

HG

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

HG/T 5918-2021

Cobalt sulfate for batteries

电池用硫酸钴

(English Translation)

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1 Scope

This document specifies the classification, requirements, test methods, inspection rules, signs, labels, packaging, transportation, storage of cobalt sulfate for batteries.

This document applies to cobalt sulfate for batteries.

2 Normative references

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, for dated reference documents, only the version corresponding to the date applies to this document; for undated reference documents, the latest version (including all amendments) applies to this document.

GB/T 191-2008 Packaging - Pictorial marking for handling of goods

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 & 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

HG/T 3696.2 Inorganic chemicals for industrial use - Preparations of standard and reagent

solutions for chemical analysis - Part 2: Preparations of standard solutions for impurity

HG/T 3696.3 Inorganic chemicals for industrial use - Preparations of standard and reagent solutions for chemical analysis - Part 3: Preparations of reagent solutions

3 Terms and definitions

There are no terms or definitions to be defined in this document.

7 Test methods

Warning: Some of the reagents used in this test method are corrosive, so be careful when operating! If necessary, perform it in a fume hood. If it splashes on your skin or eyes, rinse with water immediately. In severe cases, seek medical attention immediately.

7.6.2.3

Water

Grade-II water in compliance with Table 1 of GB/T 6682-2008.

7.1 General provisions

The reagents and water used in this document, unless otherwise specified, refer to analytically pure reagents and grade-three water specified in Table 1 of GB/T 6682-2008. The standard titration solutions, impurity standard solutions, preparations, products used in the test shall be prepared, in accordance with the provisions of HG/T 3696.1, HG/T 3696.2, HG/T 3696.3, unless otherwise specified.

7.2 Appearance inspection

Under natural light, the appearance of the solid cobalt sulfate for batteries is visually determined, on a watch glass or white porcelain plate with a white substrate. The cobalt sulfate solution for batteries is placed in a colorimetric tube and visually determined on a white porcelain plate.

7.3.1 Potentiometric titration method (arbitration method)

c) Test data processing: The concentration of potassium ferricyanide standard titration solution is measured in c; the value is expressed in moles per liter (mol/L). Make calculation in accordance with formula (1):

7.3.1.1 Principle

In an ammoniacal solution, potassium ferricyanide is used to oxidize Co^{2+} to Co^{3+} ; the excess potassium ferricyanide is titrated with cobalt standard titration solution. The reaction equation is as follows:

7.3.1.2 Reagents or materials

7.3.1.2.1

Ammonium chloride.

7.3.1.2.2

Ammonia-ammonium citrate mixed solution

Weigh 50 g of ammonium citrate. Dissolve it in water. Add 350 mL of ammonia water. Use water to dilute it to 1000 mL. Mix well.

7.3.1.2.3

Cobalt standard titration solution

$\rho(\text{Co}) = 3 \text{ g/L}$

Weigh 3.000 g of metallic cobalt (cobalt mass fraction is not less than 99.98%) (accurate to 0.0002 g). Place it in a 400 mL beaker. Add a small amount of water to moisten it.

Slowly add 30 mL of nitric acid solution (1 + 1). Heat until it is completely dissolved.

After cooling to room temperature, transfer the entire volume into a 1000 mL volumetric flask. Use water to dilute it to the mark. Mix well.

7.3.1.2.4

Potassium ferricyanide standard titration solution

$\text{C}(\text{K}_3[\text{Fe}(\text{CN})_6]) \sim 0.05 \text{ mol/L}$

Follow the following steps for preparation, calibration, test data processing:

a) Preparation: Weigh about 17 g of potassium ferricyanide. Dissolve it in water.

Filter it. Use water to dilute it to 1000 mL. Shake well.

b) Calibration: Use a pipette to transfer 20 mL of potassium ferricyanide solution.

Place it in a 250 mL beaker. Add 5 g of ammonium chloride and 80 mL of ammonia-ammonium citrate mixed solution. Stir on a magnetic stirrer. On the adjusted automatic potentiometric titrator, use the platinum electrode as the indicator electrode and the tungsten electrode as the reference electrode; use cobalt standard titration solution to make titration, to the sudden jump end point.

Where:

V_1 - The value of the volume of the cobalt standard titration solution, which is consumed by the titration test solution, in milliliters (mL);

ρ - The exact value of the mass concentration of the cobalt standard titration solution, in grams per liter (g/L);

V - The value of the volume of the potassium ferricyanide standard titration solution pipetted, in milliliters (mL);

M - The numerical value of the molar mass of cobalt (Co), in grams per mole (g/mol)

If two people do three parallel measurements at the same time, the ratio -- of the range of each person's three parallel measurements TO the average -- shall not be greater than 0.2%; the ratio -- of the difference between the average of two people's measurements TO the average result of two people -- shall not be greater than 0.2%. The result takes the average value. The concentration value is taken to 4 significant figures. greater than 0.1%.

7.3.2.1 Principle

At around pH 5.5, using hexamethylenetetramine as buffer, xylenol orange and malachite green as indicators, use disodium ethylenediaminetetraacetate (EDTA) standard titration solution to make titration, until the solution changes from purple blue to bright green, which is taken as the end point.

7.3.2.2 Reagents or materials

7.3.2.2.1

P-Nitrophenol.

7.3.2.2.2

Hexamethylenetetramine.

7.3.2.2.3

Hydrochloric acid solution

1 + 1.

7.3.2.2.4

Ammonia solution

1 + 1.

7.3.2.2.5

Disodium ethylenediaminetetraacetate (EDTA) standard titration solution

C (EDTA) ~ 0.05 mol/L.

7.3.2.2.6

Xylenol orange indicator liquid

2 g/L.

7.3.2.2.7

Malachite green solution

2 g/L.