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# NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA



# GB/T 6609.7-2026

Replacing GB/T 6609.7-2004

**Chemical analysis and physical property determination methods for alumina - Part 7: Determination of titanium dioxide, chromium sesquioxide, cupric oxide, fluorine, chlorine, boron trioxide, phosphorus pentoxide and sulfate - Spectrophotometry**

氧化铝化学分析方法和物理性能测定方法 第7部分：二氧化钛、三氧化二铬、氧化铜、氟、氯、三氧化二硼、五氧化二磷、硫酸根含量的测定 分光光度法

**Issued on: May 25, 2026** **Implemented on: December 1, 2026**

**Issued by: State Administration for Market Regulation; Standardization Administration of the PRC**

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## Foreword

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7.Determination of titanium dioxide, chromium sesquioxide, cupric oxide, fluorine, chlorine, boron trioxide, phosphorus pentoxide, sulfate contents - Spectrophotometry meth ICS

30 National Standards of the People's Republic of China Replaces GB/T 6609.7~6609.9-2004 and GB/T 6609.14~6609.18-2004 Chemical analysis methods and physical property determination of alumina Method Part

7.Titanium Dioxide, Chromium Trioxide, Copper oxide, fluorine, chlorine, boron trioxide, phosphorus pentoxide Determination of sulfate content by spectrophotometry Released on May 25, 2026; to be implemented on December 1, 2026. State Administration for Market Regulation The State Administration for Standardization issued a statement.

1.Scope This document describes a spectrophotometric method for determining titanium dioxide, chromium trioxide, copper oxide, fluorine, chlorine, boron trioxide, and pentoxide in alumina. Methods for determining the content of diphosphate and sulfate. This document applies to alumina containing titanium dioxide, chromium trioxide, copper oxide, fluorine, chlorine, boron trioxide, phosphorus pentoxide, and sulfate. Quantity determination. The measurement range is shown in Table 1.

## 4 Determination of titanium dioxide content

4.1 Method Overview The sample is dissolved in hydrochloric acid or sulfuric acid. Diantipyrin methane is then added to the dissolved hydrochloric acid or sulfuric acid solution to react with titanium ions. The resulting yellow complex was measured at a spectrophotometer at a wavelength of 390 nm. Interference from iron(III) was reduced to low concentrations with ascorbic acid. Price elimination.

4.2 Reagents Unless otherwise specified, only reagents confirmed to be of superior purity

and Class II water conforming to GB/T 6682 shall be used in the analysis.

4.2.1 Sulfuric acid (1 2).

4.2.2 Hydrochloric acid (5 1).

4.2.3 Ascorbic acid solution (100g/L). Prepare fresh before use.

4.2.4 Diantipyrinmethane solution (50 g/L). Weigh 10 g of diantipyrinmethane, dissolve it in a small amount of hydrochloric acid (1.5), and then dissolve it in hydrochloric acid. (1 5) Dilute to.200mL and mix well. Prepare fresh before use.

4.2.5 Titanium dioxide standard stock solution. Weigh 0.2998 g of metallic titanium (wTi>=99.9%) into a 500 mL Erlenmeyer flask and add 50 g of titanium dioxide standard stock solution. 0 mL water,

10.0 mL hydrochloric acid (4.2.2),

50.0 mL sulfuric acid (1 1), heat to dissolve, add nitric acid (1 4) dropwise, and oxidize the solution until it turns purple. After the color disappears, cool to room temperature, transfer to a 500mL volumetric flask, dilute to the mark with water, and mix well. 1mL of this solution contains 1mg of titanium dioxide. Alternatively, use commercially available certified solutions.



### 4.2.6 Titanium Dioxide Standard Solution. Transfer

5.00 mL of titanium dioxide standard stock solution (4.2.5) to a 1000 mL volumetric flask and dilute with water. Dilute to the mark and mix well. 1 mL of this solution contains 5 μg of titanium dioxide.

### 4.3 Instruments and Equipment

4.3.1 Microwave digestion apparatus.

4.3.2 Spectrophotometer, absorption cell is 1cm or 5cm.

4.3.3 Oven. The temperature can be controlled at 300°C±10°C.

4.3.4 PTFE sealed sample container. See Figure A.1 in Appendix A for a schematic diagram.

4.4 Sample Sampling shall be carried out in accordance with the provisions of Chapter 6 of GB/T 6609.22-2026, and sample preparation shall be carried out in accordance with Section

7.4 of GB/T 6609.22-2026. The regulations shall be followed.

### 4.5 Test Procedure

4.5.1 Sample Weigh the sample (4.4) according to Table 2, accurate to 0.0001g.

4.5.2 Parallel Tests Perform two parallel experiments and take the average value.

4.5.3 Blank Test A blank test was performed along with the sample.

### 4.5.4 Measurement

4.5.4.1 Perform sample dissolution according to one of the following steps.

---PTFE sample dissolution method. Place the sample (4.5.1) in a sealed PTFE sample dissolution container (4.3.4), and when the sample mass... When the sample mass is 0.50g, add 10.0mL of hydrochloric acid (4.2.2); when the sample mass is 1.00g, add 15.0mL of hydrochloric acid (4.2.2). 2) Melt in an oven at 240°C±3°C (4.3.3) for 4 hours, then remove and cool;

---Microwave digestion method. Place the sample (4.5.1) in a reaction vessel of a 100mL microwave digester (4.3.1), and add 10.0mL of sulfur. Add acid (4.2.1), cover the reaction vessel, place it in the microwave digester, and proceed with the selected optimal microwave digestion program. Dissolve.

4.5.4.2 Preparation of test solution. Rinse the solution (4.5.4.1) into a 50 mL volumetric flask with a small amount of hot water, shake well, and cool to room temperature. Add

2.0 mL of ascorbic acid solution (4.2.3) and

10.0 mL of diantipyrin methane solution (4.2.4) were diluted with water to the mark, shaken well, and left to stand. 15 minutes.

4.5.4.3 Measurement. Transfer a portion of the test solution (4.5.4.2) into a 1 cm or 5 cm absorption cell, and measure it at the wavelength (4.3.2) of a spectrophotometer. At 390 nm, using water as a reference, the absorbance was measured. The absorbance of the blank test solution (4.5.3) was then subtracted from the measured absorbance, and the result was obtained from the corresponding working... The mass of titanium dioxide was determined by plotting the curve.

### 4.5.5 Drawing the working curve

4.5.5.1 Transfer 0 mL,

10.0 mL of titanium dioxide standard solution (4.2.6) into a container. In a 50 mL volumetric flask, add 8 mL of hydrochloric acid (4.2.2) or 10 mL of sulfuric acid solution (4.2.1),

2.0 mL of ascorbic acid solution (4.2.3), and... Dilute

10.0 mL of diantipyrin methane solution (4.2.4) with water to the mark, shake well, and let stand for 15 min.

4.5.5.2 Transfer the series of standard solutions (4.5.5.1) into a 1 cm or 5 cm absorption