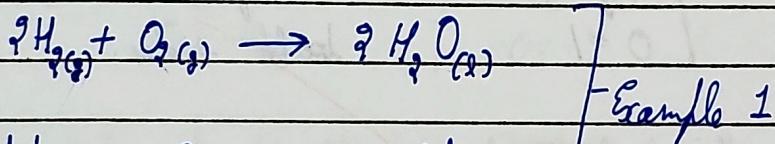


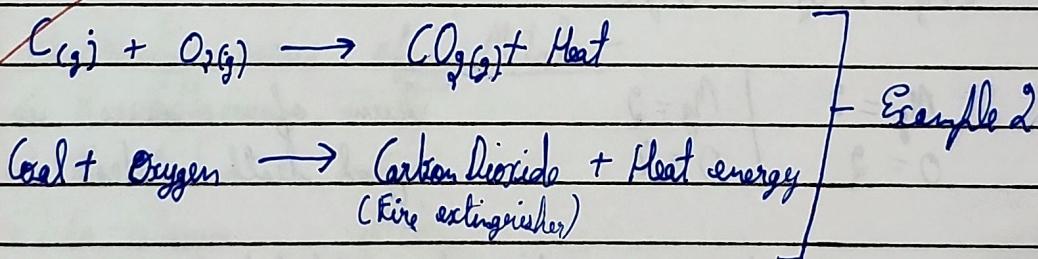
# Chemical Reactions & Equations

Chemical Reaction - A chemical reaction is an interaction of reactant(s) to form product(s).

Chemical Equations - It is a symbolic representation of chemical reaction.



Hydrogen + Oxygen → Water



Coal + Oxygen → Carbon Dioxide + Heat energy  
(Fire extinguisher)

Chemical Reactions outside lab in real life :-

- i) Digestion of food
- ii) Respiration
- iii) Photosynthesis
- iv) Combustion
- v) Fermentation
- vi) Rusting
- vii) Decomposition of manure
- viii) Ripeing of fruits
- ix) Cooking of food
- x) Setting of cement.

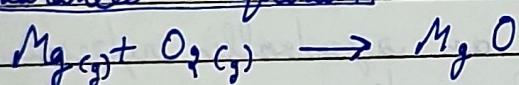
Indications of chemical reaction :-

- i) change in state
  - ii) change in temperature
  - iii) change in colour
  - iv) Evolution of gases)

## Law of Conservation of Mass:

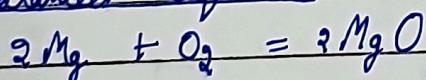
In a chemical reaction mass can neither be created nor destroyed  
i.e. mass of reactants = mass of products.

Unbalanced equation :-



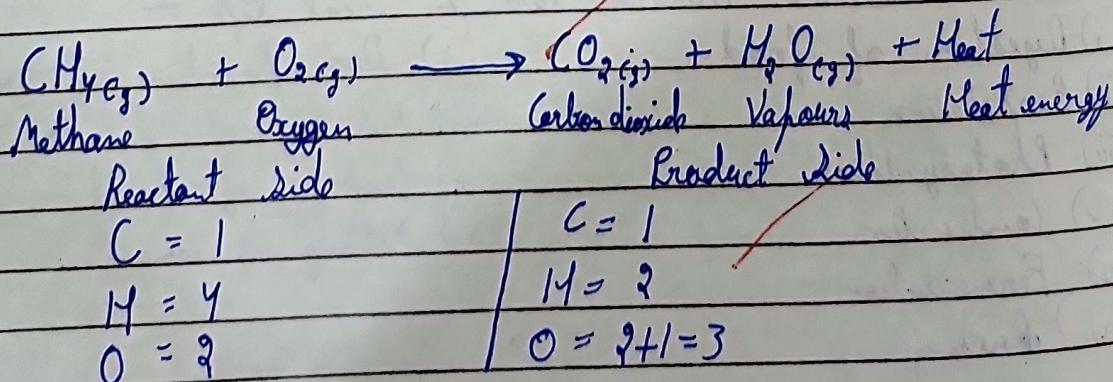
$$\begin{array}{c|c} M_g = 1 & M_g = 1 \\ O = ? & O = 1 \end{array} \quad \text{sum of masses isn't equal both sides.}$$

## Balanced equation

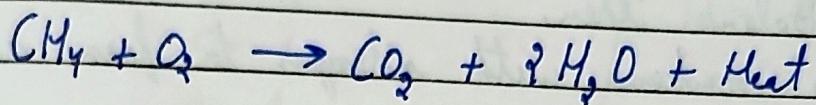


$$M_g = 2 \quad M_g = 2 \quad \text{Sum of masses is} \\ O = 2 \quad O = 2 \quad \text{equal both sides.}$$

Balancing of chemical equations by Hit & trial method:-



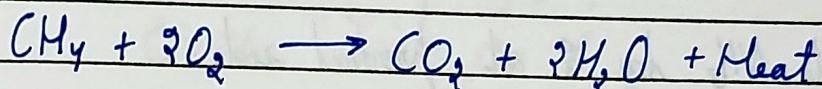
Step 1 - Hit  $H_2O$  by ? at product side



$$\begin{array}{l} C = 1 \\ H = 4 \\ O = 2 \\ \hline \end{array}$$

$$\begin{array}{l} C = 1 \\ H = 4 \\ O = 2+2=4 \\ \hline \end{array}$$

Step 2 Hit  $O_2$  by ? at reactant side.



$$\begin{array}{l} C = 1 \\ H = 4 \\ O = 4 \\ \hline \end{array}$$

$$\begin{array}{l} C = 1 \\ H = 4 \\ O = 4 \\ \hline \end{array}$$

~~∴ Balanced ∴ Masses of reactant side = Masses of product side.~~

### \* Reactivity series of Metals :-

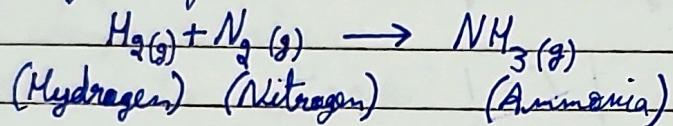
- |                   |           |   |
|-------------------|-----------|---|
| 1) K - Potassium  | Very活泼    | Reactivity series of Metals<br>Least reactive ↑ |
| 2) Na - Sodium    | Natural   |   |
| 3) Ca - Calcium   | College   |   |
| 4) Mg - Magnesium | ↑         |   |
| 5) Al - Aluminium | Alibi     |   |
| 6) Zn - Zinc      | ZTEZT     |   |
| 7) Fe - Iron      | Frid      |   |
| 8) Sn - Tin       | Sin       |   |
| 9) Pb - Lead      | PB        |   |
| 10) H - Hydrogen  | H         |   |
| 11) Cu - Copper   | Copper    |   |
| xii) Hg - Mercury | Highway   |   |
| xiii) Ag - Silver | ↑ 3 rank  |   |
| xiv) Au - Gold    | level up  |   |
| xv) Pt - Platinum | per line. |   |

## Questions

(Q5) Translate the following statements into chemical equations and then balance them.

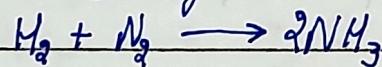
a) Hydrogen gas combines with nitrogen to form ammonia.

Ans



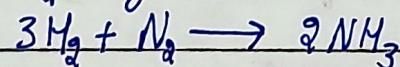
Reactant Side	Product Side
H = ?	H = 3
N = 2	N = 1

Step 1 :- Hit  $\text{NH}_3$  by 2 at product side.



H = 2	/ H = 6
N = 2	/ N = 2

Step 2 :- Hit  $\text{H}_2$  by 3 at reactant side.

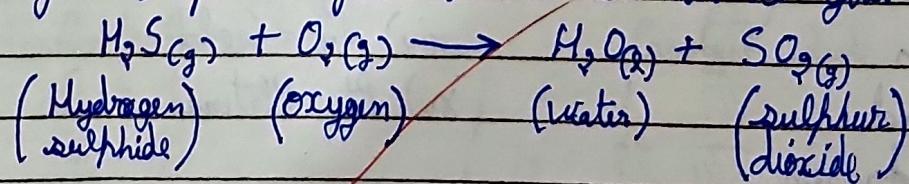


H = 6	/ H = 6
N = 2	/ N = 2

∴ Balanced equation is  $3\text{H}_2 + \text{N}_2 \rightarrow 2\text{NH}_3$

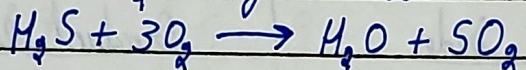
b) Hydrogen sulphide gas burns in air to give water & sulphur dioxide.

Ans



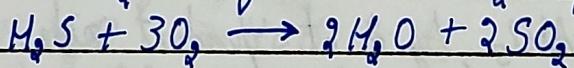
<u>Reactant Side</u>	<u>Product Side</u>
H = ?	H = ?
S = 1	S = 1
O = ?	O = 3

Step 1:- Mit O<sub>2</sub> by 3 at reactant side.



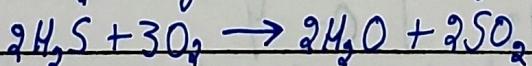
H = ?	H = ?
S = 1	S = 1
O = 6	O = 6

Step 2:- Mit H<sub>2</sub>O by 2 and SO<sub>2</sub> by 2 at product side.



H = ?	H = 4
S = 1	S = 2
O = 6	O = 6

Step 3:- Mit H<sub>2</sub>S by 2 at reactant side.

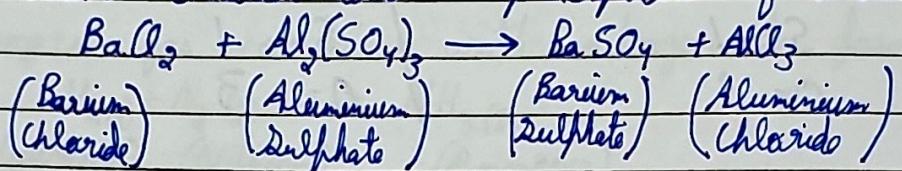


H = 4	H = 4
S = 2	S = 2
O = 6	O = 6

∴ Balanced equation is 2H<sub>2</sub>S + 3O<sub>2</sub> → 2H<sub>2</sub>O + 2SO<sub>2</sub>

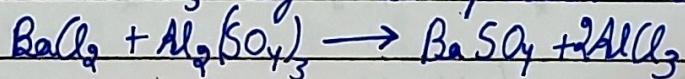
c) Barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate.

Ans



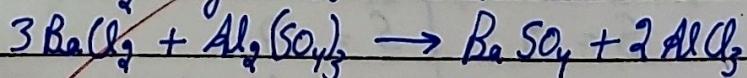
<u>Reactant side</u>	<u>Product side</u>
$\text{Ba} = 1$	$\text{Ba} = 1$
<del><math>\text{Cl} = 2</math></del>	$\text{Cl} = 3$
$\text{Al} = 2$	$\text{Al} = 1$
$S = 3$	$S = 1$
$O = 12$	$O = 4$

Step 1:- Hit  $\text{AlCl}_3$  by 2 at product side.



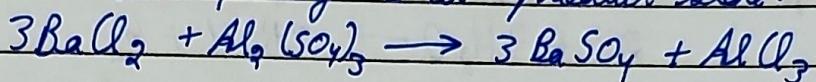
$\text{Ba} = 1$	$\text{Ba} = 1$
<del><math>\text{Cl} = 2</math></del>	$\text{Cl} = 6$
$\text{Al} = 2$	$\text{Al} = 2$
$S = 3$	$S = 1$
$O = 12$	$O = 4$

Step 2:- Hit  $\text{BaCl}_2$  by 3 at reactant side.



$\text{Ba} = 3$	$\text{Ba} = 1$
$\text{Cl} = 6$	$\text{Cl} = 6$
$\text{Al} = 2$	$\text{Al} = 2$
$S = 3$	$S = 1$
$O = 12$	$O = 4$

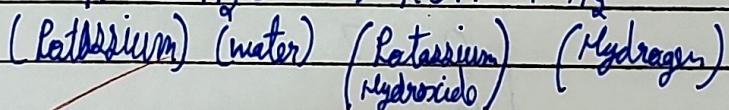
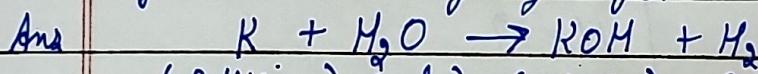
Step 3:- Mit  $\text{BaSO}_4$  lgy 3 at product side.



$\text{Ba} = 3$	$\text{Ba} = 3$
$\text{Cl} = 6$	$\text{Cl} = 6$
$\text{Al} = 2$	$\text{Al} = 2$
$S = 3$	$S = 3$
$O = 12$	$O = 12$

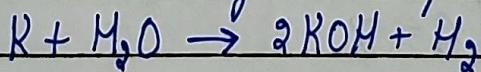
∴ Balanced equation is  $3\text{BaCl}_2 + \text{Al}_2(\text{SO}_4)_3 \rightarrow 3\text{BaSO}_4 + \text{AlCl}_3$

d) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.



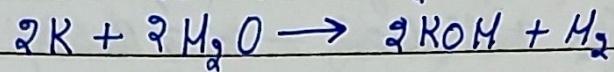
Reactant side	Product side
$\text{K} = 1$	$\text{K} = 1$
$\text{H} = 2$	$\text{H} = 3$
$\text{O} = 1$	$\text{O} = 1$

Step 1:- Mit  $\text{KOH}$  lgy 2 on product side.



$\text{K} = 1$	$\text{K} = 2$
$\text{H} = 2$	$\text{H} = 4$
$\text{O} = 1$	$\text{O} = 2$

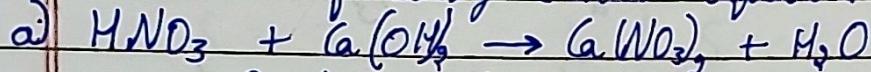
Step 2:- Hit R with 2 and  $H_2O$  with 2 at reactant side.



$K = 2$	$K = 2$
$H = 4$	$H = 4$
$O = 2$	$O = 2$

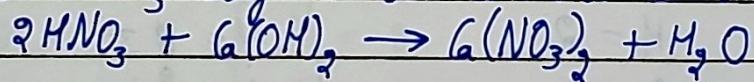
$\therefore$  Balanced equation is  $2K + 2H_2O \rightarrow 2KOH + H_2$

Q6) Balance the following chemical equations.



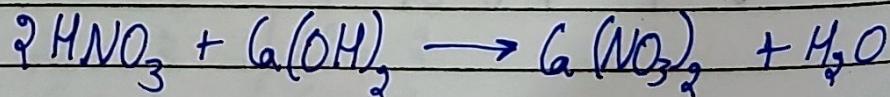
Reactant Side	Product Side
$H = 3$	$H = 2$
$N = 1$	$N = 2$
$O = 5$	$O = 7$
$Ca = 1$	$Ca = 1$

Step 1:- Hit  $HNO_3$  by 2 at reactant side.



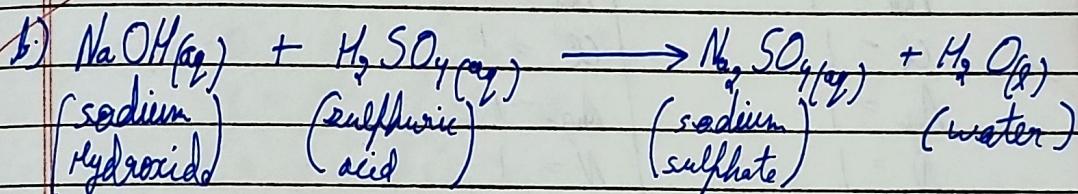
$H = 4$	$H = 2$
$N = 2$	$N = 2$
$O = 8$	$O = 7$
$Ca = 1$	$Ca = 1$

Step 2 :- Hit  $H_2O$  by 2 at product side.



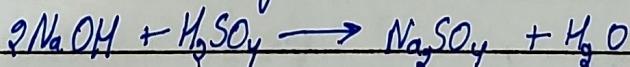
$H = 1$	$H = 1$
$N = 1$	$N = 1$
$O = 2$	$O = 2$
$G = 1$	$G = 1$

∴ Balanced equation is  $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$



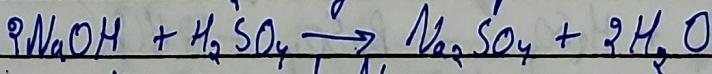
$Na = 1$	$Na = ?$
$O = 5$	$O = 5$
$H = 3$	$H = ?$
$S = 1$	$S = 1$

Step 1:- Hit  $NaOH$  by 2 at reactant side.



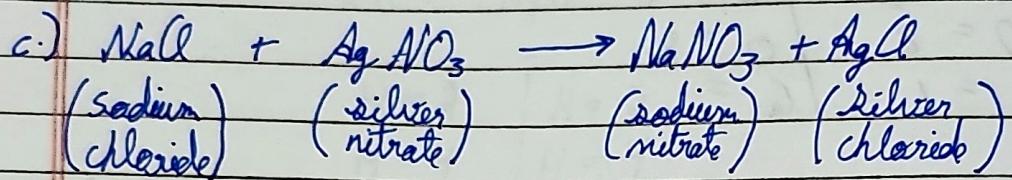
$Na = 2$	$Na = ?$
$O = 6$	$O = 5$
$H = 4$	$H = ?$
$S = 1$	$S = 1$

Step 2:- Hit  $H_2O$  by 2 at product side.



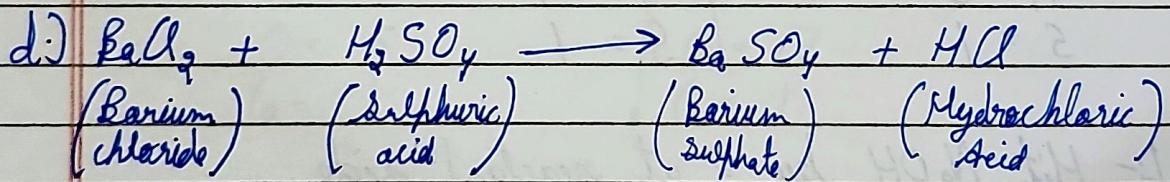
$Na = 2$	$Na = ?$
$O = 6$	$O = 6$
$H = 4$	$H = 4$
$S = 1$	$S = 1$

$\therefore$  Balanced equation is  $2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$



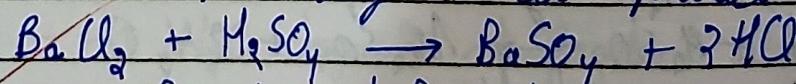
$\text{Na} = 1$	$\text{Na} = 1$
$\text{Cl} = 1$	$\text{Cl} = 1$
$\text{Ag} = 1$	$\text{Ag} = 1$
$\text{N} = 1$	$\text{N} = 1$
$\text{O} = 3$	$\text{O} = 3$

$\therefore$  Equation is already balanced.



$\text{Ba} = 1$	$\text{Ba} = 1$
$\text{Cl} = 2$	$\text{Cl} = 1$
$\text{H} = 2$	$\text{H} = 1$
$\text{S} = 1$	$\text{S} = 1$
$\text{O} = 4$	$\text{O} = 4$

Step 1:- Hit HCl by 2 at product side.

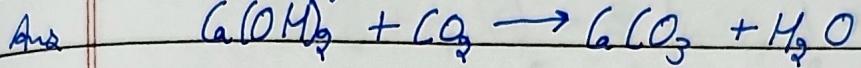


$\text{Ba} = 1$	$\text{Ba} = 1$
$\text{Cl} = 2$	$\text{Cl} = 2$
$\text{H} = 2$	$\text{H} = 2$
$\text{S} = 1$	$\text{S} = 1$
$\text{O} = 4$	$\text{O} = 4$

$\therefore$  Balanced equation is  $\text{BaCl}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + ?\text{HCl}$

Q7) Write balanced chemical equations for following :-

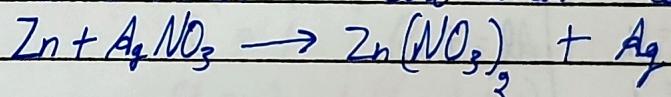
a) Calcium Hydroxide + Carbon dioxide  $\rightarrow$  Calcium carbonate + water



$\text{Ca} = 1$	$\text{Ca} = 1$
$\text{O} = 4$	$\text{O} = 4$
$\text{H} = 2$	$\text{H} = 2$
$\text{C} = 1$	$\text{C} = 1$

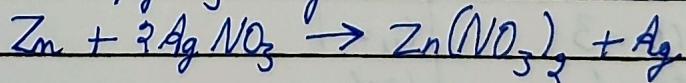
$\therefore$  Equation is already balanced.

b) Zinc + Silver nitrate  $\rightarrow$  Zinc nitrate + Silver



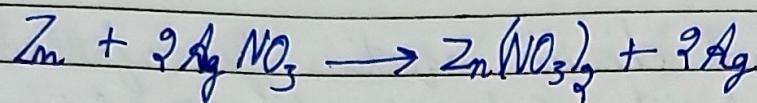
$\text{Zn} = 1$	$\text{Zn} = 1$
$\text{Ag} = 1$	$\text{Ag} = 1$
$\text{N} = 1$	$\text{N} = 2$
$\text{O} = 3$	$\text{O} = 6$

Step 1:- Mit  $\text{AgNO}_3$  lgy 2 at reactant side.



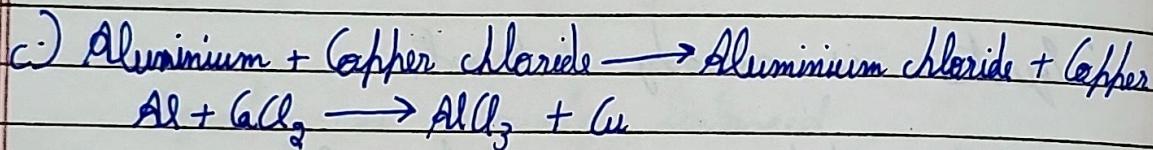
$\text{Zn} = 1$	$\text{Zn} = 1$
$\text{Ag} = 2$	$\text{Ag} = 1$
$\text{N} = 2$	$\text{N} = 2$
$\text{O} = 3$	$\text{O} = 6$

Step 2:- Mit Ag by 2 product side.



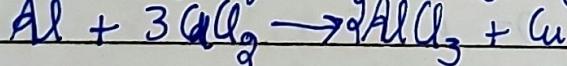
$\text{Zn} = 1$	$\text{Zn} = 1$
$\text{Ag} = 2$	$\text{Ag} = 2$
$\text{N} = 2$	$\text{N} = 2$
$\text{O} = 6$	$\text{O} = 6$

∴ Balanced equation is  $\text{Zn} + 2\text{AgNO}_3 \rightarrow \text{Zn(NO}_3)_2 + 2\text{Ag}$



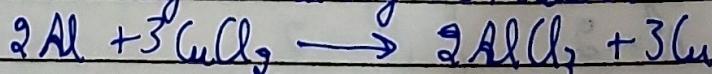
$\text{Al} = 1$	$\text{Al} = 1$
$\text{Cu} = 1$	$\text{Cu} = 1$
$\text{Cl} = 2$	$\text{Cl} = 3$

Step 1:- Mit CuCl<sub>2</sub> by 3 and AlCl<sub>3</sub> by 2 on reactant & product side



$\text{Al} = 1$	$\text{Al} = 2$
$\text{Cu} = 3$	$\text{Cu} = 1$
$\text{Cl} = 6$	$\text{Cl} = 6$

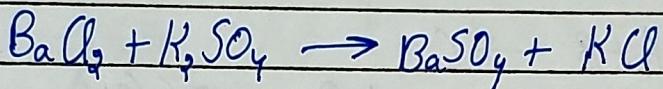
Step 2:- Mit Al by 2 & Cu by 3 on reactant and product side



$\text{Al} = 2$	$\text{Al} = 2$
$\text{Cu} = 3$	$\text{Cu} = 3$
$\text{Cl} = 6$	$\text{Cl} = 6$

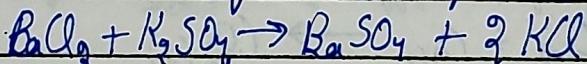
$\therefore$  Balanced equation is  $2\text{Al} + 3\text{CuCl}_2 \rightarrow 2\text{AlCl}_3 + 3\text{Cu}$

d) Barium Chloride + Potassium sulphate  $\rightarrow$  Barium sulphate + Potassium chloride



$\text{Ba} = 1$	$\text{Ba} = 1$
$\text{Cl} = ?$	$\text{Cl} = 1$
$\cancel{\text{K}} = 2$	$\text{K} = 1$
$S = 1$	$S = 1$
$O = 4$	$O = 4$

Step 1:- Hit KCl by 2 at product side.



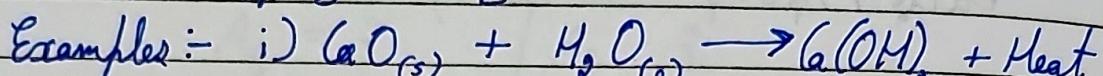
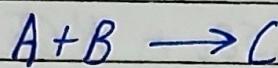
$\text{Ba} = 1$	$\text{Ba} = 1$
$\text{Cl} = ?$	$\text{Cl} = ?$
$\text{K} = ?$	$\text{K} = ?$
$S = 1$	$S = 1$
$O = 4$	$O = 4$

$\therefore$  Balanced equation is  $\text{BaCl}_2 + \text{K}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{KCl}$

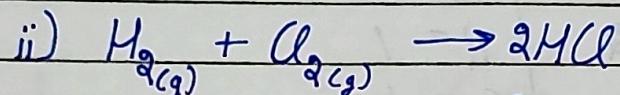
(P.M)  
08/04/25

# Types of Reactions

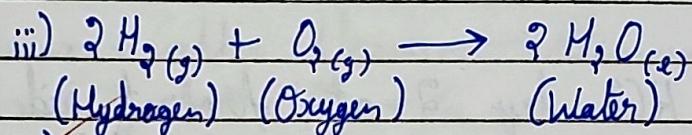
★ Combination Reaction - It is a type of reaction in which 2 reactants combine to form single product.



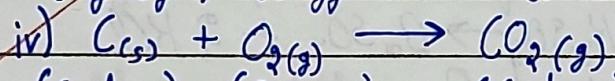
(Calcium oxide) (Water) (Calcium hydroxide)



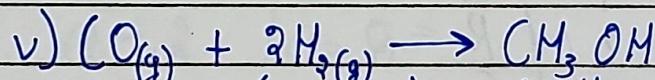
(Hydrogen) (Chlorine) (Hydrachloride)



(Hydrogen) (Oxygen) (Water)

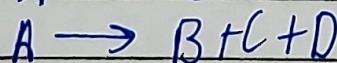
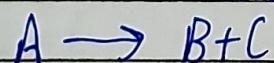


(Carbon) (Oxygen) (Carbon dioxide)



(Carbon Monoxide) (Hydrogen) (Methanol)

★ Decomposition Reaction - It is a type of reaction in which a single reactant decomposes into 2 or more than 2 products.



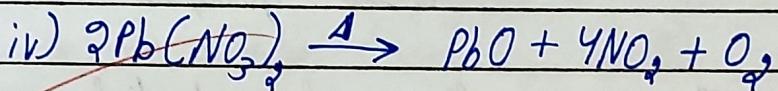
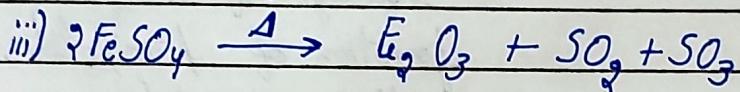
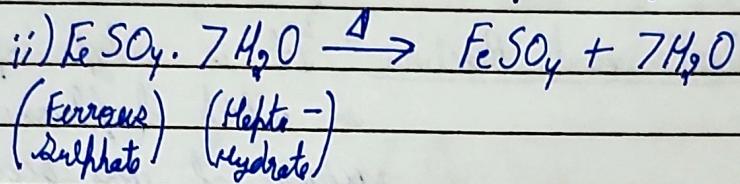
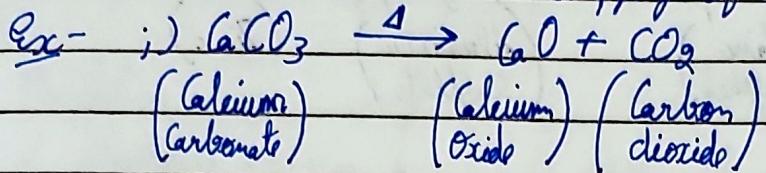
## Types of Decomposition Reactions :-

i) Thermal

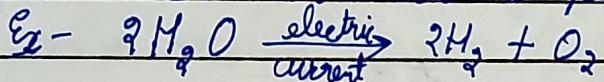
ii) Electrical

iii) Photo

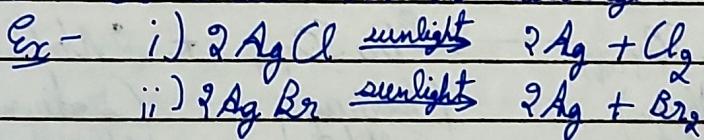
• Thermal - It occurs due to supply of heat.



• Electrical - It occurs due to passing of electric current.

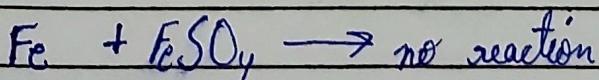
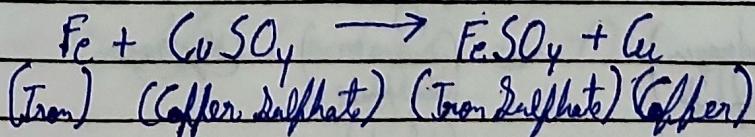
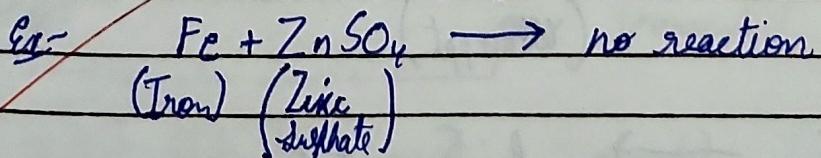


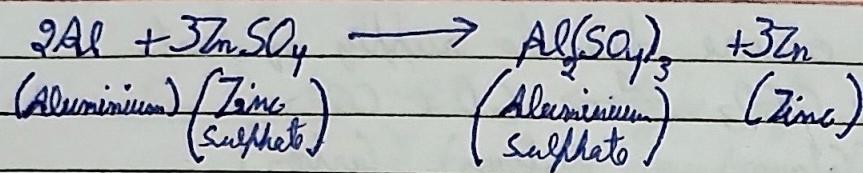
• Photo - It occurs due to sunlight.



Note - Silver chloride is used in B&W photography.

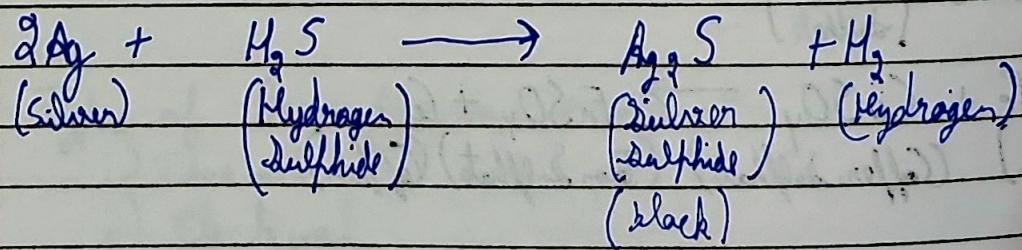
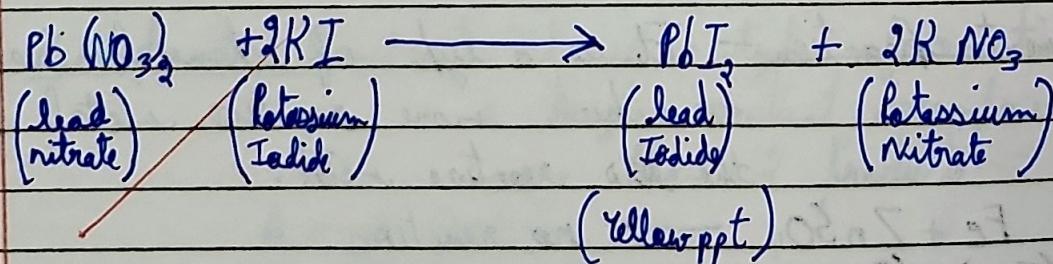
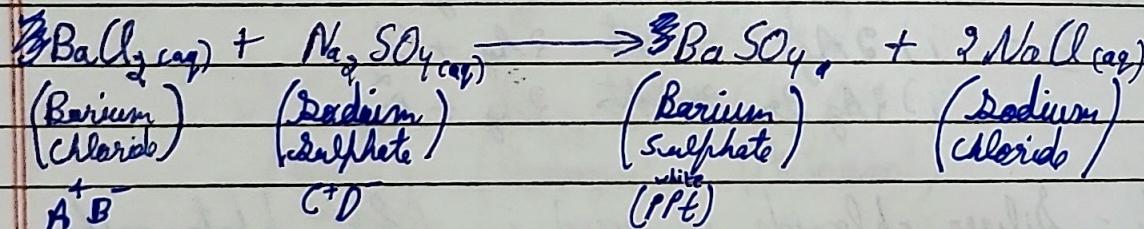
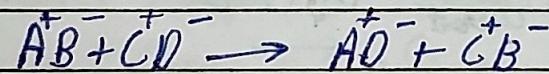
\* Displacement Reaction - It is a type of chemical reaction in which more reactive metal displaces the less reactive metal.





**★ Double Displacement Reaction** - It is a type of chemical reaction in which displacement of ions or exchange of ions occurs twice with formation of precipitate. This is also called precipitation reaction.

Precipitate - It is a small granular particles which are insoluble and settles at the bottom of tube.



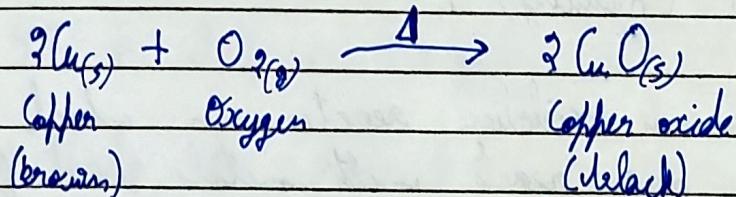
## ★ Oxidation - Reduction Reaction (Redox Reaction)

### Oxidation

- i) Gain of electrons oxygen.
- ii) loss of Hydrogen.

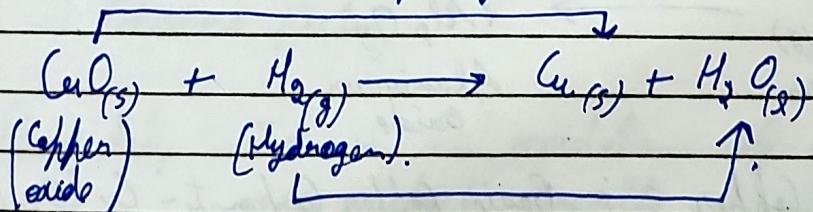
### Reduction

- i) loss of electrons oxygen.
- ii) Gain of Hydrogen.



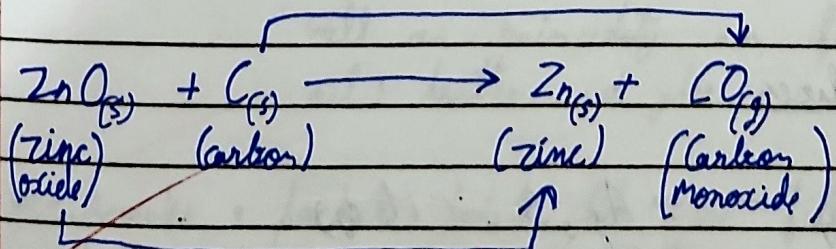
$\text{Cu} \rightarrow$  oxidation (reducing agent)

iii) Substance undergoing oxidation | vii) Substance undergoing reduction  
is called reducing agent. | is called oxidation agent.



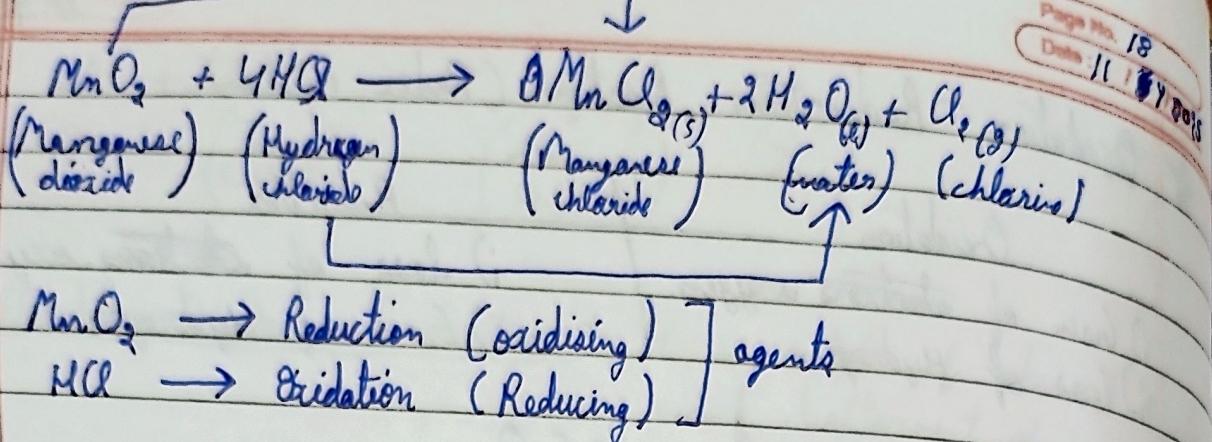
$\text{CuO}$  - reduction (loss of oxygen), Oxidising agent.

$\text{H}_2$  - oxidation (gain of oxygen), Reduction agent.



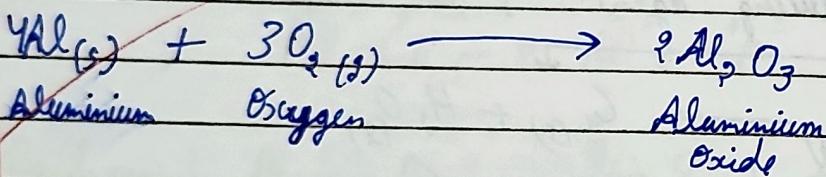
$\text{ZnO} \rightarrow$  Reduction (oxidising agent)

$\text{C} \rightarrow$  Oxidation (reducing agent)

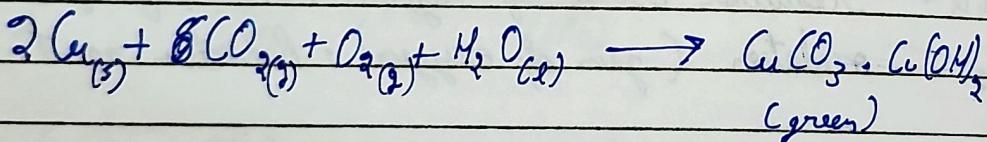


★ Corrosion - It is an oxidation reaction in which oxygen gas reacts with metals and forms a layer over the surface of metals. There is no metal loss.

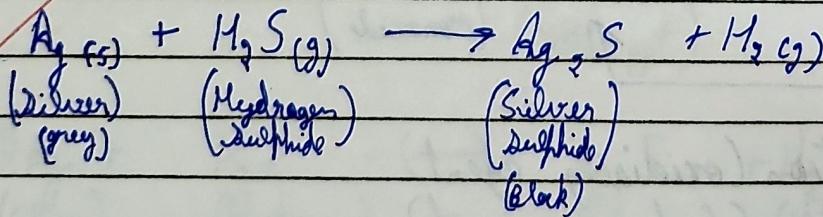
### Oxidation of aluminium



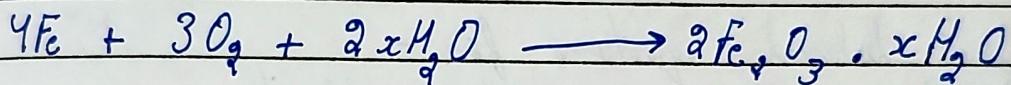
Oxidation of Copper :- Basic Copper carbonate -  $\text{CuCO}_3 \cdot \text{Cu(OH)}_2$



### Oxidation of Silver



\* Rusting - It is a type of oxidation reaction in which iron loses its uppermost layer in the form of flakes or rust due to presence of air & moisture. It results in metal loss, damages iron and it is an irreversible process.



Methods to prevent rusting -

i) Painting

ii) Oiling

iii) Greasing

iv) Galvanisation - deposition of zinc layer over iron articles.

v) Chrome plating

\* Rancidity - It is an oxidation of oils, butter and pure ghee, which results in foul smell (bad odour) from these substances making unfit for use.

Antioxidants - Those chemicals which prevents oxidation as well as rancidity in food items made of oil, butter and ghee.

\* Wraps, packets, potato chips are filled with nitrogen gas which acts as an antioxidant.

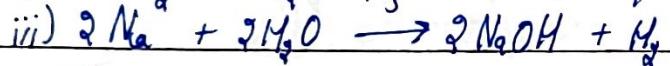
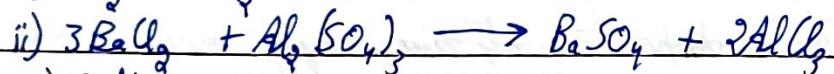
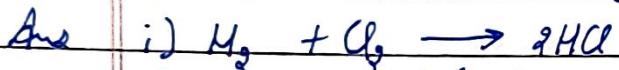
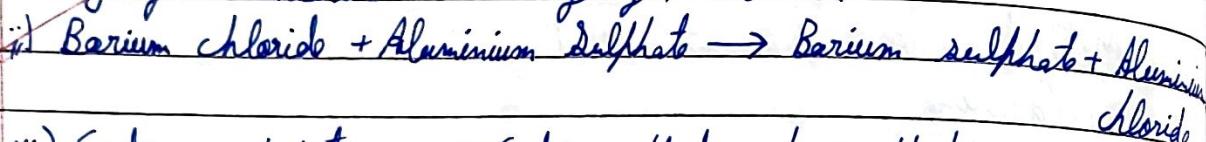
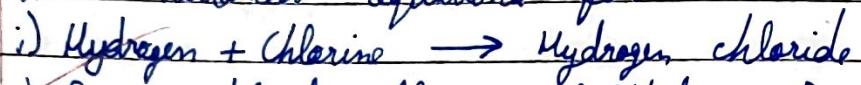
(Ch)  
15/4/2023

## Internal Questions

Q1) Why should be a magnesium ribbon be cleaned before burning in air?

Ans We cleaned magnesium ribbon before burning because to remove  $MgO$  layer coating from it due to slow reaction of moist air on it.

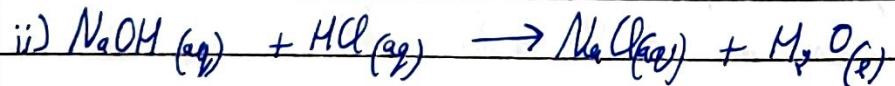
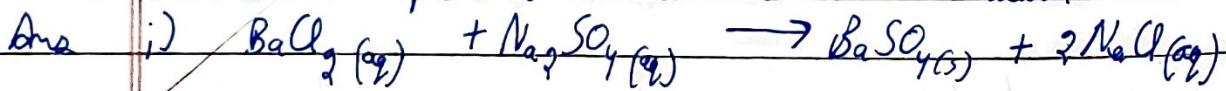
Q2) Write balanced equations for -



Q3) Write a balanced chemical equation with state symbols for the following -

i) Solution of barium chloride and sodium sulphate in water reacts to give insoluble barium sulphate and solution of sodium chloride.

ii) Sodium hydroxide (solution) in water reacts with hydrochloric acid to produce sodium chloride and water.



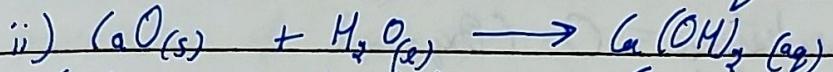
Q4) A solution of a substance 'X' is used for white washing.

i) Name 'X' and write its formula.

ii) Write reaction of 'X' with water.

Ans

i) 'X' —  $\text{CaO}$  (calcium oxide or quick lime)

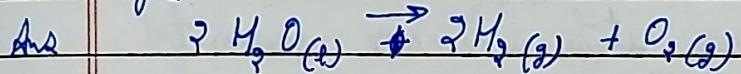


(Calcium  
oxide or  
quick lime)

(Water)

(Calcium Hydroxide)  
Slaked lime

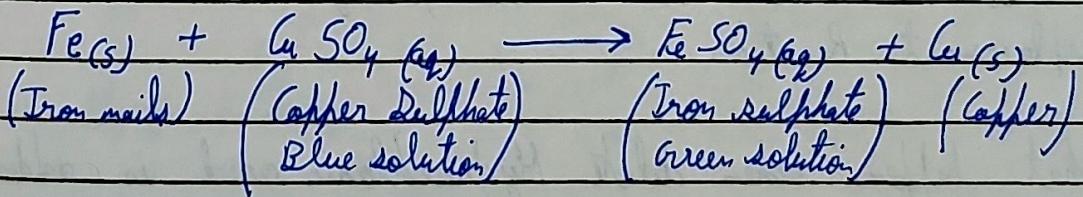
Q5) Why is amount of gas collected in one of the test tubes an activity 1/7 double of amount collected in other. Name this gas.



This equation signifies that 2 molecules of water gives 2 molecules of hydrogen and 1 molecule of oxygen. Hence amount of hydrogen gas will be double of oxygen.

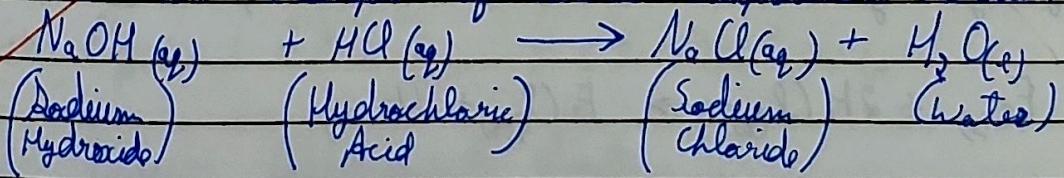
Q6) Why does color of copper sulphate solution change when an iron nail is dipped in it?

Ans It is due to displacement reaction.



Q7) Give an example of double displacement reaction.

Ans



$A^+ B^-$

$C^+ D^-$

$A^+ D^-$

$C^+ B^-$

Q8) Identify oxidised and reduced substances in following



Ans

i) Oxidised substance = Na (Sodium)

Reduced substance = O (Oxygen)

ii) Oxidised substance = H (Hydrogen)

Reduced substance = Cu (Copper)

## ~~Textbook Questions~~

Q1) Which of the following statements are incorrect?



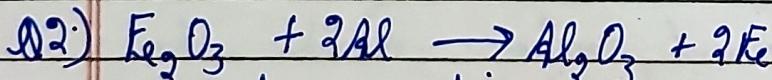
a) Lead is getting reduced.

b) Carbon dioxide is getting oxidised.

c) Carbon is getting oxidised

d) Lead oxide is getting reduced.

Ans. a and b are incorrect

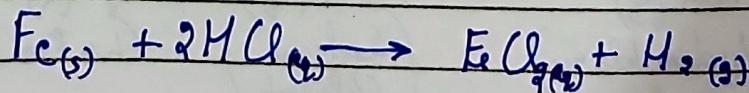


The above reaction is an example of

Ans Displacement Reaction

Q3) What happens when dilute Hydrochloric acid is added to iron filings?

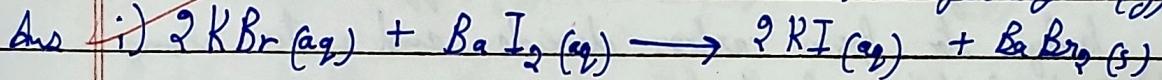
Ans Hydrogen gas and iron chloride are produced.



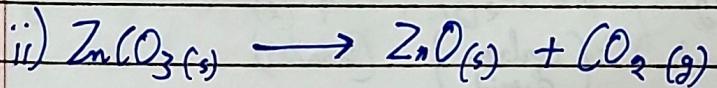
Q1) What is an balanced equation? Why should we balance it?  
 Ans A balanced chemical equation has an equal no. of atoms of different elements in reactants and products. The chemical equation should be balanced to satisfy the law of conservation of mass.

Q2) Write balanced equations for the following and identify the type of reaction in each case:

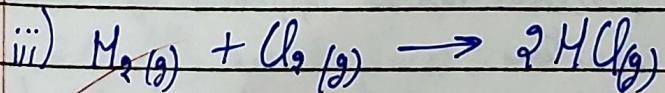
- Kalassium bromide (aq) + Barium iodide (aq)  $\rightarrow$  Kalassium iodide (aq) + Barium Bromide (s)
- Zinc carbonate (s)  $\rightarrow$  Zinc oxide (s) + Carbon dioxide (g)
- Hydrogen (g) + Chlorine (g)  $\rightarrow$  Hydrogen chloride (g)
- Magnesium (s) + Hydrochloric acid (aq)  $\rightarrow$  Magnesium chloride (aq) + Hydrogen (g)



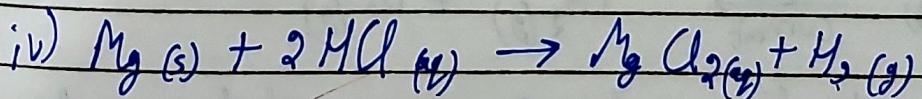
Type :- Double Displacement Reaction.



Type :- Decomposition Reaction



Type :- Combination Reaction



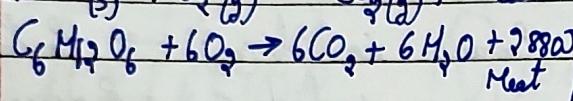
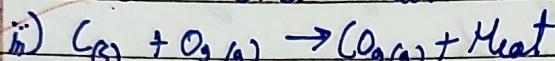
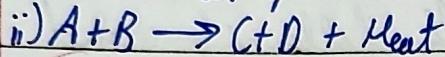
Type :- Displacement Reaction

Q9) What do you mean by exothermic and endothermic reactions? Give examples.

Ans

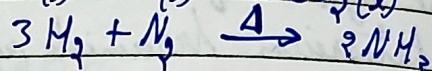
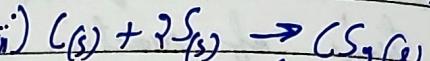
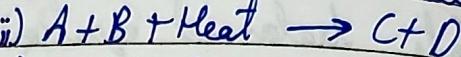
### Exothermic

i) It is a type of chemical reaction in which heat is released at product side.



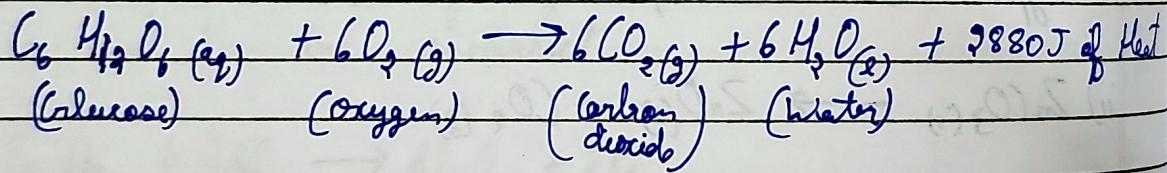
### Endothermic

i) It is a type of chemical reaction in which heat is absorbed in reactant side.



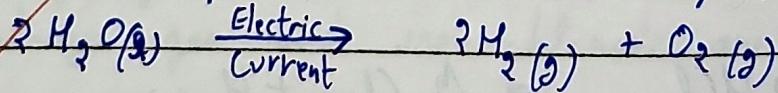
Q10) Why is respiration an exothermic reaction? Explain.

Ans Respiration is an exothermic process because during respiration glucose combines with oxygen in the cells of our body to form carbon dioxide and water along with production of heat.

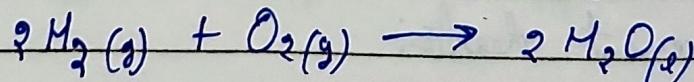


Q11) Why is decomposition reaction called opposite of combination reaction? Write their equations.

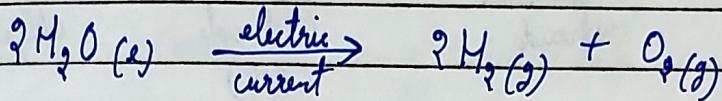
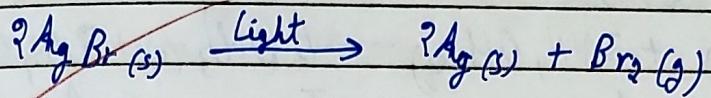
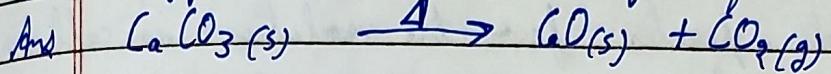
Ans In a decomposition reaction, a single compound breaks down to produce 2 or more simpler substances.



While in combination reaction 2 or more substances combine.

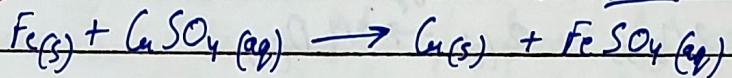


**Q12)** Write one equation each for the decomposition reactions where energy is supplied in the form of heat, light or electricity.

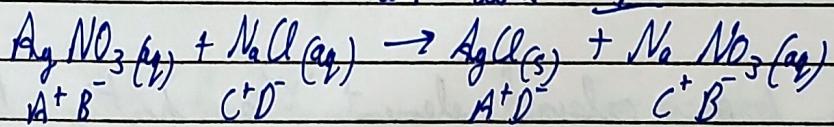


**Q13)** What is difference between displacement and double displacement reaction.

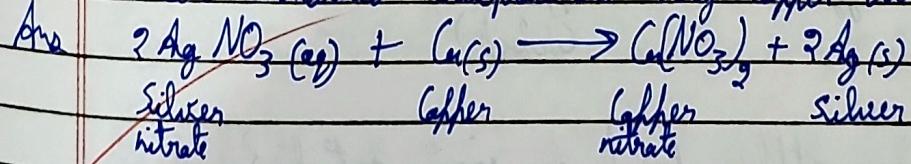
Ans Displacement - In this a more reactive metal displaces a less reactive metal. Ex -



Double Displacement - In this two reactants in solution exchange their ions. Ex -

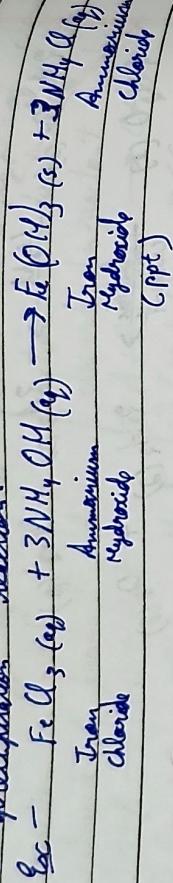


**Q14)** In refining of silver, the recovery of silver from silver nitrate involved displacement by copper. Write reaction.



Q 15) What do you mean by precipitation reaction? Explain.

Ans A reaction in which an insoluble solid called precipitate is formed that separates from the solution is called a precipitation reaction.



Q 16) Explain following in terms of gain or loss of oxygen with respect to oxidation.

a.) Oxidation

b.) Reduction

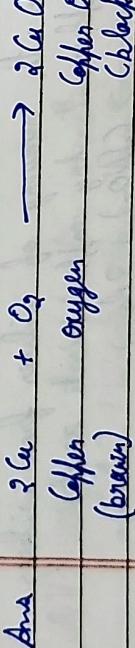
Ans a.) Oxidation - In this oxygen is added to a substance.



i.) Reduction - In this oxygen is removed from a substance.



Q 17) A shiny brown coloured element 'X' on heating becomes black in colour. Name 'X' and black coloured compound.



Q 18) Why do we apply paint on iron articles?

Ans Paint does not allow iron articles to come in contact with air & water and hence iron articles from damage due to rusting.

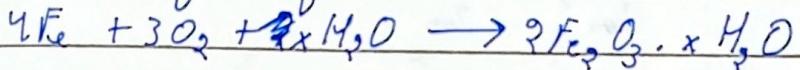
Q19) Oil and fat containing food items are flushed with nitrogen. Why?

Ans To keep food items fresh and save from getting oxidised, food items are flushed with nitrogen. This is to prevent rancidity.

Q20) Explain corrosion and Rancidity.

Ans Corrosion - It is the process in which metals are eaten up gradually by action of air, moisture or a chemical on their surface.

Ex - Rusting of Iron

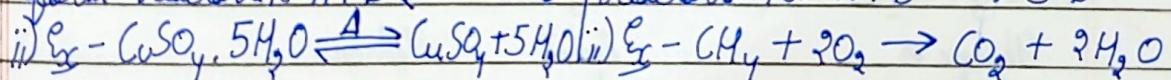


Rancidity - The condition produced by aerial oxidation of fats and oils in foods & marked by unpleasant smell and taste is rancidity.

Ex - It spoils food items such as oil, butter and ghee.

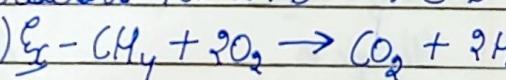
### Reversible Reaction

i) In this reactants combine to form products. Products can also form reactants.  $\text{A} + \text{B} \rightleftharpoons \text{C} + \text{D}$

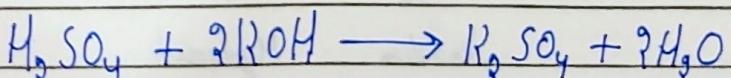
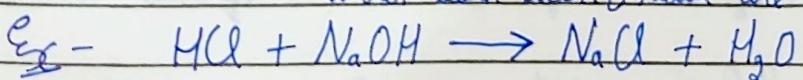


### Irreversible Reaction

ii) In this, reactants can combine to form products but products can't form reactants i.e.  $\text{A} + \text{B} \rightarrow \text{C} + \text{D}$



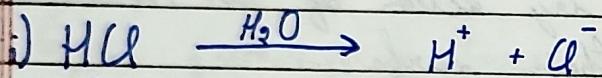
Neutralization Reaction - A type of chemical reaction in which acid combines with base to form salt and water. Both acids & bases are neutralized in this.



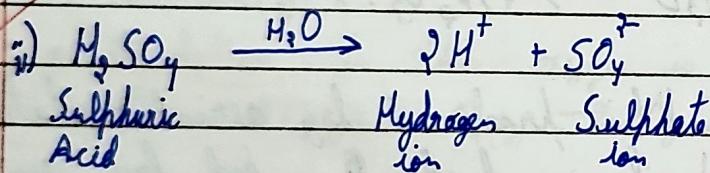
# Acids, Bases & Salts

\* Arrhenius concept of acid & base :-

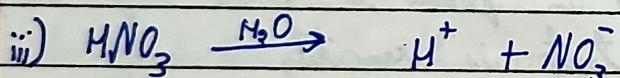
**Acid** - It is a chemical substance which releases  $H^+$  (Hydrogen) ions in aqueous solution.



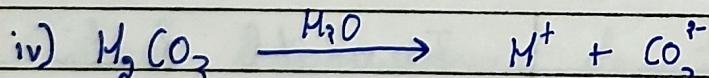
Hydrochloric Acid      Hydrogen ion      Chlorine Ion



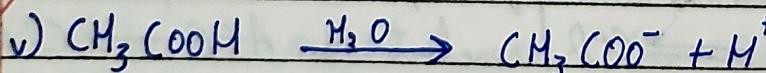
Sulphuric Acid      Hydrogen ion      Sulphate ion



Nitric Acid      Hydrogen ion      Nitrate ion

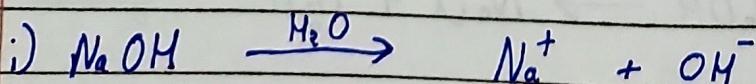


Carbonic Acid      Hydrogen ion      Carbonate ion

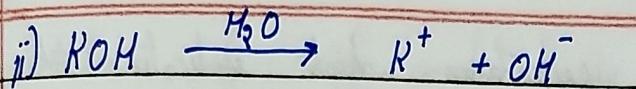


Ethanoic or Acetic Acid      Acetate ion      Hydrogen ion

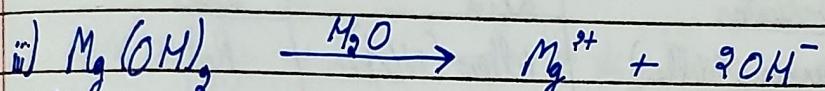
**Base** - It is a chemical substance which releases  $OH^-$  (Hydroxide / Hydroxyl) ion in aqueous solution.



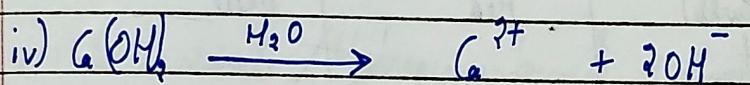
Sodium Hydroxide      Sodium Ion      Hydroxide ion



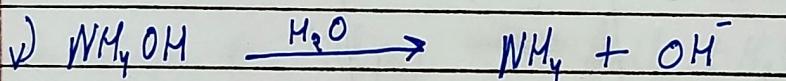
Kalassium Hydroxide  
Ion



Magnesium Hydroxide  
Ion



Calcium Hydroxide  
Ion

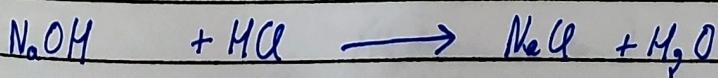
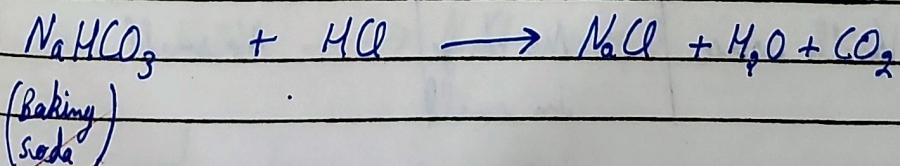


Ammonium Hydroxide  
Ion

Other bases that are exception i.e. doesn't release  $\text{OH}^-$  are :-

$\text{NaHCO}_3$  - Sodium bicarbonate (Baking Soda)

$\text{Na}_2\text{CO}_3$  - Sodium carbonate





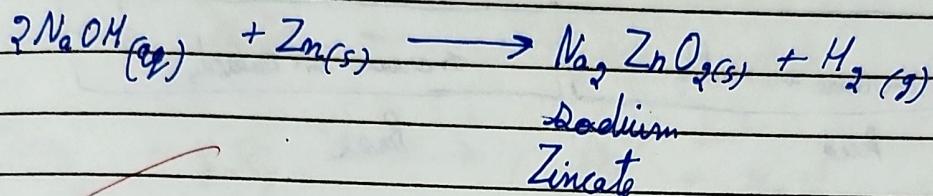
Indicator - A chemical substance which indicates the presence of acid or base by change in colour.

S.No	Indicator	Acid	Base
1.	Turmeric (Yellow) Paper/Cloth	Yellow (N/A)	Red
2.	Litmus (Purple) Paper/solution	Red	Blue
3.	Phenolphthalein (Colourless)	Colourless (N/A)	Pink
4.	Methyl Orange	Red	Yellow
5.	Onion Cloth strips	No change in smell	No smell
6.	Clove Oil	No change in smell	No smell
7.	Vanilla essence	No change in smell	No smell

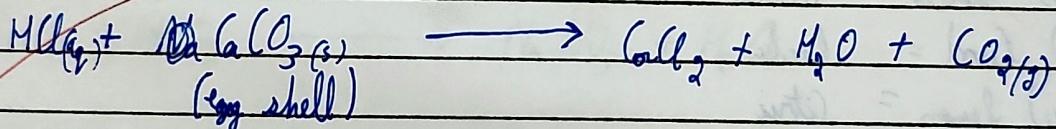
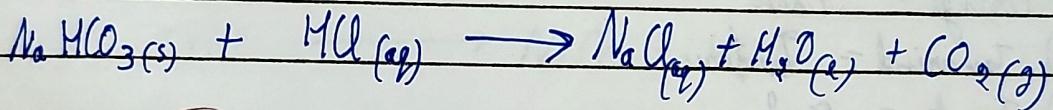
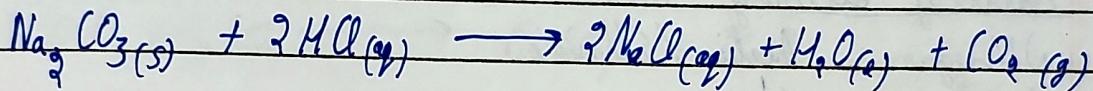
Olfactory

\* Reactions of Acids and bases with metals.

i) Acid + Metal  $\rightarrow$  Salt + Hydrogen gas



ii) Metal carbonate / Hydrogencarbonate + Acid  $\rightarrow$  Salt + CO<sub>2</sub> + H<sub>2</sub>O

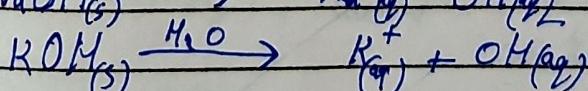
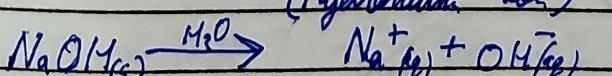
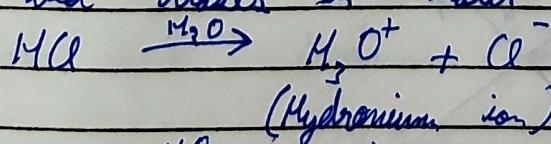


\* Reaction of Acid with base (Neutralization reaction)

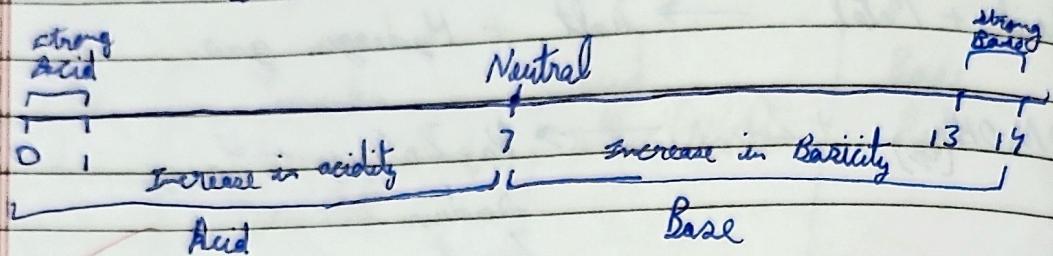
Acid + base  $\rightarrow$  Salt + water



\* Acid and bases in water



\* pH scale - It is defined as -ve logarithm of hydroxide ion concentration. It was discovered by Sorenson in 1919.



\* Neutral only at 7 not even at 6.9 or 7.1.

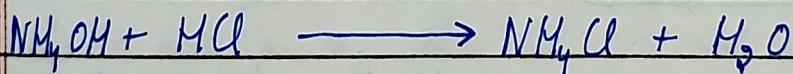
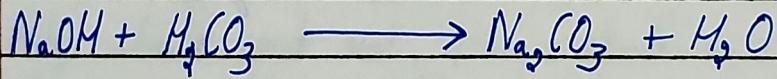
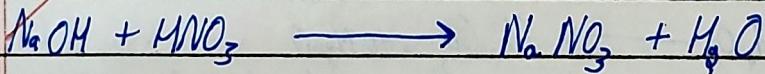
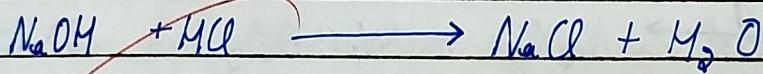
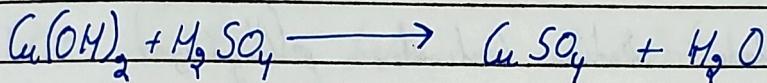
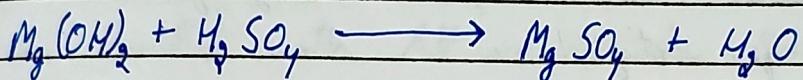
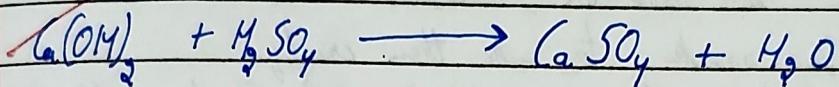
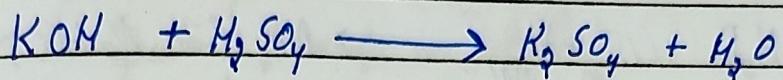
### \* Naturally occurring acids

- i) Vinegar = Acetic / Ethanoic
- ii) Orange = Citric
- iii) Tamarind = Tartaric
- iv) Tomato = Oxalic
- v) Lurd = Lactic
- vi) Lemon = Citric
- vii) Ant sting = Methanoic
- viii) Nettle sting = Methanoic
- ix) Sour Milk = Lactic
- x) Vitamin C = Ascorbic

### \* Family of salts:-



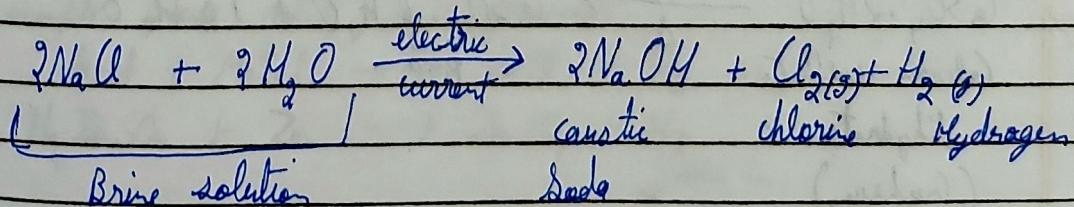
## \* Family of Salts



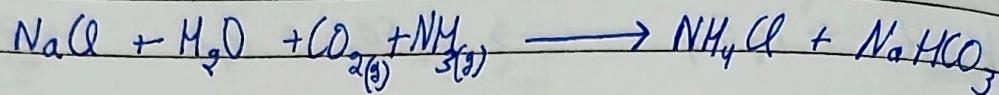
## \* Man made compounds :-

~~Soda based compounds~~

1) Caustic Soda - Sodium Hydroxide ( $\text{NaOH}$ )



ii) Baking Soda - Sodium bicarbonate ( $\text{NaHCO}_3$ ) or hydrogen carbonate



\* Baking Soda + Tartaric Acid = Baking powder

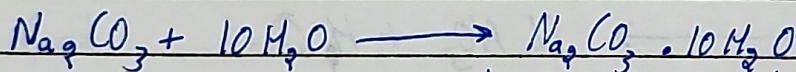
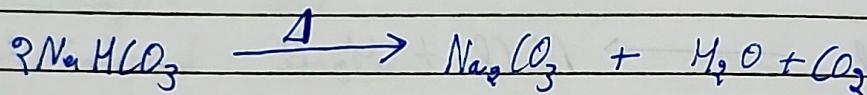
\* " " is used as Antacid

\* Added in snacks to make them crispy

\* Due to alkaline nature it prevents souring of milk.

\* Acts as fire extinguisher

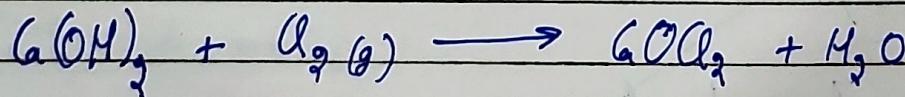
iii) Washing Soda - Sodium carbonate ( $\text{Na}_2\text{CO}_3$ )



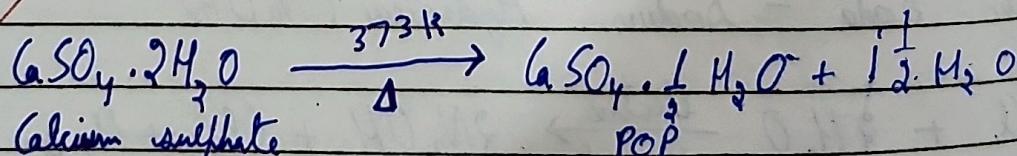
Sodium carbonate decahydrate

Calcium Based compounds -

i) Bleaching Powder - Calcium oxychloride or hypochlorite ( $\text{Ca(OCl)}_2$ )



ii) Plaster of Paris / POP - Calcium sulphate hemihydrate



(Gypsum)

## Uses of POP -

- \* used to plaster the fractures
- \* beautification of roofs or pillars
- \* decoration items like flower vase etc

## INTERNAL QUESTIONS

Page 18

~~(Q1)~~ You have 3 test tubes one has base, one has acid and one distilled water. All are colourless. You have only red litmus paper.

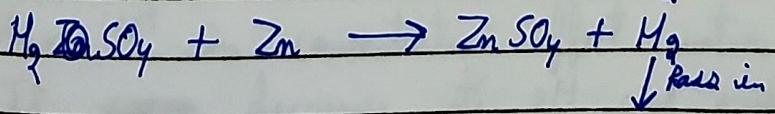
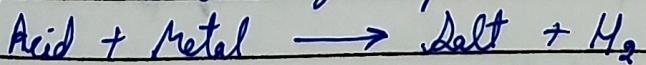
- ~~Ans~~
- i) Put Red litmus paper in all solutions. Solution which turns it blue is a base.
  - ii) Now put blue litmus paper in both remaining solutions. One that changes blue litmus to red is acid.
  - iii) ~~O~~ Left one is distilled water.

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~~(Q1)~~ Why should curd and sour substances not be kept in brass or copper vessel?

~~Ans~~ Lactic acid or any other acid will react with copper or other metal. Products will be salt and Hydrogen gas. When we will consume curd or other eatables, then we will eventually take ~~salt~~ salt, it will not digest because curd is spoiled. So we shouldn't keep curd in copper vessel.

~~(Q2)~~ Which gas is produced when an acid reacts with a metal? Give example. Name that gas' presence.

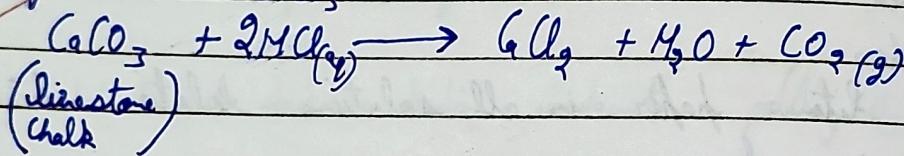


Deep solution

When we pass gas in such solution bubbles will be formed. When we will ignite bubbles with a lighter, they will give 'pop' sound. This indicates presence of Hydrogen.

- Q3.) 'A' is a metal compound. It reacts with HCl to produce effervescence. The gas evolved extinguishes candle. Write balanced equation for reaction if one of compound formed is  $\text{CaCl}_2$ .

*Ans*

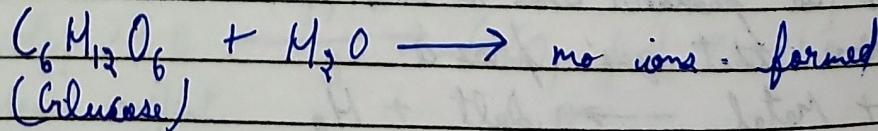
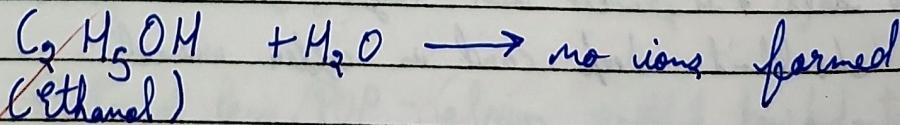
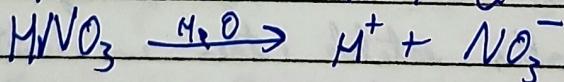
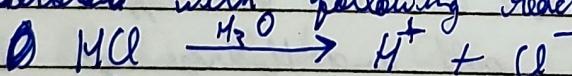


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- Q1.) Why  $\text{HCl}$ ,  $\text{HNO}_3$  etc show acidic characters in aqueous solutions while solutions of alcohol and glucose don't do so?

*Ans*

It is so due to presence of  $\text{M}^+$  ions in  $\text{HCl}$  and  $\text{HNO}_3$  while alcohol and glucose don't have  $\text{M}^+$  ions. We can understand with following reactions :-



Q2) Why does an aqueous solution of an acid conduct electricity?  
Ans They do so due to presence of  $H^+$  ions.

Q3) Why does dry  $HC\ell$  gas not change colour of dry litmus paper?  
Ans Dry  $HC\ell$  gas doesn't give  $H^+$  ions.

Q4) While dilution of acid, why should acid be added to water and not vice versa?

Ans Acid is added to water to prevent sudden heat release. Adding water to acid can cause explosive splashing due to steam, leading to acid burns.

Q5) How does dilution affect the concentration of hydroxium  $H_2O^+$  ions in an acid?

Ans On dilution, the number of hydroxium ions per unit volume decreases, so their concentration decreases.

Q6) What happens to hydroxide ion  $OH^-$  concentration when excess base is added to sodium hydroxide solution?

Ans  $OH^-$  concentration increases slightly at first, but soon levels off and becomes nearly constant.

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Q1) Two solutions A ( $pH 6$ ) and B ( $pH 8$ ) are given. Which has more  $H^+$  ions? Which is acidic and which is basic?

Ans Solution A has more  $H^+$  ions. A is acidic ( $pH 6$ ) and B is basic ( $pH 8$ ).

Q2) How  $H^+$  ion concentration affect nature of a solution?  
Ans It ~~stays~~ decreases its pH and makes it acidic.

(Q3) Do bases have  $H^+$  ions? If yes, why are they basic?  
 Ans Yes, they have  $H^+$  ions, but  $OH^-$  ions are more than  $H^+$  ions, which makes solution basic.

(Q4) When should a farmer treat soil with quick lime, slaked lime or chalk?

Ans When the soil is too acidic i.e. has low pH. These are all bases, so they neutralize it.

~~Page - 33~~

(Q1) What is common name of  $Ca(ClO)_2$ ?

Ans Bleaching powder

(Q2) Which substance gives bleaching powder with reacting with chlorine?

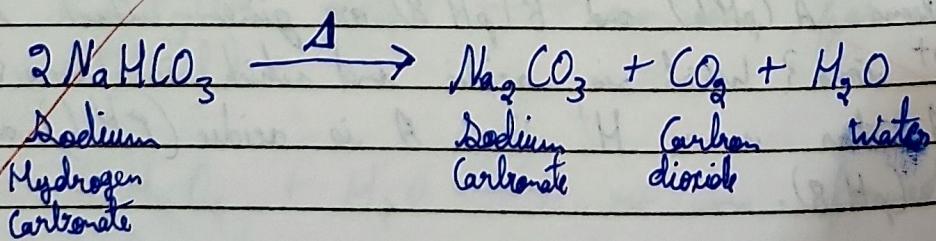
Ans Slaked lime or calcium hydroxide -  $Ca(OH)_2$   
 $Ca(OH)_2 + Cl_2 \rightarrow Ca(ClO)_2 + H_2O$

(Q3) Which sodium compound is used to soften hard water?

Ans Sodium carbonate (washing soda) -  $Na_2CO_3$

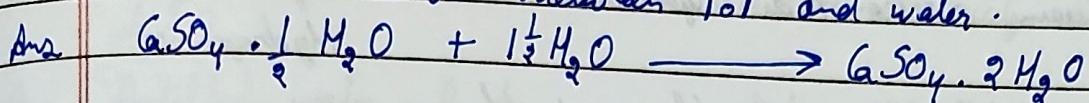
(Q4) What happens when sodium hydrogen carbonate is heated?

Ans It forms sodium carbonate and releases  $CO_2$ .



~~Q4/25~~

Q1) Write the reaction between  $\text{CaP}$  and water.



$\text{CaP}$

Water

Calcium Sulphate  
dihydrate (Gypsum)

## TEXTBOOK QUESTIONS

Q1) A solution turns red litmus blue, ~~at~~ its pH is  $7+$  ie basic nature.

Q2) A solution reacts with crushed egg-shells to give a gas that turns lime water milky. The solution contains  
Ans  $\text{MgCl}_2$

Q3) 10 ml of a solution of  $\text{NaOH}$  is found to be completely neutralized by 8 ml of  $\text{HCl}$ . If we take 20 ml of the same solution of  $\text{NaOH}$ , the amount of  $\text{HCl}$  will be  
Ans 16 ml

Q4) Which type of medicine is used for treating indigestion?  
Ans Antacid.

Q5) Write word equations then chemical equation for these reactions:

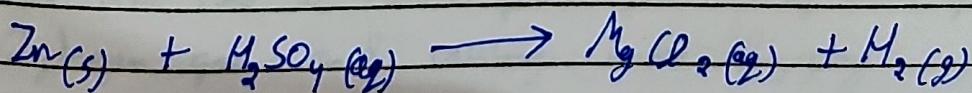
i) dilute sulphuric acid reacts with zinc granules.

ii) dilute hydrochloric acid reacts with magnesium ribbon.

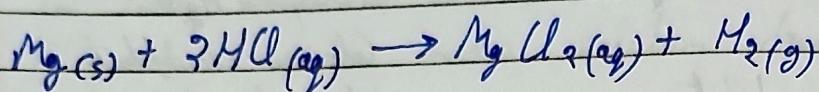
iii) dilute sulphuric acid reacts with aluminium powder.

iv) dilute hydrochloric acid reacts with iron filings.

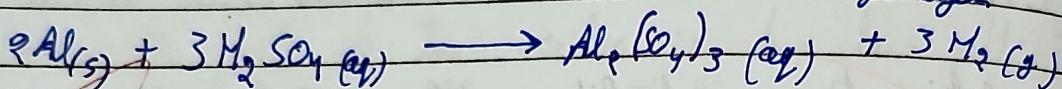
Ans i) Zinc + dilute sulphuric acid  $\longrightarrow$  Zinc sulphate + Hydrogen



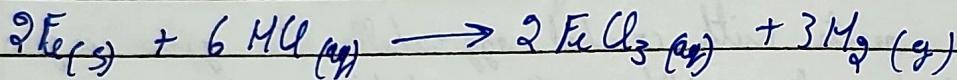
ii) Magnesium ribbon + dil. Hydrochloric acid  $\rightarrow$  Magnesium chloride + Hydrogen



iii) Aluminium powder + dil. Sulphuric acid  $\rightarrow$  Aluminium sulphate + Hydrogen



iv) Iron filings + dil. hydrochloric acid  $\rightarrow$  Ferric chloride + Hydrogen



Q6) Alcohol and glucose have  $\text{M}^+$  ions but aren't acids. Prove it with activity.

~~Ans~~ Though they both contain ~~H~~ hydrogen but they don't ionise in solution to produce  $\text{H}^+$  ions.

Activity :-

- i) Take solutions of alcohol and glucose.
- ii) Fix 2 nails on a cork and place the cork in 100 ml water.
- iii) Connect nails to the 2 terminals of a 6 volt battery through a bulb and a switch.
- iv) Now pour alcohol in the breaker and switch on the current.
- v) The bulb doesn't glow.
- vi) Repeat same with glucose. The bulb doesn't glow here also.
- vii) This means no ions or  $\text{M}^+$  ions are present in solution.

Hence ~~H~~ both are not acids.

Q7) Why distilled water doesn't conduct electricity but rainwater does?

Ans. Distilled water lacks ions so it can't conduct electricity. Rainwater dissolves  $\text{CO}_2$  from air, forming carbonic acid, which releases ions - hence it conducts electricity.

Q8) Why don't acids show acidic behaviour without water?

Ans. Acids need water to release  $\text{H}^+$  ions. Without water no  $\text{H}^+$  ions are formed, so no acidic behaviour is shown.

Q9) Five solutions A, B, C, D and E when tested with universal indicator showed pH as 7, 1, 11, 7 and 9. Which solution is -

- i.) Neutral
- ii.) Strongly alkaline
- iii.) Strong Acid
- iv.) Weak acid

v.) Weakly alkaline - Also arrange pH in increasing order  $\text{H}^+$ .

- Ans
- a.) D
  - b.) C
  - c.) B
  - d.) A
  - e.) E

Increasing order of  $\text{H}^+$  ion concentration -

$$1 < 9 < 7 < 4 < 1$$

$$\text{i.e., } \text{C} < \text{E} < \text{D} < \text{A} < \text{B}$$

Q10) Fizzing is more vigorous in test tube A ( $\text{HCl}$ ) than  $\text{CH}_3\text{COOH}$ . Why?

Ans.  $\text{HCl}$  is a strong acid and releases more  $\text{H}^+$  ions than weak acetic acid, so it reacts faster with magnesium producing more hydrogen gas and causing more fizzing.

Q 11) Fresh milk has pH 6. What happens to pH as it turns to curd? Why?

Ans Its pH decreases below 6 ∵ lactic acid forms during curdling, making it acidic.

Q 12) A milkman adds a very small amount of baking soda to fresh milk.

- Why does he shift the pH of the fresh milk from 6 to slightly ~~more~~ alkaline?
  - Why does this milk take long time to become curd?
- Ans
- To prevent milk from turning sour quickly, as alkaline pH resists acid formation.
  - It is so because lactic acid must first neutralize the added alkali pH, before curdling can begin.

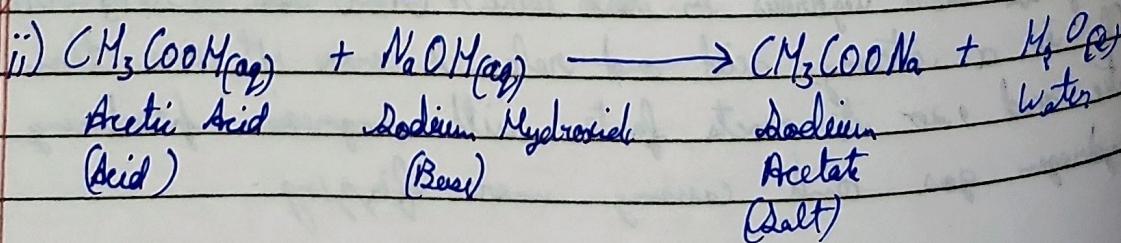
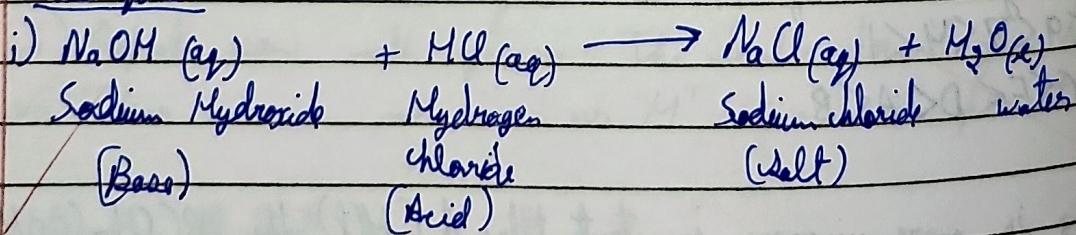
Q 13) Why should POP be stored in a moisture-proof container?

Ans Moisture causes it to react and set by forming gypsum, making it hard and unusable over time.

Q 14) What is neutralization reaction? Give two examples.

Ans The reaction between an acid and a base to form salt and water is called neutralization reaction.

Examples :-



(i) Give 2 important uses of washing soda and baking soda.  
Ans Uses of Washing Soda :-

- i) It is used in glass, soap and paper industries.
- ii) It is used for removing permanent hardness of water.

Uses of Baking Soda :-

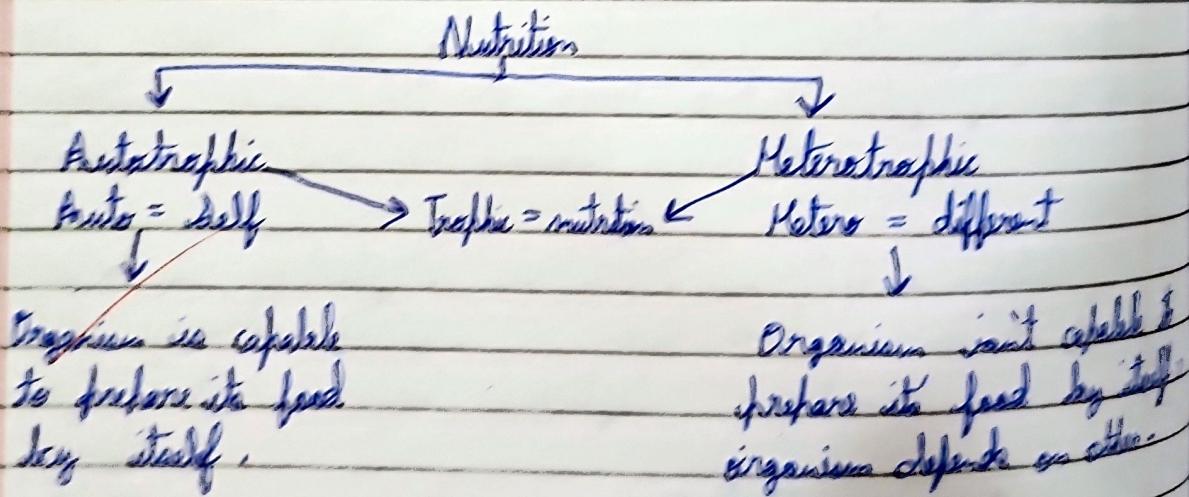
- i) It is used as an antacid.
- ii) Used in making baking powder.

(ii)  
22/4/2025

# Life Processes

★ Life Processes - It is defined as the life activities performed by living organisms which are essential for their survival. These processes or activities are nutrition, digestion, respiration, transpiration, circulation of blood, excretion, control and coordination, growth & development, reproduction etc.

★ Nutrition - Derived from 'Nutrire' - means to feed, to nourish  
 \* It provides energy and all essential nutrients required for the proper functioning & development of the body.



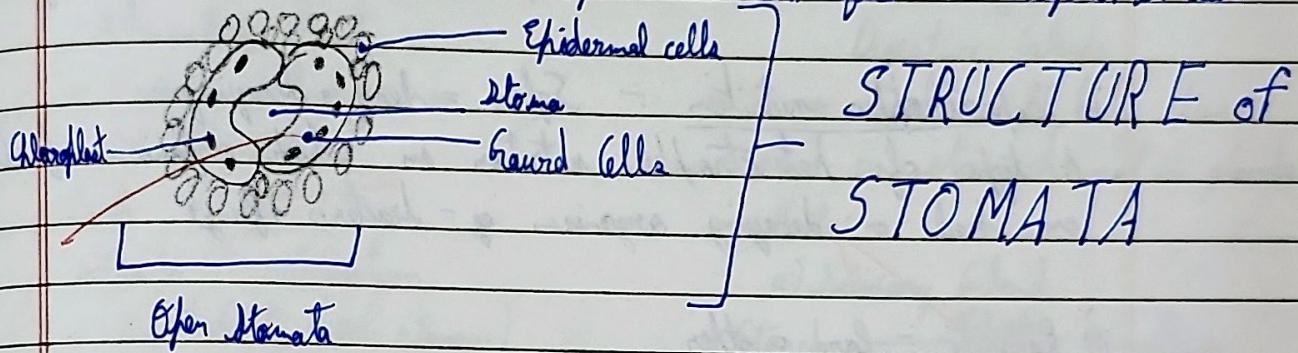
## Autotrophic Modes/Processes:-

- 1) Photosynthesis - Photo = light, synthesis = production  
 \* In this green plants, trees, vegetation produce their own food with sunlight and chlorophyll in the solar energy → chemical energy

iii) Chemosynthesis :- chemo = chemical

\* Iron bacteria feeds on iron in soil.

\* ~~Sulphur~~ Sulphur bacteria feeds on sulphur in soil.



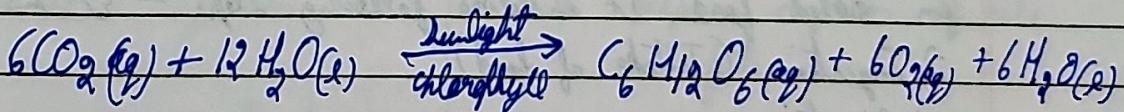
Steps involved in Photosynthesis - in chloroplast

i) Light reaction a) Photolysis of water - break down of water in the presence of sunlight.

\* Chlorophyll is a green coloured pigment which receives photons of sunlight and transfer them to chloroplast.

\* Desert plants open its stomata during night time and prepares an intermediate product.

ii) Formation of glucose, water and release of oxygen.



Q1  
Q2  
Q3



## Heterotrophic Nutrition :-

Meteoro = different

\* Organisms are dependent on plants and animals for food.

i) Saprotrophic nutrition :- Sapro = dead, decaying

A type of heterotrophic nutrition in which organisms feeds on dead or decaying organism e.g. - bacteria, fungi

ii) Parasite :- Para = other

A type of heterotrophic nutrition in which an organism called parasite lives and feeds on the body of other organism called host. e.g. Host (-) Parasite - food, shelter (+)

Man

Lice, tick, leeches (ectoparasit)

Round worm & hook worm & pin worm & tape worm (endoparasit)

Resi Plant

Anamalai

(Ziziphus)

(Acacia)

iii) Motazic :- Moto = solid

A type of heterotrophic nutrition in which organisms feeds on solid food. It involves following steps :- Ex - mucus and

i) Ingestion (Intake of food)

ii) Digestion

iii) Absorption

iv) Assimilation

v) Egestion (Removal of waste)

\* Peristalsis - Rhythmic contraction and relaxation of oesophagus

\* Chyme - Semi digested food with acidic pH in stomach

\* Gastric sphincter - Stops food in stomach till it is chyme

# Human Digestive System



## Alimentary Canal

\* Food will pass in each part

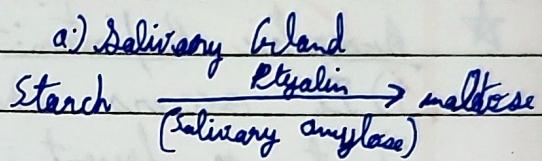
Parts :-

- i) Mouth - Ingestion
- ii) Buccal cavity (teeth & tongue)
- iii) Pharynx
- iv) Oesophagus
- v) Stomach
- vi) Small Intestine (6-7m)
  - a) Duodenum
  - b) Jejunum - Digestion
  - c) Ileum - Absorption
- vii) Large Intestine (1-2m.)
  - a.) Caecum
  - b.) Colon
  - c.) Rectum
- viii) Anus - Egestion

## Digestive Glands

\* Food will only pass in stomach not in glands

- Parts:-



Lysosyme - Kills harmful bacteria.

b) Stomach - Mucus membrane

dil. HCl - makes food soft, kills bacteria, pH acidic

Pepsin - Digestion of protein

Rennin - milk protein (casein)  $\rightarrow$  paracasein

Gastric lipase - digestion of fats

c) Liver - Bile juice stored in gall bladder  
Bile - helps in digestion of oils and fats.

In duodenum

after it releases

$\text{HCO}_3^-$  ion

$\therefore$  Bile and pancreatic

juice doesn't work in acidic

pH.

d) Pancreas - Pancreatic Juice

Trypsin - Protein digestion

Amylase - Starch  $\rightarrow$  maltose

Lipase - Fat digestion

e) ~~Regurgitated~~ Jejunum - Sucrase entericus enzyme.

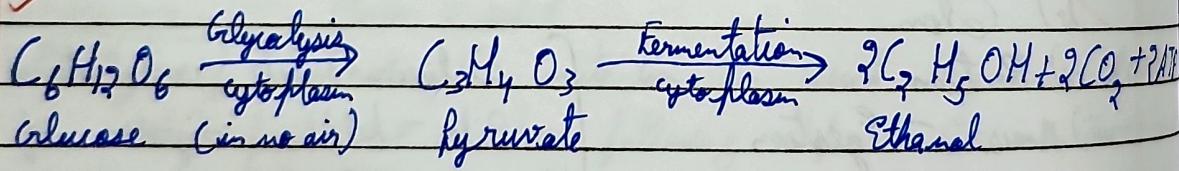
## \* Aerobic Respiration :-

- It occurs in presence of air.
- It is present in multicellular eukaryotic, complex organisms like fish, birds, man, cow etc.
- Steps involved are glycolysis and krebs cycle.
- End products are  $\text{CO}_2$ , water, 38 ATP's

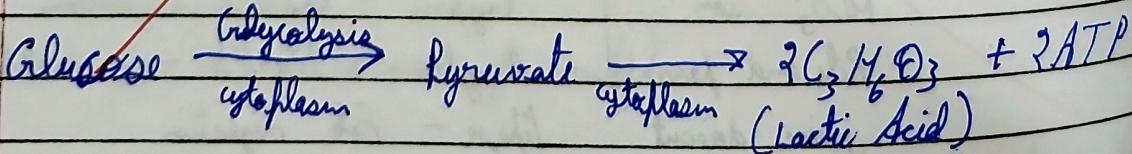
## \* Anaerobic Respiration :-

- It occurs in absence of air.
- It is present in unicellular, prokaryotic and simple organisms like bacteria, yeast etc.
- Steps involved :-  
 i) Glycolysis and fermentation (yeast, bacteria)  
 ii) Glycolysis and lactic acid (animal muscles)  
 iv) Products are : Ethanol, 2ATP,  $\text{CO}_2$  in yeast  
 Lactic acid + 2ATP in animal muscles.

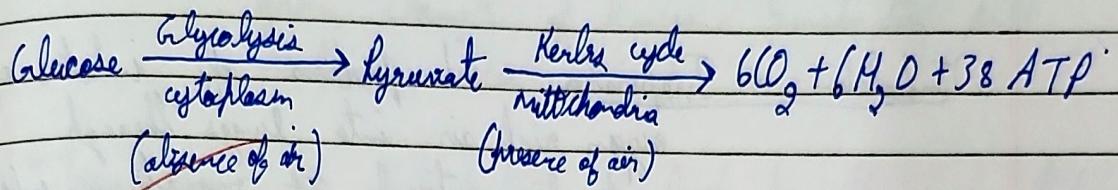
### Anaerobic respiration in yeast :-



### Anaerobic respiration in animal muscles :-

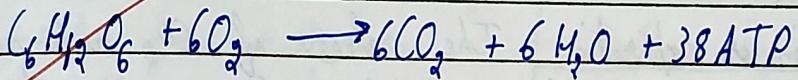


## Aerobic Respiration :-



## Respiration in Plants :-

- i) By root hairs.
- ii) Lenticels of old roots and trunk
- iii) Stomata of leaves



28/04/25

## Human Respiratory System

### i) Respiratory Tract

External nostrils  
Nasal cavity  
Internal nostrils  
Pharynx  
Glossy  
Larynx  
Trachea  
Bronchi

### ii) Respiratory Organs

Lungs  
Alveoli  
Alveolar

Bronchiolar

## \* Respiratory Mechanism :-

- Inhalation or Inspiration - The process of intake of oxygen rich air into lungs through respiratory tract. It results in inflation of lungs.
- Gaseous exchange - The  $O_2$  diffuses from alveoli to blood capillaries &  $CO_2$  diffuses into alveoli from blood capillaries.
- Exhalation or expiration - The release of  $CO_2$  rich air from mouth. The lungs gains its normal size.

## \* Transportation in Plants :-

Xylem :-

i) Transportation of water and minerals

ii) Parts :- Tracheids

Vessels

Xylem Parenchyma

Xylem Fibres

Phloem

i) Distribution of food.

ii) Parts :- Sieve tube

Companion cells

Phloem Parenchyma

Phloem Fibres

Sieve plates

\* Ascent of Sap - The upward movement of water and minerals towards the aerial parts of plant against gravity.

\* Transpiration - Loss of water in the form of water vapour from surface of leaves. Transpiration pull results in ascent of sap.

\* Translocation - The distribution of food by the sieve tubes to different parts of plant. Food is prepared in leaves and is distributed to all parts of plant.

### Ascent of Sap

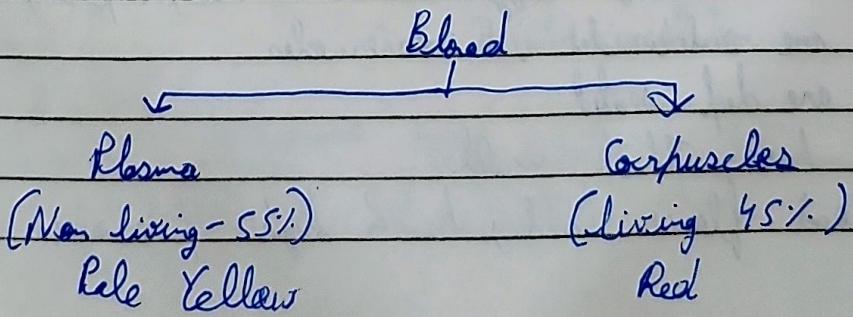
- The upward movement of water from root hairs towards aerial parts of plant against the gravity.
- Transpiration pull is required.
- Loss of water
- Occurs in Xylem
- It is unidirectional i.e. upward direction only.

### Translocation

- The distribution of food prepared by leaf by sieve tubes to different parts of plant
- Transpiration pull isn't required.
- No loss of water
- Occurs in phloem.
- It is bidirectional i.e both towards upward & downward directions.

### Transportation in Animals:-

- Circulatory medium - Blood, ~~Blood vessels~~
- Blood vessels - Artery, vein, capillaries
- Pumping organ - Heart



## Components of Plasma :-

Proteins - Albumin, Globulin, Prothrombin, Fibrinogen  
Cations -  $K^+$ ,  $Mg^{2+}$ ,  $Ca^{2+}$   
Anions -  $Cl^-$ ,  $PO_4^{3-}$   
Antibodies, cholesterol

## Components of Corpuscles :-

- i) RBC - It is secreted by bone marrow.  
Life span - 120 days (4 months)  
\* It has Hb - Haemoglobin (Iron + Protein)
  - ii) WBC - It is secreted by bone marrow & lymph glands.  
Life span - 7 days
  - iii) Platelets (Thrombocytes) - Smallest component of blood.  
- Secreted by bone marrow  
Life span = 15 days  
Platelets are responsible for blood clotting
- \* 55% of blood in adults  
\* 13-15 g Hb in male  
\* 10-12 g Hb in female.

## Arteries :-

- i) It originates from heart and carries blood towards body
- ii) All arteries carry oxygenated blood except ~~the~~ pulmonary
- iii) They are subdivided into arterioles.
- iv) They are deep seated.
- v) They have thick walls.
- vi) Blood flows with jerks & high pressure.

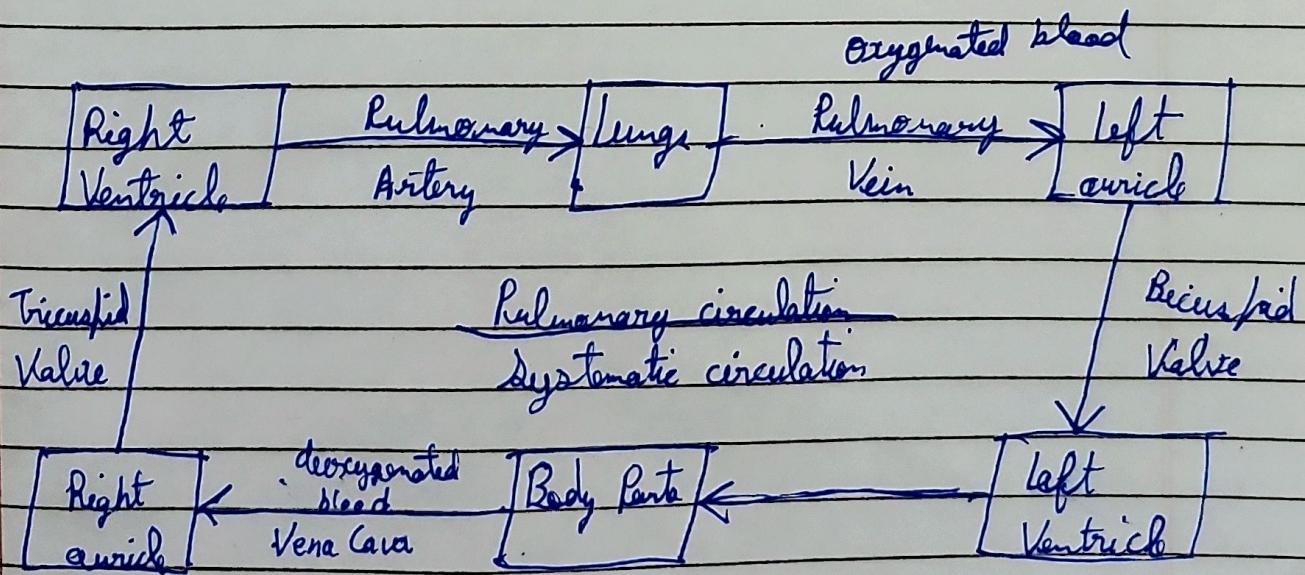
### Veins :-

- i) It originates from body parts and carries blood towards heart.
- ii) All veins carry deoxygenated blood except pulmonary.
- iii) They are further sub-divided into venous.
- iv) They are superficial
- v) They have thin walls.
- vi) Blood flows smoothly with normal pressure.
- vii) Valves are present in ~~veins~~ veins.

- \* Renal artery & renal vein in kidney
- \* Iabat - systole (contraction of ventricle)
- \* Dibat - Diastole (relaxation of ventricle)

Systolic pressure = 120 mm of Mg (Mercury)  
Diastolic pressure = 80

(Q) sphygmomanometer - used to measure BP.  
Stethoscope - used to note the BP.



Pulmonary - Lungs

Cardiac - Heart

Gastric - Stomach

Hepatic - Liver

Renal - Kidney

### Heart's Test:-

- i) ECG
- ii) TMT
- iii) Echo (Doppler)
- iv) CT-scan
- v) Angiography
- vi) MRI

\* Arteries which supply  $O_2$  & nutrient to heart muscles are coronary arteries.

### Excretion:-

\* Excretion is the process of removal of metabolic wastes like urea, uric acid, bile pigments, excess of water, salt & vitamins in the form of urine.

\* Organs performing excretion are excretory organs.

i) Skin - urea, uric acid, salt and excess of water is excreted from skin in the form of sweat.

ii) Kidneys - a) These are bean shaped present at the side of abdomen. It helps in urination.

b) Homeostasis - To maintain water balance as well as electrolyte balance in the blood.

c) Decrease a hormone 'erythropoietin' which helps in the formation of blood.

## Parts of Human excretory system :-

- i) pair of kidneys
- ii) pair of ureters
- iii) urinary bladder
- iv) urethra

Nephron :- The smallest and functional unit of kidney. Also called uriniferous tubules. Each kidney has millions of nephrons.

### Functions of Nephron :-

- i) Ultra filtration - Removal of wastes from blood in the glomerular filtrate. The wastes are known as filtrate.
- ii) Tubular reabsorption - i) PCT - It reabsorbs 70% of water, vitamin amino acids from filtrate and transports using capillaries.
- ii) Descending limb - reabsorbs water & minerals
- iii) Ascending limb - reabsorbs vitamine &  $\text{K}^+$
- iv) DCT - Anti diuretic hormone released by pituitary gland (brain) helps in the reabsorption of water from filtrate. Aldosterone hormone released by adrenal glands helps in reabsorption of  $\text{Na}^+$  &  $\text{K}^+$
- ii) Tubular excretion - The collecting duct contains urine which is transported towards water



- Excretion in Plants :-
- \* Roots secrete metabolic directly in soil.
  - \* Old brown leaves store waste.
  - \* Waste in Bark, oil, resins, gums etc.
  - \* Stomata in  $\text{CO}_2^-$ .

\* Diuretic Drinks - Those drinks which reduces the water concentration in the body are called diuretic or beverages. e.g. tea, cold drink, alcohol etc.

## INTERNAL QUESTIONS

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(Q1) Why is diffusion insufficient to meet oxygen requirements of multi-cellular organisms?

Ans Multi-cellular organisms have trillions of cells and all are not in direct contact with air, so diffusion isn't enough.

(Q2) What criteria do we use to decide whether something is alive?

Ans Organisms which show life processes like nutrition, digestion, respiration, transportation, circulation, excretion, control and coordination, growth and development, reproduction etc. are categorised as alive.

(Q3) What are outside raw materials used by organisms?

Ans Heterotrophs use food and autotrophs use carbon dioxide, minerals, water. All organisms use oxygen for respiration as raw materials.

(Q4) What are essential processes for maintaining life?

Ans Life activities like nutrition, respiration, transportation, excretion, digestion, reproduction are essential for maintaining life.

Page - 57

(Q1) What are differences between autotrophic nutrition and heterotrophic nutrition?

Ans Autotrophic

- i) In Autotrophic nutrition organisms is capable of preparing food by itself.
- ii) Ex - plants, some bacteria, fungi.

Heterotrophic

- i) In Heterotrophic nutrition organisms isn't capable and depends on other organisms.
- ii) Ex - Humans, animals.

(Q2) Where do plants get each of the raw materials required for photosynthesis?

Ans Plants get water and minerals from soil, photons from sunlight and carbon dioxide from air for photosynthesis. Chlorophyll is already present in green leaves.

(Q3) What are functions of digestive enzymes?

Ans They increase surface area of food for better absorption and break complex substances to simpler.

(Q4) How is small intestine designed to absorb digested food?

Ans In last part of small intestine called ileum, there are small hair like projections called villi. They are supplied with blood vessels and absorb nutrients.

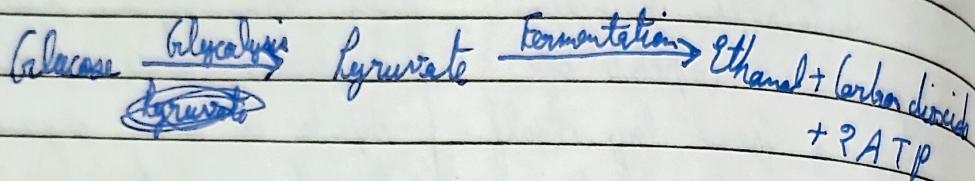
(Q5) What advantage an terrestrial organism has over aquatic?

Ans Terrestrial organism uses oxygen from air, on the other hand aquatic organisms use oxygen dissolved in water. Advantage is that concentration of oxygen in air is 21%, but in water it is very less. In water more oxygen can be upto 16%. Hence this is the biggest advantage.

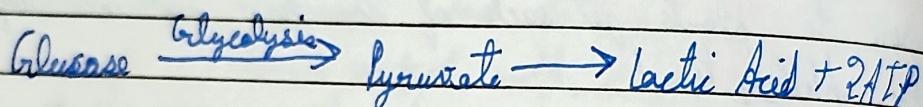
Q2) How is glucose oxidised in different organisms?

Ans It is oxidised by 3 methods :-

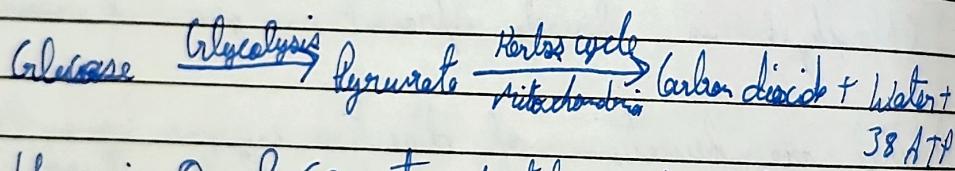
i) Aerobic Respiration in yeast :-



ii) Aerobic Respiration in muscles :-



iii) Aerobic Respiration :-



Q3) How is  $O_2$  &  $CO_2$  transported in humans?

Ans i) Inhalation -  $O_2$  enters our body and reaches lungs through respiratory tract.

ii) Then  $O_2$  is absorbed and  $CO_2$  released in lung alveoli through process of diffusion.

iii) Exhalation - Then  $(O_2$  rich air is exhaled out from lungs through respiratory tract.

Q4) How are lungs designed in Humans to maximize the area for gaseous exchange?

Ans There are millions of alveoli in lungs.

Q1) What are components of transport system in humans?  
Ans. What are their functions.

Ans. 3 Major components are:-

- i) Heart - It pumps blood and is responsible for flow control. It sends and receives blood from both lungs and body parts.
- ii) Blood - It is the fluid that circulates and carries all substances.
- iii) Blood Vessels - These are tubes present all over body. They carry blood from heart to body parts.

Q2) Why it is important to separate O<sub>2</sub> & CO<sub>2</sub> blood in mammals and birds?

Ans. These are the organisms that require more ~~energy and~~ oxygen for ~~less~~ more breakdown of glucose to get more energy because these organisms require ~~more~~ energy than others due to movement from 1 place to other.

Q3) What are components of transportation system in plants?

Ans. Xylem and Phloem

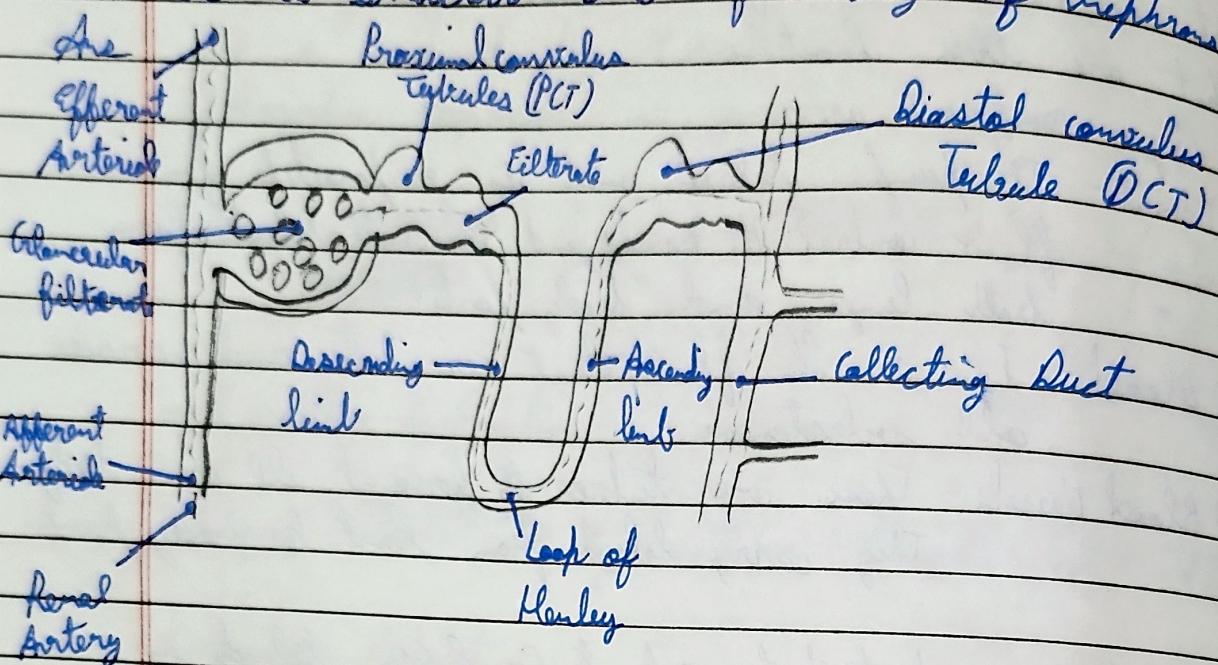
Q4) How are water and minerals transported in plants?

Ans. They are absorbed by roots in soil and transported to various parts for photosynthesis by tracheids and vessels in xylem.

Q5) How is food transported in plants?

Ans. Food is transported from leaves to other parts of plant by sieve tubes in phloem.

(Q1) Describe structures and functioning of nephrons?



i) Ultra filtration - Blood enter from renal artery and is filtered in Glomerular filter. The blood is passed forward towards Efferent arterioles and waste material called filtrate is sent to PCT.

ii) Tubular Reabsorption - PCT reabsorbs 70% water and sends it to capillaries. Then descending limb reabsorbs water and minerals. Then ascending limb reabsorbs vitamins and minerals. Then DCT absorb water via ADM and  $\text{Na}^+$  &  $\text{K}^+$  by Aldosterone.

iii) Tubular excretion - Then collecting duct collects filtrate and sends it to ureters.

(Q2) What methods are used by plants for excretion?

Ans

i) Roots excrete metabolic waste directly to soil.

ii) Some waste is stored in old brown leaves.

iii) Waste is stored in bark, resin and galls too.

Q3.) How is amount of urine produced regulated?  
Ans It is controlled by ADH and amount of fluids we take.

## EXERCISE QUESTIONS

Q1.) Kidneys in humans are part of the Excretory system

Q2.) The xylem in plants is responsible for the transport of water

Q3.) The autotrophic mode of nutrition requires  $O_2$ ,  $H_2O$ , sunlight and chlorophyll.

Q4.) How are fats digested in our bodies?  
Ans Gastric lipase in stomach, Bile juice from liver & lipase from pancreas in duodenum.

Q5.) What is role of saliva in digestion of food?  
Ans With help of salivary amylase they convert starch to maltose and with lysozyme they kill germs.

Q6.) What are conditions necessary for autotrophic nutrition and what are its by products?  
Ans  $6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll}]{\text{sunlight}} C_6H_{12}O_6 + 6O_2 + 6H_2O$

necessary conditions are :-  
Carbon dioxide, water, sunlight  
and chlorophyll

By products are :-  
Glucose, Oxygen and water

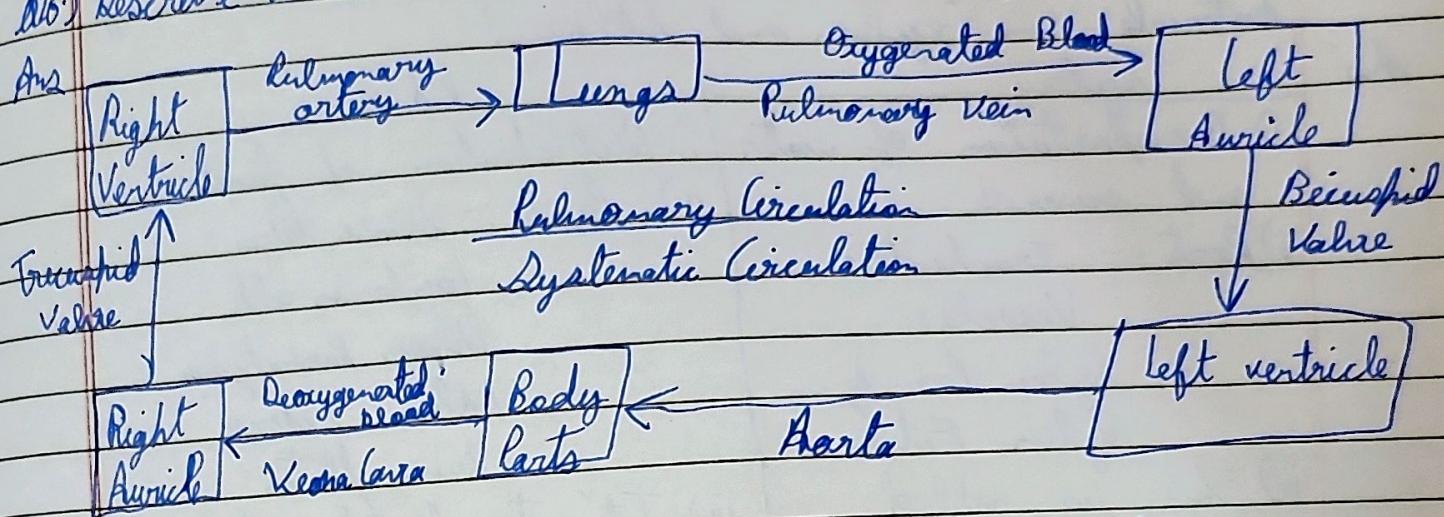
Q7) What are differences between aerobic and anaerobic respiration?	
Aerobic	Anaerobic
i) It occurs in presence of air.	i) It occurs in absence of air.
ii) It occurs in complex multicellular eukaryotic organisms like birds & fish & man, cow etc.	ii) It occurs in simple prokaryotic unicellular organisms like bacteria & yeast etc.
iii) Steps involved are glycolysis and kerba cycle	iii) Steps involved are glycolysis and fermentation in yeast and bacteria, and glycolysis and fission of $\text{C}_6\text{H}_{12}\text{O}_6$
iv) End products are 38 ATP & carbon dioxide and water	iv) Products are - lactic acid and 2 ATP or Ethanol & carbon dioxide and 2 ATP.

Q8.) How are alveoli designed to maximize exchange of gases ?  
Ans They are present in lungs in huge numbers to increase the total surface area for maximum exchange of gases. There are millions of ~~alveoli~~ alveoli in each lung.

Q9) What will be consequences of haemoglobin deficiency in humans?  
Ans Haemoglobin, present in blood, carries oxygen with it. It binds oxygen with it for transportation. If haemoglobin is less in our body then oxygen carrying capacity of blood will be highly decreased and our cells won't get enough oxygen for breakdown of glucose. As a result less ATP will be released and we will not have enough energy and we will feel tired too soon.

Ques.) Describe double circulation in human beings.

Ans



Systemic circulation and pulmonary circulation are two circulations in our body. These are referred as double circulation. Firstly deoxygenated blood enters Right auricle of heart from Vena Cava from Body parts. When Right auricle is full then with opening of tricuspid valve blood enters right ventricle. Then right ventricle sends blood to lungs via pulmonary artery. lungs makes deoxygenated blood oxygenated and sends it back to Left auricle in heart via pulmonary vein. Then ~~left auricle~~ with opening of bicuspid valve when left auricle is full, blood flows to left ventricle. Then left ventricle pumps blood and sends it to Body parts through Aorta. Then this whole cycle is repeated. Circulation of blood from Right ventricle to Left auricle is called pulmonary circulation and from Left ventricle to Right auricle is called systematic circulation.

Q12) What are differences between transportation of materials in xylem and phloem?

Ans

Xylem

- Transportation of water and minerals.
- Parts:- Tracheids, Kernels, Xylem Parenchyma, Xylem Fibres.
- This is called Agent of sap.
- It is unidirectional i.e upward movement only.
- Transpiration pull is required.

Phloem

- Distribution of food.
- Parts:- Sieve tubes ( Companion cells ), Phloem Parenchyma, Phloem Fibres, Sieve plates.
- Its transportation process is called translocation.
- It is bidirectional i.e it transports upwards and downwards.
- Transpiration pull isn't required.

Q13) Compare alveoli and nephrons.

Ans

Alveoli

- They are present in lungs.
- They make blood oxygenated.
- They are part of respiratory system.

Nephrons

- They are present in kidneys.
- They remove waste from blood.
- They are part of excretory system.

CH-9

# Light - Reflection & Refraction

- \* Light - It is a form of energy which travels in the form of electromagnetic waves.
- \* Luminous Object - Sources of light e.g. Sun, Stars, LED etc.
- \* Non Luminous Object - which doesn't emit light - trees, wall, etc.
- \* Transparent object - objects which allow light to pass completely, ex - air, glass
- \* Opaque object - objects through which light can't pass ex - wall, roof, trees etc.
- \* Translucent - objects through which small amount of light passes. ex - butter paper, cellophane, etc.

## \* Properties of light :-

- Reflection of light -
- Refraction of light -

## \* Reflection of Light :-

It is defined as property of bouncing back of light when it strikes with an opaque object. With this property we can see different objects around us.

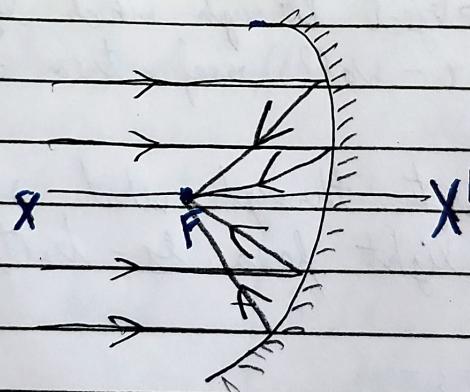
Properties of Plane mirror :-

- i) Virtual, erect image
- ii) Same size
- iii)  $L_i = L_r$
- iv)  $L_r \parallel L_i$ ,  $NN'$  lies in the same plane.
- v) Lateral Inversion

## \* Spherical Mirrors :-

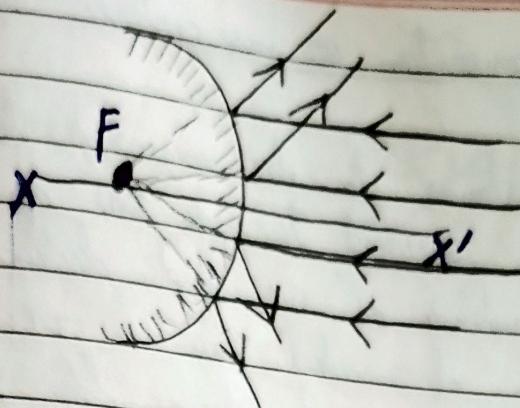
### (i) Concave Mirror :-

A spherical mirror in which the outer surface is polished and reflection takes place at the inner side. It is also called converging mirror. Converging mirror forms real and inverted image. Its uses are headlights, torches, street lights, shaving mirror, mirror used by doctors, solar cookers etc.



### (ii) Convex Mirror :-

A spherical mirror in which the inner surface is polished and reflection takes place at outer surface. It is also called diverging mirror. Diverging mirror always form virtual and erect image. It is smaller than object. Its uses are rear view mirror in to view vehicles coming behind. Also used in screens + traffic areas.



$M_1, M_2$  = Aperture (reflecting area of mirror)  
 $F$  = Principal focus

$XX'$  = Principal axis ( $F$ ,  $C$ , object, image lies at  $XX'$ )

$p$  = Fob (all distance measured from fob)

$PF$  = Focal length ( $f$ )

$C$  = Centre of curvature

$PL$  = Radius of curvature

$f = \frac{1}{2} R$

$f = \frac{1}{2} h_1$  object height

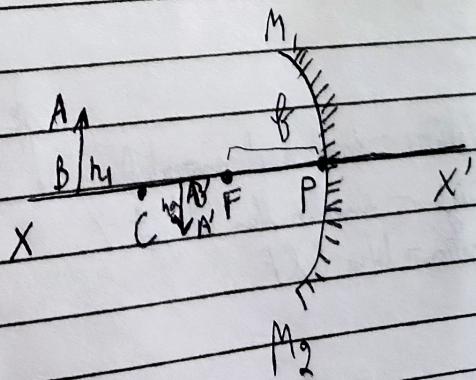
$AB$  = object

$A'B'$  = Image

$h_2$  = Image height

$PB$  = Object distance

$PB'$  = Image distance

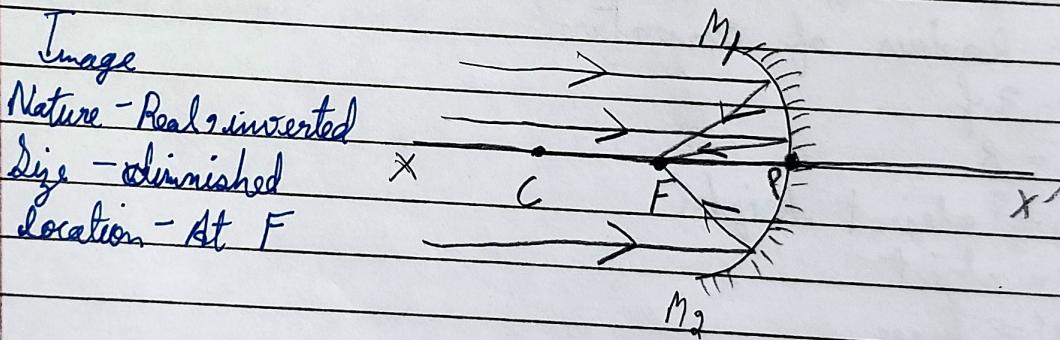


## \* Sign convention or new cartesian signs (Rules).

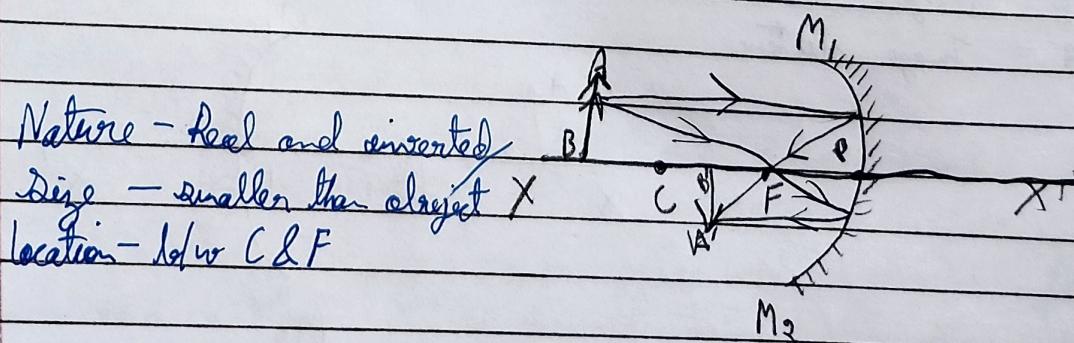
- All distances to be measured ~~to~~ from pole.
- Distance measured towards the direction of incident ray is considered as +ve and distance measured against the direction of incident ray is -ve.
- The height measured above the principal axis is +ve whereas the height measured below the principal axis is -ve.

## \* Ray diagrams using concave mirror

- At infinity

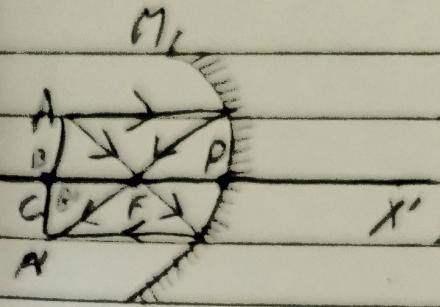


- Beyond C.



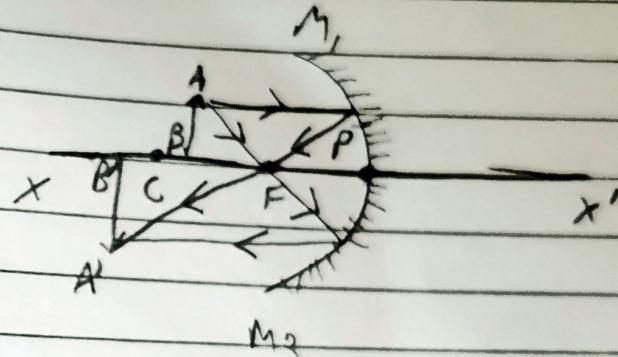
ii) At C

Nature - Real, inverted  
Size - Same size  
Location - At C



iv) Object b/w C and F

Nature - Real, inverted  
Size - Image is larger  
Location - Beyond C



v) When object is at F

Nature - Real, inverted

Size - Too large

Location -  $\infty$

