YS

NON-FERROUS METAL INDUSTRY STANDARD

OF THE PEOPLE'S REPUBLIC OF CHINA

ICS 71.100.10

Q 52

YS/T 575.4-2007

Replacing YS/T 575.4-2006

Methods for chemical analysis of bauxite - Part 4: Determination of iron oxide content - Potassium titrimetric method

铝土矿石化学分析方法 第 4 部分：三氧化二铁含量的测定

重铬酸钾滴定法

Issued on: November 14, 2007 **Implemented on: May 01, 2008**

Issued by: National Development and Reform Commission

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Foreword

YS/T 575-2007 “Methods for chemical analysis of bauxite” is a modification to YS/T 575-2006 (formerly GB/T 3257-1999). It has 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 the total content of rare earth oxide Tribromo-arsenazo photometric method;
- Part 15: Determination of gallium oxide content - Rhodamine B-extraction photometric method;

Methods for chemical analysis of bauxite - Part 4: Determination of iron oxide content - Potassium titrimetric method

1 Scope

This Part specifies the determination method of iron oxide content in bauxite.

This Part is applicable to the determination of iron oxide content in bauxite. The determination range is ≥5.00%.

2 Method principle

In the hydrochloric acid medium, use tin dichloride to reduce most trivalent iron. Use sodium tungstate as indicator. Add titanium trichloride in drops to reduce the remaining trivalent iron as divalent iron. Use excessive titanium trichloride to further reduce tungstate to generate “tungsten blue”. Then add potassium dichromate in drops till blue disappears. Use sodium dibenzamide as indicator. Use potassium dichromate standard solution to titrate ferrous iron.

Vanadium interference. In the titration solution, vanadium pentoxide below 0.6mg is allowed.

3 Reagents

3.1 Potassium hydroxide.

3.2 Sodium peroxide.

3.3 Hydrochloric acid (ρ1.19g/mL).

3.4 Hydrochloric acid (1+1).

3.5 Hydrochloric acid (1+9).

3.6 Sulfuric acid (ρ1.84g/mL).

3.7 Phosphoric acid (ρ1.70g/mL).

3.8 Sulfuric acid-phosphoric acid mixed solution: Under stirring, slowly add 200mL of sulfuric acid (3.6) into 500mL of water. Then add 300mL of phosphoric

make the melt adhere to the inner wall of the crucible evenly. Cool.

5.3.2 Place the silver crucible in a 250mL beaker. Add 30mL of hot water. After the molten material falls off, use hydrochloric acid (3.5) and hot water to wash the crucible. Add 25mL of hydrochloric acid (3.3). Cover the watch glass. Heat to completely boil. Add tin dichloride solution (3.11) in drops till light yellow. Add water to about 100mL. Add 1mL of sodium tungstate solution (3.12). Add titanium trichloride solution (3.10) in drops till blue just appears. Then immediately use potassium dichromate standard solution (3.15) to titrate till it is colorless (without reading).

NOTE: The blank test shall be heated and boiled to remove hydrogen peroxide before the acidification of hydrochloric acid.

5.3.3 Immediately add 10mL of sulfuric acid-phosphoric acid mixed solution (3.8) and 4 drops of diphenylamine sulfonate indicator solution (3.13). Use potassium dichromate standard solution (3.15) to add in drops till purple blue is stable, which shall be the end.

5.3.4 Reagent blank shall be operated according to the analysis steps in 5.3.1~5.3.2. But in (5.3.3), before sulfuric acid-phosphoric acid mixed solution is added, add 5.00mL of ferrous ammonium sulfate solution (3.14) first. The volume of potassium dichromate standard (3.15) used is A. Then add 5.00mL of ferrous ammonium sulfate solution (3.14) into the solution. Still use potassium dichromate standard solution (3.15) to titrate to the end. Record the volume as B. Repeat adding ferrous ammonium sulfate solution (3.14). Use potassium dichromate standard solution (3.15) to titrate. When B value is a certain constant value, A-B shall be the volume (V_0) of potassium dichromate standard solution (3.15) used by the blank.

6 Calculation of analysis result

Calculate the mass fraction (%) of ferric oxide according to the following formula:

$$w(Fe_2O_3) = \frac{(V - V_0) \cdot c \times 0.1597}{m} \times 100$$

Where,

V - Volume of potassium dichromate standard titration solution consumed during titration of test portion solution, in milliliters (mL);

V_0 - Volume of potassium dichromate standard titration solution consumed during titration of blank solution, in milliliters (mL);

c - Actual concentration of potassium dichromate standard solution, in Moles

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