

# Chemical Reactions and Equations

## Chemical Reaction

When a substance reacts with itself or with another substance to form one or more new substances having different chemical properties, this process is called a **chemical reaction**.

Chemical reactions involve breaking of old bonds and formation of new bonds.

## Chemical Equation

The symbolic representation of a chemical reaction using chemical formulae and symbols of reactants and products is called a **chemical equation**.

Example:



magnesium reacts with oxygen to form magnesium oxide.

→ Reactants and Products

**Reactants:** Substances that take part in a chemical reaction.

**Products:** New substances formed after the reaction.

→ Balanced Chemical Equation

A chemical equation is said to be **balanced** when the number of atoms of each element is equal on both sides of the equation.

Balancing is usually done by the **hit and trial method** to satisfy the law of conservation of mass.

## **Complete Chemical Equation**

A complete equation also shows the **physical states** of substances:

(s) = solid                      (l) = liquid                      (g) = gas                      (aq) = aqueous

## **Observations During a Chemical Reaction**

During a reaction, the following changes may be observed:

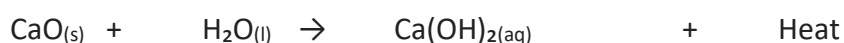
- (a) Change in state
- (b) Change in colour
- (c) Evolution of gas
- (d) Change in temperature (heat released or absorbed)
- (e) Formation of precipitate

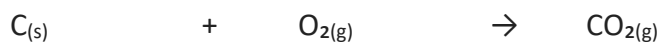
## **Types of Chemical Reactions**

### (i) Combination Reaction

Two or more substances combine to form a single product.

Examples:





### (ii) Decomposition Reaction

A single compound breaks down into two or more simpler substances.

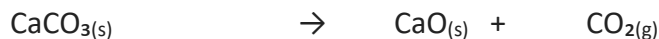


Types of Decomposition Reactions:

#### (a) Thermal Decomposition (by heat)

Decomposition occurs due to heat energy.

Example:



#### (b) Photolytic Decomposition (by light)

Decomposition occurs in presence of sunlight.

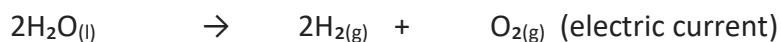
Example:



#### (c) Electrolytic Decomposition (by electricity)

Decomposition occurs due to electric current.

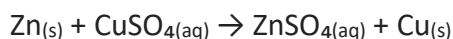
Example:



### (iii) Displacement Reaction

An element displaces another element from its compound.

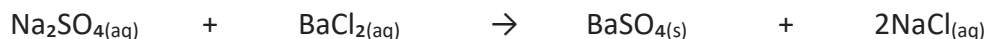
Example:



### (iv) Double Displacement Reaction

Two compounds exchange their ions to form new compounds.

Example:

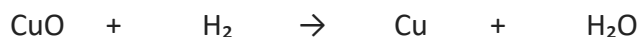


### (v) Oxidation and Reduction

**Oxidation:** Gain of oxygen or loss of hydrogen

**Reduction:** Loss of oxygen or gain of hydrogen

Example:

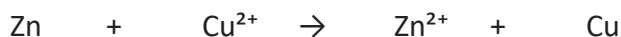


CuO is reduced and H<sub>2</sub> is oxidized.

### (vi) Redox Reaction

A reaction in which oxidation and reduction occur simultaneously.

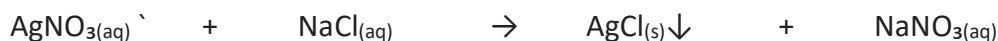
Example:



(vii) **Precipitation Reaction**

A reaction in which an insoluble solid (precipitate) is formed.

Example:



→ **Classification on the Basis of Heat**

(a) **Exothermic Reaction**

Reactions that release heat energy.

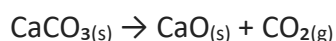
Example:



(b) **Endothermic Reaction**

Reactions that absorb heat energy.

Example:



→ **Corrosion**

When a metal reacts with air, moisture, or chemicals (like acids), it gets damaged slowly. This process is called **corrosion**.

Example: Rusting of iron.

→ **Rancidity**

When fats and oils are exposed to air for a long time, they get oxidized and develop unpleasant smell and taste. This is called **rancidity**.