

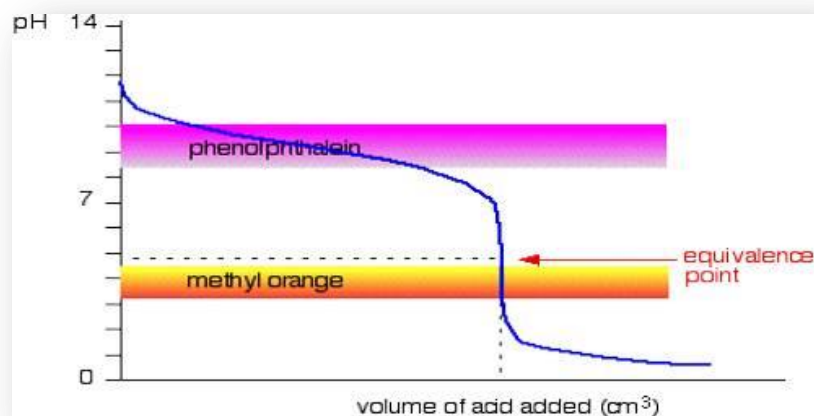


## Titration

A titration is defined as ‘the process of determining the quantity of a substance A by adding measured increments of substance B, the titrant, with which it reacts until exact chemical equivalence is achieved (the equivalence point)’.

### Some important terms in titration process:

- 1- **Analyte:** The solution of unknown concentration but known volume put in conical flask.
- 2- **Titrant:** The solution of known concentration put in burette.
- 3- **Equivalent Point:** It is a theoretical point where the amount of two reactants are just equivalent.
- 4- **End point:** It is a practical point at which the reaction is observed to be complete, this point is usually observe with the help of indicator.
- 5- **Indicator:** An conducive material used to identify the outcome of the titration process. They change color in a pH range.



Indicators in acid – base titration



## Types of Titrations:

- 1- Acid-base titrations.
- 2- Redox titrations..
- 3- Precipitation titrations
- 4- Complexometric titrations.

### Acid-base titration

Acid-base titrations depend on the neutralization between an acid and a base when mixed in solution. The acid-base indicator indicates the endpoint of the titration by changing color.

**((In this experiment we will find the normality of NaOH by using HCl as a titrant agent)).**

Hydrochloric acid reacts with sodium hydroxide according to the following equation:



### Glassware:

Burette – Stand – Conical flask – Funnel – Beaker – Pipette – Graduated Cylinder – Dropper – Washing bottle.

### Materials:

- 1- HCl solution (standard) known normality.
- 2- NaOH solution of unknown normality.
- 3- Phenol naphthalene indicator.



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### Procedure:

- 1- Transfer by a pipette 5 ml of unknown NaOH solution to a conical flask.
- 2- Add to the conical flask two drops of phenol naphthalene indicator.
- 3- Fill the burette with HCl solution to zero mark.
- 4- Titrate NaOH against HCl until the color of solution changes from pink to colorless.
- 5- Repeat the experiment two times and record your results.

### Calculations:

The unknown concentration calculated by using the law:

$$N_1 V_1 = N_2 V_2$$