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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 13219-2018

Replacing GB/T 13219-2010

Scandium oxide

氧化钪

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1 Scope

GB/T 13219-2018 is the Chinese national standard on scandium oxide, in the field of metallurgy. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 13 July 2018 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 April 2019. Classification: ICS 77.120.99, CCS H65. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This standard specifies the requirements, test methods, inspection rules and packaging, marking, transportation, storage and quality certificates of scandium oxide. This standard is applicable to scandium oxide produced by extraction method, ion exchange method or extraction chromatography method for use in laser, electric light source, atomic energy, electronics, metallurgy and other fields.

2 Normative references

The following documents are indispensable for the application of this document. For dated reference documents, only the dated version applies to this document. For undated reference documents, the latest version (including all amendments) is applicable to this document.

GB/T 8170 Rules of rounding off for numerical values & expression and judgement of limiting values

GB/T 12690.2 Chemical analysis methods for non-rare earth impurity of rare earth metals and their oxides - Part 2: Determination of ignition loss content of rare earth oxides - Gravimetric method

GB/T 12690.3 Chemical analysis methods for non-rare earth impurity of rare earth metals and their oxides - Part 3: Determination of water content of rare earth oxides - Gravimetric method

GB/T 17803 Designation system for rare earth products

3 Requirements

3.1 Product designations The products are divided into five designations according to chemical composition: Sc₂O₃-5N₅, Sc₂O₃-5N, Sc₂O₃-4N, Sc₂O₃-3N₅, Sc₂O₃-3N; the method of expressing product designations shall comply with GB/T 17803.

3.2 Chemical composition

4.1.1 Refer to Appendix A for the analysis method of total rare earth (REO). When the total amount of rare earths measured is more than 99%, the actual value of the total amount of rare earths is calculated by the subtraction method, that is (100% - Sigma non-rare earth impurities).

4.1.2 Refer to Appendix B for the analysis method of rare earth impurity content.

4.1.3 Refer to Appendix C for the analysis method of non-rare earth impurity content.

4.1.4 The analysis method of ignition loss and moisture shall be carried out in accordance with the provisions of GB/T 12690.2 and GB/T 12690.3.

4.1.5 The absolute purity of scandium oxide (Sc₂O₃) is calculated as [100% - (Sigma Rare earth impurities + Sigma non-rare earth impurities)].

4.1.6 The relative purity (Sc₂O₃/REO) of scandium oxide (Sc₂O₃) is calculated as (100% - Sigma rare earth impurities/REO).

4.2 Numerical rounding It is performed according to the provisions of GB/T 8170.

4.3 Appearance quality Under natural scattered light, visually check the appearance quality.

5.1 Inspection and acceptance

5.1.1 The product is inspected by the supplier's quality inspection department, to ensure that the product meets the requirements of this standard; meanwhile it shall fill the product quality certificate.

5.1.2 The purchaser shall inspect the received product. If the inspection result does not conform to the provisions of this standard, it shall notice the supplier within 2 months from the date of receipt of the product; the supplier and the buyer shall negotiate and resolve it. If arbitration is needed, it can be entrusted to a unit recognized by both parties to conduct a joint sampling on the buyer's site.

5.2 Group-batching Products shall be submitted for inspection in batches; each batch shall consist of products of the same designation.

5.3 Inspection items

- c) The name of the product manufacturer;
- d) Product name and designation;
- f) Gross weight and net weight;
- g) Packing date;
- h) Sign or words of "moisture-proof".

6.1.2 The products are packed in double-layer plastic bags or plastic bottles, each bag (bottle) has a net weight of

0.1 kg,

0.25 kg,

0.5 kg, 1 kg. Then put the bag (bottle) in an iron drum (wooden box, carton or plastic box); the net weight of each iron drum (wooden box, carton or plastic box) is

0.5 kg, 1 kg, 5 kg, 10 kg.

6.2 Transportation and storage The product shall be protected from rain and moisture during transportation; it shall be stored in a dry place and shall not be stacked in the open air.

6.3 Quality certificate Each batch of products shall be accompanied by a quality certificate, which shall indicate:

- a) Product name;
- b) Supplier's name, address, telephone, fax;

Appendix A

(Informative) Chemical analysis method of metal scandium and its oxide - Determination of the total amount of rare earths - Gravimetric method A.1 Scope This method specifies the determination method for the total amount of rare earths in scandium oxide. This method is suitable for the determination of the total amount of rare earths in scandium oxide.

Measuring range: 90.00% ~ 99.50%. A.2 Principle of the method The sample is dissolved in hydrochloric acid; the rare earth is precipitated by ammonia water to separate calcium and magnesium. The precipitate is dissolved by hydrochloric acid; the oxalic acid is used to precipitate rare earths. The total amount of rare earth oxide is determined by gravimetric method after precipitation and ignition. A.3 Reagents A.3.1 Hydrochloric acid ($\rho = 1.19 \text{ g/mL}$), excellent grade pure. A.3.2 Hydrochloric acid (1 + 1), excellent grade pure. A.3.3 Ammonia (1 + 1), excellent grade pure. A.3.4 Oxalic acid solution (50 g/L), excellent grade pure. A.3.5 Oxalic acid solution (20 g/L), excellent grade pure. A.3.6 Ammonia-ammonium chloride solution (20 g/L), which is adjusted to pH 9 ~ 10 with ammonia water (A.3.3). A.3.7 Cresol red indicator (1 g/L), prepared with ethanol. A.4 Specimen The oxide specimen is dried at 105 °C for 2 h, placed in a desiccator, cooled to room temperature, weighed immediately. A.5 Analytical procedures A.5.1 Sample

Appendix B

(Informative) Metal scandium and its oxide chemical analysis method - Determination of lanthanum, cerium, praseodymium, neodymium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, yttrium B.1 Scope This Appendix specifies the method for determining the amount of lanthanum oxide, cerium oxide, praseodymium oxide, neodymium oxide, samarium oxide, europium oxide, gadolinium oxide, terbium oxide, dysprosium oxide, holmium oxide, erbium oxide, thulium oxide, ytterbium oxide, lutetium oxide and yttrium oxide in scandium oxide. This appendix applies to the determination of lanthanum oxide, cerium oxide, praseodymium oxide, neodymium oxide, samarium oxide, europium oxide, gadolinium oxide, terbium oxide, dysprosium oxide, holmium oxide, erbium oxide, thulium oxide, ytterbium oxide, lutetium oxide, yttrium oxide in scandium oxide. This Appendix contains two methods. Method 1 is inductively coupled plasma spectroscopy; the measurement range is (mass fraction): 0.0010% ~ 0.10%; Method 2 is inductively coupled plasma mass spectrometry; the measurement range is (mass fraction): 0.00003% ~ 0.010%. When the measurement ranges of method 1 and method 2 overlap, method 2 is used as the arbitration method. This Appendix also applies to the determination of lanthanum, cerium, praseodymium, neodymium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, yttrium in scandium. B.2 Inductively coupled plasma spectroscopy (Method 1) B.2.1 Principle of the method The specimen is dissolved in hydrochloric acid; in a dilute hydrochloric acid medium, it is directly excited by an argon plasma light source, for the spectrum determination; the influence of the matrix on the determination is corrected by the matrix matching method. B.2.2 Reagents B.2.2.1 Hydrogen peroxide (30%), excellent grade pure. B.2.2.2 Hydrochloric acid (1 + 1), excellent grade pure. B.2.3 Apparatus B.2.3.1 Inductively coupled plasma spectrometer, resolution < 0.006 nm (at 200 nm) >. B.2.3.2 Light source: Argon plasma light source. B.2.4 Specimen