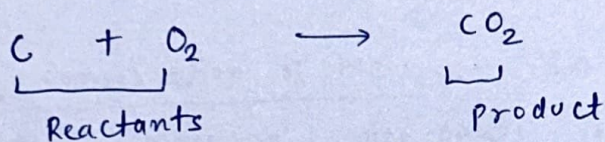


⊗ Introduction :- The changes in which a new product is formed & which cannot be reversed are called chemical changes. Chemical reactions are the processes in which chemical changes take place. eg- burning of magnesium ribbon in presence of air.

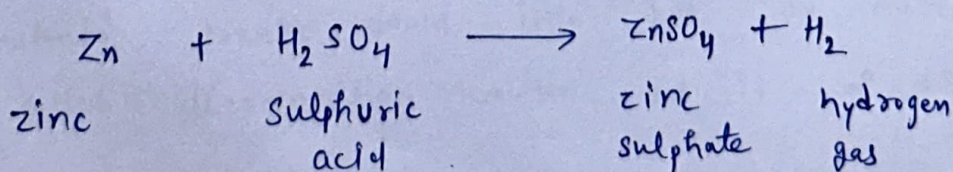
⊗ Reactants & Products :- The substances which take part in a chemical reaction are called reactants. The new substances produced as a result of the chemical reaction are called products. eg- coal is burnt in presence of oxygen to give carbon dioxide.



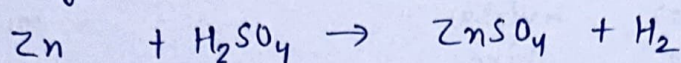
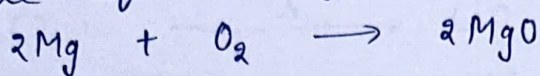
⊗ Characteristics of Chemical Reactions :

- (i) Evolution of a gas
- (ii) Formation of a precipitate
- (iii) Change in colour
- (iv) Change in temperature

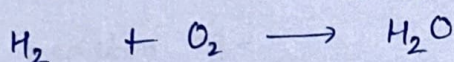
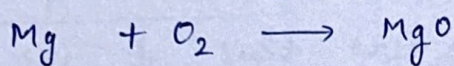
⊗ Chemical Equation :- The method of representing a chemical reaction with the help of symbols & formulae of the substances involved in it, is known as chemical equation. eg- zinc metal reacts with sulphuric acid to form zinc sulphate & hydrogen gas.



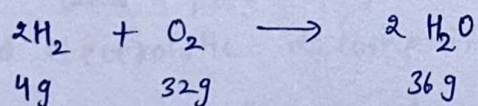
⊛ Balanced Chemical Equation :- A chemical equation in which number of atoms of different elements is equal to the number of atoms in product, is called balanced chemical equation. eg-



⊛ Skeletal Equation / Unbalanced Equation :- If the number of atoms of different elements in reactant is not equal to the number of atoms in product, the chemical equation is called skeletal equation. eg-

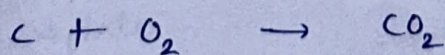
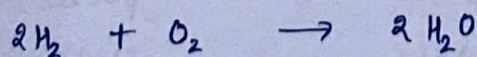


⊛ Law of Conservation of Mass :- In a chemical reaction, the total mass of reactants is always equal to the total mass of products. eg-



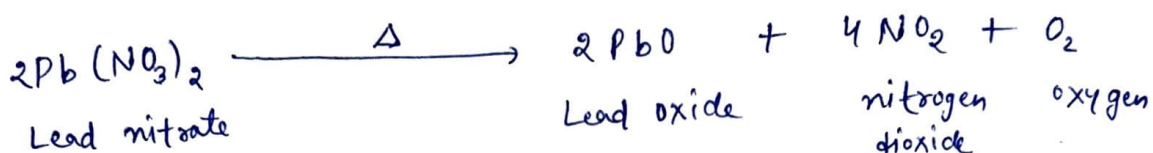
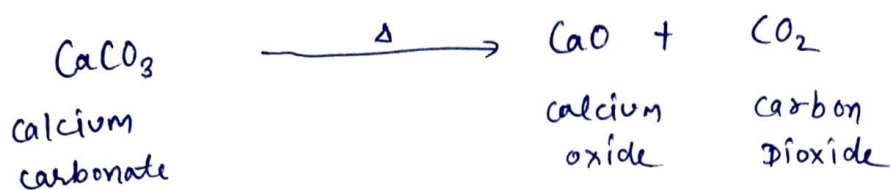
⊛ Types of Chemical Reactions :-

① Combination Reaction :- The reactions in which two or more reactants combine to form a single product are called combination reactions. eg-



② Decomposition Reaction :- The reaction in which one reactant breaks down into two or more products is called decomposition reaction. It is of three types:

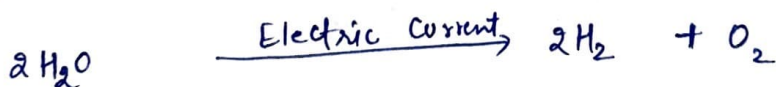
(i) Thermal Decomposition Reaction :- When a decomposition reaction takes place due to heating, it is called thermal decomposition. eg -



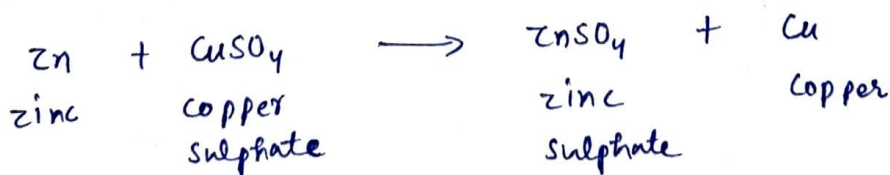
(ii) Light Decomposition Reaction :- When decomposition reaction takes place due to light energy, it is called light decomposition reaction. eg -



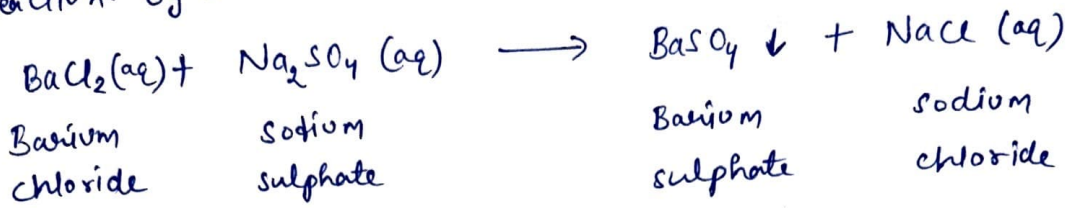
(iii) Electrolytic Decomposition Reaction :- When decomposition reaction takes place by passing electric current, it is called electrolytic decomposition reaction. eg -



(3) Displacement Reaction :- The reaction in which one more reactive element displaces a less reactive element from its salt, is called displacement reaction. eg -



④ Double Displacement Reaction :- The reaction in which two compounds react by the exchange of ions to form new compounds are called displacement reaction. eg -



⑤ Precipitation Reaction :- The reaction in which the product formed is insoluble in water is called precipitation reaction. eg -



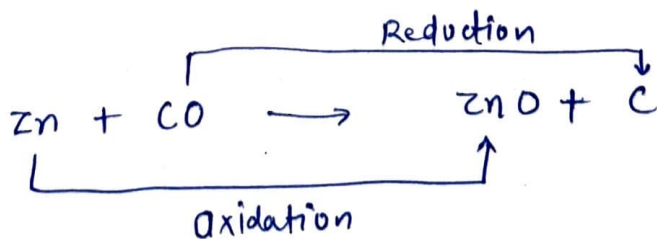
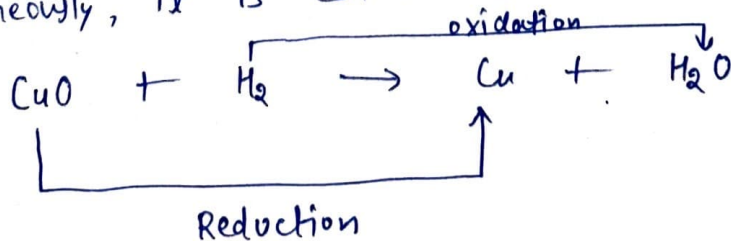
⑥ Oxidation :- The addition of oxygen to a substance or removal of hydrogen from any substance is called oxidation. eg -



⑦ Reduction :- The addition of hydrogen to a substance or removal of oxygen from any substance is called reduction.



⑧ Redox Reaction :- When oxidation & reduction occurs simultaneously, it is called redox reaction. eg -



⊗ Reducing Agents & Oxidising Agents :- The chemical substances which help in reduction are called reducing agents. These are also called reductants. The chemical substances which help in oxidation are called oxidation are called oxidising agents. These are also called oxidants. eg -



In the above example, CuO is oxidising agent & H<sub>2</sub> is reducing agent.

⊗ Corrosion :- When metals are kept in air for long time, their surface get corroded by the action of air & water (moisture). This phenomenon is called corrosion. In this process, metals are eaten up slowly by the action of air & water. eg - rusting of iron. (Chemical formula of rust is Fe<sub>2</sub>O<sub>3</sub>·xH<sub>2</sub>O)

⊗ Methods to prevent corrosion :-

- (i) By applying oil, paint or grease
- (ii) By galvanization
- (iii) By forming alloys
- (iv) By using anti-rust solutions

⊗ Rancidity :- When the oils & fats present in food items get oxidised by oxygen (air), their oxidation products have unpleasant smell & taste. This phenomenon is called rancidity. Rancidity spoils the food items.

⊗ Methods of Prevention of Rancidity :- Rancidity can be prevented:

- ① By keeping food in refrigerator
- ② By storing food in air-tight container
- ③ By storing away from light
- ④ By packaging fats & oil containing foods in nitrogen gas.

⊗ Endothermic Reactions :- The reactions which need energy for their completion are called endothermic reactions. The decomposition reactions are endothermic in nature. eg-



⊗ Exothermic Reactions :- The reactions which give out (release) heat after completion are called exothermic reactions. eg-



⊗ Colour of Different Salts :- (i) The colour of Ferrous sulphate ( $\text{FeSO}_4$ ) is green, It becomes black when heated

(ii) Lead nitrate ( $\text{Pb(NO}_3)_2$ ) is a white coloured compound. When it is heated, it gives a yellow coloured compound & brown coloured gas.

(iii) Copper nitrate ( $\text{Cu(NO}_3)_2$ ) is a blue coloured compound. When it is heated, it gives a black solid & brown gas.

## ⊕ How to Make Chemical Equation More Informative :-

- ① Physical States of Substances :- The physical states of the reactants & products can be represented by using symbols (s) for solid, (l) for liquid, (g) for gas & (aq) for aqueous solution.
- ② Reaction Conditions :- The specific conditions of the reaction like temperature, pressure etc are written above or below the arrow in a chemical reaction.
- ③ Evolution or Absorption of Heat :- Heat absorbed or evolved can be indicated by writing (+ Heat) on the LHS or RHS accordingly.

### Reactivity Series

K	Potassium	Most Reactive           ↓ Reactivity Decreases           Least Reactive
Na	Sodium	
Ca	Calcium	
Mg	Magnesium	
Al	Aluminium	
Zn	Zinc	
Fe	Iron	
Pb	Lead	
H	Hydrogen	
Cu	Copper	
Hg	Mercury	
Ag	Silver	
Au	Gold	

## ⊗ Points to be Kept in Mind While Writing

### Chemical Equation :-

- (i) Gases like hydrogen, nitrogen, oxygen, chlorine are written in diatomic form.
- (ii) Metals like sodium, potassium, magnesium, iron etc are written in monoatomic form
- (iii)  $\uparrow$  (upheaded arrow) indicates the evolution of gas &  
 $\downarrow$  (downheaded arrow) indicates the formation of precipitate

⊗ Electrolysis :- The process of passing current through a liquid or a solution is called electrolysis. Electrolysis is always carried out with direct current. eg- electrolysis of water gives hydrogen gas & oxygen gas.

### ⊕ Common Names of Some Compounds

①	$\text{CaO}$	Quicklime	Calcium oxide
②	$\text{Ca(OH)}_2$	Slaked lime	calcium hydroxide
③	$\text{CaCO}_3$	Limestone	calcium carbonate
④	$\text{NaHCO}_3$	Baking soda	sodium bicarbonate
⑤	$\text{CuSO}_4$	Blue vitriol	copper sulphate

### ⊕ Some Common Acids :-

$\text{HCl}$  - hydrochloric acid  
 $\text{H}_2\text{SO}_4$  - sulphuric acid  
 $\text{HNO}_3$  - nitric acid  
 $\text{CH}_3\text{COOH}$  - ethanoic acid (acetic acid)



⊛ List of Cations : -

<u>Name</u>	<u>Symbol</u>	<u>Charge</u>
Lithium	Li	+1
Sodium	Na	+1
Potassium	K	+1
Silver	Ag	+1
Beryllium	Be	+2
Magnesium	Mg	+2
Calcium	Ca	+2
Copper	Cu	+2
Zinc	Zn	+2
Iron	Fe	+2
Lead	Pb	+2
Mercury	Hg	+2
Aluminium	Al	+3
Hydrogen	H	+1
Ammonium	NH <sub>4</sub>	+1
Boron	B	+3

⊕ List of Anions :-

<u>Name</u>	<u>Symbol</u>	<u>Charge</u>
Fluoride	F	-1
Chloride	Cl	-1
Bromide	Br	-1
Iodide	I	-1
Hydroxide	OH	-1
Nitrate	NO <sub>3</sub>	-1
Nitrite	NO <sub>2</sub>	-1
Bicarbonate	HCO <sub>3</sub>	-1
Sulphide	S	-2
oxide	O	-2
Sulphate	SO <sub>4</sub>	-2
Sulphite	SO <sub>3</sub>	-2
Carbonate	CO <sub>3</sub>	-2
Nitride	N	-3
Phosphide	P	-3
Phosphate	PO <sub>4</sub>	-3
Phosphite	PO <sub>3</sub>	-3

Learning Arena

⊗ List of Elements Whose Symbols Are Taken From

Latin Names :-

<u>Element</u>	<u>Symbol</u>	<u>Latin Name</u>
Sodium	Na	Natrium
Potassium	K	Kalium
Iron	Fe	Ferrium
Copper	Cu	Cuprum
Silver	Ag	Argentum
Lead	Pb	Plumbum
Mercury	Hg	Hydrargyrum

⊗ Chemical Formula :- It tells which & how many elements are present in a compound.

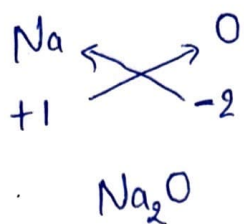
⊗ How to Write Chemical Formula :- Let us consider that we have to make chemical formula of sodium oxide. The following steps are followed:

(i) Write the symbols of elements involved.  
           Na           O

(ii) Find the charge on atoms with the help of electronic configuration.

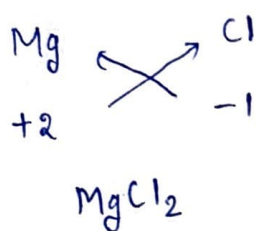
Na           O  
 +1           -2

(iii) By cross multiplication, we get the formula



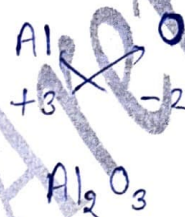
Examples :

① Magnesium Chloride



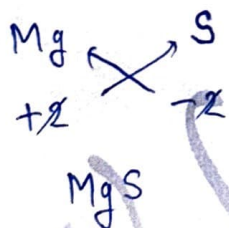
②

Aluminium Oxide



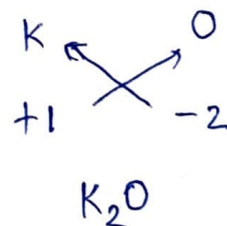
③

Magnesium Sulphide



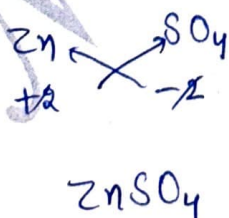
④

Potassium oxide



⑤

Zinc sulphate



⑥

Calcium Hydroxide

