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Chapter - 1

Chemical Reaction & Equations

Chemical Reaction

It is a process in which one or more substances foamed new substances.
& it can't be reserved by physical methods.

Chemical Reaction involves

- Change in states
- Change in colour
- Change in temperature
- Evolution of Gas.

Chemical Reaction can't be reversed by the physical methods :—

- → Magnetism
- → Filteration
- → Centrifugation
- → Levitation
- → Evaporation.

Chemical Reaction happens in our daily life :—

(i) Digestion of food

(ii) Respiration

(iii) Rusting of iron

(iv) Formation of curd

Reactants → Who take part in chemical Reaction

Products → The substance which are formed in a chemical reaction.

exp. — When Magnesium Ribbon burns in air (oxygen) gives us (Magnesium oxide)

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Chemical Equation A chemical Reaction can be represented by chemical equation it involves uses of symbols of substances of reactants & products with mention of physical state.

Solid ⟶ (s)
Liquid ⟶ (l)
Gaseous ⟶ (g)
Aqueous ⟶ (aq)

Magnesium Ribbon burnt in air (oxygen) gives us Magnesium oxide.

$$2Mg + O_2 \longrightarrow 2MgO$$

Aqueous Solution — It is a solution in which solvent is water.

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How to balance a chemical Equation

★ $3[Fe] + 4[H_2O] \longrightarrow [Fe_3O_4] + 4[H_2]$

Element	Reactant	Product
Fe	1 x 3 = 3	3
H	2 x 4 = 8	2 x 4 = 8
O	1 x 4 = 4	4

= $3Fe + 4H_2O \longrightarrow Fe_3O_4 + 4H_2$

= $3Fe(S) + 4H_2O(l) \longrightarrow Fe_3O_4(S) + 4H_2(g)$

★ $2[Mg] + [O_2] \longrightarrow 2[MgO]$

= $2Mg(S) + O_2(g) \longrightarrow 2MgO(S)$

Why do we need to balance a chemical Reaction?:-

- Law of Conservation of mass — matter can neither be created or nor be destroyed in a chemical Reaction.
- Law of conservation of mass — No. of elements involve in chemical Reaction should remain same at reactant & product side.

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Types of a chemical Reaction :-

1. **Combination Reaction** :-
The reaction in which two or more reactants combines to form a single product.

Exp- $A + B = (AB)$

(i) Burning of coal

$$C(s) + O_2(g) \longrightarrow CO_2(g)$$

(ii) Formation of water

$$H_2(g) + O_2(g) \longrightarrow H_2O(l)$$

2. **Decomposition Reaction** :-
In this reaction a compound splits into two or more substances is called decomposition Reaction.

- $(A) \longrightarrow B + C$
- Thermal Decomposition
- Electrolytic decomposition
- Photolytic decomposetion

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- **Thermal decomposition** — When, the decomposition is carried out by heating.

$$\underset{R.}{CaCO_3\ (s)} \xrightarrow{Heat} \underset{P.}{CaO\ (s) + CO_2\ (g)}$$

- **Electrolytic decomposition** — When, the decomposition is carried out by passing electricity.

$$\underset{R.}{H_2O\ (l)} \xrightarrow{\text{electric current}} \underset{P.}{H_2\ (g) + O_2\ (g)}$$

- **Photolysis decomposition** — When, the decomposition is carried out in presence of sunlight.

$$\underset{R.}{AgCl\ (s)} \xrightarrow{Sunlight} \underset{P.}{Ag\ (s) + Cl_2\ (s)}$$

Above reaction is used in black & white photography.

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3. **Displacement Reaction :—**

The reaction in which more reactive element displaces less reactive element from its solutions.

$$Fe(s) + CuSO_4(aq) \longrightarrow FeSO_4(aq) + Cu(s$$

4. **Double displacement Reaction :—**

A reaction in which new compounds are formed by ~~mutual~~ mutual exchange of ions between two compounds.

$$NaSO_4(aq) + BaCl_2(aq) \longrightarrow BaSO_4(s) + 2NaCl(aq)$$

↓	↓	↓	↓
Sodium Sulphate	Barium chloride	Barium sulphate	Sodium chloride

Precipitate :— It is an insoluble solid that emerges from a liquid solution

5. Oxidation & Reduction :—

Oxidation —★ The addition of oxygen to substance ★ The removal of hydrogen from a ~~so~~ substance.

Reduction —★ The addition of hydrogen to substance ★ The removal of oxigen from a substance

$2Cu + O_2 \longrightarrow 2CuO$ (Oxidation)

$CuO + H_2 \longrightarrow Cu + H_2O$ (Reduction)

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Effects of Oxidation in daily life

(i) **Corrosion** — When a metal is exposed to substance such as moisture, air, water, acid etc for some time, a layer of oxide is formed which weakness the metal hence metal said to be corrode

Ex. → Rusting of iron
→ Black coating on silver
→ Green coating on copper

(ii) **Rancidity** — The oxidation of fats & oils when exposed to air is known as rancidity. It leads to bad smell & bad taste of food.

Chemical Reaction also classify on the basis of temperature :—

Exothermic Reaction — Reaction in which heat is released along with formation of product called **exothermic Reactions**

Ex. Burning of Natural gas.

$$CH_4(g) + O(g) \longrightarrow CO_2(g) + 2H_2O(g) + \boxed{Heat}$$

Endothermic Reaction — The reaction which requires energy in the form of [Heat, light & Electricity] called endothermic Reaction