

Translated English of Chinese Standard: YS/T575.23-2009

www.ChineseStandard.net

Sales@ChineseStandard.net

YS

NONFERROUS METAL INDUSTRY STANDARD

OF THE PEOPLE'S REPUBLIC OF CHINA

ICS 77.120.10

H 30

YS/T 575.23-2009

**Methods for chemical analysis of aluminum ores –
Part 23: Determination of element contents X-ray
fluorescence spectrometric method**

铝土矿石化学分析方法

第 23 部分: X 射线荧光光谱法测定元素含量

YS/T 575.23-2009 How to BUY & immediately GET a full-copy of this standard?

1. www.ChineseStandard.net;
2. Search --> Add to Cart --> Checkout (3-steps);
3. No action is required - Full-copy of this standard will be automatically & immediately delivered to your EMAIL address in 0~25 minutes.
4. Support: Sales@ChineseStandard.net. Wayne, Sales manager

Issued on: December 4, 2009

Implemented on: June 01, 2010

**Issued by: Ministry of Industry and Information Technology of People's
Republic of China**

Table of contents

Foreword.....	3
1 Scope	6
2 Principle of the method.....	6
3 Reagent.....	7
4 Instruments and apparatus.....	8
5 Samples	8
6 Analysis procedures	8
7 Calculation of analysis results	10
8 Precision.....	11
9 Quality assurance and control	14
Appendix A (Informative) Operation parameters of X-ray fluorescence spectrometer	15

Foreword

YS/T 575-2007 "Methods for chemical analysis of aluminum ores" is consisted of 24 parts in total:

Part 1: Determination of aluminum oxide content - EDTA titrimetric method

Part 2: Determination of silicon dioxide content - Gravimetric-molybdenum blue photometric method

Part 3: Determination of silicon dioxide content - Molybdenum blue photometric method

Part 4: Determination of iron oxide content - Potassium titrimetric method

Part 5: Determination of iron oxide content - Orthophenanthroline photometric method

Part 6: Determination of titanium dioxide content - Diantipyrylmethane photometric method

Part 7: Determination of calcium oxide content - Flame atomic absorption spectrophotometric method

Part 8: Determination of magnesium oxide content - Flame atomic absorption spectrophotometric method

Part 9: Determination of potassium oxide, sodium oxide content - Flame atomic absorption spectrophotometric method

Part 10: Determination of manganese oxide content - Flame atomic absorption spectrophotometric method

Part 11: Determination of chromium oxide content - Flame atomic absorption spectrophotometric method

Part 12: Determination of vanadium pentoxide content - N-benzoyl-N-phenylhydroxylamine photometric method

Part 13: Determination of zinc content - Flame atomic absorption spectrophotometric method

Part 14: Determination of total content of rare earth oxide - Tribromo-arsenazo photometric method

The responsible drafting organization of this part: China Aluminum Industry Co., Ltd. Zhengzhou Research Institute, China Nonferrous Metals Industry Standard Metering Quality Institute.

The drafting organization of this part: China Aluminum Industry Co., Ltd. Shandong Branch, Shanxi Luneng Jinbei Aluminum Co., Ltd., Cayman Aluminum (Sanmenxia) Co., Ltd.

The main drafters of this part: Zhang Aifen, Zhang Shuchao, Ma Huixia, Lu Xia, Wang Yunxia, Zhong Daiguo, Wang Xiaolei, Han Guifen, Li Yuling and Li Huiling.

Methods for chemical analysis of aluminum ores -

Part 23: Determination of element contents X-ray

fluorescence spectrometric method

1 Scope

This part specifies the methods for the determination of aluminum oxide, silica, total iron (expressed by Fe_2O_3), titanium dioxide, potassium oxide, sodium oxide, calcium oxide, magnesium oxide, phosphorus pentoxide, manganese oxide, sulfur, vanadium, gallium and zinc, and the like, in the aluminum ores.

This part is applicable to the determination of the aluminum oxide, silica, total iron (expressed by Fe_2O_3), titanium dioxide, potassium oxide, sodium oxide, calcium oxide, magnesium oxide, phosphorus pentoxide, manganese oxide, sulfur, vanadium, gallium and zinc, and the like, in the aluminum ores. It is also applicable to the determination of the aforementioned elements in such samples as clay and kaolin. As for the determination range, SEE Table 1.

Table 1

Composition	Content range (mass fraction)/%	Composition	Content range (mass fraction)/%
Al_2O_3	30.00~80.00	SiO_2	1.00~50.00
Fe_2O_3	0.30~30.00	TiO_2	0.50~8.00
K_2O	0.050~3.00	Na_2O	0.050~3.00
CaO	0.050~5.00	MgO	0.030~3.00
P_2O_5	0.010~5.00	S	0.050~3.00
MnO	0.003 0~0.20	V	0.008 0~0.40
Ga	0.002 0~0.050	Zn	0.001 5~0.30

2 Principle of the method

2.1 USE the anhydrous lithium tetraborate and lithium metaborate mixed reagent to melt the sample, in order to eliminate the mineral effects and particle size effects; and CAST it into the glass sheet of the shape suitable for the X-ray fluorescence spectrometer; MEASURE the fluorescence X-ray intensity of the measured element in the glass sheet. USE the calibration curve or equation to conduct analysis; the correction equation is established through using series standard samples, and CONDUCT inter-element disturbance effect correction.

4 Instruments and apparatus

4.1 Platinum-gold alloy crucible (95% Pt + 5% Au).

4.2 Platinum-gold alloy mold (95% Pt + 5% Au). The base thickness of the mold material is about 1 mm, making it difficult to deform.

4.3 The melting vessel and mold can be combined into one. If the sample is directly formed after being melted in the crucible, it requires the internal wall of the crucible bottom flat and smooth, so that the glass sheet is easily peeled off from the mold without being broken.

4.4 Melting machine: automatic flame melting or high-frequency induction melting machine. If using other types of melting machines, the temperature is not less than 1150 °C, AND the temperature shall be able to controlled, with the temperature control accuracy at ± 15 °C.

4.5 Wavelength dispersive X-ray fluorescence spectrometer: end window rhodium target X-ray tube.

4.6 Oven: controllable temperature $105\text{ °C} \pm 5\text{ °C}$.

5 Samples

5.1 The particle size of sample shall be less than 125 μm .

5.2 The sample shall be preheated in an oven (4.6) at $105\text{ °C} \pm 5\text{ °C}$ for 2 h, placed in a desiccator and allowed to cool to room temperature.

6 Analysis procedures

6.1 Number of determinations

TAKE two samples for parallel determination, and TAKE their average value.

6.2 Sample

Based on the equipment used, accurately WEIGH the sample (5) and the flux (3.1) according to the mass ratio of the sample to the flux of 1: 8 ~ 1:10.

6.3 Calibration test

Together with the sample, ANALYZE the standard samples of the same type.

6.5.4 Calibration: As for the elements with spectral line overlap interference, it shall conduct the spectral line overlap interference correction. As for the zinc and gallium element, it shall use the RATIO between the intensity and the RhK α line Compton scattering intensity AND the recommended value regression analysis to conduct calibration. As for the inter-element absorption-enhancement effect, it shall use the theoretical α coefficient or the basic parameter method to correct it.

6.6 X-Ray fluorescence spectrometry

6.6.1 PREHEAT the wavelength dispersive X-ray fluorescence spectrometer (4.5) to stabilize it. Based on the X-ray tube type, ADJUST the tube voltage and tube current. Based on the X-ray fluorescence spectrometer model, SELECT the operating parameters (SEE Appendix A).

6.6.2 Measurement of monitoring sample: SET the monitoring sample name; MEASURE the X-ray intensity of the analyzed element in the monitoring sample. The reference intensity of the analyzed element in the monitoring sample must be measured in the same machine start-up with the standard sample, in order to ensure the validity of the drift calibration.

6.6.3 Measurement of standard sample: INPUT the standard sample name; MEASURE the X-ray intensity of the analyzed element in the standard sample.

6.6.4 Measurement of unknown samples: START the quantitative analysis program; MEASURE the monitoring sample; CONDUCT instrument drift correction. MEASURE the standard sample which is prepared in the same batch of the unknown sample. The element analysis results of the standard sample shall comply with the repeatability requirements as specified in Table 2. INPUT the unknown sample name and MEASURE the unknown sample.

7 Calculation of analysis results

MEASURE the X-ray intensity of the standard sample, in order to obtain the quadratic equation or the first order equation of the intensity and concentration. The quadratic equation can be calculated by the least squares method. CALCULATE the calibration curve constants a , b , c AND the spectral line overlap correction coefficient β_{ik} , and SAVE them in the quantitative analysis software of the computer. Based on the X-ray measurement intensity of the unknown sample, USE the computer software and the equation (2) to calculate the content and automatically PRINT the measurement results.

$$W_i = aI_i^2 + bI_i + c \quad \dots\dots\dots (2)$$

This is an excerpt of the PDF (Some pages are marked off intentionally)

Full-copy PDF can be purchased from 1 of 2 websites:

1. <https://www.ChineseStandard.us>

- SEARCH the standard ID, such as GB 4943.1-2022.
- Select your country (currency), for example: USA (USD); Germany (Euro).
- Full-copy of PDF (text-editable, true-PDF) can be downloaded in 9 seconds.
- Tax invoice can be downloaded in 9 seconds.
- Receiving emails in 9 seconds (with download links).

2. <https://www.ChineseStandard.net>

- SEARCH the standard ID, such as GB 4943.1-2022.
- Add to cart. Only accept USD (other currencies - <https://www.ChineseStandard.us>).
- Full-copy of PDF (text-editable, true-PDF) can be downloaded in 9 seconds.
- Receiving emails in 9 seconds (with PDFs attached, invoice and download links).

Translated by: Field Test Asia Pte. Ltd. (Incorporated & taxed in Singapore. Tax ID: 201302277C)

About Us (Goodwill, Policies, Fair Trading...): <https://www.chinesestandard.net/AboutUs.aspx>

Contact: Wayne Zheng, Sales@ChineseStandard.net

Linkin: <https://www.linkedin.com/in/waynezhengwenrui/>

----- The End -----