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**YS**

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

**YS/T 990.5-2014**

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**Methods for chemical analysis of copper matte. Part 5:  
Determination of fluorine content. Ion-selective electrode  
method**

冰铜化学分析方法 第5部分：氟量的测定离子选择电极法  
**(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 Na<sub>2</sub>EDTA 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 Na<sub>2</sub>EDTA 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 5 990.

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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## 1 Scope

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

This section applies to the determination of copper in ice fluorine content. Determination range of 0.010% to 0.30%.

## 2 Method summary

Sample with sodium peroxide and sodium hydroxide melt decomposition, leaching the melt water after filtration, iron, copper and other interfering ions precipitate as hydroxides Isolated, sodium citrate - triethanolamine medium, the control solution pH6.5 ~ 7.0, a saturated calomel electrode as reference electrode selection circuit, fluoride ion Extremely indicator electrode, potentiometric determination of fluorine content meter.

## 3 Reagents

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

### 3.1

sodium peroxide.

### 3.2

sodium hydroxide.

### 3.3

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

### 3.4

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

### 3.5

nitric acid (14).

### 3.6

sodium citrate solution (294g/L). Weigh 294g of sodium citrate ( $\text{Na}_3\text{C}_6\text{H}_5\text{O}_7 \cdot 2\text{H}_2\text{O}$ ) was dissolved in water, diluted with water to 1000mL.

Triethanolamine 3.7. 100mL Triethanolamine [ $\text{N}(\text{CH}_2\text{CH}_2\text{OH})_3$ ] added 64mL of hydrochloric acid (3.3) was adjusted to pH6.5 ~ 7.0, water Diluted to 500mL, and mix.

### 3.8

fluoro standard stock solution. Weigh 0.2210g NaF, dissolved in water and transferred to 1000mL volumetric flask, dilute to the mark with water, mix uniform. Store in a polyethylene bottle. This solution 1mL containing 100 $\mu\text{g}$  fluorine.

### 3.9

fluoro standard solution. Pipette 10.00mL fluoro standard stock solution (3.8) in 100mL volumetric flask, dilute with water to volume, and mix.

Immediately transferred to dry plastic bottles. This solution 1mL containing 10 $\mu\text{g}$  fluorine.

### 3.10

Phenol red solution (2g/L). Weigh 0.1g of phenol red, add 6mL sodium hydroxide solution (0.05mol/L), diluted with water to 50mL, mix well.

## 4 Instrument

### 4.1

FISE. Requires fluorine content in  $1 \times 10^{-6}\text{mol/L} \sim 1 \times 10^{-1}\text{mol/L}$  concentration, and the concentration of the negative electrode potential of the number was a good linear relationship. Electrodes before use in  $1 \times 10^{-3}\text{mol/L}$  sodium fluoride solution soak 1h, so that activation, and then washed with water to wash the fluorine-containing liquid is not

more than  $1 \times 10^{-6}$ mol/can only be determined after L.