



CHAPTER – 1

Chemical Reactions and Equations

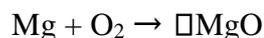
- **Chemical Reaction** : – Whenever a chemical change occurs we can say that a chemical reaction has taken place

eg – Food gets digested in our body –

Rusting of iron.

- **Chemical Equation** : – A chemical reaction can be expressed symbolically by using chemical equation

eg magnesium is burnt into air to form magnesium oxide can be represented as

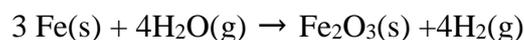


- We can observe or recognise a chemical reaction by observing change in state, colour, by evolution of gas or by change in temperature.

- Physical state of the reactant and products are mentioned to make chemical reaction more informative. eg we use (g) for gas, (l) for liquid, (s) for solid and (aq) for aqueous.

- **Balancing Equation** : – We balance the chemical equation so that no. of atoms of each element involved in the reaction remain same at the reactant and product side.

eg $\text{Fe} + \text{H}_2\text{O} \rightarrow \text{Fe}_2\text{O}_3 + \text{H}_2$ can be written as



- **Combination Reaction** : – The reaction in which two or more substances combine to form a new single substance

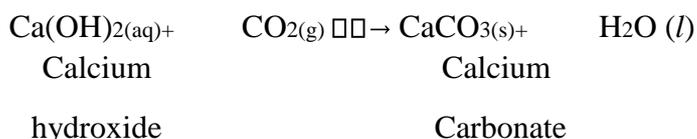
eg $\text{CaO}(s) + \text{H}_2\text{O}(l) \rightarrow \square \square \rightarrow \text{Ca}(\text{OH})_2(aq)$



Calcium Water Calcium hydroxide oxide (slaked lime)

Quick lime

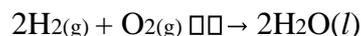
- Ca(OH)₂ slaked lime is used for white washing walls. It reacts with CO₂ to form CaCO₃ and gives a shiny finish to the walls.



- Burning of Coal



- Formation of water



- **Exothermic Reactions** :- Reaction in which heat is released along with the formation of products. eg. $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$ - Respiration is also exothermic reaction.

- Decomposition of vegetable matter into compost.

- **Decomposition Reactions** :- The reaction in which a single substance decomposes to give two or more substances. Decomposition reactions can be of three types

Thermal Decomposition :- When a decomposition reaction is carried out by heating

Decomposition Reactions

→ **Thermal Decomposition :-** When a decomposition reaction is carried out by heating

eg $2 \text{FeSO}_4(s) \xrightarrow{\text{Heat}} \text{Fe}_2\text{O}_3(s) + \text{SO}_2(g) + \text{SO}_3(g)$

Ferrous Sulphate Ferric Oxide
Green Colour → Reddish brown colour

$\text{CaCO}_3(s) \xrightarrow{\text{Heat}} \text{CaO}(s) + \text{CO}_2(g)$

$\text{Pb}(\text{NO}_3)_{2(s)} \xrightarrow{\text{Heat}} \text{PbO}(s) + 4\text{NO}_2(g) + \text{O}_2(g)$

Lead Nitrate Leadoxide Nitrogen Oxygen
White colour → Brown colour dioxide

→ **Electrolytic Decomposition :-** When a decomposition reaction is carried out by electric current,

eg. $\text{H}_2\text{O}(l) \xrightarrow{\text{electric current}} 2 \text{H}_2(g) + \text{O}_2(g)$

→ **Photolytic decomposition :-** When a decomposition reaction is carried out by light

eg. $2\text{AgCl}(s) \xrightarrow{\text{Sunlight}} 2\text{Ag}(s) + \text{Cl}_2(g)$

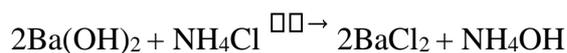
White colour → grey colour

– Silver bromide behaves similarly

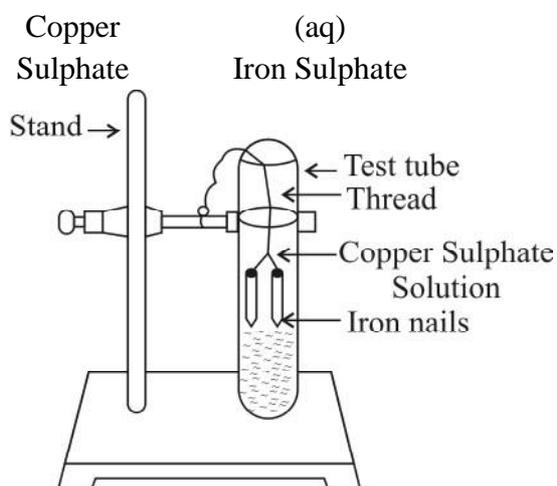




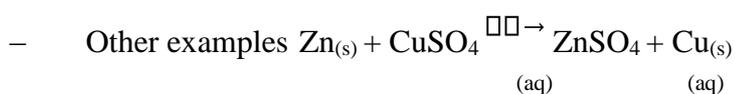
- The above two reactions are used in black and white photography. -
- **Endothermic Reactions** – The reactions which require energy in the form of heat, light or electricity are called Endothermic Reactions.



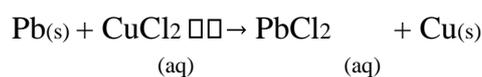
- **Displacement Reaction :** The chemical Reaction in which an element displaces another element from its solution



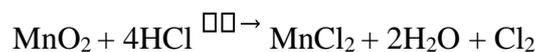
- The nail becomes brownish in colour and the blue colour of Copper Sulphate solution fade.



Copper Sulphate Zinc Sulphate



Copper Chloride Lead Chloride



- **Corrosion** : When a metal is attacked by substances around it such as moisture, acids etc. eg. Reddish brown coating on iron.
(ii) Black coating on Silver.
- **Rancidity** : When fats and oils are oxidised they become rancid and their smell and taste change.
- Antioxidants are added to foods containing fats and oil.

EXERCISE (Question Bank)

(1 Mark)

Answer the following questions very briefly

1. What happens when the milk is left at room temperature during summer?
2. Write a chemical equation when magnesium is burnt in air to give magnesium oxide.
3. A substance under goes chemical reactions to produce simpler products, what type of reaction is this?
4. Why do copper vessels lose their shine when exposed to air?
5. Which gas is produced by the action of dilute hydrochloric acid on zinc granules?
6. $\text{Fe}_2\text{O}_3 + 2\text{Al} \xrightarrow{\quad\quad} \text{Al}_2\text{O}_3 + 2\text{Fe}$

The above reaction is an example of which type of reaction.

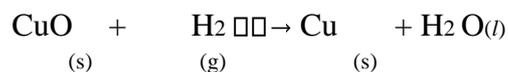
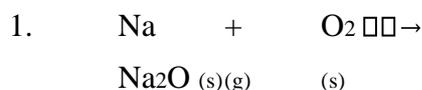
7. Name the type of reaction in which energy is absorbed.
8. Why does the colour of copper sulphate solution change when an iron nail is dipped into it?



9. Give an example of decomposition reaction which proceeds by absorbing electric energy.
10. Why do we balance the chemical equation?

Answer the following questions briefly (2 mark)

1. Write down the observations which indicate the occurrence of a chemical reaction.
2. Why is respiration considered as an exothermic reaction? Explain.
3. Transfer the following statements into Chemical equations and then balance them.
 - a) Hydrogen gas combines with nitrogen to form ammonia.
 - b) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.
4. Identify the substances that are oxidised and the substances that are reduced to the following reactions.



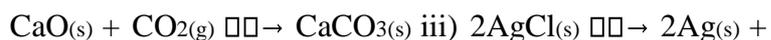
5. What happens when silver chloride is exposed to sunlight? Give one practical application of this reaction. Write the equation also.
6. Why is the bag used for potato chips flushed with nitrogen gas?

Answer the following questions in detail (3 marks)

1. Write down the balanced chemical equations for the following reactions.
 - a) Zinc Carbonate_(s) → Zinc Oxide + Carbon Dioxide_(g)
 - b) Aluminium_(s) + Chlorine_(g) → Aluminium Chloride_(s)
 - c) Magnesium_(s) + Water_(l) → Magnesium Hydroxide_(l) + Hydrogen_(g) + Heat



2. Choose combination, displacement and double displacement reactions out of the given reactions.

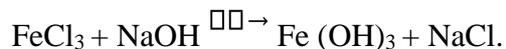
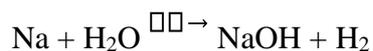
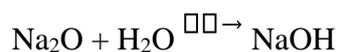
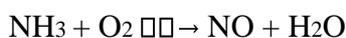
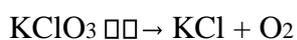


3. What happens when $\text{CO}_2(\text{g})$ is passed through slaked lime? Write the balanced chemical equation. Write the type of reaction that has occurred.

Explain the following questions detail

(5 marks)

1. Balance the following chemical equation and identify the type of reaction they represent



2. Define various types of chemical reactions. Write one chemical equation for each type.