

Acids and Bases

Acids and Bases are the main categories of chemical compounds. They have certain definite properties.

Acid:

- The word 'acid' is derived from a Latin word, which means "**sour**".
- **Organic acids:** These acids contain carbon as a constituent and are present in organic matter i.e, animals and plants.eg, Citric acid, acetic acid, tartaric acid etc. Organic acids are **weak acids**.
- **Mineral Acids:** These acids are prepared from minerals present in the Earth's crust. eg, sulphuric acid, hydrochloric acid , nitric acid,etc. These are also called laboratory acids. Mineral acids are **strong acids**.
 - **Sulphuric acid** is known as the **king of chemicals**.

Base:

- **Bases** are substances that, in aqueous solution, release hydroxide (OH^-) ions, are slippery to the touch, can taste **bitter** eg: Milk of Magnesia, baking soda, washing soda, calcium hydroxide, etc.

Weak and Strong Bases:

Strong bases: Some bases are readily soluble in water. These are strong bases. These are also called alkalis.eg: sodium hydroxide and potassium hydroxide.

- Strong bases are very corrosive and can burn the skin

Weak bases: Some bases are insoluble or partly soluble in water such bases are called weak bases.eg: ammonium hydroxide, calcium hydroxide etc.

Arrhenius concept of acids and bases:

- Acid is a substance which produces **hydrogen ions** in aqueous solution e.g. HCL ($\text{H}^+ \text{Cl}^-$), Sulphuric Acid, $\text{H}_2\text{SO}_4(2\text{H}^+ \text{SO}_4^{2-})$.
- Base is a substance which produces **Hydroxide ion (OH^-)** in aqueous solution e.g. sodium hydroxide and ammonium hydroxide etc.

Lewis concept of Acids and Bases:

- An acid is a substance which can **accept an electron** e.g. boron fluoride (BF_3) and carbon dioxide.
- Base is a substance which can **produce an electron** e.g. fluoride (F^-) and chloride (Cl^-).

Bronsted Lowery concept of Acids and Bases

- An acid is a molecule or ion which is capable of **donating a proton**.
- A base is a molecule or ion which is capable of **accepting a proton**.

Some important acids:

Acid	Present in
Acetic Acid	Vinegar
Ascorbic Acid	Amla
Citric Acid	Citrus Fruits
Formic Acid	Red ants
Lactic Acid	Curd
Tartaric Acid	Grapes, Ripe Mangoes
Oxalic Acid	Tomato
Malic Acid	Apple
Hydrochloric Acid	Stomach
Butyric Acid	Butter
Stearic Acid	Fat
Amino Acid	Protein
Tanic Acid	Tea

Some important bases:

Name of Base	Found in
(i) Calcium hydroxide	Lime water
(ii) Ammonium hydroxide	Window cleaner
(iii) Sodium hydroxide	Soap

(iv) Potassium hydroxide	Soap
(v) Magnesium hydroxide	Milk of Magnesia

PH Scale:

- PH value is a measure of the acidity or basicity of an aqueous solution.
- Solution with PH value **less than 7** is considered as acidic.
- Solution with PH value **greater than 7** is considered as basic.

PH values of some important solutions:

Substance	P ^H Value
Hcl	2
Vinegar	2.4 -3.4
Wine	2.8-3.8
Beer	4.0-5.0
Lysosomes	4.5
Coffee	4.5-5.5
Human skin	4.7
Urine	5.5-7.5
Saliva	6.5-7.5
Tears	7.4
Blood	7.3 to 7.5
Pure water	7
Sea water	8.5
Ammonia	12

Application of Acids:

Acids	Uses
Hydrochloric acid	used for cleaning sinks and sanitary wares and in textile industry as a

	bleaching agent.
Nitric acid	used in manufacture of fertilizers, paints, explosives
Tartaric acid	used in making baking powder by mixing it with baking soda.
Citric acid	medicine
Acetic acid	used in preservation of food and for enhancing flavor of food.
Sulphuric acid	used in the batteries for cars, inverters

Application of Bases:

Base	Uses
Calcium hydroxide	used as an ingredient in whitewash, neutralizing acidic soil, in making bleaching powder and softening hard water.
Magnesium hydroxide	also known as milk of magnesia is used as an antacids.
Sodium hydroxide	also known as caustic soda is used manufacture of soaps, paper and textile.
Aluminium hydroxide	used as foaming agent in fire extinguishers.
Ammonium hydroxide	used in household cleaners and in fertilizers
Sodium carbonate+sulphuric acid	used in fire extinguisher.