. Beijing Mining and Metallurgy Research Institute.

This section participates in the drafting unit. Liaoning Exit Inspection and Quarantine, China Nonferrous Metals Group Co., Ltd., Zijin Mining Group shares Ltd., Anhui National Copper, Lead, Zinc and Products Quality Supervision and Inspection Center, Kunming Metallurgical Research Institute, Tongling Nonferrous Metals Group Holdings Limited Division, Zhejiang Huayou Cobalt Co., Ltd.

1 Scope

This part of YS/T 1115 specifies the method for the determination of copper, lead, zinc, nickel, cobalt, cadmium, magnesium and manganese in copper ores and tailings.

This section applies to copper ore and tailings copper, lead, zinc, nickel, cobalt, cadmium, magnesium and manganese determination. The measurement range is shown in Table 1.

Table 1 measurement range

Element	Measurement Range /%	Element	Measurement Range /%
Cu	0.010 ~ 2.50	Pb	0.0050 ~ 1.00
Zn	0.0050 ~ 1.50	Ni	0.0050 ~ 0.050
Co	0.0050-0.050	Cd	0.0050 ~ 0.015
Mg	0.010 ~ 8.00	Mn	0.0050-0.50

2 Method summary

Samples hydrochloric acid, nitric acid, hydrofluoric acid and perchloric acid decomposition. Nitric acid dissolved salts, in dilute nitric acid medium, in the inductively coupled plasma at the wavelength of each element selected by the emission spectrometer, the emission intensity was measured, and the mass fraction of each element was calculated by the working curve method.

3 Reagent

Unless otherwise noted, only reagents identified as superior grade pure are used in the analysis, all water used is distilled or deionized water or equivalent Water.

3.1

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

3.2

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

Hydrofluoric acid ($\rho = 1.15 \text{ g/mL}$).

3.4

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

3.5

Hydrochloric acid (1 1).

Nitric acid (1 1).

3.7

Standard storage solution of copper Weigh 1.0000g of metallic copper ($w_{\text{Cu}} \geq 99.99\%$), placed in 300mL beaker, cover the table, add slowly Into 50mL nitric acid (3.6), dissolved at low temperature, get rid of nitrogen oxides, removed and cooled to room temperature, washed with water and table glass table wall, into 1000mL volumetric flask, add 50mL of nitric acid (3.6), diluted with water to the mark, mix well. 1 mL of this solution contains 1 mg of copper.

3.8

Lead standard stock solution Weigh 1.0000g metallic lead ($w_{\text{Pb}} \geq 99.99\%$), placed in 300mL beaker, cover the table, slowly add Into 50mL nitric acid (3.6), dissolved at low temperature, get rid of nitrogen oxides, removed and cooled to room temperature, washed with water and the cup table wall, into 1000mL volumetric flask, add 50mL of nitric acid (3.6), diluted with water to the mark, mix well. 1mL of this solution contains 1mg lead.

3.9

Standard zinc storage solution Weigh 1.0000g zinc metal ($w_{\text{Zn}} \geq 99.99\%$), placed in a 300mL beaker, cover the table, slowly add