

HG

**CHEMICAL INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

HG/T 5919-2021

Nickel sulfate for batteries

电池用硫酸镍

(English Translation)

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Foreword

This document was drafted in accordance with the rules given in GB/T 1.1-2020 "Directives for standardization - Part 1: Rules for the structure and drafting of standardizing documents".

1 Scope

This document specifies the classification, requirements, test methods, inspection rules, marks, labels, packaging, transportation, storage of nickel sulfate for battery materials.

This document applies to nickel sulfate for battery materials.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 191, Packaging and storage marks

GB/T 6678, General principles for sampling chemical products

GB/T 6682-2008, 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

HG/T 3696.1, Inorganic chemicals for industrial use. Preparations of standard and reagent solutions for chemical analysis. Part 1: Preparations of standard volumetric solutions

3 Terms and definitions

This document does not have terms and definitions that need to be defined.

4 Molecular formula and relative molecular mass Molecular formula. $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$ Relative molecular mass. 262.86 (according to the international relative atomic mass in 2018)

5 Classification

Nickel sulfate for battery materials is divided into two categories. solid type and solution type.

6 Requirements

6.1

Appearance. The solid is emerald, green granular crystal. The solution is green transparent liquid.

7 Test methods

WARNING -- Some reagents used in this test method are corrosive, so be careful when handling them! If necessary, it shall be carried out in a fume hood. If splashed on skin or eyes, rinse with water immediately. Seek medical attention immediately if it is serious.

7.4

Determination of cobalt, copper, iron, manganese, zinc, calcium, magnesium, chromium, cadmium and lead content

7.1 General

The reagents and water used in this document refer to analytically-pure reagents and grade three water specified in GB/T 6682-2008, unless otherwise specified. The standard titration solutions, impurity standard solutions, preparations and products used in the test shall be prepared according to the regulations of HG/T 3696.1, HG/T 3696.2 and HG/T 3696.3 unless otherwise specified.

7.3.1.3 Instruments and equipment

7.3.1.3.1

Glass sand crucible. filter plate pore size is 5 μm ~ 15 μm .

7.3.1.3.2

Electric constant temperature drying oven. the temperature can be controlled at $105^{\circ}\text{C} \pm 2^{\circ}\text{C}$.

7.3.1.5 Test data processing

The nickel content is calculated as the mass fraction w_1 of nickel (Ni). Calculate according to formula (1).

7.3.2.3.2 Test

Use a pipette to pipette 25 mL of the test solution. Place it in a 500 mL Erlenmeyer flask. Add 1 g ~ 2 g of ammonium fluoride, 10 mL of sodium potassium tartrate solution, 15 mL of sodium thiosulfate solution, 0.1 g of ammonium violate indicator. Shake well.

Add ammonia solution dropwise until the solution turns yellow. Use disodium EDTA standard titration solution to titrate till the solution turns orange yellow. Then add ammonia solution dropwise until the solution turns yellow. Continue to titrate with disodium edetate standard titration solution. After the solution becomes darker, add ammonia solution dropwise until the solution turns yellow. Use disodium edetate standard titration solution to titrate. Repeat this until the solution turns purple, which is the end point.

7.4.1 Principle

In nitric acid medium, use the standard curve method and inductively-coupled plasma optical emission spectrometer to determine the contents of the analyte elements.

7.4.2 Reagents or materials

7.4.2.1

Nitric acid solution. 1+1.

7.4.2.4

Water. grade two water specified in GB/T 6682-2008.

7.4.3 Instruments and equipment

Inductively-coupled plasma optical emission spectrometer.

7.4.4.1 Drawing of standard curve

Pipette 0.00 mL, 0.50 mL, 1.00 mL, 2.00 mL, 4.00 mL, 8.00 mL of mixed standard solutions respectively. Place in six 100 mL volumetric flasks. Add 10 mL of nickel matrix solution and 2 mL of nitric acid solution respectively. Use water to dilute to the scale. Shake well.

7.5.4.2 Test

Weigh an appropriate amount of specimen (about 1.0 g for solid product, about 2.0 g for solution product) (accurate to 0.0002 g). Place in a 100 mL beaker. Add appropriate amount of water. Stir to dissolve all. Add 2 mL of nitric acid solution. Transfer all to a 100 mL volumetric flask. Add water to the scale. Shake well. Use a pipette to pipette 10 mL of the above test solution. Place in a 100 mL volumetric flask. Use water to dilute to the scale. Shake well.

7.6.1 Principle

The specimen is dissolved in water. After filtering and washing, dry it to constant mass.

Determine the water-insoluble content based on the amount of residue after drying.

7.6.3 Analysis steps

Weigh about 50 g of specimen (accurate to 0.01 g). Place it in a 400 mL beaker. Add 200 mL of water. Heat and stir to dissolve. After cooling to room temperature, use a glass sand crucible that has been dried at $105^{\circ}\text{C} \pm 2^{\circ}\text{C}$ to a constant mass for suction-filtration. After fully washing with hot water, place the glass sand crucible in an electric heating constant temperature drying oven at $105^{\circ}\text{C} \pm 2^{\circ}\text{C}$. Dry to constant mass.

7.7.5 Test data processing

The content of magnetic foreign matter is calculated as mass fraction w_4 . Calculate according to formula (6).

7.8.1 Reagents or materials

7.8.1.1

Tetrachlorethylene.

7.8.1.2

Anhydrous sodium sulfate.