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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 3074.3-2026

Replacing GB/T 3074.3-2008

Method for the determination of the oxidation resistance of carbon materials

炭素材料氧化性测定方法

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. This document is Part 3 of GB/T 3074.GB/T 3074 has the following parts published.

---Test Method for Flexural Strength of Carbon Materials (GB/T 3074.1);

---Method for Determining the Elastic Modulus of Carbon Materials (GB/T 3074.2);

---Determination of Oxidizing Properties of Carbon Materials (GB/T 3074.3);

---Determination of the coefficient of thermal expansion (CTE) of graphite electrodes (GB/T 3074.4). This document replaces GB/T 3074.3-2008 "Method for Determination of Oxidizing Properties of Graphite Electrodes". Compared with GB/T 3074.3-2008, except for the structure... Aside from adjustments and editorial changes, the main technical changes are as follows:

a) The scope of application of the standard has been changed (see Chapter 1, Chapter 1 of the.2008 edition);

b) Added terms and definitions (see Chapter 3);

c) The formulation of the principle has been changed (see Chapter 4, Chapter 3 of the.2008 edition);

d) The instrumentation and equipment requirements have been changed (see Chapter 5, Chapter 4 of the.2008 edition);

e) The requirements for the test specimens have been changed (see Chapter 6, Chapter 5 of the.2008 edition);

f) The experimental procedures were changed (see Chapter 7, Chapter 6 of the.2008 edition);

g) The calculation formula has been changed (see Chapter 8, Chapter 7 of the.2008

edition);

h) Increased precision requirements (see Chapter 9). 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 by the China Iron and Steel Association. This document is under the jurisdiction of the National Steel Standardization Technical Committee (SAC/TC183). This document was drafted by: Jilin Carbon Co., Ltd., Kaifeng Pingmei New Carbon Materials Technology Co., Ltd., and Shanxi Sanxian New Energy Co., Ltd. Company, Chengdu Fangda Carbon Composite Materials Co., Ltd., Shanxi Meishanhu Technology Co., Ltd., Jimeng Carbon Co., Ltd., Metallurgical Industry Information Standards Research Institute. The main drafters of this document are. Feng Ximing, Jia Wentao, Zhao Shigui, Cui Lingwei, Wang Zhiqiang, Dong Zengliang, Jia Xinjian, Yao Luguang, and Wang Xiaoyuan. Guo Mingsheng, Zhang Xiangjun, Lu Qinghong, Lu Peizhong, Zhang Songwei, Ma Wei, Yang Bo, Jiao Xiaoyong, Gao Bo, Xiao Hui, Zhang Jiandong, Lu Bing. This document was first published in 1982, revised for the first time in.2008, and this is the second revision.

5 Instruments and Equipment

5.1 Analyzing the Balance Scale Graduation value 0.0001g.

5.2 Suspension Specimen Device A bracket with a hanging function.

5.3 Quartz Tube Outer diameter 64mm, inner diameter 56mm, length 900mm.

5.4 Heating Furnace Temperatures can reach over 650°C.

5.5 Automatic Temperature Controller It can adjust the heating rate and control the heat preservation accuracy to ±5°C.

5.6 Gas Flow Meter Accuracy within ±2%, measuring range 0L/min~5L/min.

5.7 Compressed Air Moisture content level 4.

5.8 Nitrogen Purity is above 99.99%.

5.9 Platinum wire (or tungsten wire) Diameter 0.3mm.

5.10 Forced-air drying oven It has an automatic temperature control device and can heat up to.200°C.

5.11 Oxidizing property measuring device A schematic diagram of the oxidizing property measuring device is shown in Figure 1.

6 Samples

6.1 Sampling and sample preparation shall be carried out in accordance with the provisions of GB/T 1427, and two samples shall be taken each time.

6.2 The sample shall be machined into a cylindrical specimen with a diameter of 25 mm and a height of 50 mm, with a machining error not exceeding ±

0.5 mm.

6.3 Drill a 1mm diameter hole 8mm from one end of the specimen, perpendicular to the forming direction, for suspending the specimen. The specimen should be... Dry in an oven at 120°C~130°C for no less than 2 hours, then place in a desiccator to cool to room temperature for later use.

7 Experimental Procedure

7.1 Remove the sample from the desiccator and weigh the sample (m1), with the reading accurate to 0.0001g.

7.2 Specimen size measurement. The diameter is measured three times along the axial direction (center point) of the specimen, at three points. top, middle, and bottom. Measurement is taken at each point. The sample was rotated 90° twice, and the average value was taken. The height was measured three times at different locations on the circumference of the sample end, rotating approximately 60° each time, and the average value was taken. Mean.

7.3 Calculate the surface area (S) of the sample using the average value of the measurement data.

7.4 The dried sample is suspended in the constant temperature zone of the quartz tube using platinum or tungsten wire (5.9), with the upper end suspended from the lower end of the sample suspension device. On the hook.

7.5 Place the thermocouple test end in the middle of the side of the sample, close to the inner wall of the quartz tube. Cover the top of the quartz tube with a graphite cap. Check the sample before measurement. The sample should not come into contact with the graphite cap or thermocouple before power is supplied. The heating rate should not exceed 8°C/min.

7.6 When the furnace temperature reaches 400°C, begin introducing nitrogen gas from the lower end of the quartz tube at a flow rate of 0.5L/min ± 0.02L/min. Continue heating until the furnace temperature reaches 400°C. When the temperature reaches 650°C±5°C, maintain a constant temperature, stop the nitrogen supply, and replace it with compressed air at a flow rate of 2L/min±0.05L/min.

7.7 The oxidation time was controlled according to different types of samples. graphite electrode samples were oxidized at a constant temperature for 4 hours, and carbon product samples were oxidized at a constant temperature for

0.5 hours, followed by isostatic pressing. The graphite sample was oxidized at a constant temperature for 6 hours, then heating was stopped, the compressed air supply was

stopped, and nitrogen gas was introduced instead at a flow rate of

0.5 L/min ±

0.02 L/min. Once the furnace temperature has dropped below.200°C, remove the sample and quickly place it in a constant-temperature desiccator to cool to room temperature (it needs to be cooled in the desiccator for at least...). After 30 minutes, weigh the sample mass (m2).

8 Result Calculation

8.1 The surface area (S) of the cylindrical sample is calculated according to formula (1).

8.2 The oxidizing power (Ox) of the sample is calculated according to formula (2).

8.3 Calculated results shall be rounded to one decimal place, and numerical rounding shall be performed in accordance with the provisions of GB/T 8170.

9.Precision The precision of the oxidizing property determination should meet the requirements of Table 1.

10 Test Report The test report should include the following.

a) Subjects, laboratory, and date of the experiment;

b) This document number;

c) Oxidation time, results, and their representation;

d) The analytical lines used;

e) Abnormal phenomena found during the measurement.