Acids, Bases and Salts

Acids

Acids furnish H^+ ions or H_3O^+ ions when dissolved in water. Acids have one or more replaceable H atoms

Arrhenius Concept of Acids

Acid is capable of producing hydrogen ion H^+ by dissociating in aqueous solution. This reaction can be represented by

$$\underset{\text{Acid}}{HA\,(aq)} \longrightarrow \underset{\text{Hydrogen Ion (proton)}}{H^+(aq)}\quad A^-(aq)$$

For example: Hydrochloric Acid (HCl)

$$HCl\,(aq) \longrightarrow H^+(aq)\,Cl^-(aq)$$

The proton or hydrogen ion binds itself to a water molecule to form a **hydronium ion** (H_3O^+)

$$\underset{\text{Hydrogen Ion (proton)}}{H^+} + \underset{\text{Water}}{H_2O} \longrightarrow \underset{\text{Hydronium Ion}}{H_3O^+}$$

The **hydronium ion** is also known as **oxonium ion** or **hydroxonium ion**.

The first equation can be rewritten as

$$HA\,(aq) + H_2O \longrightarrow H_3O^+(aq)\,A^-(aq)$$

Note: H^+ ions are protons.

- Acids generally have sour taste.
- Acids change Blue litmus Red.
- They are colorless with **phenolphthalein** and pink with **methyl orange**.
- Acids show acidic nature in their aqueous form.

Classification of Acids

- **Based on Source:**
  - **Organic Acids** are present in plants and animals (living beings).

    Eg: HCOOH (Formic Acid), CH_3COOH (Acetic Acid)

- **Inorganic Acids** are found from rocks and minerals.

  Eg: HCl (Hydrochloric Acid), HNO_3 (Nitric Acid), H_2SO_4 (Sulphuric Acid)

- **Based on their Basicity**

  Basicity = The number of H atoms replaceable by a base in a particular acid.

  - **Monabasic Acid** gives one H^+ ion per molecule of the acid in solution.

    Eg: HCl, HNO_3

  - **Dibasic Acid** gives two H^+ ions per molecule of the acid in the solution.

    Eg: H_2SO_4, H_2CO_3

  - **Tribasic Acid** gives three H^+ ions per molecule of the acid in the solution.

    Eg: H_3PO_4

- **Based on Ionisation**

  - **Strong Acids** ionise completely in water.

    Eg: HCl

  - **Weak Acids** ionise partially in water.

    Eg: CH_3COOH

- **Based on Concentration**

  - **Concentrated Acid** has a relatively high percentage of acid in its aqueous solution.
  - **Dilute Acid** has a relatively low percentage of acid in its aqueous solution.