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Lithium nickel oxide

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Table of Contents

Lithium nickel oxide

1 Scope

This standard specifies the terms and definitions, requirements, test methods, inspection rules, markings, packaging, transportation, storage, quality certificate, and contract (or order form) content of lithium nickel oxide.

This standard applies to lithium nickel oxide, the positive active material for lithium-ion batteries.

2 Normative references

The following documents are essential for the application of this document. For the dated referenced documents, only the versions with the indicated dates are applicable to this document; for the undated referenced documents, only the latest version (including all the amendments) is applicable to this document.

GB/T 1717 Determination of pH value of an aqueous suspension of pigments

GB/T 5162 Metallic powders - Determination of tap density

GB/T 5314 Powders for powder metallurgical purposes - Sampling

GB/T 6283 Chemical products - Determination of water Karl • Fischer method (general method)

GB/T 13390 Metallic powder - Determination of the specific surface area - Method of nitrogen adsorption

GB/T 19077.1 Particle size analysis - Laser diffraction methods - Part 1: General principles

GB/T 23365 Electrochemical performance test of lithium cobalt oxide - Test method for the initial discharge specific capacity and the initial efficiency

GB/T 23366 Electrochemical performance test of lithium cobalt oxide - Test method for discharge plateau capacity ratio and cycle life

JCPDS[1)] (16-427) Graph of X-ray powder diffraction standard of lithium nickel oxide

[1)] Joint Committee on Powder Diffraction Standards

D_{10} shall be greater than 1.0 μm; D_{50} shall be 5.0 μm~10.0 μm; D_{90} shall be less than 30.0 μm.

4.5.3 Specific surface area

The specific surface area of the product shall be 0.30 m^2/g~0.70 m^2/g.

4.6 pH value

The pH value of the product shall be 10.0~12.5.

4.7 Electrochemical performance

4.7.1 First discharge specific capacity

The first discharge specific capacity of the product under specified conditions shall not be less than 170 mA • h/g.

4.7.2 First charge and discharge efficiency

The first charge and discharge efficiency of the product under specified conditions shall not be less than 87%.

4.7.3 Platform capacity ratio

Under specified conditions, the platform capacity ratio of the product shall not be less than 80% after 10 charge and discharge cycles, and the platform capacity ratio shall not be less than 70% after 100 charge and discharge cycles.

4.7.4 Cycle life

When the discharge capacity of the product reaches 80% of the first cycle discharge capacity under specified conditions, the number of cycles shall be no less than 300 times.

5 Test methods

5.1 Chemical composition

5.1.1 The chemical composition of the product shall be measured according to the method approved by both the supplier and the buyer.

5.1.2 The molar ratio of Li TO the combination of two elements Ni and Co in the chemical composition of the product is calculated based on the results measured in 5.1.1.

5.2 Appearance quality

The appearance quality of the product is visually inspected.

5.3 Moisture content

The moisture content of the product is measured in accordance with the provisions of GB/T 6283.

5.4 Crystal structure

The crystal structure of the product is detected by using an X-ray diffractometer.

5.5 Physical properties

5.5.1 Tap density

The measurement of the tap density of the product shall be carried out in accordance with the provisions of GB/T 5162.

5.5.2 Particle size distribution

The determination of the particle size distribution of the product is carried out in accordance with the provisions of GB/T 19077.1.

5.5.3 Specific surface area

The specific surface area of the product is measured in accordance with the regulations of GB/T 13390.

5.6 pH value

The pH value of the product is measured in accordance with the regulations of GB/T 1717.

5.7 Electrochemical properties

5.7.1 First discharge specific capacity

The first discharge specific capacity of the product is measured in accordance with the regulations of GB/T 23365.

5.7.2 First charge and discharge efficiency

The first charge and discharge efficiency of the product is measured in accordance with the regulations of GB/T 23365.

5.7.3 Platform capacity ratio

The determination of the platform capacity ratio of the product is carried out in accordance with the provisions of GB/T 23366. The voltage platform is 3.4 V.

6.5.2 If the appearance inspection of the product fails, the product quality of the barrel will be deemed to be unqualified.

6.5.3 Six test batteries are made according to the method specified in GB/T 23365. Three of them are selected randomly to test the first discharge specific capacity and first charge and discharge efficiency. If the performance of 2 batteries cannot meet the requirements of this standard, the batch is deemed to be unqualified; however, it is allowed to take 3 more batteries for re-inspection. If the performance of 2 batteries meets the requirements of this standard, the batch is deemed to be qualified.

6.5.4 Six test batteries are made according to the method specified in GB/T 23366. Three of them are selected randomly to test the platform capacity ratio and cycle life. If the performance of 2 batteries cannot meet the requirements of this standard, the batch will be deemed to be unacceptable; however, it is allowed to take 3 more batteries for re-inspection. If the performance of 2 batteries meets the requirements of this standard, the batch will be deemed to be qualified.

7 Marking, packaging, transportation, storage, and quality certificate

7.1 Marking

There is no mark on the surface of the aluminum-plastic packaging bag. There shall be a certificate of conformity on the outer packaging barrel, which shall be marked:

a) Batch number;

b) Trademark and name of the manufacturer;

c) Net weight;

d) This standard number;

e) Date of inspection;

f) Name or code of the inspector;

g) Moisture-proof mark.

7.2 Packaging

Products that pass the inspection are packed in aluminum plastic bags, thermoplastic sealed, and put into outer packaging barrels. The net weight of each barrel is about 25 kg.

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