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High-purity Sodium Hydroxide

高纯氢氧化钠

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High-purity Sodium Hydroxide

WARNING: if appropriate precautions are not taken, the products covered by this document may be dangerous during production, transportation, loading and unloading, storage, transportation and use, etc. This document does not intend to advise on all safety issues associated with this product. It is the user's responsibility to establish appropriate safety and preventive measures and determine the applicability of relevant regulatory limitations before using this document.

1 Scope

This document specifies the technical requirements for the appearance, physical and chemical properties of high-purity sodium hydroxide, and describes the corresponding sampling, test methods, inspection rules, marking, labeling, accompanying documents, packaging, transportation and storage.

This document applies to the production, use and quality control of high-purity sodium hydroxide products produced by electrolysis of sodium chloride aqueous solution.

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 191 Packaging - Pictorial Markings for Handling of Goods

GB/T 209-2018 Sodium Hydroxide for Industrial Use

GB/T 4348.1 Sodium Hydroxide for Industrial Use - Determination of Sodium Hydroxide and Sodium Carbonate Content

GB/T 4348.3 Sodium Hydroxide for Industrial Use - Determination of Iron Content - 1,10-phenanthroline Photometric Method

GB/T 6678 General Principles for Sampling Chemical Products

GB/T 6679 General Rules for Sampling Solid Chemical Products

GB/T 6680 General Rules for Sampling Liquid Chemical Products

GB/T 6682 Water for Analytical Laboratory Use - Specification and Test Methods

GB/T 7698 Sodium Hydroxide for Industrial Use - Determination of Carbonates Content - Titrimetric Method

GB/T 8170 Rules of Rounding off for Numerical Values & Expression and Judgement of Limiting Values

GB/T 11200.1 Sodium Hydroxide for Industrial Use - Determination of Sodium Chlorate Content - o-Tolidine Spectrometric Method

GB/T 11200.2 Test Methods of High-purity Sodium Hydroxide - Part 2: Determination of Aluminum Oxide Content - Spectrometric Method

GB/T 11200.3 Test Methods of High-purity Sodium Hydroxide - Part 3: Determination of Calcium Contents - Flame Atomic Absorption Method

GB/T 11213.1 Sodium Hydroxide for Chemical Fiber Use - Determination of Sodium Hydroxide Content

GB/T 11213.2 Sodium Hydroxide for Chemical Fiber Use - Determination of Sodium Chloride Content - Spectrometric Method

GB/T 11213.4 Sodium Hydroxide for Chemical Fiber Use - Determination of Silicon Content - Reduced Molybdosilicate Spectrophotometric Method

GB/T 11213.5 Sodium Hydroxide for Chemical Fiber Use - Determination of Sulphate Content

GB 15258 General Rules for Preparation of Precautionary Label for Chemicals

GB/T 31197-2014 Inorganic Chemicals for Industrial Use - Determination of Impurity Anions - Ion Chromatography Method

HG/T 3942 Sodium Hydroxide for Industrial Use - Determination of Metal and Nonmetal Ions Content - ICP Method

3 Terms and Definitions

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

4 Symbols

The following symbols apply to this document.

HL: high-purity liquid sodium hydroxide.

HS: high-purity solid sodium hydroxide.

bag shall prevail. The volume of each sample shall not be less than 500 g.

6.3 For high-purity liquid sodium hydroxide products, in accordance with the provisions of GB/T 6680, from the top, middle and bottom of the tank truck or storage tank, take equal amounts of representative samples, mix the samples, put them in two clean, dry, stoppered polyethylene bottles and seal them. Manufacturers may collect samples at the sampling port of the finished product tank or use an automatic sampling device or manually collect representative samples on the pipeline before entering the finished product tank. When a dispute arises between the supply-side and the demand-side regarding product quality, representative samples taken from the top, middle and bottom of the tank truck or storage tank after stirring and mixing shall prevail. The volume of each sample shall not be less than 500 mL.

6.4 The sample bottle shall be labeled and marked with: manufacturer name, product name, model, batch No. or production date, sampling date and sampler, etc.

7 Test Method

7.1 Appearance

Under natural light, conduct visual observation.

7.2 Determination of Mass Fraction of Sodium Hydroxide

In accordance with the provisions of GB/T 4348.1 or GB/T 11213.1, conduct the determination. Between them, GB/T 11213.1 is the arbitration law.

7.3 Determination of Mass Fraction of Sodium Carbonate

In accordance with the provisions of GB/T 4348.1 or GB/T 7698, conduct the determination. Between them, GB/T 7698 is the arbitration law.

7.4 Determination of Mass Fraction of Sodium Chloride

In accordance with the provisions of GB/T 11213.2 or Appendix A of GB/T 209-2018, conduct the determination. Between them, Appendix A of GB/T 209-2018 is the arbitration law.

7.5 Determination of Mass Fraction of Ferric Oxide

In accordance with the provisions of GB/T 4348.3 or HG/T 3942, conduct the determination. Between them, HG/T 3942 is the arbitration law.

7.6 Determination of Mass Fraction of Silicon Dioxide

In accordance with the provisions of GB/T 11213.4 or HG/T 3942, conduct the determination. Between them, HG/T 3942 is the arbitration law.

7.7 Determination of Mass Fraction of Sodium Sulfate

In accordance with the provisions of GB/T 11213.5, conduct the determination.

7.8 Determination of Mass Fraction of Sodium Chlorate

7.8.1 Spectrophotometric method (arbitration method)

Comply with the provisions of GB/T 11200.1.

7.8.2 Ion chromatography

7.8.2.1 Principle

After the sample is prepared into a specimen solution, take an appropriate amount of the specimen solution and inject it into the ion chromatographic column through the injection system. Use an appropriate eluent to elute it. The active exchange groups on the ion exchange resin exchange ions with the ions in the specimen solution and the ions in the eluent. As the eluent flows, the anions in the specimen solution are continuously exchanged - eluted - re-exchanged - re-eluted. The anions under test are separated based on their different retention characteristics on the chromatographic column and finally brought to the detector by the eluent. The detection signal forms a Gaussian distribution chromatographic peak on the chromatogram. Under certain chromatographic conditions, the retention time of each component is fixed, which is used as the qualitative basis for the component ions; within a certain concentration range, the peak area or peak height of the component is proportional to the concentration of the component, and the peak area or peak height is used as the quantitative basis for the component ions.

7.8.2.2 Reagents or materials

7.8.2.2.1 Unless otherwise specified, only guaranteed reagents and Grade-1 water specified in GB/T 6682 or water of equivalent purity shall be used in the analysis.

7.8.2.2.2 Sodium carbonate solution: 3.6 mmol/L.

Weigh-take 19.08 g of anhydrous sodium carbonate (accurate to 0.01 g) burned at 270 °C ~ 300 °C to a constant weight, dissolve it in water, cool to room temperature, transfer to a 500 mL volumetric flask, use water to dilute to the scale, and shake it well. Use a pipette to measure-take 5 mL into a 500 mL volumetric flask, use water to dilute to the scale, and shake it well.

The solution shall be stored in polyethylene or polytetrafluoroethylene reagent bottles.

7.8.2.2.3 Sodium hydroxide solution: 13 mmol/L.

Weigh-take 0.52 g of sodium hydroxide (accurate to 0.01 g), dissolve it in water, cool to room temperature, transfer it into a 1,000 mL volumetric flask, use water to dilute to the scale, and shake it well.

The solution shall be stored in polyethylene or polytetrafluoroethylene reagent bottles.

7.8.2.2.4 Potassium hydroxide solution: 13 mmol/L.

7.10 Determination of Mass Fraction of Calcium Oxide

In accordance with the provisions of GB/T 11200.3 or HG/T 3942, conduct the determination. Between them, HG/T 3942 is the arbitration law.

8 Inspection Rules

8.1 Inspection Classification and Inspection Items

8.1.1 Inspection classification

The inspection is classified into type inspection and exit-factory inspection.

8.1.2 Type inspection

Type inspection items include all inspection items specified in this document. Under normal production conditions, type inspection shall be carried out at least once a month. If any of the following situations occur, type inspection shall be carried out:

- Resumption of production after suspension;
- Relatively significant changes in production process (such as: materials and process conditions, etc.);
- After major fluctuations and adjustments in production equipment.

8.1.3 Exit-factory inspection

The exit-factory inspection items are appearance, mass fraction of sodium hydroxide and mass fraction of sodium chloride.

8.2 Determination Rules

Product quality indicators are determined in accordance with the “rounded value comparison method” in GB/T 8170.

8.3 Re-inspection Rules

If one of the indicators in the inspection results does not meet the requirements of this document, double the quantity of representative samples shall be taken from the packaging unit for re-inspection. If one or more indicators in the re-inspection results do not meet the requirements of this document, then, the batch of products will be determined as disqualified products.

9 Marking, Labeling and Accompanying Documents

9.1 Marking

The outer packaging of high-purity sodium hydroxide products exiting the factory shall have obvious and firm markings, including production enterprise's name, address, product name, serial No. of implemented Standard, model, batch No. or production date, net weight and the "corrosive substance" mark specified in GB 190. High-purity solid sodium hydroxide products shall also have the "rain-proof" mark specified in GB/T 191.

9.2 Labeling

It shall comply with the provisions of GB 15258.

9.3 Accompanying Documents

Each batch of high-purity sodium hydroxide products exiting the factory shall be inspected by the quality supervision and inspection department of the production enterprise in accordance with the requirements of this document and accompanied by a quality certification document, including production enterprise name, product name, model, quality indicator, batch No. or production date, and serial No. of this document.

10 Packaging, Transportation and Storage

10.1 Packaging

10.1.1 For high-purity solid sodium hydroxide products in the form of flakes, granules or blocks, polyethylene or polypropylene film bags should be used as inner bags, and polyethylene or polypropylene woven bags (or laminated bags) or kraft paper bags should be used as outer bags. The net weight of each bag is 25.0 kg. Based on the agreement between the supply-side and the demand-side, other appropriate packaging modes and packaging quantities may also be adopted. The packaging bags and seals shall ensure that the products will not be contaminated or leaked during normal storage and transportation.

10.1.2 High-purity liquid sodium hydroxide products shall be shipped and transported in special tank trucks or storage tanks, and the packaging containers shall not contaminate the products.

10.2 Transportation and Storage

10.2.1 During transportation, avoid collision. For bag-packed high-purity sodium hydroxide products, avoid packaging damage, and being affected by moisture and contamination. The products shall not be transported together with acidic items.

10.2.2 High-purity solid (including flaky, granular and blocky, etc.) sodium hydroxide products shall be stored in dry and clean warehouses; high-purity liquid sodium hydroxide products shall be stored in storage tanks. Avoid collision and contact with acidic objects.

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