

CHEMICAL REACTIONS AND EQUATIONS

1. Chemical reactions- The transformation of chemical substance into a new chemical substance by making and breaking of bonds between different atoms is known as Chemical Reaction.

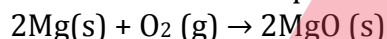
For example: Rusting of iron, the digestion of food, burning of coal, respiration, settling of milk into curd etc.

2. Signs of a chemical reaction- These factors denote that a chemical reaction has taken place- change of state of substance, change of color of substance, evolution of heat, absorption of heat, evolution of gas and evolution of light.

In a chemical Reaction, a new substance is formed which is completely different in properties from the original substance, so in a chemical reaction, a chemical change takes place.

Only a rearrangement of atoms takes place in a chemical reaction.

- The substances which take part in a chemical reaction are called **reactant**.
- The new substances produced as a result of chemical reaction are called **products**.

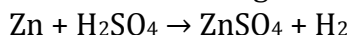


Reactant: Substances which take part in a chemical are called reactant. Example: Mg and O₂

Product: New substance formed after a chemical reaction is called a product. Example: MgO

3. Chemical Equation: The representation of chemical reaction by means of symbols of substances in the form of formulae is called chemical equation. E.g. - $\text{H}_2 + \text{O}_2 \Rightarrow \text{H}_2\text{O}$

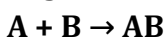
4. Balanced Chemical Equation: A balanced chemical equation has number atoms of each element equal on both left and right sides of the reaction.



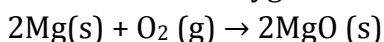
***Note-** According to Law of Conservation of Mass, mass can neither be created nor destroyed in a chemical reaction. To obey this law, the total mass of elements present in reactants must be equal to the total mass of elements present in products.

TYPES OF CHEMICAL REACTIONS:

- I. Combination Reactions-** When two elements or one element and one compound or two compounds combines to give one single product.



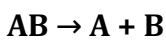
Examples: When Magnesium is burnt in the air (oxygen), magnesium oxide is formed. In this reaction, magnesium is combined with oxygen.



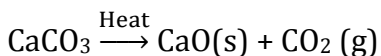
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II. Decomposition Reactions- Splitting of a compound into two or more simple products.

A general decomposition reaction can be represented as follows:

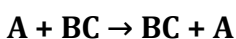


Example: When calcium carbonate is heated, it decomposes into calcium oxide and carbon dioxide.

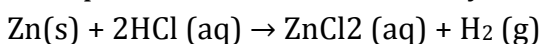


III. Displacement Reactions- It takes place when a more reactive metal displaces a less reactive metal.

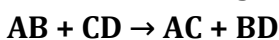
A general displacement reaction can be represented by using a chemical equation as follows:



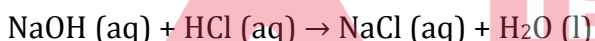
Example: When zinc reacts with hydrochloric acid, it gives hydrogen gas and zinc chloride.



IV. Double displacement Reactions- Reactions in which ions are exchanged between two reactants forming new compounds are called double displacement reactions.



Example: When sodium hydroxide (a base) reacts with hydrochloric acid, sodium chloride and water are formed.



V. Precipitation Reactions- The insoluble compound called precipitate forms in this reaction.

Example: When the solution of barium chloride reacts with the solution of sodium sulphate, white precipitate of barium sulphate is formed along with sodium chloride.



VI. Neutralization Reaction- The reaction in which an acid reacts with a base to form salt and water by an exchange of ions is called neutralization reaction.



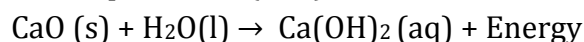
EXOTHERMIC AND ENDOTHERMIC REACTION:

1. Exothermic- Reactions which produce energy are called exothermic reaction. Most of the decomposition reactions are exothermic.

Respiration is a decomposition reaction in which energy is released.



When quick lime (CaO) is added to water, it releases energy.



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2. Endothermic- Reactions which absorb energy are called endothermic reaction. Most of the combination reactions are endothermic.

Example: Decomposition of calcium carbonate



OXIDATION AND REDUCTION REACTION:

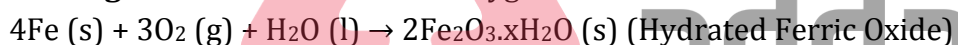
- 1. Oxidation:** Gain of oxygen or removal of hydrogen or metallic element from a compound is known as oxidation.
- 2. Reduction:** Addition of hydrogen or removal of oxygen from a compound is called reduction.
- 3. Redox:** A chemical reactions where oxidation and reduction both take place simultaneously are also known as redox reaction.

E.g. $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$

EFFECTS OF OXIDATION REACTIONS IN EVERYDAY LIFE:

Corrosion: The process of slow conversion of metals into their undesirable compounds due to their reaction with oxygen, water, acids, gases etc. present in the atmosphere is called corrosion. Example: Rusting of iron

Rusting: When iron reacts with oxygen and moisture forms a red substance called rust.



Corrosion (rusting) weakens the iron and steel objects and structures such as railings, car bodies, bridges and ships etc. and cuts short their life.

Method to prevent rusting:

- By painting
- By greasing and oiling
- By galvanization

Rancidity: The taste and odour of food materials containing fat and oil changes when they are left exposed to air for a long time. This is called Rancidity. It is caused due to the oxidation of fat and oil present in food materials.

Methods to prevent rancidity:

- By adding anti-oxidant
- By Vacuum packing
- Replacing air by nitrogen
- Refrigeration of foodstuff

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