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

YS/T 514.1-2009

**Method for chemical analysis of high-titanium slag and rutile.
Part 1: Determination of titanium dioxide content. Ferric
ammonium sulfate titration**

高钛渣、金红石化学分析方法 第1部分：二氧化钛量的测定 硫酸铁铵滴定法
(English Translation)

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Foreword

YS/T 514 " Methods for chemical analysis of high-titanium slag and rutile"

consists of the following 10 parts:

- Part 1: Determination of titanium dioxide content - Ferric ammonium sulfate titration;
- Part 2: Determination of total iron content - Potassium dichromate titration;
- Part 3: Determination of sulfur content - High frequency infrared absorption method;
- Part 4: Determination of silicon dioxide content - Gravimetric analysis and molybdenum blue spectrophotometry;
- Part 5: Determination of aluminium oxide content - EDTA titration;
- Part 6: Determination of manganese monoxide content - Flame atomic absorption spectrometry;
- Part 7: Determination of calcium oxide and magnesium oxide content - Flame atomic absorption spectrometry;
- Part 8: Determination of phosphorus content - Antimony molybdenum blue spectrophotometry;

- Part 9: Determination of calcium oxide, magnesium oxide, manganese monoxide, phosphorus, chromic oxide and vanadium pentoxide;
- Part 10: Determination of carbon content - High frequency infrared absorption method.

This Part is Part 1 of YS/T 514.

This Part replaces YS/T 514.1-2006 " Methods for chemical analysis of high-titanium slag and rutile The ammonium ferric sulfate volumetric method for the determination of titanium dioxide content".

Compared with YS/T 514.1-2006, the main changes in this Part are as follows:

- the added sodium peroxide does not change, but the amount added in advance is adjusted from 2g to 3g; adjusted the amount of coverage on the test material from 2g to 1g;
- adjusted the sample weight from 0.2000g to 0.1000g;
- added regulations on the allowable number of interfering elements such as Methods for chemical analysis of high-titanium slag and rutile - Part 1: Determination of titanium dioxide content - Ferric ammonium sulfate titration

1 Scope

This Part of YS/T 514 specifies the determination of titanium dioxide content in high titanium slag, rutile.

This Part is applicable to the determination of titanium dioxide content in high titanium slag, rutile. The determination range: $\geq 70\%$.

This Part is applicable to the determination of titanium dioxide amount in the test solution of which the content of chromium and vanadium is not more than 3mg, the content of molybdenum and tungsten is not more than 2mg, and the content of tin and copper is not more than 1mg.

2 Method summary

The test material is melted with sodium peroxide. Use water to leach. In sulfuric acid and hydrochloric acid medium, use aluminum foil to reduce titanium (IV) to (III) valence. Under the protection of carbon dioxide gas, use ammonium thiocyanate solution as indicator. Use ferric ammonium sulfate standard titration solution to titrate.

3 Reagents

Unless otherwise specified, it shall only use the confirmed analytically-pure reagents AND distilled water or deionized water or equivalent-pure water.

3.4 Aluminum foil (mass fraction $\geq 99.5\%$): Cut 1g of aluminum foil into a rectangle with a length of 3cm~4cm and a width of about 1cm.

0.9999 - The purity of titanium dioxide (3.3).

If the range exceeds 0.10mL, it shall be re-calibrated.

4.2 The specimen needs to be pre-baked at 105°C~110°C for 2h. Place in a desiccator. Cool to room temperature.

5.1 Test material

Weigh 0.1g of specimen, to the nearest of 0.0001g.

5.2 Number of determinations

Make parallel determinations of 3 test materials. Take the average value.

5.3 Blank test

Do a blank test with test material.

5.4.1 Place the test material in a 30mL corundum crucible that has been pre- filled with 3g of sodium peroxide (3.1). Cover with 1g of sodium peroxide (3.1). Put on the crucible lid. Leave a gap. Bake on the electric stove until the flux is browned. Then put the crucible in a high temperature furnace. Melt at

750°C~800°C for 4min~6min. Take it out and cool.

5.4.2 Use filter paper to wipe the outer wall of the crucible. Put the crucible lid

in a 300mL beaker. Add 50mL~60mL of water. Cover with watch glass. Heat and leach the melt. Remove and cool for a while. Slowly add 30mL of sulfuric acid (3.7) and 30mL of hydrochloric acid (3.5) along the wall of the cup. Heat to dissolve all the melt. Remove. Use hydrochloric acid (3.6) to wash the crucible and lid.

5.4.3 Transfer the solution into a 500mL Erlenmeyer flask. Add hydrochloric acid

(3.6) to make the volume about 150mL. Heat for a while. Remove. Add 2g of aluminum foil in portions (3.4). Shake it from time to time. After most of the aluminum foil is dissolved, stopper the mouth of the bottle with a Geistlich funnel containing an appropriate amount of saturated sodium bicarbonate solution (3.8). Heat it on a low-temperature electric stove until the aluminum foil is

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