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**Lithium-ion battery cathode materials-Determination of powder
compaction density**

锂离子电池正极材料 粉末压实密度的测定

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Foreword

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Lithium-ion battery cathode materials - Determination of powder compaction density

1 Scope

This document describes the principle, reagents and materials, instruments and equipment, samples, test procedures, test data processing, precision, test report, etc. of the method for determining the compaction density of lithium-ion battery positive electrode material powder.

This document is applicable to the determination of compaction density of lithium-ion battery positive electrode material powder.

2 Normative references

GB/T 8170

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 Compaction density

The ratio of the mass of a powder sample after being compacted under a certain pressure to the volume it occupies.

[Source: GB/T 41232.2-2021, 3.1.2, modified]

4 Principle

Weigh a certain mass of the powder material to be tested. Use external force to compress it. During the compression process, the gaps between the powders are filled. The contact

area between the particles increases. This causes attraction between atoms and enhances the mechanical fit between particles, thus forming a compact with a certain density and strength. The volume of the compact is calculated by measuring the thickness of the compact and combining it with the inner diameter of the mold. The compaction density of the powder material under a certain pressure is further calculated.

5 Reagents and materials

5.1 Anhydrous ethanol: analytically pure. 5.2 Dust-free paper. 5.3 Weighing paper.

6.1 Balance

The accuracy of the balance shall be not less than 0.0001 g.

6.2.1 The powder compaction density test system consists of a test mold, a

pressurization system, a thickness measurement system, etc., which meet the following requirements:

a) Test mold: The test mold is a double-opening cylinder made of high-hardness and wear-resistant material. It contains stainless steel, ceramic or other high-hardness material gaskets. There are two gaskets, upper and lower. It is also equipped with stainless steel upper and lower pressure heads. The inner diameter of the mold is 13 mm, 15 mm, 16 mm, 20 mm and other sizes. The upper and lower gaskets and upper and lower pressure heads shall match the inner diameter of the mold;

b) Pressurization system: The pressurization system is divided into two types:

automatic pressurization and manual pressurization. The pressurization pressure shall be no less than 63 MPa. The pressure can be maintained stably. The pressure rate of repeated tests shall be stable and consistent;

c) Thickness measurement system: Capable of accurately reading thickness information. Deviation is not less than 0.001 mm.

6.2.2 According to the production equipment conditions, an integrated automatic

pressurization thickness measurement data acquisition system can be selected. The system includes modules such as automatic pressurization, thickness measurement, data acquisition and calculation, which can realize automatic data output. The schematic diagram of the powder compaction density test mold and pressurization system is shown in Figure 1.