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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 42391-2023

Electrolyte for lead acid storage battery

铅酸蓄电池用电解液

Issued on: March 17, 2023 **Implemented on: October 1, 2023**

Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC

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Foreword

This document was issued on 17 March 2023 by the State Administration for Market Regulation; Standardization Administration of the PRC and takes effect on 1 October 2023.

It is a GB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies when assessing a submission.

1 Scope

GB/T 42391-2023 covers the electrolyte a lead acid storage battery is filled with, dilute sulfuric acid and colloidal electrolyte alike. Requirements are stated first, and then the determination methods, which occupy most of the document: the analytical procedures by which the properties set in the requirements clause are measured, so that two parties testing the same drum reach the same verdict. Inspection rules reach back to the ingredients, since the electrolyte can be no better than what goes into it - the concentrated sulfuric acid used to prepare it has to meet HG/T 2692, and the water used to dilute it is specified as well. Marking, packaging, transportation and storage fix what the container states: manufacturer name and address, product name, trademark, grade, specification, date, batch number and net weight. A safety clause covers handling, with pouring or conduit discharge to keep impurities out, and protective glasses, gloves and clothing because sulfuric acid is corrosive and burnable. Appendix A tabulates concentration against density, the link between a hydrometer reading taken on the floor and the concentration a specification is written in. Contamination is the practical reason for the document: a filled battery cannot be rinsed out, and whatever came in with the acid stays for the life of the

cell. For electrolyte producers, battery manufacturers, incoming inspection laboratories and purchasers.

This document specifies the requirements, determination methods, inspection rules, marking,

packaging, transportation, storage and safety requirements of the electrolyte (including

colloidal electrolyte) for lead acid storage battery.

This document is applicable to the electrolyte (including colloidal electrolyte) for lead acid

storage battery.

This document does not apply to the electrolyte in lead acid storage battery after disassembly.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document

through the normative references in the text. In terms of references with a specified date, only

versions with a specified date are applicable to this document. In terms of references without a

specified date, the latest version (including all the modifications) is applicable to this document.

GB 190 Packing Symbol of Dangerous Goods

GB/T 622 Chemical Reagent - Hydrochloric Acid (GB/T 622-2006, ISO 6353-2:1983, NEQ)

GB/T 625 Chemical Reagent - Sulfuric Acid (GB/T 625-2007, ISO 6353-2:1983, NEQ)

GB/T 626 Chemical Reagent - Nitric Acid (GB/T 626-2006, ISO 6353-2:1983, NEQ)

GB/T 629 Chemical Reagent - Sodium Hydroxide

GB/T 643 Chemical Reagent - Potassium Permanganate (GB/T 643-2008, ISO 6353-2:1983,

NEQ)

GB/T 661 Chemical Reagent - Ammonium Iron (II) Sulfate Hexahydrate (GB/T 661-2011, ISO

6353-3:1987, NEQ)

GB/T 670 Chemical Reagent - Silver Nitrate (GB/T 670-2007, ISO 6353-2:1983, NEQ)

GB 1253 Working Chemical - Sodium Chloride

GB 1254 Working Chemical - Sodium Oxalate

GB 1257 Working Chemical - Potassium Hydrogen Phthalate

GB 12595 Working Chemical - Silver Nitrate

In a brightly lit room, conduct a visual inspection on whether the surface of the sample is colorless and transparent.

5.2.2 Density

5.2.2.1 Instrument

Density meter: with a division value of ? 0.001 g/cm3.

5.2.2.2 Determination steps

Take 250 mL of the specimen in 5.1.2.1, stir it well, then, transfer it into a 250 mL measuring cylinder; put it in a water bath at 25 ?C, let it stand for 20 min. Gently put the density meter into the specimen, wait until it stops sinking, visually observe the tangent line of the concave surface of the liquid, and read the value on the density meter.

The test result shall retain three decimal places.

5.2.3 Determination of sulfuric acid content

5.2.3.1 Principle

Weigh-take or absorb a certain amount of specimen, and use methyl red-methylene blue as a mixed indicator. The end point of titration is pH = 5.4, and the solution turns from purple red to gray green, and the color variation is sensitive and easy to judge.

5.2.3.2 Reagents and solutions

The reagents and solutions required for the test are as follows:

---Methyl red-methylene blue mixed indicator: one portion of 0.2% methyl red ethanol solution is mixed with one portion of 0.1% methylene blue ethanol;

---Potassium hydrogen phthalate (GB 1257): benchmark reagent;

---Phenolphthalein: analytically pure, 0.1% ethanol solution;

---Sodium hydroxide (GB/T 629): analytically pure, standard solution of C (NaOH) = 0.5 mol/L.

a) Preparation: prepare a saturated solution of sodium hydroxide and store it in a plastic bottle, seal it and place it, until the solution becomes clear. Take 26 mL of the supernatant and place it in 1,000 mL of carbon dioxide-free water, and mix it well;

b) Calibration: weigh-take 3 g (accurate to 0.0001 g) of benchmark potassium hydrogen phthalate dried at 105 ?C ~ 110 ?C for 2 h, put it in a 250 mL conical flask, add 80 mL of water and heat it to boiling. Dropwise add 2 drops ~ 3 drops of 0.1% phenolphthalein indicator, and use sodium hydroxide solution of C (NaOH) = 0.5 mol/L to titrate it, until the solution turns pink, which is the end point.

5.2.4 Determination of reduced potassium permanganate (calculated by O) content

5.2.4.1 Principle

Inject excess potassium permanganate solution into the specimen to thoroughly oxidize the reducing substance; use ferrous ammonium sulfate solution to perform back titration, so as to obtain the content of reduced potassium permanganate.

5.2.4.2 Reagents and solutions

The reagents and solutions required for the test are as follows:

---Sulfuric acid (GB/T 625): analytically pure, 1 + 1 solution and solution with a density of 1.200 g/cm3;

NOTE: see Appendix A for the comparison of the concentration and density of sulfuric acid.

---Sodium oxalate (GB 1254): benchmark reagent;

---Ferrous ammonium sulfate solution (GB/T 661): analytically pure, C [(NH4)2Fe(SO4)2] = 0.01 mol/L. Weigh-take 4 g of (NH4)2Fe(SO4)2 ? 6 H2O and dissolve in 100 mL of 1 + 1 sulfuric acid solution, and use water to dilute to 1,000 mL;

---Potassium permanganate standard solution (GB/T 643): analytically pure, C (1/5 KMnO4) = 0.1 mol/L. This standard solution is used to prepare a standard solution of C (1/5 KMnO4) = 0.01 mol/L.

a) Preparation: weigh-take 3.30 g of potassium permanganate, dissolve it in 1,050 mL