## Organic Pharmaceutical Chemistry

3rd Stage 1st Semester

## Lab No: 1

# Preparation & Statandardization of 0.1N HCL


## Prepared by:

**Assist. lecturar: Mustafa Mohammed Hussein Al-Hakiem**

- B.Sc. Pharmacy 2013.
- M.Sc. Pharmaceutical Chemistry 2020.
-E. Mail:mustafa.hashim@uobasrah.edu.iq

# Introduction:

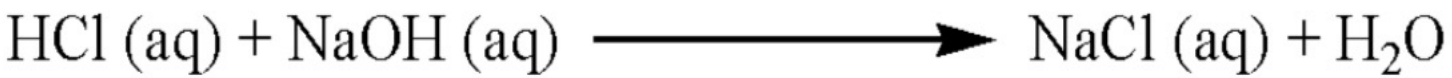
- Hydrochloric acid is produced in solutions up to 38% HCl (concentrated grade).
- Higher concentrations up to just over 40% are chemically possible, but the evaporation rate is then so high that storage and handling need extra precautions, such as pressure and low temperature.
- **In this experiment** you will be determining the volume of sodium hydroxide solution of known concentration required to neutralize a known mass of an unknown acid in solution. The technique used will be **titration**.

# Introduction:

## What is a Titration?

- A titration is an analytical procedure used to determine the accurate concentration of a sample by reacting it with a standard solution.

- One type of titration uses a neutralization reaction, in which an acid and a base react to produce a salt and water:



# Introduction:

**Terms you will need to be familiar with in order to understand a discussion of titration are:**

**Burette:** an instrument used to measure volume; a graduated glass tube about 40 cm long with a stopcock on one end.

**Standard solution:** a solution of known concentration; that is divided into primary & secondary.

- ✓ ***Primary standard solution***: is a reagent that is extremely pure, stable, has no waters of hydration, and has high molecular weight. Some primary standards of titration of acids include sodium carbonate.

- ✓ ***Secondary standard solution:*** Solutions whose concentration changes with time needs to be standardized everyday before you continue your titration for that day like HCL & NaOH.

# Introduction:

**Terms you will need to be familiar with in order to understand a discussion of titration are:**

**Unknown:** a substance or a mixture about which something is not known.

**Indicator:** a substance which is added to the reaction system in small amounts; it indicates that the reaction is complete (has reached the end point) by changing color.

**End point:** the stage in the titration at which the indicator color change is observed, indicating that the reaction is complete.

# Procedure:

1- Preparing 100 ml of 0.1 N HCl :- 37 % HCl shows sp. gravity 1.19 g/mL and we can find normality by the following equation:-

$$N = \frac{wt}{eq.wt} \times \frac{1000}{v}$$

✓Then calculate the volume of HCl (conc.) :- We must dilute it to prepare 0.1 N HCl in 100 ml

$$N_1V_1\,(\text{conc.}) = N_2V_2 \Rightarrow 12 * V_1 = 0.1 * 100\text{ml}$$

$$V_1 = 0.8\text{ ml}$$

# Procedure:

2- Preparing 100 ml of 0.1 N NaOH :- calculate the amount of sodium hydroxide for preparing 0.1 N in 100 ml by the following equation:-

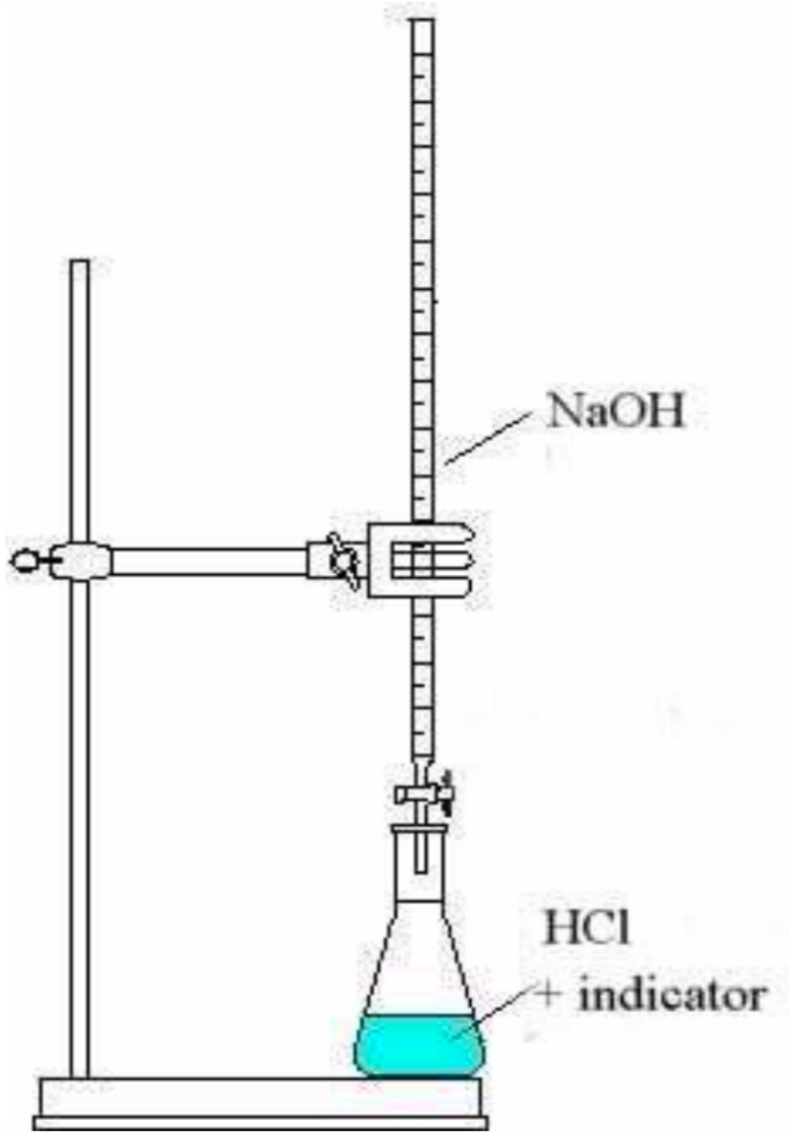
$$\mathrm{N} = \frac{wt}{eq.wt} \times \frac{1000}{v}$$

✓From above equation the weight of NaOH is 0.4 gm to be dissolved in 100 ml D.W.

# Procedure:

3- Transfer 10 ml of the HCl solution, with a pipette, to a conical flask then add two drops of phenolphthalein indicator to this solution.

4- Add the NaOH solution from the burette gradually with continuous stirring of the solution in the conical flask and near the end point, the base is added drop by drop. Continue the addition of the base until the color of the solution changes from colorless to pink.



# Calculation:

✓ When the base neutralizes the acid (at the endpoint), the number of equivalents of acid = the number of equivalents of base , therefore :-

$(N1 * V1)_{base} = (N2 * V2)_{acid}$

N1 :the normality of NaOH solution
V1 :the volume of NaOH solution used (descending from burette)
N2 :the normality of HCl solution (to be calculated)
V2 : volume of HCl solution used (10 ml in our experiment)

# Thank You For Listening