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# Sodium Hydroxide

NaOH 40.00

Sodium hydroxide CAS RN®: 1310-73-2.

## DEFINITION

Sodium Hydroxide contains NLT 95.0% and NMT 100.5% of total alkali, calculated as sodium hydroxide (NaOH), including NMT 3.0% of sodium carbonate (Na<sub>2</sub>CO<sub>3</sub>). It also contains NLT 54.0% and NMT 59.8% of sodium.

[**CAUTION**—Exercise great care in handling sodium hydroxide, because it rapidly destroys tissues.]

## IDENTIFICATION

• **A.** ~~IDENTIFICATION TESTS—GENERAL (191), Chemical Identification Tests, Sodium:~~ A solution (1 in 25) meets the requirements.

• **B.** ~~pH (791).~~

**Sample solution:** 0.1 mg/mL of Sodium Hydroxide

**Acceptance criteria:** NLT 11.0

## ASSAY

• **TOTAL ALKALI**

**Sample:** 1.5 g

**Blank:** 40.0 mL of [carbon dioxide-free water](#)

**Titrimetric system**

(See [Titrimetry \(541\)](#).)

**Mode:** Direct titration

**Titrant:** [1 N sulfuric acid VS](#)

**Endpoint detection:** Visual

**Analysis:** Dissolve the *Sample* in 40 mL of [carbon dioxide-free water](#). Cool the solution to room temperature, and add [phenolphthalein TS](#).

Titrate with [1 N sulfuric acid VS](#). At the discharge of the pink color of the indicator, record the volume of *Titrant* ( $V_{S1}$ ). Add [methyl orange TS](#), and continue the titration until a persistent pink color is produced. Record the volume of *Titrant* ( $V_{S2}$ ). Perform a blank determination, and make any necessary corrections.

Calculate the percentage of total alkali, calculated as sodium hydroxide (NaOH), in the *Sample* taken:

$$\text{Result} = \{[(V_{S2} - V_B) \times N \times F_1] / W\} \times 100$$

$V_{S2}$  = volume of *Titrant* consumed by the *Sample* to the second endpoint (mL)

$V_B$  = volume of *Titrant* consumed by the *Blank* (mL)

$N$  = actual normality of the *Titrant* (mEq/mL)

$F_1$  = equivalency factor, 40.00 mg/mEq

$W$  = weight of the *Sample* (mg)

Calculate the percentage of sodium carbonate (Na<sub>2</sub>CO<sub>3</sub>) in the *Sample* taken:

$$\text{Result} = \{[(V_{S2} - V_{S1}) \times N \times F_2] / W\} \times 100$$

$V_{S2}$  = volume of *Titrant* consumed by the *Sample* to the second endpoint (mL)

$V_{ST}$  = volume of *Titrant* consumed by the *Sample* to the first endpoint (mL)

$N$  = actual normality of the *Titrant* (mEq/mL)

$F_2$  = equivalency factor, 106.0 mg/mEq

$W$  = weight of the *Sample* (mg)

**Acceptance criteria:** 95.0%–100.5% of total alkali; NMT 3.0% of sodium carbonate ( $\text{Na}_2\text{CO}_3$ )

#### • CONTENT OF SODIUM

**Diluent:** 1% [hydrochloric acid](#) solution

**Standard stock solution:** 25.41 µg/mL of [sodium chloride](#) in *Diluent*. This solution contains 10 µg/mL of sodium.

**Standard solutions:** Transfer 6.0-, 7.5-, and 9.0-mL portions of *Standard stock solution* to separate 100-mL volumetric flasks. Dilute the content of each flask with *Diluent* to volume, and mix to obtain solutions having known concentrations of 0.6, 0.75, and 0.9 µg/mL of sodium, respectively.

**Sample stock solution:** 1.303 mg/mL of Sodium Hydroxide in *Diluent*

**Sample solution:** Transfer 0.1 mL of *Sample stock solution* to a 100-mL volumetric flask and dilute with *Diluent* to volume.

#### Instrumental conditions

(See [Atomic Absorption Spectroscopy \(852\)](#).)

**Mode:** Atomic absorption spectrophotometry

**Analytical wavelength:** 589.0 nm (sodium emission line)

**Lamp:** Sodium hollow-cathode

**Flame:** Air–acetylene

**Blank:** *Diluent*

#### Standard curve

**Samples:** *Standard solutions*

**Plot:** Absorbance values versus their corresponding concentration (µg/mL) of sodium. The correlation coefficient is NLT 0.995.

#### Analysis

**Sample:** *Sample solution*

From the *Standard curve*, determine the concentration of sodium in the *Sample solution*.

Calculate the percentage of sodium in the portion of Sodium Hydroxide taken:

$$\text{Result} = (C_s/C_u) \times 100$$

$C_s$  = concentration of sodium in the *Sample solution* from the *Standard curve* (µg/mL)

$C_u$  = concentration of Sodium Hydroxide in the *Sample solution* (µg/mL)

**Acceptance criteria:** 54.0%–59.8%

#### IMPURITIES

##### • POTASSIUM

**Diluent:** 1% [hydrochloric acid](#) solution

**Standard stock solution:** 1.907 mg/mL of [potassium chloride](#), previously dried at 105° for 2 h, in [water](#). Transfer 5.0 mL of this solution to a 1.0-L volumetric flask and dilute with *Diluent* to volume. This solution contains 5 µg/mL of potassium.

**Standard solutions:** Transfer 2.0-, 5.0-, and 10.0-mL portions of the *Standard stock solution* to separate 100-mL volumetric flasks. Dilute the content of each flask with *Diluent* to volume, and mix to obtain solutions having known concentrations of 0.10, 0.25, and 0.50 µg/mL of potassium, respectively.

**Sample stock solution:** 0.5 mg/mL of Sodium Hydroxide

**Sample solution:** 50 µg/mL of Sodium Hydroxide in *Diluent*, prepared from the *Sample stock solution*

#### Instrumental conditions

(See [Atomic Absorption Spectroscopy \(852\)](#).)

**Mode:** Atomic absorption spectrophotometry

**Analytical wavelength:** 766.5 nm (potassium emission line)

**Lamp:** Potassium hollow-cathode

**Flame:** Air–acetylene

**Blank:** *Diluent*

#### Standard curve