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YS

**NONFERROUS METALS INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

YS/T 1460-2021

Crude nickel cobalt hydroxide

粗氢氧化镍钴

(English Translation)

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1 Scope

This document specifies the technical requirements, test methods, inspection rules, markings, packaging, transportation, storage, accompanying documents and order forms for crude nickel cobalt hydroxide.

This document is applicable to crude nickel cobalt hydroxide products, which are obtained by wet enrichment processes such as pretreatment, leaching, impurity removal, and precipitation of lithium-ion battery waste containing nickel and cobalt elements. It can be used as raw materials for the production of nickel, cobalt, manganese three- element composite hydroxides, nickel cobalt manganese oxide, nickel or cobalt chemical salts and other related materials.

2 Normative references

The contents of the following documents constitute the essential terms of this document through normative references in the text. Among them, for referenced documents with dates, only the version corresponding to that date applies to this document; for referenced documents without dates, the latest version (including all amendments) applies to this document.

GB/T 6682 Water for analytical laboratory use - Specification and test methods

GB/T 8170 Rules of rounding off for numerical values and expression and judgement of limiting values

YS/T 1157.2 Methods for chemical analysis of crude cobalt hydroxide - Part 2:

Determination of nickel, copper, iron, manganese, zinc, lead, arsenic and cadmium contents - Inductively coupled plasma atomic emission spectrometry

YS/T 1229.2 Methods for chemical analysis of crude nickel hydroxide - Part 2:

Determination of cobalt content - Flame atomic absorption spectrometric method

YS/T 1229.3 Methods for chemical analysis of crude nickel hydroxide - Part 3:

Determination of copper, cobalt, manganese calcium, magnesium, zinc, iron, aluminum, lead, arsenic and cadmium contents - Inductively coupled plasma atomic emission spectrometry

YS/T 1342.1 Methods for chemical analysis of waste secondary battery - Part 1:

Determination of nickel content - Dimethylglyoxime gravimetric method and flame

5.2 Moisture

The moisture content of the product shall not exceed 60%.

5.3 Appearance quality

The product is in the form of wet block or dry mud or powder; it shall not be mixed with inclusions. The color of the same batch of products shall be consistent. Due to the oxidation of the surface, a certain difference in color between the surface and the inside is allowed.

5.4 Others

If the buyer has other requirements for the product, it shall be determined by negotiation between the supplier and the buyer and indicated in the order.

6 Test method

6.1

When the nickel content in the product is less than 1.00%, it shall be determined according to the provisions of YS/T 1157.2; when the nickel content is not less than 1.00%, it shall be determined according to the provisions of YS/T 1342.1.

6.2

When the cobalt content in the product is less than 1.00%, it shall be determined according to the provisions of YS/T 1229.2; when the cobalt content is not less than 1.00%, it shall be determined according to the provisions of YS/T 1342.2.

6.3

When the manganese content in the product is less than 0.10%, it shall be determined according to the provisions of YS/T 1229.3; when the manganese content is not less than 0.10%, it shall be determined according to the provisions of YS/T 1342.3.

6.4

The lithium content in the product shall be determined according to the provisions of YS/T 1342.4.

6.5

The copper, aluminum, arsenic, cadmium, lead contents in the product shall be determined according to the provisions of YS/T 1229.3.

6.6

The phosphorus and chromium contents in the product shall be determined according to the provisions of Appendix A or the method agreed upon by the supplier and the buyer.

6.7

The hydrochloric acid insoluble matter content in the product shall be determined according to the provisions of Appendix B or the method agreed upon by the supplier and the buyer.

6.8

The fluorine content in the product shall be determined in accordance with the provisions of Appendix C or the method agreed upon by the supplier and the buyer.

6.9

The moisture content in the product shall be determined in accordance with the provisions of Appendix D or the method agreed upon by the supplier and the buyer.

6.10

The appearance quality of the product shall be inspected by visual inspection.

7.1 Inspection and acceptance

7.1.1

The product shall be inspected by the supplier or a third-party inspection department. The supplier shall ensure that the product quality complies with the provisions of this document and the order form.

7.1.2

The buyer may inspect the received products in accordance with the provisions of this document. If the inspection results do not comply with the provisions of this document or the order form, the buyer shall submit the matter to the supplier within 30 days, from the

date of receipt of the product; the supplier and the buyer shall negotiate to resolve the issue. If arbitration is required, the supplier and the buyer shall jointly sample or negotiate at the buyer's place.

7.2 Group-batching

The products shall be submitted for inspection in batches; each batch shall consist of products of the same grade. One batch shall be formed by products of the same mixture.

7.3 Inspection items

Each batch of products shall be inspected for chemical composition, moisture content, appearance quality.

7.4 Sampling and specimen preparation

7.4.1

Randomly sample at least 50% of the packaging quantity of each batch of products.

When the packaging quantity is less than 10 bags, each bag shall be sampled; the sampling volume of each bag shall not be less than 0.4%.

7.4.2

The sampling points of each bag shall be evenly distributed at the top, middle, and bottom points according to any diagonal line on the side of the packaging bag. The sample rod shall penetrate both sides of the packaging bag; rotate the sample rod 180° and pull it out; the sample rod shall be full. When the material is not easy to sample, a hand hammer can be used to assist the sample rod to do sampling. Each sample shall be put into a plastic bag and sealed in time.

7.4.3

The whole batch of samples shall be put into a woven bag and sealed. All samples of each batch shall be fully mixed and divided into samples of about 4.0 kg by the grid method.

Appendix A (Normative)

Determination of phosphorus and chromium content in crude nickel cobalt hydroxide -
Inductively coupled plasma atomic emission spectrometry

A.1 Method summary

Dissolve the sample in hydrochloric acid; determine the phosphorus content by the working curve method and the chromium content by the standard addition method on an inductively coupled plasma atomic emission spectrometer.