

## Chemical Reactions and Equations - Notes

[Notes](#) [Important Questions](#) [Previous Years Questions](#)

### Chemical Reactions and Equations - Notes

**Chemical Reaction:-** The change in which one or more new substances with different chemical properties are formed is called a chemical reaction.

**Common observations during a chemical reaction are:-**

- Change in state
- Change in color
- Change in temperature
- Evolution of gas

**Word Equation:-** A chemical reaction expressed in words rather than chemical formulas is called word equation.

e.g., Magnesium + Oxygen → Magnesium Oxide

**Chemical Equation:-** A brief representation of a chemical reaction in terms of symbols and formulas is known as chemical equation.

e.g.,  $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$

- **Skeletal Chemical Equation:-** The unbalanced chemical equation is called skeletal

chemical equation.

e.g.,  $\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$

- **Balanced Chemical Equation:-** The chemical equation in which the number of atoms of each element is same on both sides of the equation is called a balanced chemical equation.

e.g.,  $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$

**Note:-** A chemical equation can be made more informative by indicating:-

1. physical states [(s), (l), (g), or (aq)] of the reactants and products.
2. reaction conditions, such as temperature, pressure, catalyst etc., below and/or above the arrow.

**Exothermic Reaction:-** The reaction in which heat is released with the formation of products is called exothermic reaction.

e.g.,

- Burning of coal:-  $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$
- Burning of natural gas (Methane):-  $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
- Respiration:  $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{energy}$
- Reaction of Quick lime (Calcium Oxide) with water to give slaked lime (Calcium Hydroxide):-  $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2$
- Decomposition of vegetable matter into compost

**Endothermic Reaction:-** The reaction in which energy is absorbed is called endothermic reaction.

e.g.,

- $2\text{FeSO}_4 \rightarrow \text{Fe}_2\text{O}_3 + \text{SO}_2 + \text{SO}_3$
- $2\text{Pb}(\text{NO}_3)_2 \rightarrow 2\text{PbO} + 4\text{NO}_2 + \text{O}_2$
- $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
- Photosynthesis:-  $6\text{CO}_2 + 12\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$

### Types Of Chemical Reactions:-

1. Combination Reaction
2. Decomposition Reaction
3. Displacement Reaction
4. Double Displacement Reaction
5. Precipitation Reaction
6. Oxidation
7. Reduction
8. Redox Reaction

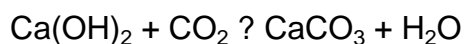
**Combination Reaction:-** The reaction in which two or more substances combine to form a single product is known as combination reaction.

e.g.,

- $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$
- $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
- $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2$

**Note:-** The solution of Quick lime (CaO) with water which gives Slaked lime  $[\text{Ca}(\text{OH})_2]$  is used for white washing the walls.

Now, this slaked lime reacts with  $\text{CO}_2$  in air to form  $\text{CaCO}_3$  and gives shiny finish to walls.

**Some important compounds:-**

- **Chemical formula:-** CaO, **Chemical name:-** Calcium Oxide, **Common name:-** Quick lime
- **Chemical formula:-** Ca(OH)<sub>2</sub>, **Chemical name:-** Calcium Hydroxide, **Common name:-** Slaked lime
- **Chemical formula:-** CaCO<sub>3</sub>, **Chemical name:-** Calcium Carbonate, **Common name:-** Limestone/Marble/Chalk

**Decomposition Reaction:-** The reaction in which a single reactant splits to form two or more products is called a decomposition reaction.

**Types Of Decomposition Reactions:-**

1. Thermal Decomposition
2. Photo Decomposition
3. Electrical Decomposition

**Thermal Decomposition:-** The decomposition reaction which is carried out by heating is called thermal decomposition.

e.g.,

- $2\text{FeSO}_4 \rightarrow \text{Fe}_2\text{O}_3 + \text{SO}_2 + \text{SO}_3$
- $2\text{Pb(NO}_3)_2 \rightarrow 2\text{PbO} + 4\text{NO}_2 + \text{O}_2$
- $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$

**Note:-** CaO is used in manufacturing of cement.

---

**Photo Decomposition:-** The decomposition reaction which is carried out by sunlight is called photo decomposition.

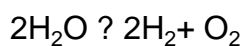
e.g.,

- $2\text{AgCl} \xrightarrow{\text{Sunlight}} 2\text{Ag} + \text{Cl}_2$
- $2\text{AgBr} \xrightarrow{\text{Sunlight}} 2\text{Ag} + \text{Br}_2$

**Note:-** These reactions are used in black and white photography.

**Electrical Decomposition:-** The decomposition reaction which is carried out by electricity is called electrical decomposition.

e.g.,



**Note:-**

- In electrolysis of water, hydrogen gas is released at cathode and oxygen is released at anode.
- The amount of hydrogen gas collected at cathode is double the amount of oxygen gas collected at anode because when 2 mole of water is decomposed then, 2 mole of hydrogen gas and 1 mole of oxygen gas is produced.

**Displacement Reaction:-** The reaction in which highly reactive metal displaces the less reactive metal from its salt solution is called displacement reaction.

## BrainIgniter

Ignite the new brains...

<https://brainigniter.in>

---

e.g.,

- $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$
- $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$
- $\text{Pb} + \text{CuCl}_2 \rightarrow \text{PbCl}_2 + \text{Cu}$

**Reactivity Series:-**  $\text{K} > \text{Na} > \text{Ba} > \text{Ca} > \text{Mg} > \text{Al} > \text{Zn} > \text{Fe} > \text{Co} > \text{Ni} > \text{Sn} > \text{Pb} > \text{H} > \text{Cu} > \text{Hg} > \text{Ag} > \text{Au} > \text{Pt}$

**Double Displacement Reaction:-** The reaction in which there is an exchange of ions between the reactants is called double displacement reaction.

e.g.,

- $\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4 + 2\text{NaCl}$
- $\text{H}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4 + 2\text{HCl}$

**Precipitation Reaction:-** The reaction that produces a precipitate (ppt) is called a precipitation reaction.

e.g.,  $\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4 + 2\text{NaCl}$

Here,  $\text{BaSO}_4$  is white precipitate produced.

**Some Important Compounds and their colors:-**

- Nitrogen Dioxide( $\text{NO}_2$ )- Brown fumes
- Hydrated Ferrous Sulphate( $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ )- Green
- Ferrous Sulphate( $\text{FeSO}_4$ )- Brown
- Silver Chloride( $\text{AgCl}$ )- White

## BrainIgniter

Ignite the new brains...

<https://brainigniter.in>

---

- Hydrated Copper Sulphate( $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ )- Blue
- Copper Sulphate( $\text{CuSO}_4$ )- White
- Copper Oxide( $\text{CuO}$ )- Black

**Oxidation:-** The process of addition of oxygen or removal of hydrogen is called oxidation. **OR**  
The process of loss of electrons is called oxidation.

e.g.,  $2\text{Cu} + \text{O}_2 \rightarrow 2\text{CuO}$

**Reduction:-** The process of addition of hydrogen or removal of oxygen is called reduction. **OR**  
The process of gain of electrons is called reduction.

e.g.,  $2\text{Na} + \text{H}_2 \rightarrow 2\text{NaH}$

**Redox Reaction:-** The reaction in which both oxidation and reduction take place simultaneously is called redox reaction.

**Oxidising Agent:-** The substance which gets reduced itself and oxidises the other substance is known as oxidising agent.

**Reducing Agent:-** The substance which gets oxidised itself and reduces the other substance is known as reducing agent.

e.g.,  $\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$

- HCl is oxidised to  $\text{Cl}_2$
- $\text{MnO}_2$  is reduced to  $\text{MnCl}_2$
- Oxidising agent-  $\text{MnO}_2$
- Reducing Agent- HCl

**Corrosion:-** The process by which metals are slowly eaten away by the reaction of air, water and chemicals present in atmosphere is called corrosion.

e.g., Rusting of iron, Black coating on silver, Green coating on copper

**Rancidity:-** The process of slow oxidation of oil and fat present in the food materials resulting in the change of smell and taste is known as rancidity.

**Methods to prevent rancidity are:-**

- By keeping the food in air tight containers
- By flushing the bags of chips with nitrogen gas
- By keeping the food in refrigerator at low temperature
- By adding antioxidants like BHA (Butylated Hydroxy Anisole) and BHT (Butylated Hydroxy Toluene)