Medicinal Chemistry
The first stage
College of Dentistry

By

University of Basrah
College of Dentistry

Assistant Lecturer
HAZIM SAAD JABBAR AL-MALIKI

University of Basra - College of Dentistry - Department of Basic Sciences

MSc. Medicinal Biochemistry from Malaysian National University (UKM) – Malaysia

Email:- hazim.saad@uobasrah.edu.iq and hazzmrn@yahoo.com

Preparation of different types of solutions

Experiment (6)

Standardization of sodium hydroxide NaOH solution with standard solution of hydrochloric acid HCl

Important requirements for primary standard compounds are:

- Extremely pure
- Highly stable
- Anhydrous
- Can be weighed easily
- Should be ready to use and available
- Should be preferably non toxic
- Should not be expensive

Objectives

- Standardize a sodium hydroxide solution
- Determine the Molarity or Normality of an unknown hydrochloric acid solution
- Understand the use of indicators in titrations
- Learn proper pipetting technique
- Learn to titrate a strong acid with a strong base.

Preparation of standard solution of Na_2CO_3 (0.1N):

1- Weigh out accurately 1.325gm of Na_2CO_3.

2- Dissolve in small quantity of distilled water and transfer quantitatively to 250ml measuring flask.

3- Complete to the mark and shake well.

4- Calculate the exact normality of Na_2CO_3 solution.

$$N = \frac{Weight}{eq.wt} * \frac{1000}{Volume(mL)}$$

Weight required = Normality x eq.wt. x volume in (1000 ml (liter)).
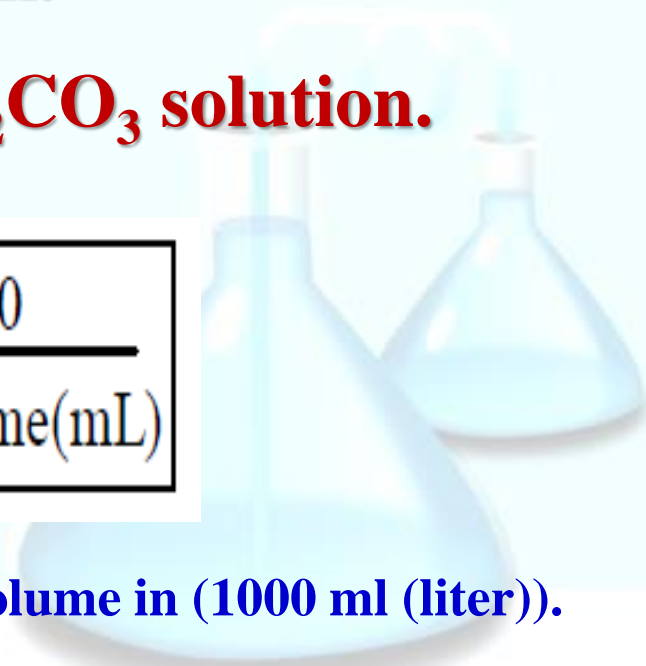
(I) Determination of the normality of hydrochloric acid by a standard solution of sodium carbonate (0.1N).

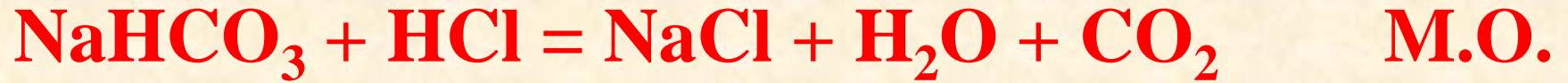Sodium carbonate reacts with hydrochloric acid according to the following equation:

$$Na_2CO_3 + 2HCl = 2NaCl + CO_2 + H_2O$$

When one equivalent of HCl is added to the carbonate it is transformed into bicarbonates.

$$Na_2CO_3 + HCl = NaHCO_3 + NaCl \quad \text{ph.ph.}$$

pH= 11.5 (alkaline) to 8.3.

HCl is added to the solution of bicarbonate

$$NaHCO_3 + HCl = NaCl + H_2O + CO_2 \quad \text{M.O.}$$

pH = 8.3 to 3.8

Calculations:

- **In case of M.O.**

$$N_1 V_1(HCl) = N_2 V_2(Na_2CO_3)$$
Or
$$N_1 = N_2 V_2/V_1$$

•In case of ph.ph .

$$N_1 2V_1 = N_2 V_2$$

Or
$$N_1 = N_2 V_2 / 2V_1$$

buret

standardized solution

ring stand

sample to be titrated (with indicator)

Erlenmeyer Flask
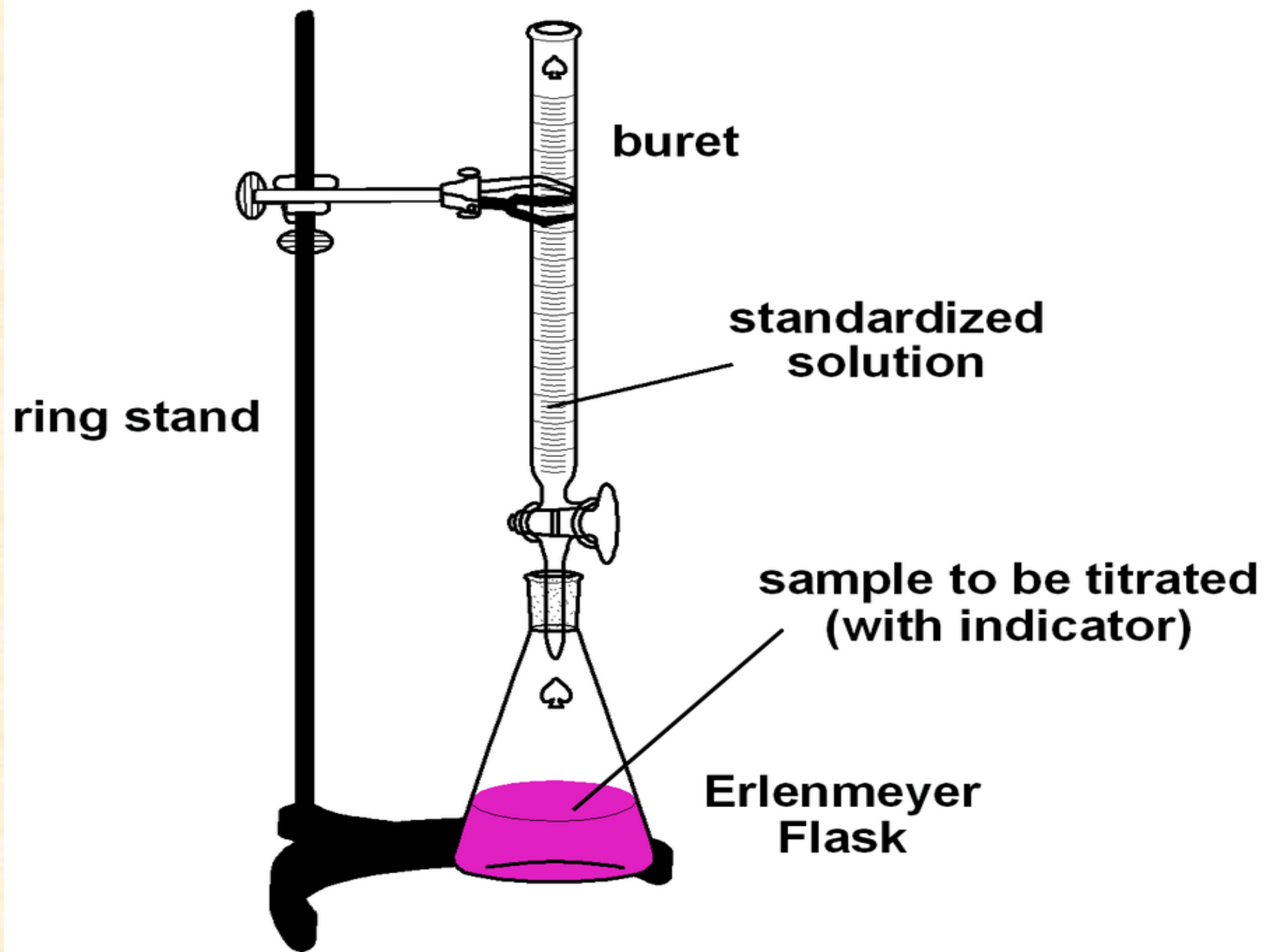
(II) Determination of the strength and normality of sodium hydroxide solution by a standard solution of hydrochloric acid

HCl reacts with sodium hydroxide according to the following equation:

$$HCl + NaOH = NaCl + H_2O$$

Calculations:

$$N = \frac{Weight}{eq.wt} * \frac{1000}{Volume(mL)}$$

In both cases of M.O. and ph.ph.

use the relation:

$$N_1 V_1 (HCl) = N_2 V_2 (NaOH)$$

In order to deduce the normality of NaOH

Thank You For Listening