

Each mL of 0.5 mol/L sulfuric acid VS  
= 52.99 mg of Na<sub>2</sub>CO<sub>3</sub>

**Containers and storage** Containers—Tight containers.

## Sodium Hydroxide

水酸化ナトリウム

NaOH: 40.00

Sodium Hydroxide contains not less than 95.0% of NaOH.

**Description** Sodium Hydroxide occurs as white fused masses, in small pellets, in flakes, in sticks, and in other forms. It is hard and brittle, and shows a crystalline fracture.

It is freely soluble in water and in ethanol (95), and practically insoluble in diethyl ether.

It rapidly absorbs carbon dioxide in air.

It deliquesces in moist air.

**Identification (1)** A solution of Sodium Hydroxide (1 in 500) is alkaline.

(2) A solution of Sodium Hydroxide (1 in 25) responds to the Qualitative Tests for sodium salt.

**Purity (1)** Clarity and color of solution—Dissolve 1.0 g of Sodium Hydroxide in 20 mL of water: the solution is clear and colorless.

(2) Chloride—Dissolve 2.0 g of Sodium Hydroxide in water, and add water to make 100 mL. To 25 mL of the solution add 10 mL of dilute nitric acid and water to make 50 mL, and perform the test using this solution as the test solution. Prepare the control solution with 0.7 mL of 0.01 mol/L hydrochloric acid VS (not more than 0.050%).

(3) Heavy metals—Dissolve 1.0 g of Sodium Hydroxide in 5 mL of water, add 11 mL of dilute hydrochloric acid, and evaporate on a water bath to dryness. Dissolve the residue in 35 mL of water, add 2 mL of dilute acetic acid and 1 drop of ammonia TS, add water to make 50 mL, and perform the test using this solution as the test solution. Evaporate 11 mL of dilute hydrochloric acid on a water bath to dryness, dissolve the residue in 2 mL of dilute acetic acid and 3.0 mL of Standard Lead Solution, add water to make 50 mL, and use this solution as the control solution (not more than 30 ppm).

(4) Potassium—Dissolve 0.10 g of Sodium Hydroxide in water and dilute with water to make 40 mL. Add 1.0 mL of dilute acetic acid to 4.0 mL of this solution, and shake. Add 5.0 mL of a solution of sodium tetraphenylboron (1 in 30), shake immediately, and allow to stand for 10 minutes: the solution has no more turbidity than the following control solution.

Control solution: Dissolve 9.5 mg of potassium chloride in water, and dilute with water to make 1000 mL. Add 1.0 mL of dilute acetic acid to 4.0 mL of this solution, shake, and proceed as directed above.

(5) Sodium carbonate—The amount of sodium carbonate (Na<sub>2</sub>CO<sub>3</sub>: 105.99) is not more than 2.0%, when calculated by the following equation using *B* (mL) which is obtained in the Assay.

$$\text{Amount (mg) of sodium carbonate} = 105.99 \times B$$

(6) Mercury—Dissolve 2.0 g of Sodium Hydroxide in 1 mL of a solution of potassium permanganate (3 in 50) and 30 mL of water, neutralize gradually with purified hydrochloric acid, and add 5 mL of diluted sulfuric acid (1 in 2). To this solution add a solution of hydroxylammonium chloride (1 in 5) until the precipitate of manganese dioxide disappears, add water to make exactly 100 mL, and use this solution as the sample solution. Perform the tests according to the Atomic Absorption Spectrophotometry (Cold vapor type) with the sample solution. Place the sample solution in the sample bottle of an atomic absorption spectrophotometer, add 10 mL of tin (II) chloride-sulfuric acid TS, connect the bottle immediately to the atomic absorption spectrophotometer, and circulate air. Read the absorbance *A<sub>T</sub>* of the sample solution when the indication of the recorder rises rapidly and becomes constant at the wavelength of 253.7 nm. On the other hand, to 2.0 mL of Standard Mercury Solution add 1 mL of a solution of potassium permanganate (3 in 50), 30 mL of water and a volume of purified hydrochloric acid equal to that used in the preparation of the sample solution, and read the absorbance *A<sub>S</sub>* of the solution obtained by the same procedure as used for the sample solution: *A<sub>T</sub>* is smaller than *A<sub>S</sub>*.

**Assay** Weigh accurately about 1.5 g of Sodium Hydroxide, and dissolve in 40 mL of freshly boiled and cooled water. Cool the solution to 15°C, add 2 drops of phenolphthalein TS, and titrate with 0.5 mol/L sulfuric acid VS until the red color of the solution disappears. Record the amount, *A* (mL), of 0.5 mol/L sulfuric acid VS consumed. Then add 2 drops of methyl orange TS to the solution, and further titrate with 0.5 mol/L sulfuric acid VS until the solution shows a persistent light red color. Record the amount, *B* (mL), of 0.5 mol/L sulfuric acid VS consumed. Calculate the amount of NaOH from the difference, *A* (mL) – *B* (mL).

Each mL of 0.5 mol/L sulfuric acid VS  
= 40.00 mg of NaOH

**Containers and storage** Containers—Tight containers.

## Sodium Lauryl Sulfate

ラウリル硫酸ナトリウム

Sodium Lauryl Sulfate is a mixture of sodium alkyl sulfate consisting chiefly of sodium lauryl sulfate (C<sub>12</sub>H<sub>25</sub>NaO<sub>4</sub>S).

**Description** Sodium Lauryl Sulfate occurs as white to light yellow crystals or powder. It has a slightly characteristic odor.

It is sparingly soluble in methanol and in ethanol (95).

A solution of Sodium Lauryl Sulfate (1 in 10) is a clear or an opalescent solution, which foams on agitation.

**Identification (1)** To 0.2 g of the residue obtained in Total alcohol content add 4 mL of bromine-cyclohexane TS with vigorous shaking, add 0.3 g of *N*-bromosuccinimide, and heat in a water bath at 80°C for 5 minutes: a red color develops.

(2) A solution of Sodium Lauryl Sulfate (1 in 10) responds to the Qualitative Tests (1) for sodium salt.

(3) To a solution of Sodium Lauryl Sulfate (1 in 10) add dilute hydrochloric acid to make acid, boil gently, and cool: the solution responds to the Qualitative Tests for sulfate.

**Purity (1) Alkali**—Dissolve 1.0 g of Sodium Lauryl Sulfate in 100 mL of water, add 2 drops of phenol red TS and 0.60 mL of 0.1 mol/L hydrochloric acid VS: the solution remains yellow.

(2) Sodium chloride—Dissolve about 5 g of Sodium Lauryl Sulfate, accurately weighed, in 50 mL of water, neutralize the solution with dilute nitric acid, if necessary, add exactly 5 mL of 0.1 mol/L sodium chloride TS, and titrate with 0.1 mol/L silver nitrate VS (indicator: 2 drops of fluorescein sodium TS). Perform a blank determination, and make any necessary correction.

$$\begin{aligned} \text{Each mL of 0.1 mol/L silver nitrate VS} \\ = 5.844 \text{ mg of NaCl} \end{aligned}$$

The combined content of sodium chloride (NaCl: 58.44) and sodium sulfate ( $\text{Na}_2\text{SO}_4$ : 142.04) obtained in the next paragraph (3) is not more than 8.0%.

(3) Sodium sulfate—Dissolve about 1 g of Sodium Lauryl Sulfate, accurately weighed, in 10 mL of water, add 100 mL of ethanol (95), and heat at a temperature just below the boiling point for 2 hours. Filter through a glass filter (G4) while hot, and wash with 100 mL of boiling ethanol (95). Dissolve the precipitate by washing with 150 mL of water, collecting the washings in a beaker. Add 10 mL of hydrochloric acid, heat to boiling, add 25 mL of barium chloride TS, and allow to stand overnight. Collect the precipitate, and wash with water until the last washing shows no opalescence with silver nitrate TS. Dry the precipitate, ignite to a constant mass between 500°C and 600°C by raising the temperature gradually, and weigh as barium sulfate ( $\text{BaSO}_4$ : 233.39).

$$\begin{aligned} \text{Amount (mg) of sodium sulfate (Na}_2\text{SO}_4) \\ = \text{amount (mg) of barium sulfate (BaSO}_4) \times 0.6086 \end{aligned}$$

(4) Unsulfated alcohols—Dissolve about 10 g of Sodium Lauryl Sulfate, accurately weighed, in 100 mL of water, add 100 mL of ethanol (95), and transfer to a separator. Extract the solution with three 50-mL portions of petroleum benzin. If an emulsion forms, sodium chloride may be added to promote separation of the two layers. Combine the petroleum benzin extracts and wash with three 50-mL portions of water. Evaporate the petroleum benzin on a water bath, and dry the residue at 105°C for 30 minutes. The mass of the dried residue is not more than 4.0% of the mass of the Sodium Lauryl Sulfate taken.

**Water** Not more than 5.0% (0.5 g, direct titration).

**Total alcohol content** Dissolve about 5 g of Sodium Lauryl Sulfate, accurately weighed, in 150 mL of water and 50 mL of hydrochloric acid, and boil under a reflux condenser for 4 hours. Cool, extract with two 75-mL portions of diethyl ether, and evaporate the combined diethyl ether extracts on a water bath. Dry the residue at 105°C for 30 minutes. The mass of the residue is not less than 59.0%.

**Containers and storage** Containers—Well-closed containers.

## Sodium Pyrosulfite

### Sodium Metabisulfite

ピロ亜硫酸ナトリウム

$\text{Na}_2\text{S}_2\text{O}_5$ : 190.11

Sodium Pyrosulfite contains not less than 95.0% of  $\text{Na}_2\text{S}_2\text{O}_5$ .

**Description** Sodium Pyrosulfite occurs as white crystals or crystalline powder. It has the odor of sulfur dioxide.

It is freely soluble in water, very slightly soluble in ethanol (95), and practically insoluble in diethyl ether.

A solution of Sodium Pyrosulfite (1 in 20) is acid.

It is hygroscopic.

It decomposes slowly on exposure to air.

**Identification** A solution of Sodium Pyrosulfite (1 in 20) responds to the Qualitative Tests for sodium salt and for bisulfite.

**Purity (1) Clarity and color of solution**—Dissolve 1.0 g of Sodium Pyrosulfite in 10 mL of water: the solution is clear and colorless.

(2) Thiosulfate—Dissolve 1.0 g of Sodium Pyrosulfite in 15 mL of water, add slowly 5 mL of dilute hydrochloric acid, shake, and allow to stand for 5 minutes: no turbidity is produced.

(3) Heavy metals—Dissolve 1.0 g of Sodium Pyrosulfite in 10 mL of water, and evaporate with 5 mL of hydrochloric acid on a water bath to dryness. Dissolve the residue in 10 mL of water, add 1 drop of phenolphthalein TS, and add ammonia TS until the solution becomes slightly red. Add 2 mL of dilute acetic acid and water to make 50 mL. Perform the test using this solution as the test solution. Prepare the control solution as follows: evaporate 5 mL of hydrochloric acid on a water bath to dryness, and to the residue add 2 mL of dilute acetic acid, 2.0 mL of Standard Lead Solution and water to make 50 mL (not more than 20 ppm).

(4) Iron—Prepare the test solution with 1.0 g of Sodium Pyrosulfite according to Method 1, and perform the test according to Method A. Prepare the control solution with 2.0 mL of Standard Iron Solution (not more than 20 ppm).

(5) Arsenic—Dissolve 0.5 g of Sodium Pyrosulfite in 10 mL of water, heat with 1 mL of sulfuric acid on a sand bath until white fumes are evolved, and add water to make 5 mL. Perform the test using Apparatus B with this solution as the test solution (not more than 4 ppm).

**Assay** Weigh accurately about 0.15 g of Sodium Pyrosulfite, and transfer to an iodine flask containing an exactly measured 50 mL of 0.05 mol/L iodine VS. Stopper tightly, shake well, and allow to stand for 5 minutes in a dark place. Add 1 mL of hydrochloric acid VS, and titrate the excess of iodine with 0.1 mol/L sodium thiosulfate VS (indicator: 1 mL of starch TS). Perform a blank determination.

$$\text{Each mL of 0.05 mol/L iodine VS} = 4.753 \text{ mg of Na}_2\text{S}_2\text{O}_5$$

**Containers and storage** Containers—Tight containers.

Storage—Light-resistant, preferably well-filled, and not exceeding 30°C.