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

YS/T 575.6-2007

**Methods for chemical analysis of bauxite. Part 6: Determination
of titanium dioxide content. Diantiprylmethane photometric
method**

(English Translation)

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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 Methods for Chemical Analysis of Bauxite -

Part 6: Determination of Titanium Dioxide Content -
Diantiprylmethane Photometric Method

1 Scope

This Part specifies the determination of titanium dioxide content in bauxite.

This Part is applicable to the determination of titanium dioxide content in bauxite; the determination range is 0.50%~8.00%.

2 Method Principle

a) Treat with a mixed acid among hydrochloric acid, nitric acid and sulfuric acid.

This method is suitable for gibbsite or boehmite. It is required that after the dissolution of the sample, the residue after volatile of silicon dioxide is less than 1% of the amount of the specimen.

b) Sintered with sodium peroxide, melted briefly, and dissolved with sulfuric acid.

This method is suitable for diasporite. It is required that after the dissolution of the sample, the residue after volatile of silicon dioxide is greater than 1% of the

amount of the specimen.

c) Melt with sodium carbonate and sodium tetraborate, and extract with sulfuric acid.

This method is applicable to all types of ore.

Silicon dioxide dehydrates, dissolves salts, filters, and burns the residue. It is evaporated with hydrofluoric acid and sulfuric acid to disperse the silicon dioxide; melted with sodium carbonate and sodium tetraborate; dissolved with sulfuric acid, and incorporated into the main solution. Reduce Fe^{3+} with ascorbic acid; develop color by diantipyrylmethane; then measure the absorbance of the solution at about 390nm.

3.1 Sodium peroxide.

NOTE: Sodium peroxide should prevent moisture absorption and it cannot be used once it is agglomerated.

3.2 Sodium carbonate and sodium tetraborate flux: use 3 parts of anhydrous sodium

carbonate (Na_2CO_3) and 1 part of anhydrous sodium tetraborate ($\text{Na}_2\text{B}_4\text{O}_7$) to mix thoroughly.

3.7 Mixed acid: pipette 225 mL of water into a 1000 mL beaker; carefully add 175 mL

of sulfuric acid, and mix well. Cool to room temperature; add 150mL of hydrochloric acid and 50mL of nitric acid; and mix well (prepared when it is used).

3.9 Diantipyrylmethane solution (15g/L): dissolve 15g of diantipyrylmethane

($\text{C}_{23}\text{H}_{24}\text{N}_4\text{O}_2$) into 1L of sulfuric acid (1+49); prepare on the day of use.

3.10 Ammonium ferric sulfate solution: Dissolve 6 g of ferric ammonium sulfate [Fe₂

$(\text{NH}_4)_2(\text{SO}_4)_4 \cdot 24\text{H}_2\text{O}$] in 1L of water containing 10mL sulfuric acid solution (3.5).

3.11 Titanium standard storage solution: 1mL solution contains 1mg titanium dioxide.

In use, any of the following methods can be used:

3.11.1 Take 0.300g of high-purity titanium (99.9%), accurate to 0.001g. Put in a conical

flask; add 50mL of water and 50mL sulfuric acid solution (3.4); dissolved by heating. Add nitric acid (1+4) drop by drop to oxidize the solution until the purple color disappears. Cool off, transfer to a 500mL volumetric flask; dilute to the scale and mix evenly.

3.11.2 Take 0.500g of high-purity titanium dioxide (99.9%), accurate to 0.001g (burned

in a platinum crucible at 980°C for 30min before cooling in a dryer). Put it into a 250mL conical flask; add 8g of ammonium sulfate and 25mL of sulfuric acid (3.4). Insert a short-neck glass funnel on the bottle mouth; carefully heating continuously to a slight boiling; continue heating to complete dissolution; and cool to room temperature. Add 200mL of water in one portion and cool. Quantitatively transfer 100mL of sulfuric acid. If the specimen is decomposed by acid; it shall be performed according to analytical procedure 6.5.1.1. If the specimen is decomposed by alkaline sintering, it shall be performed by analytical procedure 6.5.1.2. If the specimen is decomposed by melting, it shall be performed by the analysis steps of 6.5.1.3.

6.4.1.1 Acid decomposition

Put the specimen (6.1) in a 400mL beaker; moisten it with water. Add 60mL of mixed acid (3.7); cover with a watch glass and decompose by heating at 80°C (when the amount of Fe₂O₃ in the specimen is greater than 15%, heating time shall be extended a bit). After the brown smoke is gone, wash the watch glass and the wall of the beaker. Remove the watch glass; heat and evaporate until the thick sulfuric acid smoke appears. Cover the watch glass again; and heat it on hot plate to keep the temperature of the solution at 210°C±10°C. Heat the strong reflow for 60min. In another beaker