ICS 77.120.99
CCS H 14

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 20170.2-2026

Replacing GB/T 20170.2-2006

Test methods for the physical properties of rare earth metals and their compounds - Part 2: Determination of the specific surface area of rare earth compounds - Nitrogen adsorption method

稀土金属及其化合物物理性能测试方法 第2部分：稀土化合物比表面积的测定 氮气吸附法

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

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 2 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 20170.2-2006 "Test Methods for Physical Properties of Rare Earth Metals and Their Compounds - Specific Surface Area of Rare Earth Compounds". Compared with GB/T 20170.2-2006, the main technical changes in "Determination of Volume" are as follows, except for structural adjustments and editorial modifications.

a) The applicable range and measurement range have been changed from "

0.20 m^2/g~300 m^2/g" to "

1.00 m^2/g~900 m^2/g" (see section 1). Chapter 1 (2006 edition).

b) The method summary has been revised (see Chapter 4, Chapter 4 of the.2006 edition);

c) Sample requirements have been changed from "all samples dried" to "rare earth carbonates only dried," and other samples should be weighed immediately after opening (see [link]). Chapter 7 (Chapter 7 of the.2006 edition);

d) The degassing conditions were changed; the degassing temperature was changed from "200 °C" to "200 °C~300 °C", and an additional degassing device was added (see 8.2). (8.3.1,.2006 edition).

e) The measurement conditions have been changed, and requirements for relative pressure data points and the BET linear correlation coefficient have been added (see

8.2.3 and 8.2.4). Chapter 8 of the.2006 edition);

f) The specific surface area range, pore type, and measurement parameters of common rare earth compounds have been added (see Table 1);

g) The operating conditions for the Beckman-Kurt surface comparison instrument have been removed (see Appendix A of the.2006 edition). Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents. This document was proposed and is under the jurisdiction of the National Rare Earth Standardization Technical Committee (SAC/TC 229). This document was drafted by: Baotou Rare Earth Research Institute, Jiangyin Jia Hua New Material Resources Co., Ltd., and Hunan Rare Earth Metal Materials Research Institute Co., Ltd. Limited Liability Company, National Standard (Beijing) Inspection and Certification Co., Ltd., Baotou Tianjiao Qingmei Rare Earth Polishing Powder Co., Ltd., Gansu Rare Earth New Materials Co., Ltd. Limited Liability Company, Sichuan Leshan Ruifeng Metallurgy Co., Ltd., Ganzhou Zhanhai New Material Technology Co., Ltd., and Northern Zhongxin Antai New Material (Inner Mongolia) Limited Liability Company. The main drafters of this document are. Yang Xuezheng, Zhang Xiuyan, Li Xinxin, Yao Jingbi, Wang Guichao, Fu Zhongzhen, Fan Chengmei, Chen Yanqun, and Yi Ruilin. Yang Guosheng, Li Chongshan, Liang Xiaoxia, Luo Wei, Jin Hongxia, Zhang Hongli, Zhang Qixin. This document was first published in.2006, and this is its first revision.

5 Reagents or materials

5.1 Liquid nitrogen. colorless and transparent, with a volume fraction of not less than 99.9%.

5.2 Nitrogen. Volume fraction not less than 99.999%.

6 Instruments and Equipment

6.1 Specific surface area analyzer. Applicable to all physical adsorption instruments based on static volumetric method.

6.2 Degassing device. capable of heating to a temperature of not less than 300 °C and maintaining a vacuum pressure of less than

10 Pa for degassing.

6.3 Quartz sample tube (equipped with a dedicated funnel and filling rod).

7 Samples

Rare earth carbonate samples were dried at 105 °C for 1 h, placed in a desiccator, and weighed immediately after cooling to room temperature. Other samples were weighed immediately after opening.

8 Test Procedure

8.1 Sample Weigh the cleaned and dried quartz sample tube (6.3) (accurate to 0.0001 g), and use a special funnel to fill the sample tube with the sample. Avoid sticking to the sample tube wall. Ensure the maximum sample volume does not exceed 1/2 of the sample tube, and follow the ratio of common rare earth compounds in Table 1. The area range and sample weight control are set at 2 m2 to 80 m2 for the total surface area of the sample.

8.2 Degassing Connect the sample tube containing sample (8.1) to the degassing device and set the heating temperature to.200 °C~300 °C. Turn on the degassing switch and begin degassing the sample. Heat the sample and evacuate it. Once the heating temperature reaches the set temperature and the vacuum degree is no greater than

10 Pa, set the degassing time according to the specifications in Table 1.

Note. If a special sample requires a lower degassing temperature, the holding time needs to be increased.

8.3 Adsorption

8.3.1 After degassing, cool to room temperature and backfill with nitrogen (5.2). Weigh the total mass of the sample tube and the sample, accurate to 0.0001 g. The actual mass (m) of the sample is calculated according to formula (1).

8.3.2 Add a filling rod to the sample tube (8.2.1) containing the sample and transfer it to the analysis station, and inject sufficient liquid nitrogen (5.1) into the Dewar flask.

8.3.3 Set the measurement parameters according to the instrument manual and set the relative pressure points as specified in Table 1.

8.3.4 During the calculation, the pore type is determined according to the adsorption curve, and the points are selected within the range of relative pressure points in Table 1, choosing 3 to 5 consecutive relative pressure points. Data points were calculated using the BET model, with the maximum specific surface area result used while ensuring a BET linear correlation coefficient greater than 0.999. As the final result.

9 Precision

9.1 Repeatability The absolute difference between two independent test results obtained under repeatability conditions does 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.

9.2 Reproducibility The absolute difference between two independent test results obtained under reproducibility conditions does not exceed the reproducibility limit. The number of cases exceeding the reproducibility limit (R) is no more than 5%. The reproducibility limit (R) is obtained by linear interpolation based on the data in Table 3.