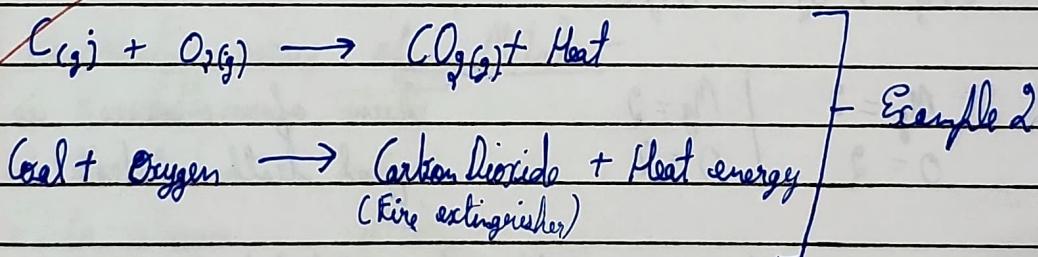
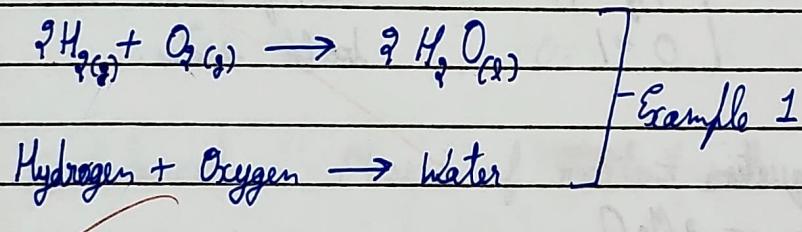


Chemical Reactions & Equations

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.



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.

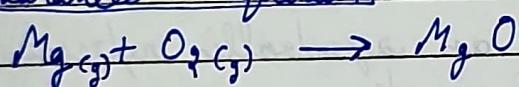
Indications of chemical reaction :-

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

Law of Conservation of Mass:

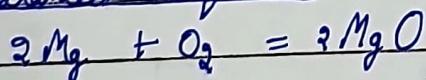
In a chemical reaction mass can neither be created nor destroyed
i.e. mass of reactants = mass of products.

Unbalanced equation :-



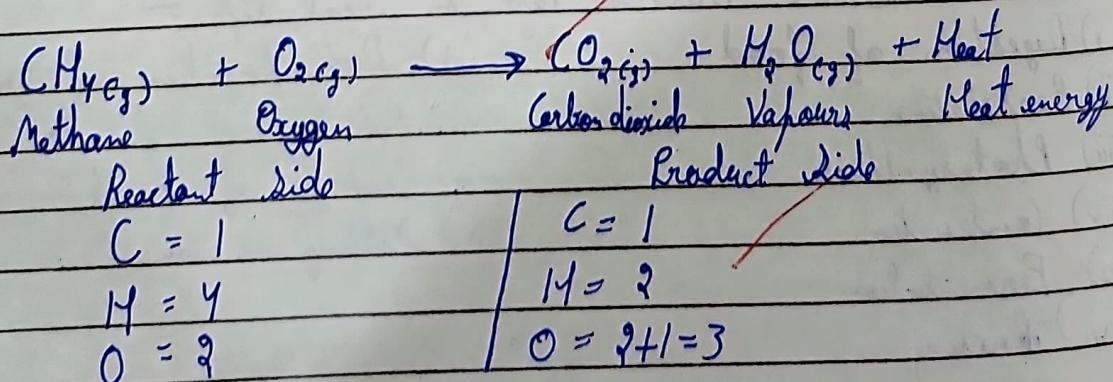
$$\begin{array}{c|c} M_g = 1 & M_g = 1 \\ O = ? & O = 1 \end{array} \quad \begin{array}{l} \text{sum of masses isn't equal} \\ \text{both sides.} \end{array}$$

Balanced equation :

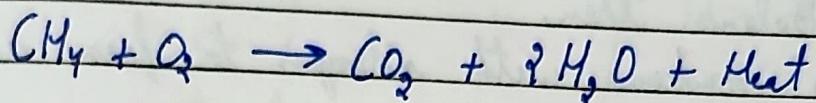


$$\begin{array}{l|l} M_g = 2 & M_g = 2 \\ O = 2 & O = 2 \end{array} \quad \text{Sum of masses is equal both sides.}$$

Balancing of chemical equations by Hit & trial method:-



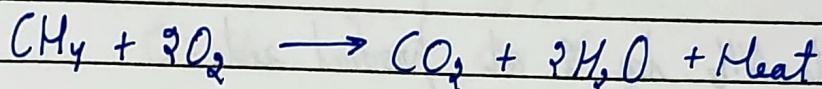
Step 1 - Hit H_2O by ? at product side



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

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

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 :-

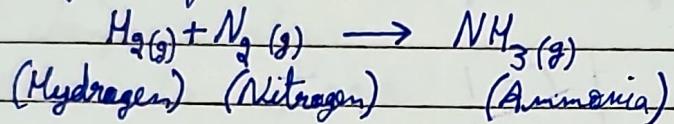
1) K - Potassium	Very	most
2) Na - Sodium	Natural	reactive
3) Ca - Calcium	college	
4) Mg - Magnesium	↑	
5) Al - Aluminium	Alibi	
6) Zn - Zinc	ZTTT	xii) Hg - Mercury Highway
7) Fe - Iron	FIR	xiii) Ag - Silver ↑ 3 rank least reactive
8) Sn - Tin	SITI	xiv) Au - Gold level up
9) Pb - Lead	PB	xv) Pt - Platinum per line.
10) H - Hydrogen	HTT ↑ 1	
11) Cu - Copper	Copper	

Questions

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

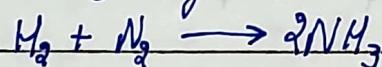
a) Hydrogen gas combines with nitrogen to form ammonia.

Ans



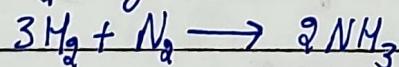
Reactant Side	Product Side
H = ?	H = 3
N = 2	N = 1

Step 1 :- Hit NH_3 by 2 at product side.



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

Step 2 :- Hit H_2 by 3 at reactant side.

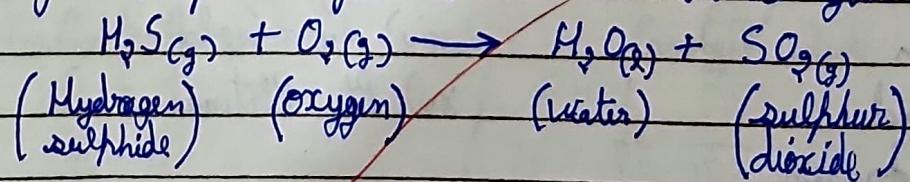


H = 6	/ H = 6
N = 2	/ N = 2

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

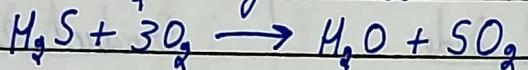
b) Hydrogen sulphide gas burns in air to give water & sulphur dioxide.

Ans



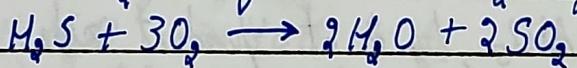
<u>Reactant Side</u>	<u>Product Side</u>
H = ?	H = ?
S = 1	S = 1
O = ?	O = 3

Step 1 :- Mit O₂ by 3 at reactant side.



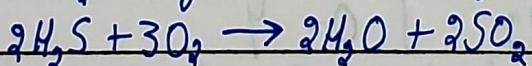
H = ?	H = ?
S = 1	S = 1
O = 6	O = 6

Step 2 :- Mit H₂O by 2 and SO₂ by 2 at product side.



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

Step 3 :- Mit H₂S by 2 at reactant side.

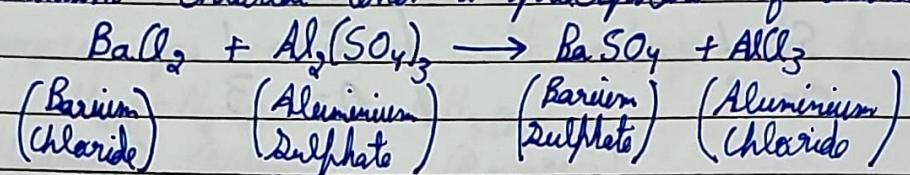


H = 4	H = 4
S = 2	S = 2
O = 6	O = 6

∴ Balanced equation is 2H₂S + 3O₂ → 2H₂O + 2SO₂

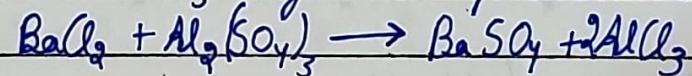
c) Barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate.

Ans



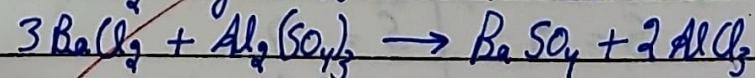
Reactant side	Product side
$\text{Ba} = 1$	$\text{Ba} = 1$
$\text{Cl} = 2$	$\text{Cl} = 3$
$\text{Al} = 2$	$\text{Al} = 1$
$S = 3$	$S = 1$
$O = 12$	$O = 4$

Step 1:- Hit AlCl_3 by 2 at product side.



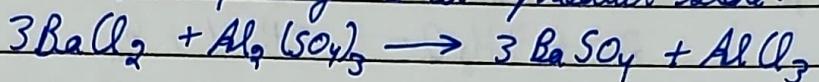
$\text{Ba} = 1$	$\text{Ba} = 1$
$\text{Cl} = 2$	$\text{Cl} = 6$
$\text{Al} = 2$	$\text{Al} = 2$
$S = 3$	$S = 1$
$O = 12$	$O = 4$

Step 2:- Hit BaCl_2 by 3 at reactant side.



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

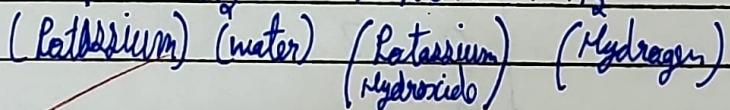
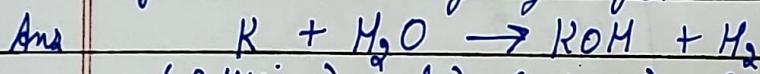
Step 3:- Mit BaSO_4 lgy 3 at product side.



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

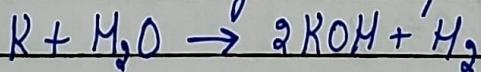
∴ Balanced equation is $3\text{BaCl}_2 + \text{Al}_2(\text{SO}_4)_3 \rightarrow 3\text{BaSO}_4 + \text{AlCl}_3$

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 KOH lgy 2 on product side.



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

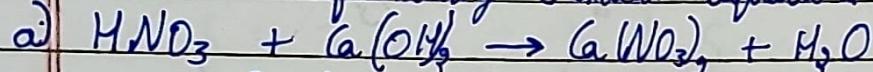
Step 2:- Hit R with 2 and H_2O with 2 at reactant side.

$$2K + 2H_2O \rightarrow 2KOH + H_2$$

$$\begin{array}{l|l} R = 2 & R = 2 \\ M = 4 & M = 4 \\ O = 2 & O = 2 \end{array}$$

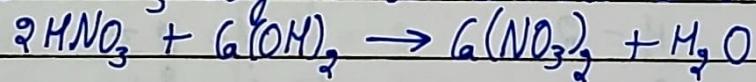
\therefore Balanced equation is $2K + 2H_2O \rightarrow 2KOH + H_2$

Q6) Balance the following chemical equations.



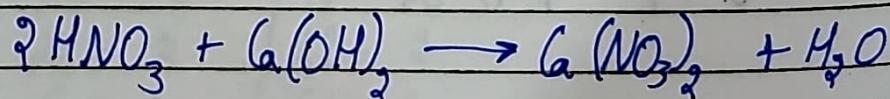
Reactant Side	Product Side
$H = 3$	$H = 2$
$N = 1$	$N = 2$
$O = 5$	$O = 7$
$Ca = 1$	$Ca = 1$

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



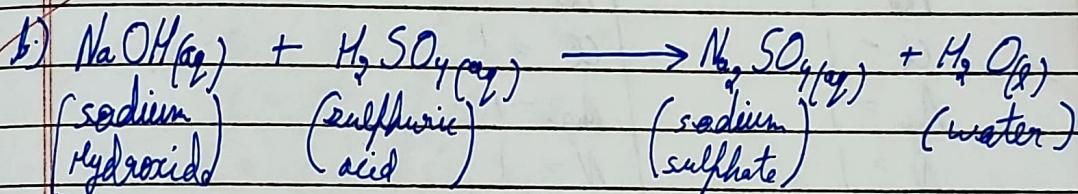
$$\begin{array}{l|l} H = 4 & H = 2 \\ N = 2 & N = 2 \\ O = 8 & O = 7 \\ Ca = 1 & Ca = 1 \end{array}$$

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



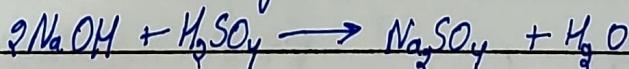
$H = 1$	$H = 1$
$N = 1$	$N = 1$
$O = 8$	$O = 8$
$G = 1$	$G = 1$

∴ Balanced equation is $2HNO_3 + 2NaOH \rightarrow Na_2SO_4 + 2H_2O$



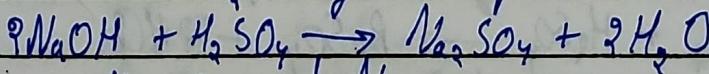
$Na = 1$	$Na = ?$
$O = 5$	$O = 5$
$H = 3$	$H = 3$
$S = 1$	$S = 1$

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



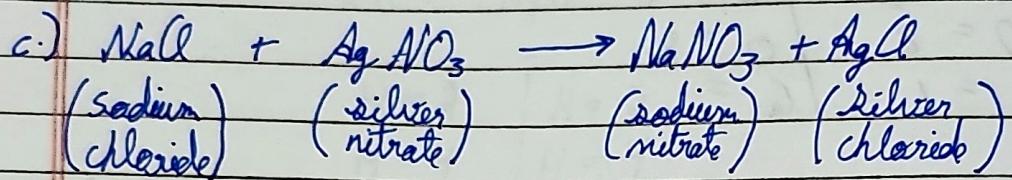
$Na = 2$	$Na = 2$
$O = 6$	$O = 5$
$H = 4$	$H = 2$
$S = 1$	$S = 1$

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



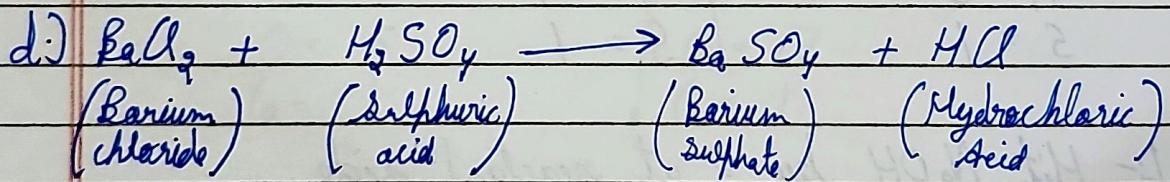
$Na = 2$	$Na = 2$
$O = 6$	$O = 6$
$H = 4$	$H = 4$
$S = 1$	$S = 1$

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



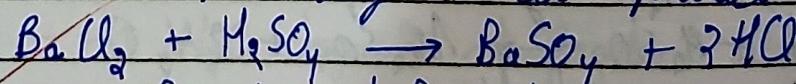
$\text{Na} = 1$	$\text{Na} = 1$
$\text{Cl} = 1$	$\text{Cl} = 1$
$\text{Ag} = 1$	$\text{Ag} = 1$
$\text{N} = 1$	$\text{N} = 1$
$\text{O} = 3$	$\text{O} = 3$

\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.

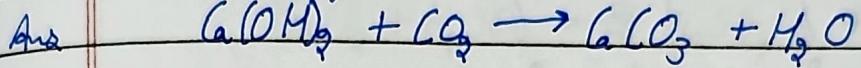


$\text{Ba} = 1$	$\text{Ba} = 1$
$\text{Cl} = 2$	$\text{Cl} = 2$
$\text{H} = 2$	$\text{H} = 2$
$\text{S} = 1$	$\text{S} = 1$
$\text{O} = 4$	$\text{O} = 4$

∴ 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 :-

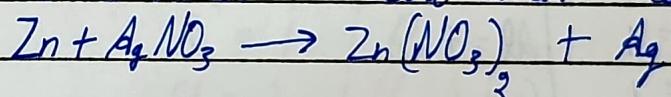
a) Calcium Hydroxide + Carbon dioxide \rightarrow Calcium carbonate + water



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

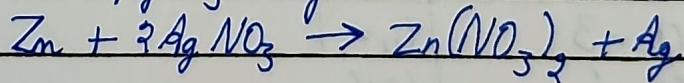
∴ Equation is already balanced.

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



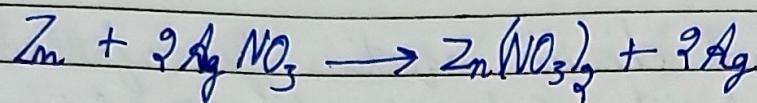
$\text{Zn} = 1$	$\text{Zn} = 1$
$\text{Ag} = 1$	$\text{Ag} = 1$
$\text{N} = 1$	$\text{N} = 2$
$\text{O} = 3$	$\text{O} = 6$

Step 1:- Mit AgNO_3 lgy 2 at reactant side.



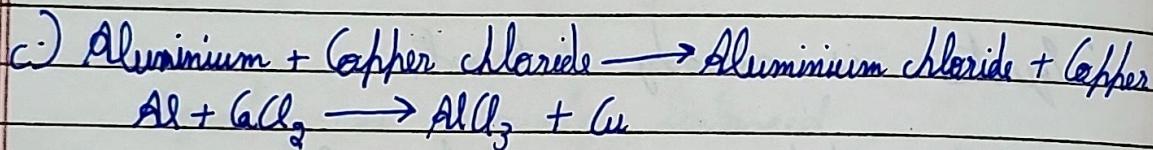
$\text{Zn} = 1$	$\text{Zn} = 1$
$\text{Ag} = 2$	$\text{Ag} = 1$
$\text{N} = 2$	$\text{N} = 2$
$\text{O} = 3$	$\text{O} = 6$

Step 2:- Mit Ag by 2 product side.



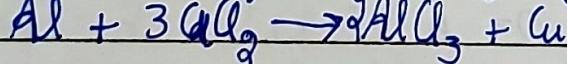
$\text{Zn} = 1$	$\text{Zn} = 1$
$\text{Ag} = 2$	$\text{Ag} = 2$
$\text{N} = 2$	$\text{N} = 2$
$\text{O} = 6$	$\text{O} = 6$

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



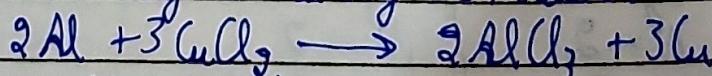
$\text{Al} = 1$	$\text{Al} = 1$
$\text{Cu} = 1$	$\text{Cu} = 1$
$\text{Cl} = 2$	$\text{Cl} = 3$

Step 1:- Mit CuCl₂ by 3 and AlCl₃ by 2 on reactant & product side



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

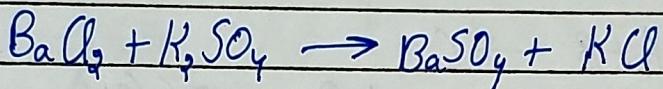
Step 2:- Mit Al by 2 & Cu by 3 on reactant and product side



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

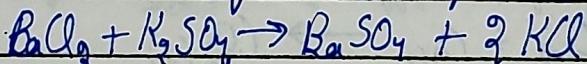
\therefore Balanced equation is $2\text{Al} + 3\text{CuCl}_2 \rightarrow 2\text{AlCl}_3 + 3\text{Cu}$

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.



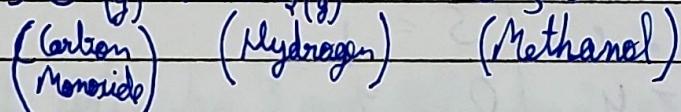
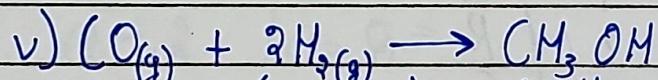
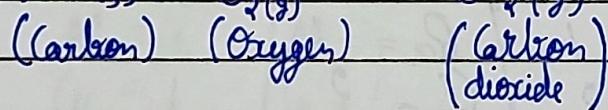
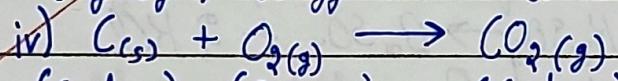
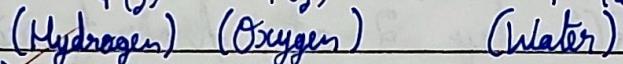
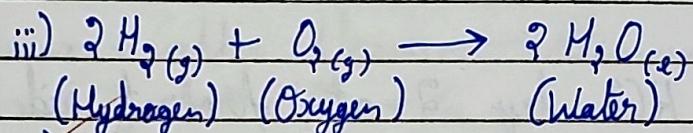
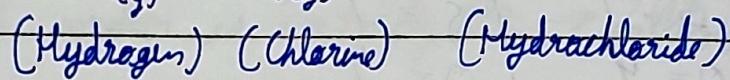
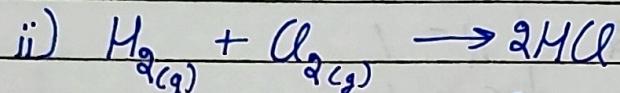
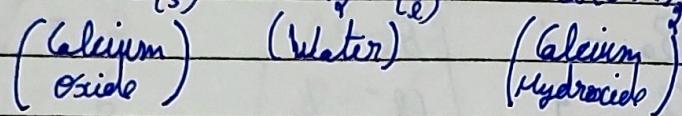
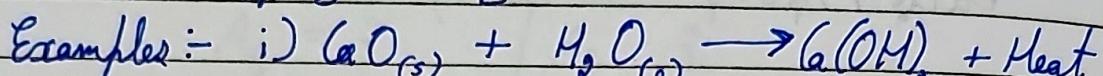
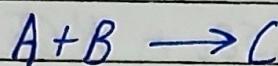
$\text{Ba} = 1$	$\text{Ba} = 1$
$\text{Cl} = ?$	$\text{Cl} = ?$
$\text{K} = ?$	$\text{K} = ?$
$S = 1$	$S = 1$
$O = 4$	$O = 4$

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

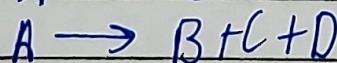
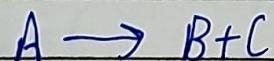
(P.M)
08/04/25

Types of Reactions

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



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



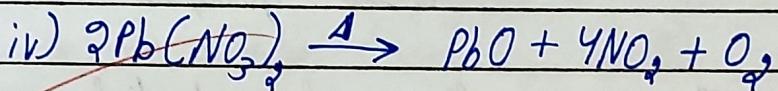
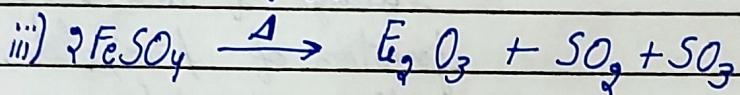
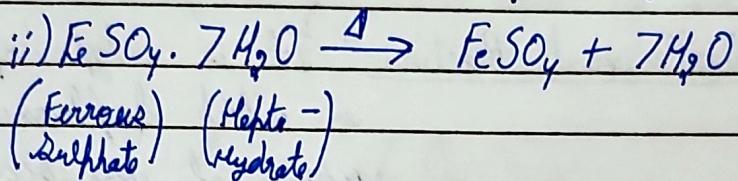
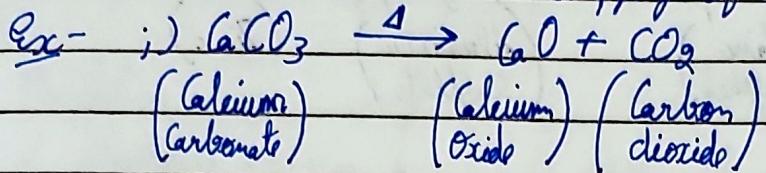
Types of Decomposition Reactions :-

i) Thermal

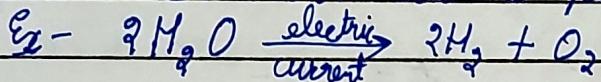
ii) Electrical

iii) Photo

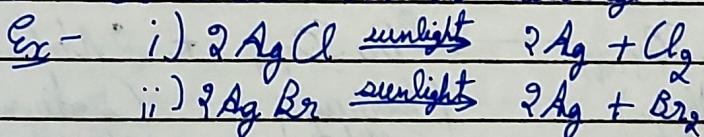
• Thermal - It occurs due to supply of heat.



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

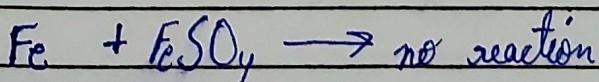
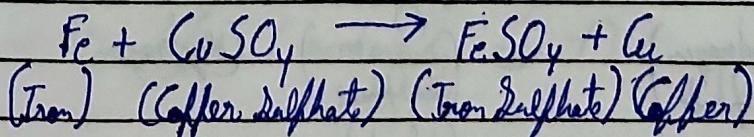
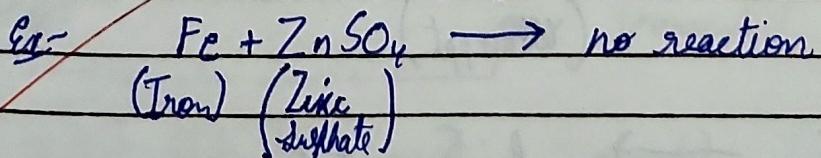


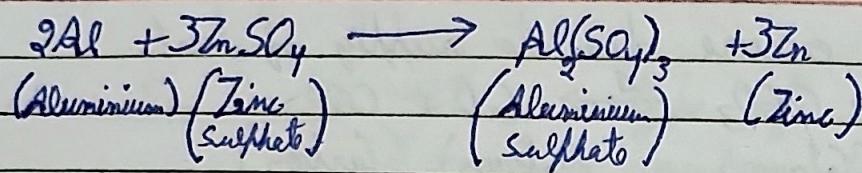
• Photo - It occurs due to sunlight.



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

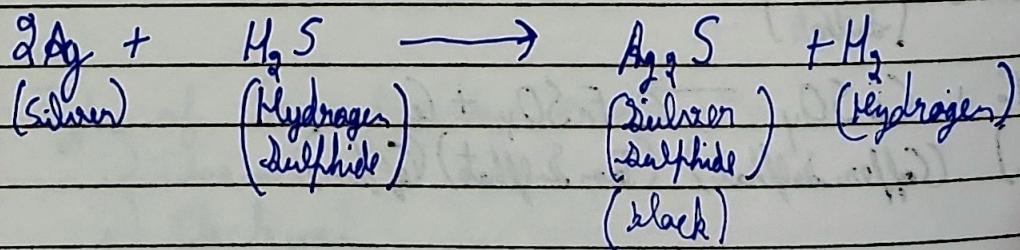
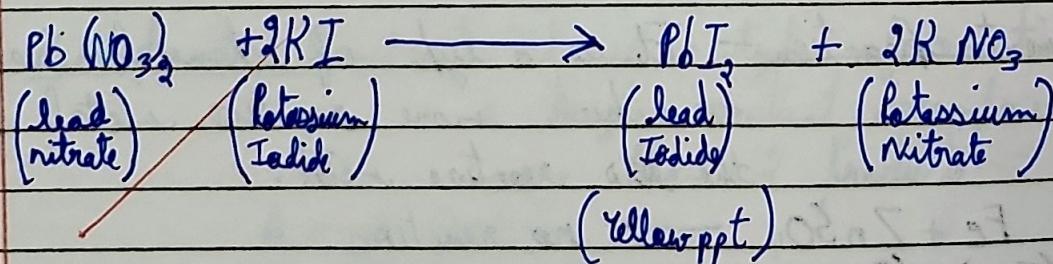
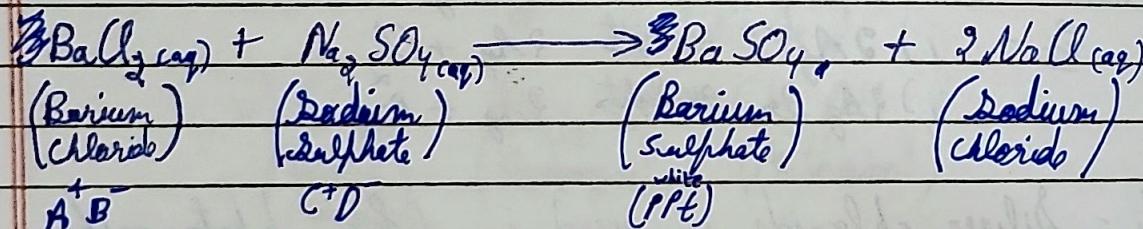
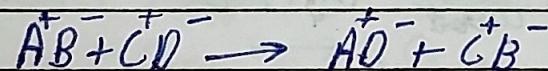
* Displacement Reaction - It is a type of chemical reaction in which more reactive metal displaces the less reactive metal.





★ 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.



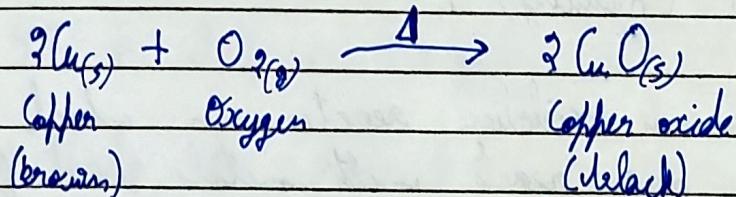
★ Oxidation - Reduction Reaction (Redox Reaction)

Oxidation

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

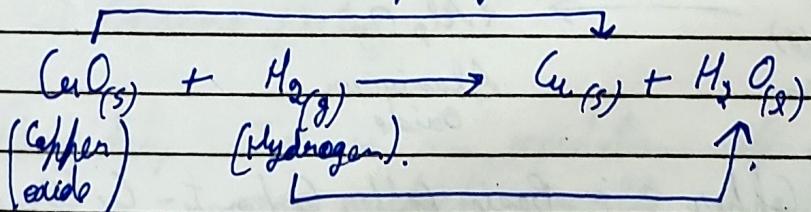
Reduction

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



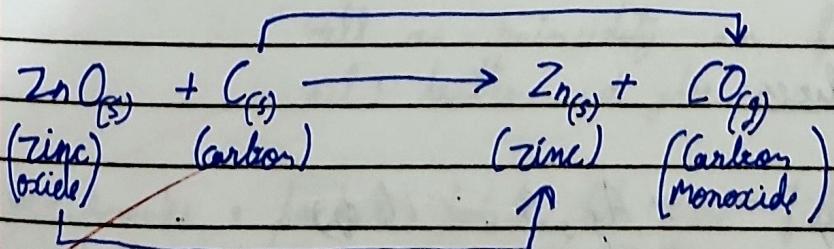
$\text{Cu} \rightarrow$ oxidation (reducing agent)

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



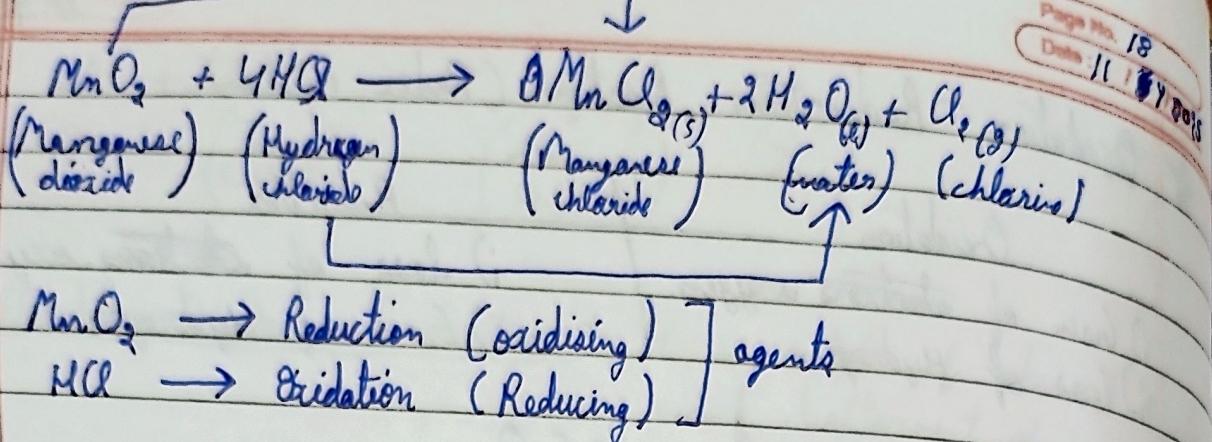
CuO - reduction (loss of oxygen), Oxidising agent.

H_2 - oxidation (gain of oxygen), Reduction agent.



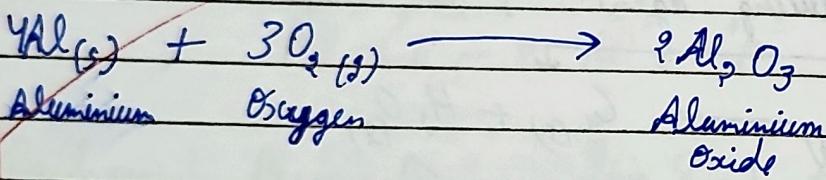
$\text{ZnO} \rightarrow$ Reduction (oxidising agent)

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

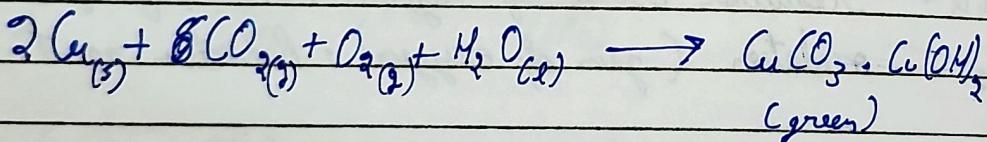


★ Corrosion - It is an oxidation reaction in which oxygen gas reacts with metals and forms a layer over the surface of metals. There is no metal loss.

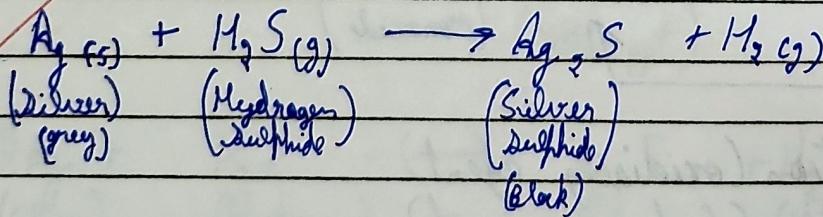
Oxidation of aluminium



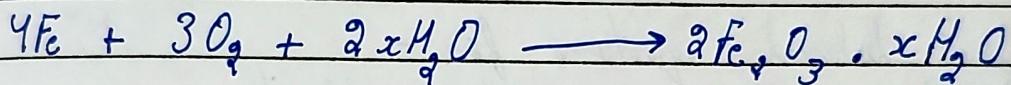
Oxidation of Copper :- Basic Copper carbonate - $\text{CuCO}_3 \cdot \text{Cu(OH)}_2$



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.

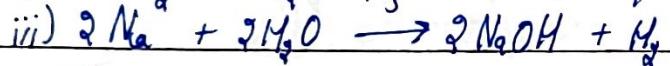
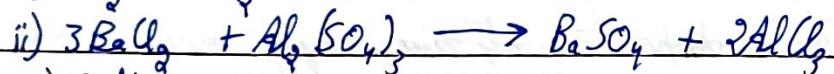
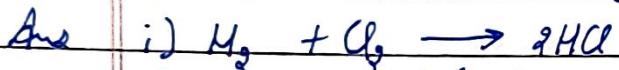
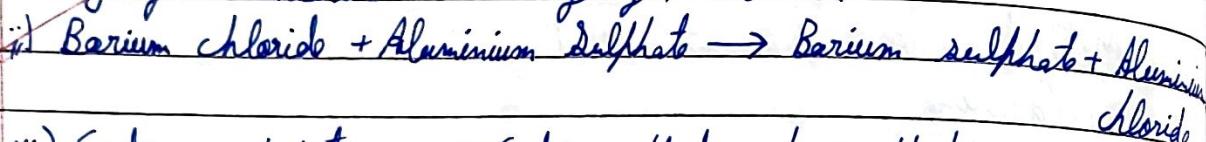
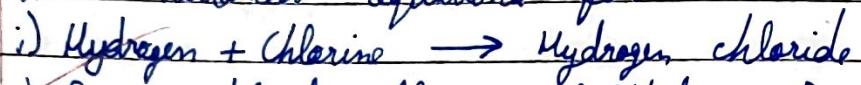
(1)
15/4/2023

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.

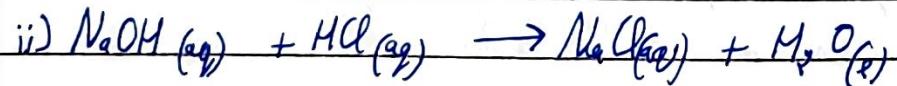
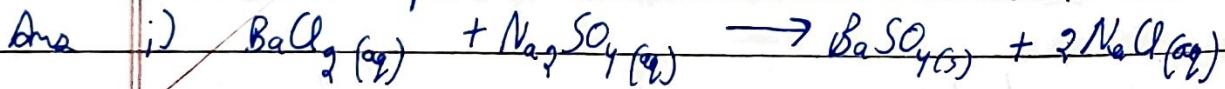
Q2) Write balanced equations for -



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.



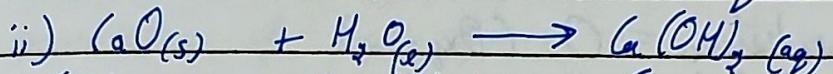
Q4) A solution of a substance 'X' is used for white washing.

i) Name 'X' and write its formula.

ii) Write reaction of 'X' with water.

Ans

i) 'X' — CaO (calcium oxide or quick lime)

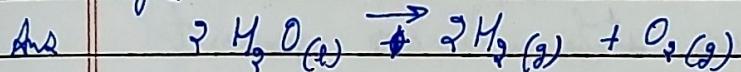


(Calcium
oxide or
quick lime)

(Water)

(Calcium Hydroxide)
Slaked lime

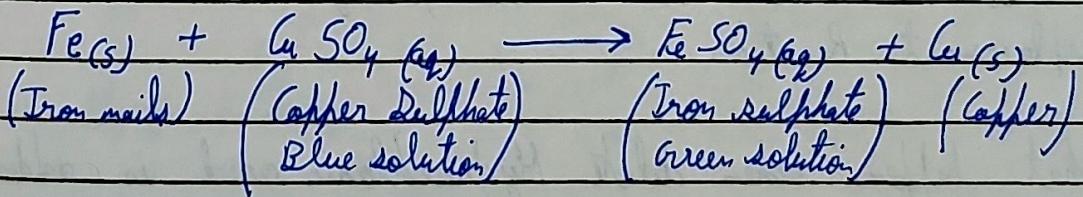
Q5) Why is amount of gas collected in one of the test tubes an activity 1/7 double of amount collected in other. Name this gas.



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.

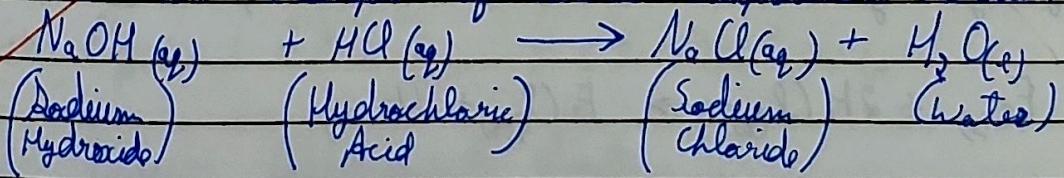
Q6) Why does color of copper sulphate solution change when an iron nail is dipped in it?

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?



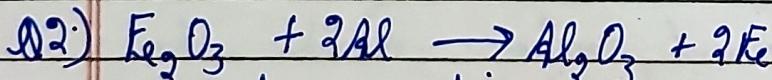
a) Lead is getting reduced.

b) Carbon dioxide is getting oxidised.

c) Carbon is getting oxidised

d) Lead oxide is getting reduced.

Ans. a and b are incorrect

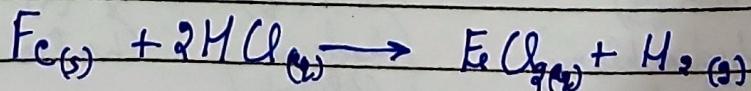


The above reaction is an example of

Ans Displacement Reaction

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

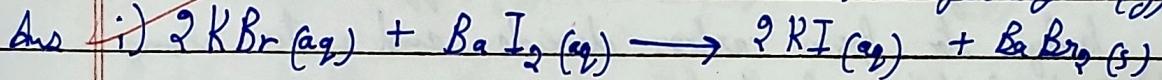
Ans Hydrogen gas and iron chloride are produced.



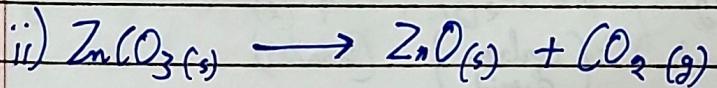
Q1) What is an balanced equation? Why should we balance it?
 Ans A balanced chemical equation has an equal no. of atoms of different elements in reactants and products. The chemical equation should be balanced to satisfy the law of conservation of mass.

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

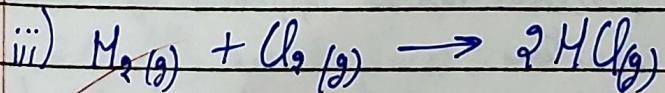
- Kalassium bromide (aq) + Barium iodide (aq) \rightarrow Kalassium iodide (aq) + Barium Bromide (s)
- Zinc carbonate (s) \rightarrow Zinc oxide (s) + Carbon dioxide (g)
- Hydrogen (g) + Chlorine (g) \rightarrow Hydrogen chloride (g)
- Magnesium (s) + Hydrochloric acid (aq) \rightarrow Magnesium chloride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



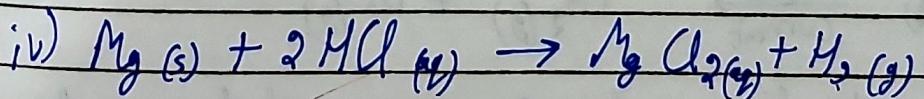
Type :- Double Displacement Reaction.



Type :- Decomposition Reaction



Type :- Combination Reaction



Type :- Displacement Reaction

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

Ans

Exothermic

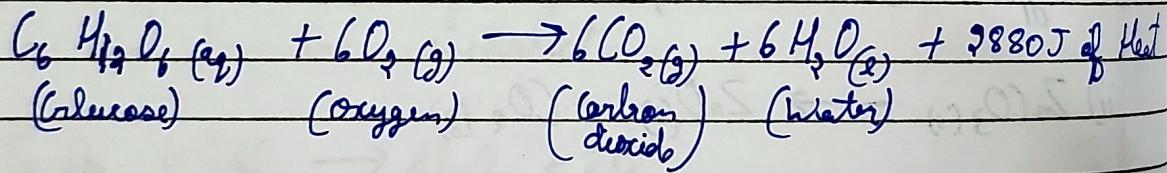
- It is a type of chemical reaction in which heat is released at product side.
- $A + B \rightarrow C + D + \text{Heat}$
- $C(s) + O_2(g) \rightarrow CO_2(g) + \text{Heat}$
- $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + 2880J$
Heat

Endothermic

- It is a type of chemical reaction in which heat is absorbed in reactant side.
- $A + B + \text{Heat} \rightarrow C + D$
- $C(s) + 2S(s) \xrightarrow{\Delta} CS_2(l)$
- $3H_2 + N_2 \xrightarrow{\Delta} 2NH_3$

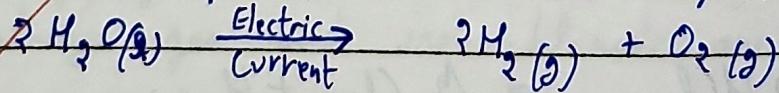
Q10) Why is respiration an exothermic reaction? Explain.

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.

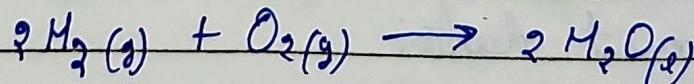


Q11) Why is decomposition reaction called opposite of combination reaction? Write their equations.

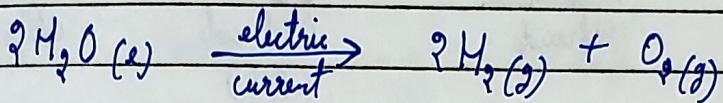
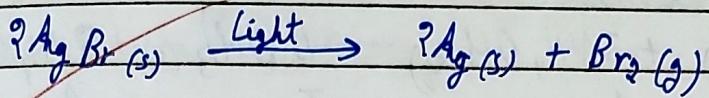
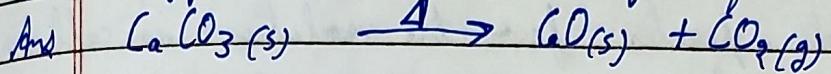
Ans In a decomposition reaction, a single compound breaks down to produce 2 or more simpler substances.



While in combination reaction 2 or more substances combine.

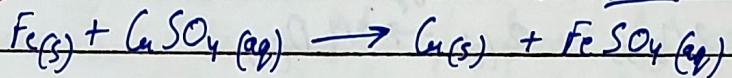


Q12) Write one equation each for the decomposition reactions where energy is supplied in the form of heat, light or electricity.

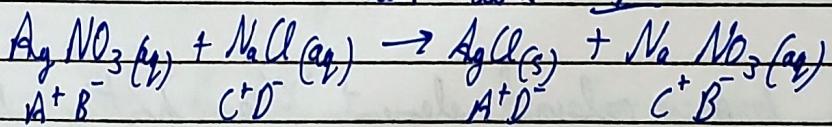


Q13) What is difference between displacement and double displacement reaction.

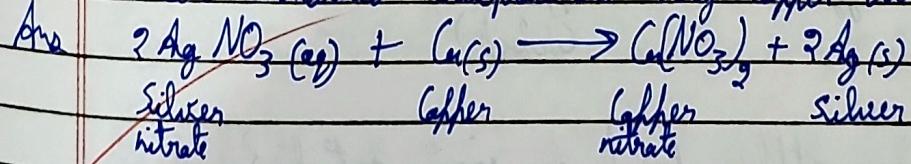
Ans Displacement - In this a more reactive metal displaces a less reactive metal. Ex -



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

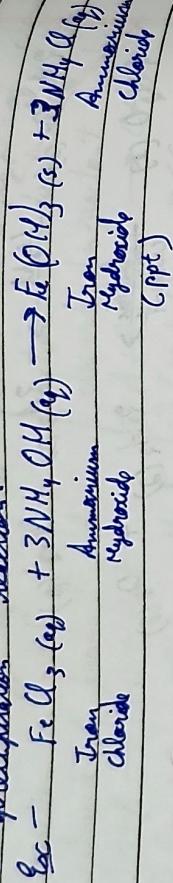


Q14) In refining of silver, the recovery of silver from silver nitrate involved displacement by copper. Write reaction.



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

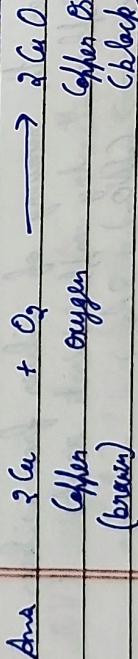
Ans a.) Oxidation - In this oxygen is added to a substance.



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.

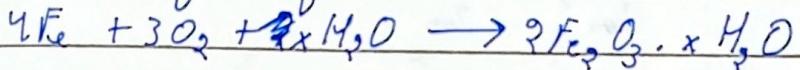
Q19) Oil and fat containing food items are flushed with nitrogen. Why?

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

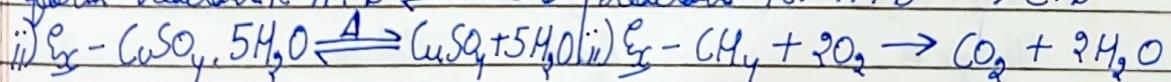


Rancidity - The condition produced by aerial oxidation of fats and oils in foods & marked by unpleasant smell and taste is rancidity.

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

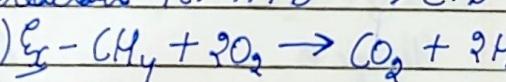
Reversible Reaction

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

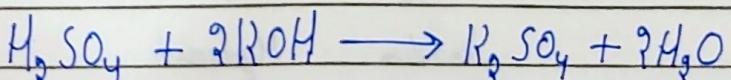
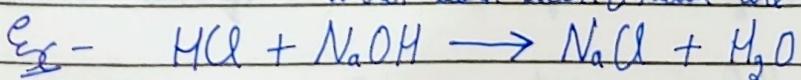


Irreversible Reaction

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



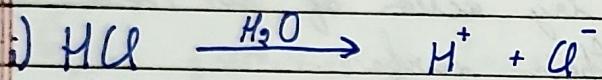
Neutralization Reaction - A type of chemical reaction in which acid combines with base to form salt and water. Both acids & bases are neutralized in this.



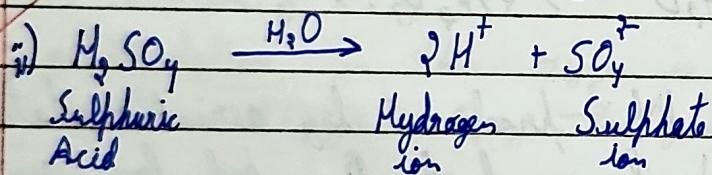
Acids, Bases & Salts

* Arrhenius concept of acid & base :-

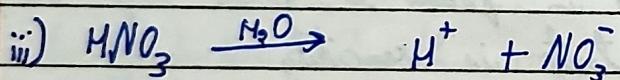
Acid - It is a chemical substance which releases H^+ (Hydrogen) ions in aqueous solution.



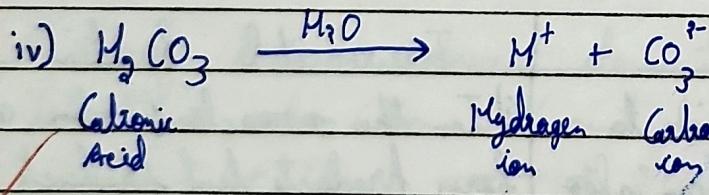
Hydrochloric Acid Hydrogen ion Chlorine Ion



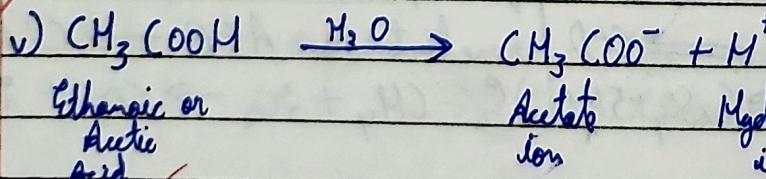
Sulphuric Acid Hydrogen ion Sulphate ion



Nitric Acid Hydrogen ion Nitrate ion

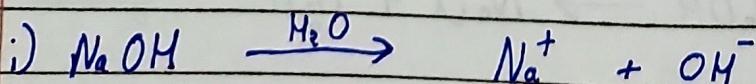


Carbonic Acid Hydrogen ion Carbonate ion

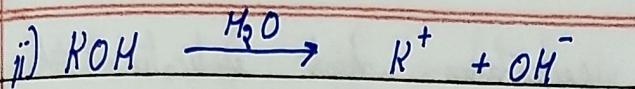


Ethanoic or Acetic Acid Acetate ion Hydrogen ion

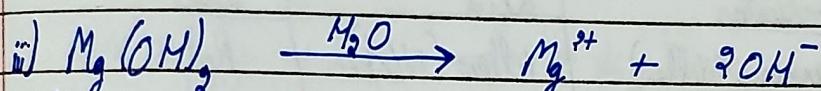
Base - It is a chemical substance which releases OH^- (Hydroxide / Hydroxyl) ion in aqueous solution.



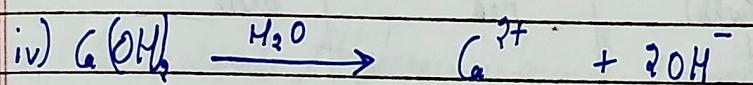
Sodium Hydroxide Sodium Ion Hydroxide ion



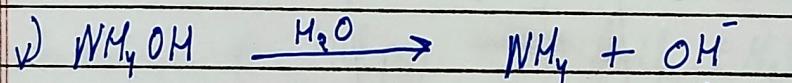
Kalassium Hydroxide
Ion



Magnesium Hydroxide
Ion



Calcium Hydroxide
Ion

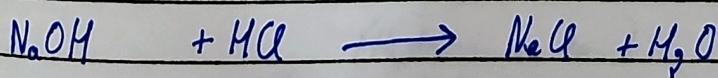
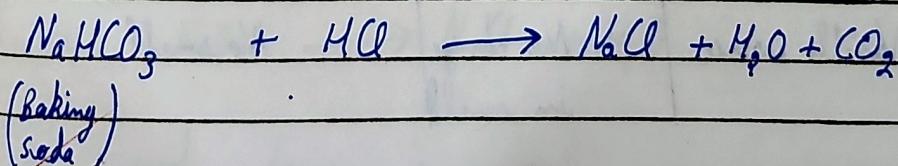


Ammonium Hydroxide
Ion

Other bases that are exception i.e. doesn't release OH^- are :-

NaHCO_3 - Sodium bicarbonate (Baking Soda)

Na_2CO_3 - Sodium carbonate





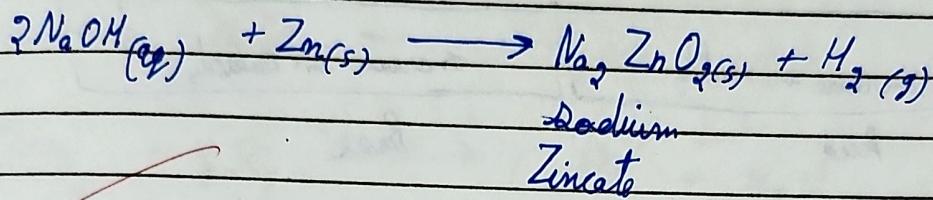
Indicator - A chemical substance which indicates the presence of acid or base by change in colour.

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

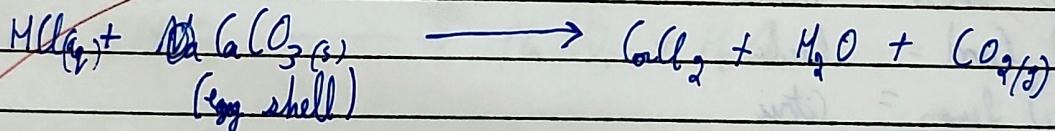
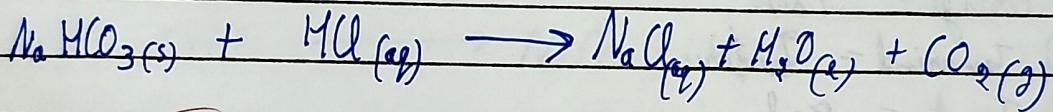
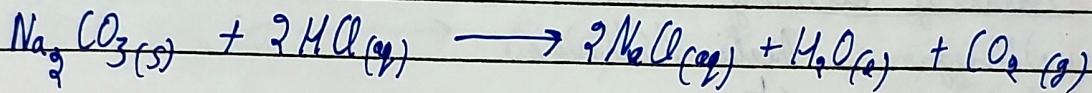
Olfactory

* Reactions of Acids and bases with metals.

i) Acid + Metal \rightarrow Salt + Hydrogen gas



ii) Metal carbonate / Hydrogen carbonate + Acid \rightarrow Salt + CO₂ + H₂O

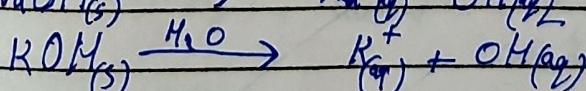
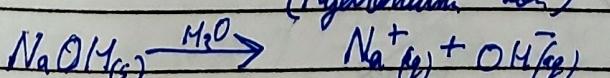
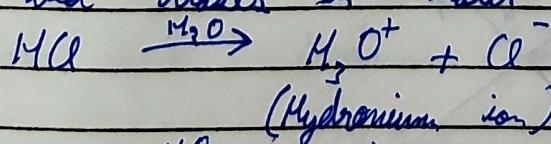


* Reaction of Acid with base (Neutralization reaction)

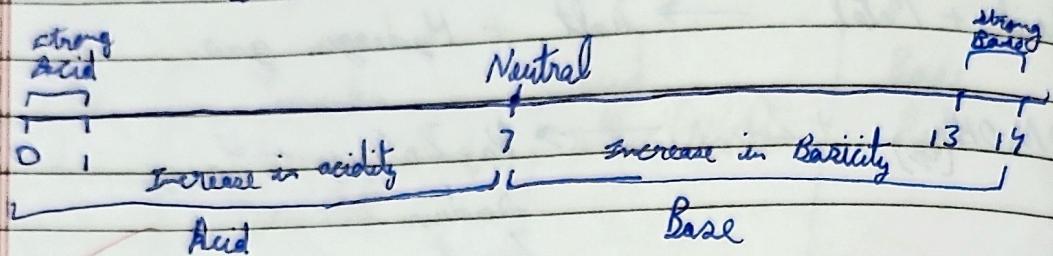
Acid + base \rightarrow Salt + water



* Acid and bases in water



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

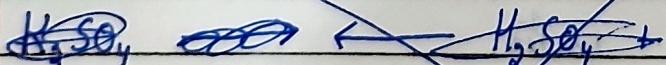


* Neutral only at 7 not even at 6.9 or 7.1.

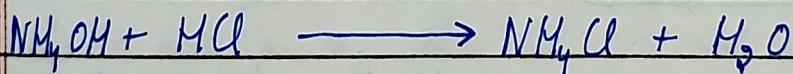
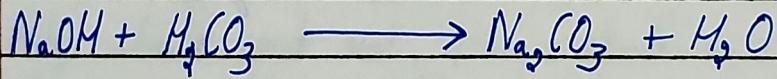
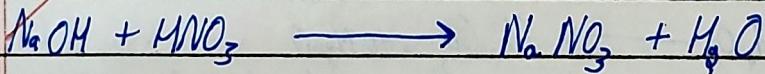
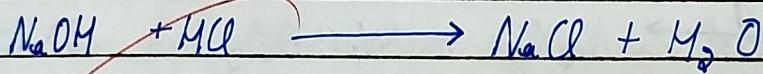
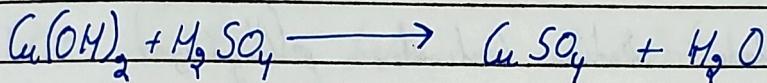
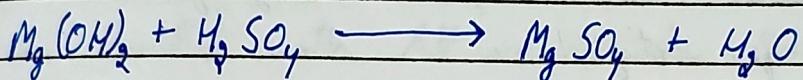
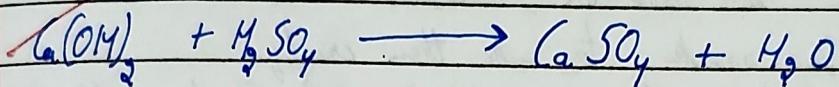
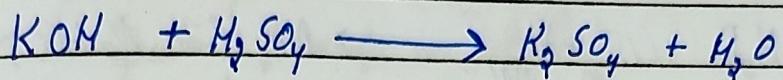
* Naturally occurring acids

- 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:-



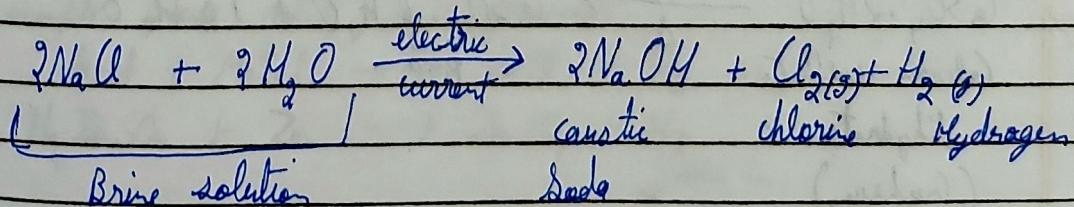
* Family of Salts



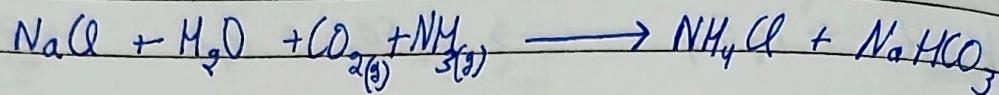
* Man made compounds :-

~~Soda based compounds~~

1) Caustic Soda - Sodium Hydroxide (NaOH)



ii) Baking Soda - Sodium bicarbonate (NaHCO_3) or hydrogen carbonate



* Baking Soda + Tartaric Acid = Baking powder

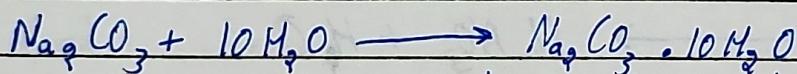
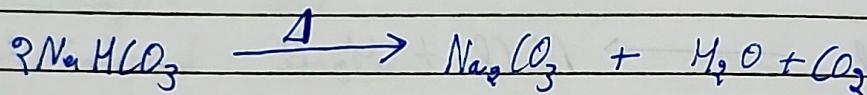
* " " is used as Antacid

* Added in snacks to make them crispy

* Due to alkaline nature it prevents souring of milk.

* Acts as fire extinguisher

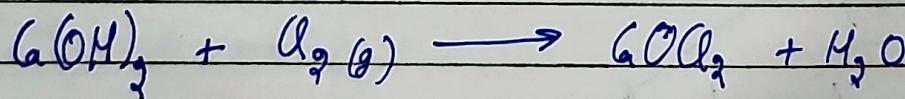
iii) Washing Soda - Sodium carbonate (Na_2CO_3)



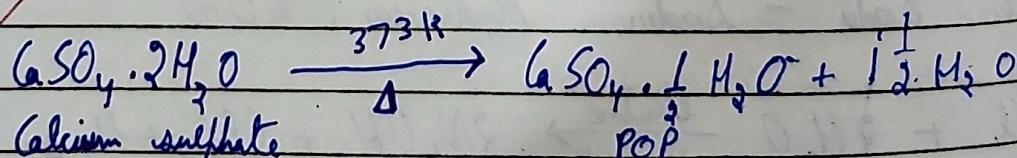
Sodium carbonate decahydrate

Calcium Based compounds -

i) Bleaching Powder - Calcium oxychloride or hypochlorite (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.

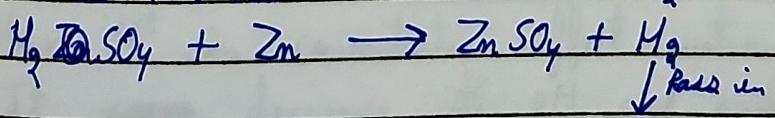
Page - 22

~~(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.

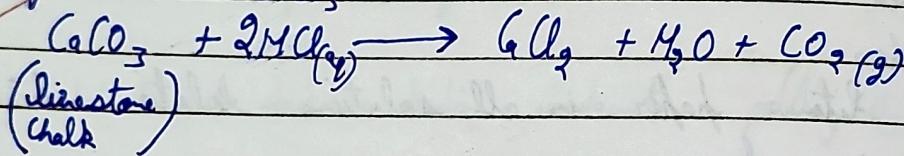


Deep solution

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 CaCl_2 .

Ans

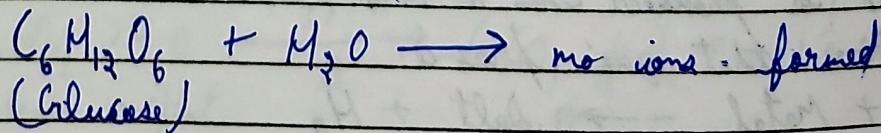
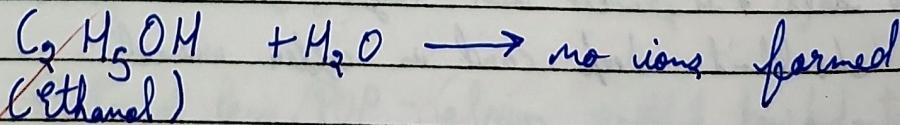
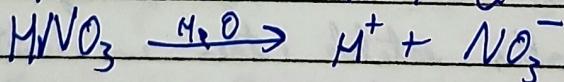
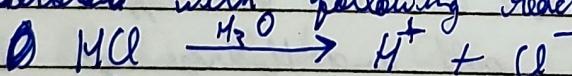


Page - 35

- Q1.) Why HCl , 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 M^+ ions in HCl and HNO_3 while alcohol and glucose don't have 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.

Page - 28

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?

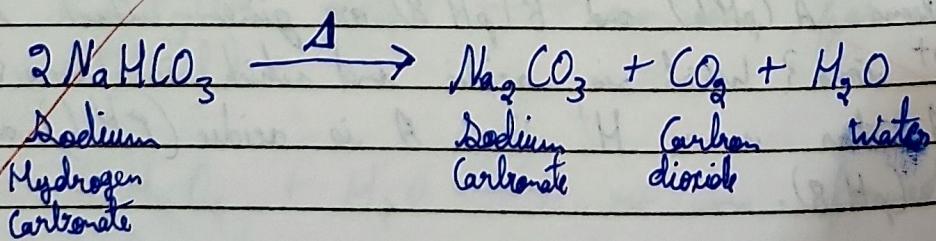
Ans Slaked lime or calcium hydroxide - $Ca(OH)_2$
 $Ca(OH)_2 + Cl_2 \rightarrow Ca(ClO)_2 + H_2O$

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

Ans Sodium carbonate (Washing Soda) - Na_2CO_3

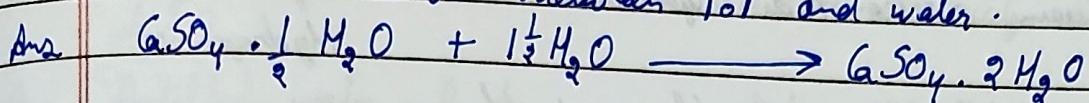
(Q4) What happens when sodium hydrogen carbonate is heated?

Ans It forms sodium carbonate and releases CO_2 .



~~Q4/25~~

Q1) Write the reaction between CaP and water.



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 MgCl_2

Q3) 10 ml of a solution of NaOH is found to be completely neutralized by 8 ml of HCl . If we take 20 ml of the same solution of NaOH , the amount of 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:

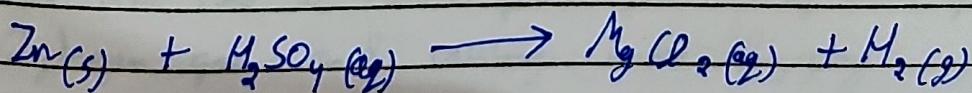
i) dilute sulphuric acid reacts with zinc granules.

ii) dilute hydrochloric acid reacts with magnesium ribbon.

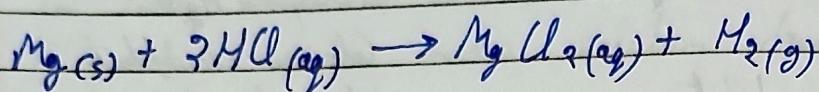
iii) dilute sulphuric acid reacts with aluminium powder.

iv) dilute hydrochloric acid reacts with iron filings.

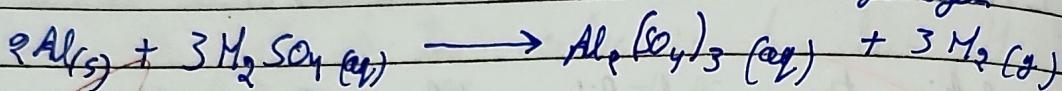
Ans i) Zinc + dilute sulphuric acid \longrightarrow Zinc sulphate + Hydrogen



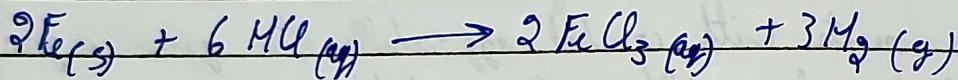
ii) Magnesium ribbon + dil. Hydrochloric acid \rightarrow Magnesium chloride + Hydrogen



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 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 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 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 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 H^+ ions. Without water no 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

Ans. v.) Weakly alkaline - Also arrange pH in increasing order H^+ .

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

Increasing order of 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 (HCl) than CH_3COOH . Why?

Ans. HCl is a strong acid and releases more 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 It's pH decreases below 6 : lactic acid forms during
curdling , making it acidic.

Q12) A milkman adds a very small amount of baking soda to fresh milk.

a) Why does he shift the pH of the fresh milk from 6 to slightly more alkaline?

Q) Why does this milk take long time to become sour?

A) To prevent milk from turning sour quickly as alkaline pH resists acid formation.

(vi) It is so because lactic acid must first neutralize the added alkali pH, before curdling can begin.

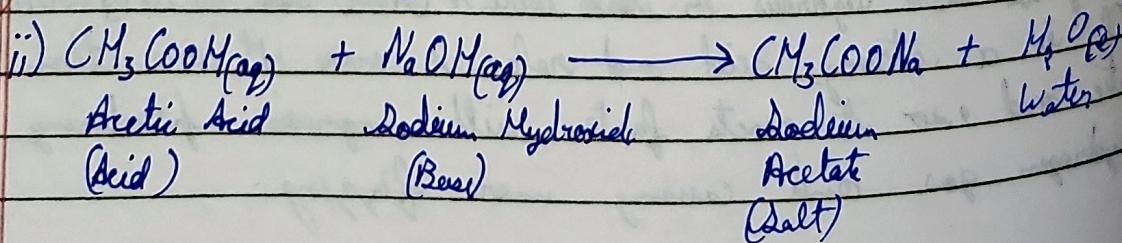
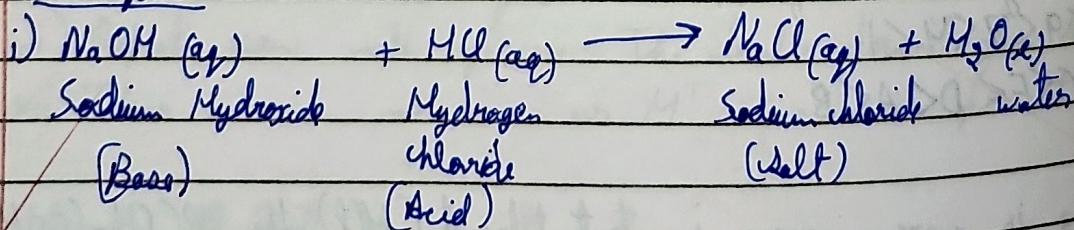
(13) Why should POP be stored in a moisture-proof container?

~~Anne~~ Moisture causes it to react and set dry forming gypsum making it hard and unusable over time.

Q(4) What is neutralization reaction? Give two examples.

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 :-

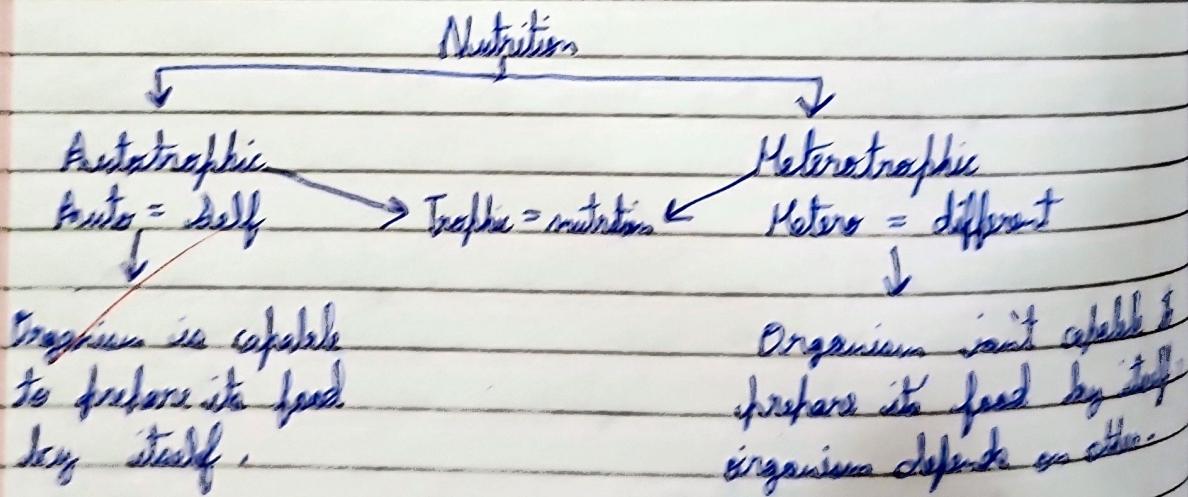
- i) It is used as an antacid.
- ii) Used in making baking powder.

(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.



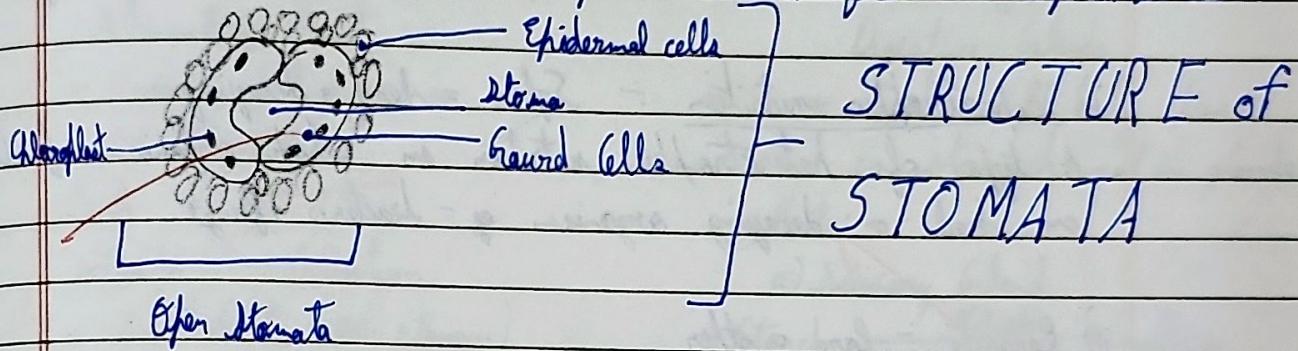
Autotrophic Modes/Processes:-

- 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.



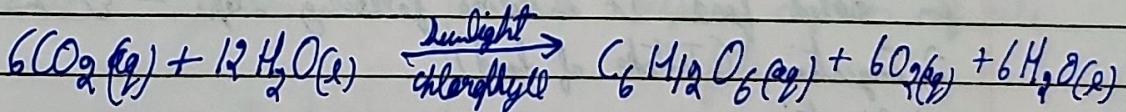
Steps involved in Photosynthesis - in chloroplast

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

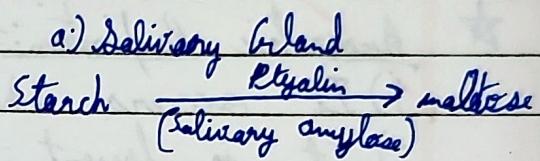
Parts :-

- 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

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.

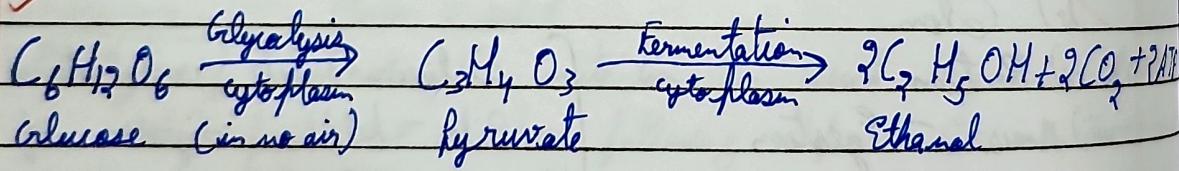
* Aerobic Respiration :-

- 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 CO_2 , water, 38 ATP's

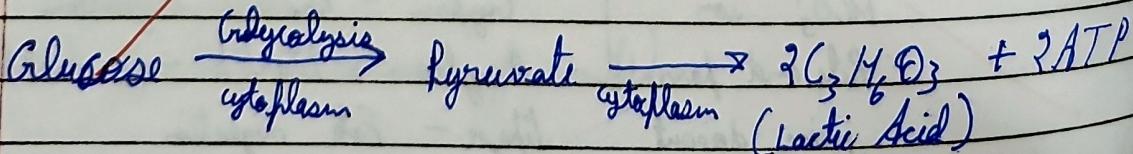
* Anaerobic Respiration :-

- It occurs in absence of air.
- It is present in unicellular, prokaryotic and simple organisms like bacteria, yeast etc.
- Steps involved :-
 - Glycolysis and fermentation (yeast, bacteria)
 - Glycolysis and lactic acid (animal muscles)
 - Products are : Ethanol, 2ATP, CO_2 in yeast
Lactic acid + 2ATP in animal muscles.

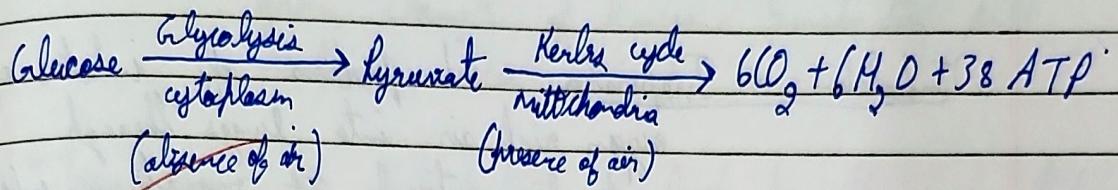
Anaerobic respiration in yeast :-



Anaerobic respiration in animal muscles :-

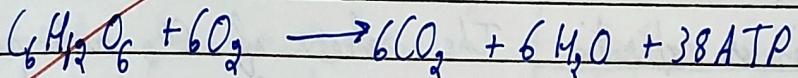


Aerobic Respiration :-



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

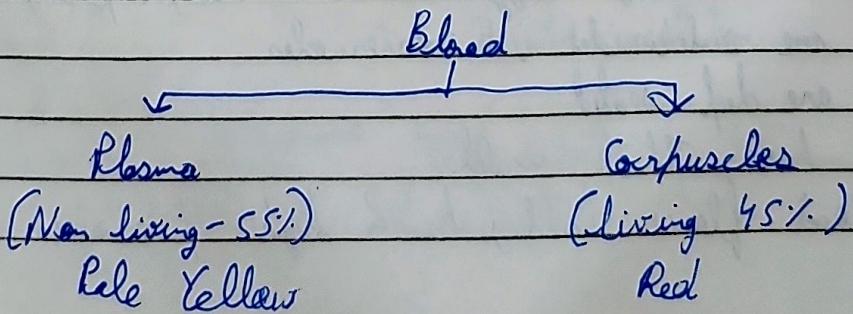
- The upward movement of water from root hairs towards aerial parts of plant against the gravity.
- Transpiration pull is required.
- Loss of water
- Occurs in Xylem
- It is unidirectional i.e. upward direction only.

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 (Thrombines) - Smallest component of blood.
- Secreted by bone marrow
Life span = 15 days
Platelets are responsible for blood clotting
- * 55 liters 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.

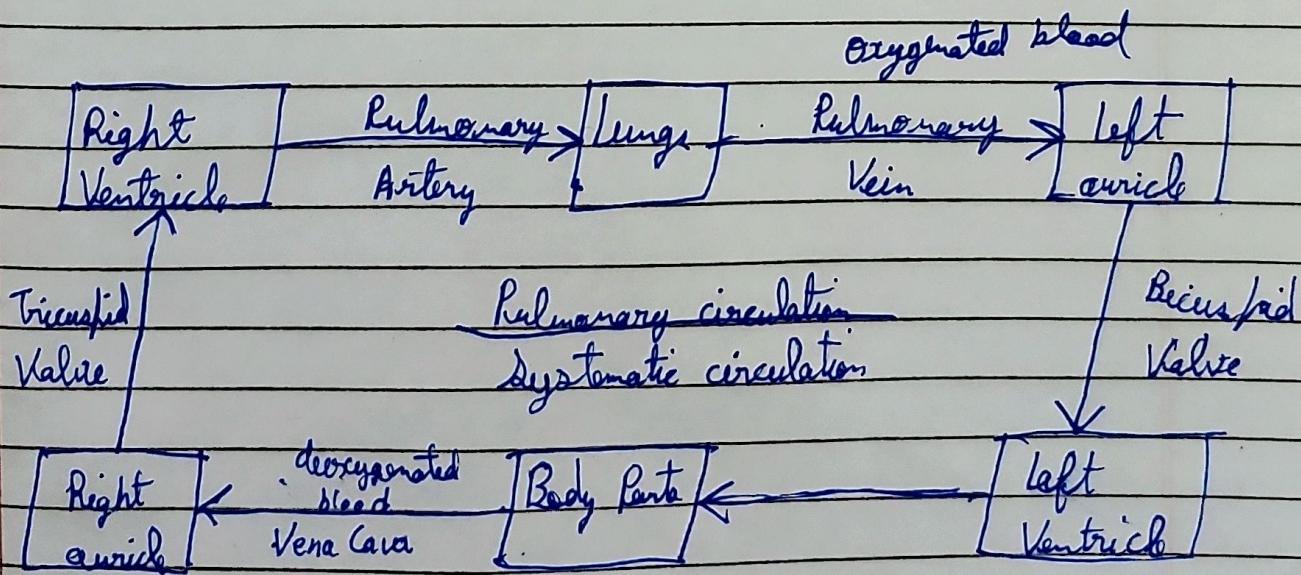
Veins :-

- 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.