

## Experiment

### Preparation and standardization of Sodium hydroxide

**Aim:-** To prepare and standardize 0.1N sodium hydroxide.

**Reference:-** Indian Pharmacopoeia by Ministry of Health And Family Welfare, Gov. of India, Volume I 2007, P-316.

Practical book of Pharmaceutical Chemistry, Fourth edition edited by A.H Beckett, J.B Stenlake, CBS Publishers and Distributors, 2005 P-187.

#### Requirements:

**Chemical Requirement:-** Sodium hydroxide pellets (NaOH), **Carbon-dioxide-free water** (boil distilled water 10 min, cool protected from air), **Potassium hydrogen phthalate (KHP)**, primary standard; dry at 120 °C for 2 h; cool in desiccator, Phenolphthalein indicator.

**Glassware Requirement:-** Conical flask, Burette ,Pipette ,Water bath, Burner ,Measuring Cylinder ,Beaker ,Dropper , Glass rod ,Butter paper.

#### Principle:-

NaOH is hygroscopic and absorbs CO<sub>2</sub> → concentration is uncertain. Prepare an approximate solution, then standardize it against a **primary standard** acid (commonly potassium hydrogen phthalate, KHP), using phenolphthalein as indicator.

#### Procedure:-

##### A. Preparation of ~0.1 N NaOH

🔧 Tare a dry beaker **Weigh 1.00 g** NaOH pellets and **dissolve in** ~250 mL CO<sub>2</sub>-free water to the beaker, stir until pellets fully dissolve. (**Make CO<sub>2</sub>-free water:** Boil distilled water ~10 min, cool covered to room temp).

**Label & store:** "NaOH ~0.1 N (approx).

##### B — Standardization with KHP

1. Accurately weigh **~0.50–0.60 g dried KHP** into a 250 mL conical flask.
2. Add ~75–100 mL CO<sub>2</sub>-free water to dissolve.
3. Add **2–3 drops phenolphthalein**.
4. Fill burette with the NaOH solution.
5. Titrate to a **pale pink** endpoint persisting **≥30 s** (perform at least **3 concordant** titrations within 0.10 mL).

## Calculation

For each titration:

$$N_{\text{NaOH}} = \frac{m_{\text{KHP}} \times 1000}{\text{Eq. wt.}_{\text{KHP}} \times V_{\text{NaOH}}(\text{mL})} = \frac{m \times 1000}{204.22 \times V}$$

Example (illustrative):

$m = 0.5110$  g KHP;  $V = 25.20$  mL NaOH

$$N = \frac{0.5110 \times 1000}{204.22 \times 25.20} = 0.09929 \text{ N}$$

- Factor (F) to 0.1 N:  $F = N_{\text{found}}/0.1000$

**Result:-** The Normality of prepared NaOH solution is .....N.

## Viva-Voce Questions

1. Which substances are commonly used as primary standards to standardize NaOH?
2. Why is freshly boiled and cooled distilled water used in preparing NaOH solution?
3. What is the equivalent weight of NaOH?
4. Why is phenolphthalein preferred over methyl orange in this titration?
5. What are common errors in NaOH standardization?