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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 20170.1-2026

Replacing GB/T 20170.1-2006

Test methods for the physical properties of rare earth metals and their compounds - Part 1: Determination of the particle size distribution of rare earth compounds - Laser diffraction method

稀土金属及其化合物物理性能测试方法 第1部分：稀土化合物粒度分布的测定 激光衍射法

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Foreword

This document conforms to GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting is scheduled. This document is Part 1 of GB/T 20170 "Test Methods for Physical Properties of Rare Earth Metals and Their Compounds". GB/T 20170 has been... The following sections were published. --Part

1.Determination of particle size distribution of rare earth compounds by laser diffraction; --Part

2.Determination of the specific surface area of rare earth compounds by nitrogen adsorption method. This document replaces GB/T 20170.1-2006 "Test Methods for Physical Properties of Rare Earth Metals and Their Compounds, Rare Earth Compound Particle Size Analysis". The main technical changes in the "Determination of Fabric" standard, compared with GB/T 20170.1-2006, are as follows, except for structural adjustments and editorial modifications.

a) The scope has been changed from "rare earth compounds" to "rare earth oxides, rare earth composite oxides, rare earth carbonates, rare earth polishing powders". The measurement range for "rare earth compounds such as rare earth sulfides" has been changed from "0.1 μm ~ 1200 μm" to "0.1 μm ~ 500 μm" (see page 1). Chapter 1 (2006 edition).

b) The principle has been changed (see Chapter 4, Chapter 4 of the.2006 edition);

c) The instruments and reagents were changed, and ethanol was added as the dispersion medium; the mass concentration of the dispersant was changed from "

3.0 g/L" (see...). Chapter 5 (Chapter 5 of the.2006 edition);

d) The requirements for instruments and equipment have been changed (see Chapter 6, Chapter 5 of the.2006 edition);

e) Increased sample requirements (see Chapter 7);

f) The test procedures were changed (see Chapter 8, Chapter 6 of the.2006 edition);

g) The experimental data processing was changed (see Chapter 9, Chapter 7 of the.2006 edition);

h) The precision has been changed (see Chapter 10, Chapter 8 of the.2006 edition);

i) Quality assurance has been removed (see Chapter 9 of the.2006 edition);

5 Reagents or materials

5.1 Unless otherwise specified, only reagents confirmed to be of analytical grade or higher and water conforming to GB/T 6682 shall be used in the analysis.

5.2 Dispersion medium. water, ethanol.

6 Instruments and Equipment

6.1 Laser Particle Size Analyzer Under optimal instrument operating conditions. --Configure a multi-functional wet dispersion injection system; --Complies with JJF 1211.

6.2 Ultrasonic Cleaner Power not less than 100 W, frequency 40 kHz.

7 Samples

Before testing, the sample condition should be checked to ensure that the particles are fully dispersed.

8 Test Procedure

8.1 Sample Preparation Testing should begin immediately after opening the sample, using a multi-point sampling method (no less than 3 points) to collect

0.1 g to

0.5 g of sample (see Chapter 7). Place the mixture in a 100 mL beaker, add 10 mL of dispersant (5.3), shake to disperse, and then place in an ultrasonic cleaner (6.2) to disperse for 5 min to 10 min. Immediately afterwards, the ultrasonic liquid level should not be lower than the liquid level of the dispersed sample during the ultrasonic dispersion process.

8.2 Testing

8.2.1 Turn on the instrument and preheat for at least 30 minutes.

8.2.2 Cleaning the sample injection system.

8.2.3 Common rare earth compound samples should be examined using the Mie theory optical model. The refractive indices and absorptivity of common rare earth compounds are shown in Appendix A. Table A.1.For samples where the accurate complex refractive index cannot be obtained, if they are opaque or have a particle size greater than 50 μm, light transmission within the particles can be disregarded. However, the Fraunhofer approximation theoretical optical model is used. Other measurement parameter settings should be made according to the specifications in Table 1.

8.2.4 The test shall begin once the test background meets the requirements of the laser particle size analyzer instruction manual.

8.2.5 During rapid stirring, use a syringe sampler or Pasteur pipette to draw an appropriate amount of sample (8.1), and add it to the measurement system in small, frequent additions. Continue testing until the required shading rate or concentration is reached, and then perform three consecutive tests after stabilization, taking the average value.

Note. While ensuring the representativeness of the sampling, the sampling amount can be appropriately changed and transferred to the measurement system.

8.2.6 After the measurement is completed, the sample injection system should be cleaned in a timely manner.

9.Presentation of Experimental Results Particle size distribution results are expressed as D50, but D10 and D90 can also be used. Precision data are provided in Appendix B. D10 represents the lower volumetric accumulation. The particle diameter corresponding to a cumulative distribution of 10%; D50 is the particle diameter corresponding to a cumulative distribution of 50%; D90 is the particle diameter corresponding to a cumulative distribution of 50%; The particle diameter corresponding to a cumulative distribution of 90%.

10 Precision

10.1 Repeatability Two independent tests obtained under repeatability conditions should be performed, and the absolute difference between the results of these two independent tests should not exceed the repeatability limit. (r), the number of cases exceeding the repeatability limit (r) is no more than 5%, and the repeatability limit (r) is obtained by linear interpolation based on the data in Table 2.

10.2 Permissible Difference The D50 test results of two independent tests between laboratories should not exceed the allowable difference listed in Table 3.