Ministry of higher Education & Scientific Research
Al-Rasheed University College/
Pharmacy Department

Practical Inorganic pharmaceutical chemistry I

Third stage / 1st semester

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Lab 2

Preparation and Standardization of 1N Hydrochloric acid

Done by:

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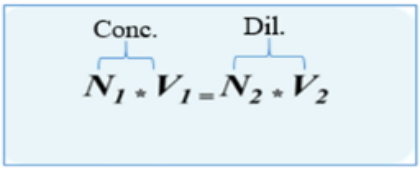
Preparation and Standardization of 1N Hydrochloric acid

1. Preparation of 100 ml. of 1N HCl:

Procedure:

Dilute 9 ml. of conc. HCl with distilled water to 100 ml. using a suitable volumetric flask. According to the following equation:



N_1: is the normality of concentrated HCl used.

V_1: is the volume of concentrated HCl to be used for dilution.

N_2: is the requested normality of HCl (1N in our experiment).

V_2: is the final volume after dilution (100 ml. in our experiment).

- **The normality of concentrated HCl is calculated from the following equation:**

$$N = \frac{\% * \text{sp. gr.} * 1000}{\text{Eq. wt.}}$$

N: is the normality of concentrated HCl.

%: is the weight by volume concentration of HCl (36.5%).

Sp. gr.: is the specific gravity of concentrated HCl (1.18g/ml).

Eq. wt.: is the equivalent weight of concentrated HCl (36.45).

- By applying the above equation, you can find the normality of concentrated HCl to be (11.81).

Now applying this normality in the equation you can find the volume of concentrated HCl to be used for dilution.

$$N_1 * V_1 = N_2 * V_2$$

$$11.81 * V_1 = 1 * 100$$

$$V_1 = 8.46 \text{ ml (A little excess is used about 0.5ml)}$$

2. Standardization of 1N Hydrochloric acid:

Chemical Priciple;

Hydrochloric acid is standardized against anhydrous sodium carbonate as the primary standard in **acid-base titration.**

$$Na_2CO_3 + 2HCl \rightarrow 2NaCl + H_2O + CO_2$$

Procedure

1. Dissolve 0.75 gm of primary standard anhydrous sodium carbonate in 50 ml. distilled water.
2. Add 3-5 drops of (methyl red) as indicator.
3. Start titration by adding HCl drop wise from the burette with continuous stirring until the solution becomes faint pink.
4. Heat the solution to boiling so that the color changes back into yellow, cool, and titrate again until the faint pink color is no longer affected by boiling.

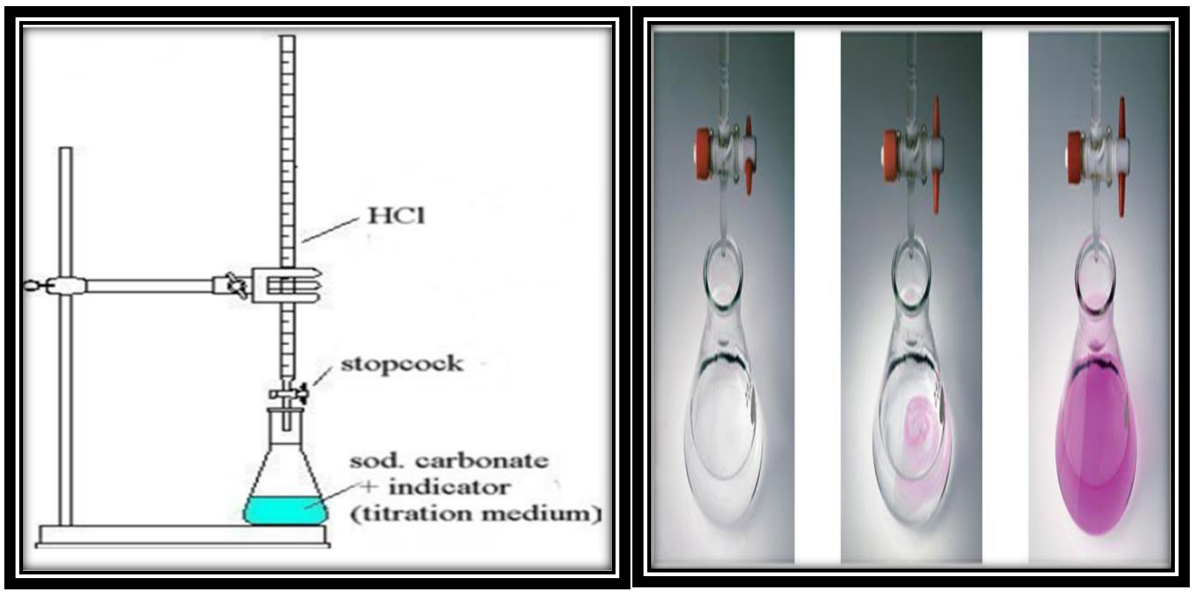
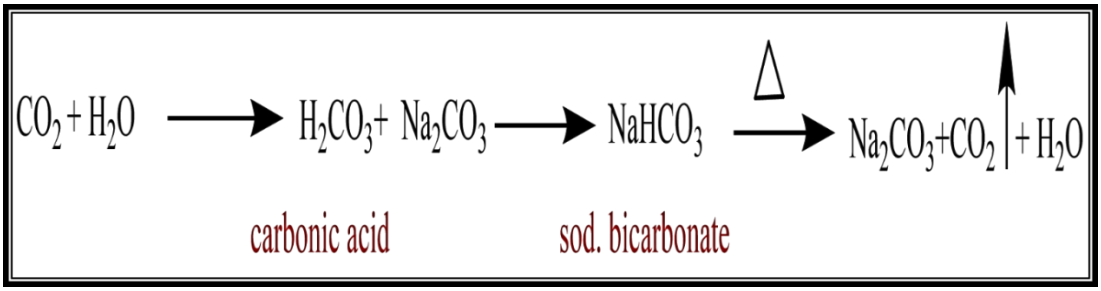
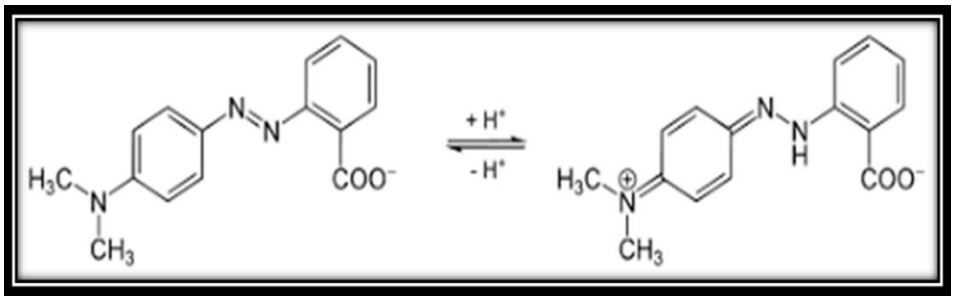


Figure (1-1) titration apparatus & endpoint in standardization of 1N HCl

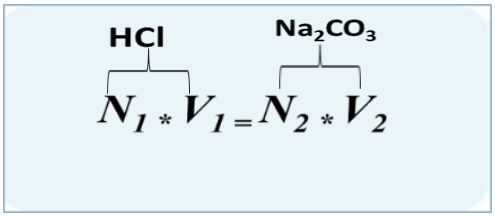
Q/ what is the effect of CO_2 in this reaction?





Calculation

- Record the volume of HCl used and calculate the normality using the following equation:



N_1= the normality of HCl to be calculated

V_1= The volume of HCl obtained from experiment (in ml.)

N_2= the normality of Sodium carbonate calculated from the following equation

$$N_2 = \frac{\text{wt} * 1000}{\text{Eq.wt.} \quad \text{V(ml)}}$$

Wt.= Wt. of Sodium carbonate used (in g).

Eq.wt.= Equivalent weight of Sodium carbonate.

V_2= volume of Sodium carbonate used (in ml.).

Important terms used in the calculation involved in analytical chemistry

❖ **No. of moles** = $\frac{\text{Weight (g)}}{\text{Molecular wt. (g/mol)}}$

❖ **No. of Equivalents** = $\frac{\text{Weight (g)}}{\text{Equivalent wt. (g/eq)}}$

Molarity (M) = $\frac{\text{wt} * 1000}{\text{M.wt.} \quad \text{V(ml)}}$

Normality (N) = $\frac{\text{wt} * 1000}{\text{Eq.wt.} \quad \text{V(ml)}}$

} **for solids**

$$M = \frac{\%* \text{ sp. gr.} * 1000}{\text{M. wt.}}$$

$$N = \frac{\%* \text{ sp. gr.} * 1000}{\text{Eq. wt}}$$

} **for liquids**