**2.SOLUTIONS**

**1) Define molality?**

Ans: - The number of Moles of Salute present in 1 Kg (1000 Kg) of solvent is called Molality. It's denoted by “M”.

Units = Mole’s kg-1.

Molality (M) =

Molality (M) = X

Molality (M) = X .

**2) Define Male fraction?**

Ans: - More fraction is the ratio of number of moles of one component to the total number of moles of an components in the solution.

Mole fraction of solute = .

**3) State Raouit's Law?**

Ans: - Raoult’s low states that “At a given temperature the relative lowering of Vapour pressure of dilute solution containing non-volatile solute is equal to the mole fraction of solute”.

Po – Ps / Po = X2; Where

po = Vapour pressure of Pune Solvent.

Ps = Vapour pressure of solution of non-volatile solute.

X2 = Mole fraction of Solute.

**4) State Henny's law?**

Ans: - Henry's law states that “At a given temperature the partial pressure of the gas in vapour phase (P) is proportional to the Mole fraction of the gas (x) in the solution".

P = partial pressure of the gas in Vapour Phase

X = Hole fraction of the gas Henny's law constant

KH = Henry’s low constant.

**5) What is Ebullioscopi constant?**

Ans: - The Ebullioscopic constant is defined as the elevation of the boiling Point When Mole of Solute is dissolved in 1kg of the Solvent, it is also known as Mela’s elevation constant.

The elevation of boiling point is denoted by k b .

Units: - K. Kg. mal-1.

**6) What is cagoscopic constant?**

Ans :- The cryoscopic constant is defined as the depression in the freezing point Produced When one mole of solute is dissolved in 1kg of the solvent. It is also known as Molal depression constant. It is denoted by Kg.

Units: K.kg. Mol-1.

**7) Define osmotic pressure?**

Ans: - The pressure that should be applied on the Solution side to prevent the Migration of solvent Molecules into the solution through a semi-permeable Membrane is called osmotic pressure.

**8) What one isotonic Solutions?**

Ans: - The solutions having same osmotic pressure at a given temperature are called isotonic Solutions.

Ex: - Blood is isotonic with saline solution [ 0.9 %

**9) calculate the amount of Benzoic acid (C 6H5 ,COOH) required for preparing 250ml of 0.15 M Solution in Methanol ?**

Ans: - Molarity of Benzoic acid in Methanol solution = 0.15 M

Volume of solution.= 350 M

Mulan Mass of C 6H5 ,COOH = 122

Wt of Benzonic acid (W) =

= = 4.515 gm’s of C 6H5 ,COOH.

**10) What is relative lowering of Vapour pressure ?**

Ans :- It's the ratio of lowering of vapour pressure to the vapour pressure of Pune Solvent is called relative lowering of vapour pressure.

R.L.V.P =

= lowening of Vapoun pressure.

Ps = Vapoun pressure of Pune Solvant

**11) Calculate the more fraction of H₂SO4 in a solution containing 98 % H₂SO4 by Mass?**

Ans :- 98%, H₂SO4 Means 98 parts of H₂SO4 is present in 100 ports of Solution.

wt of H₂SO4 = 12

Molar Mass of H₂SO4 = 98

No. of Moles of H₂SO4 = = 1

wt. of H₂0 = 100-98 = 2 gram

M.W of H₂0 = 18

No. of Moles of H₂0 =

Total Moles in Solution = 1 + 0.1 = 1.1

Mole fraction of H₂SO4 = = 0.9.

**12) What are colligative properties?**

Ans: - The properties of dilute solution which depends on the number of solute Particles are called “colligative properties”. These are independent of nature of Solute.

1. Relative lowering of Vapour pressure.

2. Elevation of boiling Point.

3. Depression of freezing point.

4. Osmotic Pressure.

**13) What is osmosis?**

Ans: - The process of Solvent flowing into the solution when the Solvent and Solution are

Separated by Semipermeable membrane is called osmosis.

**14) calculate the Mass of a non-volatile solute (Molar Mass 40-gram mol -1) Which Should be dissolved in 114-gram octane to reduce its Vapour pressure to 80%?**

Ans: - Let the vapour pressure of pure octane = 100 mm.

:. Vapour pressure of Solution = 80mm.

Solute Solvent (octane)

W =? W = 114 gram

m = 40 M = 114

:. =

:. W = 8 gram.

**15) vapour pressure of water at 293K is 17.535 mm Hg. Calculate the vapour pressure of the solution at 293K When 25g of glucose is dissolved in 450g of water?**

Glucose ( solute ) Solvent (Water)

W = 25grm W = 450grm

m = 180 M = 18

:. po = 17.535 mm

ps = ?

=

=

:. Ps = 17.44 mm.Hg.

**16) What is an ideal solution ?**

Ans :- i) A Solution which obey 5 Raoult's law at all conditions of concentration and Temperature is called an ideal solution.

ii) In all ideal solutions, the solute and the Solvent Molecules have similar structure and polarity, the solute-solute interactions and the solven-Solvent interactions are the same.

iii) = 0

iv) = 0

Examples :-

1) Benzene + Toulere

2) n - hexane + n - heptane

3) ethyl bromide + ethyl iodide

**17)Calculate the fraction of ethylene glycol(C₂H60₂)in a solution containing 20% of C₂H60₂ by Mass ?**

Ans :- Given 20 % [ ]

Let Wt of solution = 100 grm

Wt of water = 100-20 80 grm

Molor mass of C₂H60₂ = = 0.322 mol

Mole of water = .

Xglycol =

Mole fraction of haten can also be calculated as: 1-0.068 = 6.932.

**18) calculate the Molarity of a solution containing 5g of NaOH in 450ml Solution ?**

Ans: - Moles of NaOH = 0.125 mol

Volume of the solution in litres = 450 ml / 1000 mlL L¹ using equation (2.8)

Molarity = = 0.278M

0.278 mol L- 1

0.278 mol dm-3.

**19) calculate Molarity of 2.5g of ethanoic acid (CH3COOH) in 75g of benzene?**

Ans: - Molar mass of C₂ H₂O₂: 12 X 2 + 1 x 4 + 16 x 2 = 60g mol-1

Moles of C₂ H4 O₂ = = 0.0417 mol

Mass of benzene in kg = 759/1000 g kg-¹ = 75× 10Kg

Molality of C₂ H4 O₂ =

=

= 0.556 mol kg-¹.

------------------- THE **END -----------------**

**3. ELECTRO CHEMISTRY**

**1) What is stand and hydrogen elect node ?.**

Ans :- An electrode prepared by placing platinum black coated platinum electrode in LM Hcl Solution and in contact with hydrogen gas at one atmosphere Pressure is standard hydrogen electnode (SHE). Its potential is assumed as zero.

Standard Hydrogen electrode (SHE)

**2) How is Gibbs energy (G) related to the cell emf (E) Mathematically ?**

Ans :- G0  = -nfe0cen .

**3) What is cell constant of a conductivity cell ?**

Ans :- Ratio of the distance separating the two electrodes (1) to the area of the cross Section of an electrode (A) is cell constant.

Cell constant = G\* = (or) G\* = conductivity (K) x Resistance (R).

**4) Define Molar conductivity m and how it is related to conductivity (K) ?**

Ans : - Molas conductivity is conducting power of all the ions produced by dissolving one mole of an electrolyte in the given solution. Its units are S cm² mole-1 (or) Sm², more–¹

Molor conductivity = m = .

**5) State paraday's second law of electrolysis. What is electrolysis ? Give Faroday's First law of Electrolysis ?**

Ans :- . **Second Low :-** if the same quantity of electricity is passed through different electrolytes connected in series, the amount of the different substances liberated (or) deposited (or) dissolved at the electrodes are directly proportional to (or) in the natio of) their chemical equivalents (or) equivalent weights.

**Electrolysis :-** The decomposition of a chemical compound in the molten state (or) in the solution state into constituent elements under the influence of an applied EMF is called electrolysis.

Ex: When molten Nacl is electrolysed by applying an EMF, it decomposes into Sodium metal and cl₂ gas at the respective electrodes due to redox-reaction.

**First law :-** The amount of substance liberated (or) deposited (or) dissolved at an electrode during the electrolysis of an electrolyte is directly proportional to the quantity of electricity passed through the electrolyte.

M Q

M = eQ

Where M = mass of the substance in grams liberated (or) deposited, (or) dissolved.

Q = quantity of electricity in coulombs,

“e” is the electrochemical equivalent.

But Q = i x t current (amp) x time (seconds)

M = e x i x t.

**6) What is a fuel cell ? How is it different from conventional galvanic cell ?**

Ans :- Fuel cell is a galvanic cell in which the chemical energy of fuel oxidant System (Combustion of fuel) is converted directly into electrical energy.

in fuel cells, chemical energy can be converted into electrical energy with an efficiency of 100%.

**7) What is metallic corrosion? Give examples ?**

Ans :- the natural tendency of conversion of a metal into its mineral compound on interaction with the environment (Polluted a, water, associated with other Meta etc) is known as composion.

**8) what are galvanic cells ?** **Explain the working of a galvanic een cell with neat- Sketch baking Donielttaking Donicell cell as example** ?

Ans :- **Galvanic cell :-** The electrochemical cell which convents chemical Energy into Electrical Energy is called galvanic cell.

Daniel cell is an example of galvanic cell.

Daneill cell having electrodes of zinc and copper dipping in the samtions of their respective saits.

**Wanking of Daniel cell :-** “Zn" rod dipped in Zn S04(aq Solution act as “anode" (-ve electrode)

"Cu"rod dipped in CuS04(aq solution act as “cathode” (+ve electrode).

Both the electralytic Solutions are connected through a 'salt Bridge". The “Zn” rod and “cu” rod are connected through a Metallic wire externally. Now anodic and cathodic reactions occurs as shown below. and hence poten. tial difference between electrodes arises, which is taken as the electrodes potential of the Daniel cell.

Anode (-ve electrode) : Zn(s)  Zn2+(aq) + ze- (oxidation)

cathode (+ve electrode) : Cu2+(aq)  Cu(s) (Reduction)

1. ln the construction of the Daniel cell, oxidation half-cent is written on the left hand side and then reduction half-cell is written on the night hand side.
2. In both sides Metal and Metal ion are seperated by single slash (i)
3. Both half cells are separated by double slash (ii) that is known as salt Bridge.

The cell construction of Daniel cell having salt bridge.

Zn(s) / Zn2+(aq) // Cu2+(aq)  Cu(s)

**9) state and explain Nerrst equation with the help of a metallic electrode and a non metalic electrode ?.**

Ans :- **Nernst equation:-** An equation used to calculate the potential of metal or a non- Metal single electrode, at any concentration measured with respect to stand and hydrogen electrode is called Nernst equation.

**For Metal single electrod : -** Suppose zine single electrode is taken in a known concentration (activity) of ZnSo4(aq) solution and is galvanized with Standard hydrogen electrode, then the single electrode potential of metal (zine) single electrode is calculated by the following formula.

.

**For non-Metal Single electrodes :-** Suppose chlorine over pt-electrode (non- Metal electrode) is taken in a known concentration of Hel(aq) Solution and is galvanized With Standord hydrogen electrode, then the single electrode potential of non-metal single electrode is calculated by the following formula.

**10) The Stand and emit of Daniel cell is 1.iv, then calculate Standard Gibbs energy for the Daniel cell?**

Ans:- The Daniel cell reaction is

Zn (s) + Cu 2+(aq)  Zn 2+(aq) + Cu (s)

in the above reaction n = 2; F = 96500C / mole and Eocell  =1.1V

The relation between the rGO and EOcall is

rGO  = -MFEOcall  = - 2 X 96500 X 1.1 = -21227 joill / molse

rGO  = - 212.27 Kj/mole.

**11) What one the primary and secondary batteries ? Give one example for each ?**

Ans :- Primary cell (or) Battery :- “ The battery after it's use over a period of time. become dead and the cell reaction is completed and this can't be revsed again is called primory battery.

(or)

“The bottry which is not previously changed up from an external source of current (electricity), but gives the electrical energy by the redox reaction of chemical (electricity) in it is called Primary battery.

Ex:- Dry cell (leclanche cell), Mercury cell

Secondry battery: - A battery in which both changing and discharging takes place is called Secondary battery. it can be rechanged and use again.

Secondary battery Produce a constant voltage containing electricity during the dischange.

Ex:- Lead Sterage battery, Nickel cadmium cell.

**12) Give the applications of kohirausch’s law of independent Migration of ions.State kohinausch's law of independent Mignation of ions ?**

Ans :- **1) Kohlrash laws :-**

calculation of Holan conductivities of weak elect nolytes of infinite diustion :-

Kohinausch's law is helpful in determining the limiting molar conductivities of Weak electroyte.

For example, the value of for acetic acid can be calculated from the knowledge of the molar conductivities at infinite dilution of strong electrolytes like CH3COONa, Hcl and Nacl as follows.

19)

20)

**21) A solution of CuSo4 is electrolysed for 10 minutes with a current of 1.5 amperes.what is the mass of copper deposited at the cathode ?**

Ans :- Time = 600s : charge = current x time =1.5 A x 600s = 900c electrode reaction is

Cu2+(aq) + 2e- Cu(s)

According to faroday first low M =

=

**END**

**4. CHEMICAL KINETICS**

**1) Define the speed or rate of a reaction?**

Ans :- The rate of a chemical reaction at any instant is the decrease in concentration of the reactions or the erase in the concentration of the products in unit time during the reaction.

(or)

The speed or rate of reaction can be defined as the change in concentration of a reactants on products in a unit time.

Rate =

Units :- Molt -1 sec -1 (or) atm.sec -1.

**3) Write is rate low ? illustrate with an example ?.**

Ans:- The equation that describes mathematically the dependence of the make of a Reaction on the concentration teams of the reactants is known as the rate equation or rate law.

Ex : For the reaction 2 No(g) + O2 (g) 2 No2(g)

Rate = K [No]2 [O2].

**4) What are elementary reactions ?**

Ans :- The reactions taking place in one step one cared elementary sections.

**5) What one complex Reactions ? Name one complex reaction?**

Ans :- The reactions taking place in meat than one step are called complex Reactions.

Ex : 2H2O2  2H2O + O2 (two steps)

**6) Give the units of rate constants for zone, first order and second order reactions ?**

Ans :- units of rate constant for nth order reaction lit n-1 mol 1-n sec -1.

**Order units of rate constant (k)**

* + 1. Zero mole lit n-1 sec -1
    2. First sec -1
    3. Second mole lit n-1 sec -1 .

**7) Define Molecularity of a reaction. illustrate with an example ?**

Ans :- The number of reacting species (atoms, ions an molecules) taking part in an elementary Reaction, which must collide simultaneously in orders to form Products is called mplecularity of a reaction.

Ex : molecularity connot be zero (or) non - integer and does not exceed three

( i.e , 1 or 2 or 3). It is always whole number.

**8) Give two examples for zero order reactions ?**

1. NH4 NO2  N2(g) + 2 H2O
2. N2O5(g)  N2O4(g) + O2(g).

**9) What are pseudo first order reactions? Give one example?**

Ans:- The reactions in which molecularity is two but the order is one are called pseudo first order reactions (or) Pseudo unimolecular reactions.

Ex: 3 COOC2 H5  + H2O 3 COOCH + C2H5 OH

**10) Explain the term “activation energy” of a reaction with a suitable diagram?**

Ans :- The difference between threshold energy and energy of normal reacting Molecules is called activation energy

(or)

The energy required to attain threshold energy by a normal reacting Molecule is called activation energy.

Activation Energy (Ea) = Threshold energy (Er) = Energy of normal reacting molecules.

* Ep = Energy of Products,
* Er = Energy of Reactants,
* Ea = Activation Energy for forward reaction
* ET = Threshold energy,
* E1a = Activation Energy for backward reaction.
* **Ea = E₁ - F**

Reaction coordinate

**11) What is the effect of temperature on the rate constant?**

Ans :- The rate of a reaction generally increases with increase in the temperature of the reaction because of increase in the number of fruitful (or) effective collisions between the reacting molecules.

Generally, for every 10°c rise in temperature, the rate constant will be doubled.

**12) Define and explain the order of a reaction?**

Ans :- (1) The Sum of Powers of the concentration terms of the reactants in the rate low expression is called the order of that chemical reaction.

(2) Order of a reaction can be whole number / Negative / Fraction / Zero.

(3) In the reaction xA + yB Products.

Rate = K [A] x + [B] y, order of reaction = x+y.

Ex : H2 + i2 2Hi

Order = [H2]1[i2]1

= 1+1

= 2.

**13) What is "Molecularity" of a reaction? How is it different from the "order” of a reaction? Name one bimolecular and one trimolecular gaseous sreaction?**

Ans :-

|  |  |
| --- | --- |
| **ORDER** | **MOLECULARITY** |
| 1. The sum of the power of the concertation terms of the reactants in a rate equation is called order of reaction. | 1. The number of atoms or ions or molecules taking part in an elementary reaction which must collide simultaneously to from products is called molecularity. |
| 2. Order of reaction is an experimental quantity. | 2. Molecularity is theoretical quantity and it can be calculated by using reaction mechanism. |
| 3. Order may be a whole number / fraction /negative/zero. | 3. Molecularity can’t be zero/non integer and does not exceed three. |
| 4. Order is applicable to elementary as well as complex reactions.  Ex:-  H2 + I2 2HI  Rate = K [I2] [I2] order = 2 | 4. Molecularity is applicable only for elementary reactions.  Ex:-  2NO + O2 2NO3  Molecularity = 3  H2 + Cl2 2HCl  Molecularity = 2. |

**14) What is half-life (t1/2) of a reaction? Derive the equations for the ‘half-life” value of zero and first order reactions?**

|  |
| --- |
| K = |

Ans :- The half-life of a reaction is the time in which the concentration of reactant is reduced to one half of its initial reaction.

**15) What is Arrhenius equation? Derive an equation which describes the effect of rise of temperature (T) on the rate constant (k) of a reaction?**

Ans :- Arrhenius rate equation K = Ae- EolRT

Where 'A' is the Arrhenius factor (or) Frequency factor (or) Pre - exponential

factor 'R' is the gas constant.

“E4” is activation energy

Taking natural logarithm on both sides of equation

Lak =

At temperature T₁ lnk1 =

At temperature T2 lnk2 =

Eq (2) - (1) : lnk2 – lnk1 = -

ln

Where K1 and K₂ are the values of Rate Temperature T1 and T2 respectively.

**16) Discuss the effect of catalyst on the kinetics of a chemical reaction with Suitable diagram?**

Ans :- A positive catalyst increases the rate of reaction because it can provide an alternate path for the reacting molecules by decreasing the activation energy.

Whine A - Energy of activation with catalyst

B = Energy of activation without catalyst

**17) Give a detailed account of the Collison theory of reaction rates of bimolecular gaseous reactions?**

Ans :- Collision theory was developed by Max Treitz and William Lewis in 1916 -18. According to this theory.

i) Reactant Molecules are assumed to be hand spheres and reacting molecules shall have to collide for any reaction to occur.

ii) For a bimolecular elementary reaction

A + B Products

Rate of reaction can be expressed as

Rate = Z AB e-EalRT  (1)

Where ZAB collision frequency of reactants A and B

e-EalRT = fraction of molecules with energies equal to or greater than Eq.

iii) The number of collisions occurring per second per unit volume of the reaction mixture is known as collision frequency (z)

iv) Equation (1) predicts the value of rate constants fairy accurately for the reactions that involve simple molecules but for complex molecules significant deviations are observed. The reason for this is all collisions do not lead to the formation of products.

v) The Minimum energy required by the colliding Molecules to give products is called threshold energy.

vi) The molecules possessing the threshold energy are called activated molecules.

vii) collisions occurring between activated molecules are called activated collisions (or) effective collisions.

viii) To account for effective collisions, another factor “P” is called the probability (or) Steric factor is introduced. then

Rate = PZAB e-EalRT

In collision theory, activation energy and proper orientation of the molecules together determine the criteria for an effective collision and hence the rate of a reaction.

For example, formation of CH30H from CH3Br depends upon orientation of reactant Molecules. The proper orientation of reactant molecules lead to bond formation where as improper orientation Makes them simply bounce back and no products are formed.

**18) in a first order reaction, the concentration of the reactant is reduced from 0.6 mol/L to 0.2 mol/L in 5 min. Calculate the Rate constant?**

Ans :- K =

=

=

= .

**19) Calculate the half-life of first order reaction whose rate constant is 200 S -¹ ?**

Ans :- K =

= = 3.46 X 10 -3 5.

**20) The decomposition of a compound is found to follow first order rate law. If it takes 15 minutes for 20% of original material to react. Calculate the rate constant?**

Ans :- For the first order reaction,

K = ………. (1)

a = 100, x = 20, t = 15 min

K = = 0.0149 min -1.

**21) Calculate the over all order of a reaction which has the rate expression?**

**a) Rate = K [A] 3/2 [B] 3/2  b) Rate = K [A] 3/2 [B] -1**

Ans :- a) Rate = K [A] x [B] y

Order = x+y

So order = 1/2 + 3/2 = 2. i.e ., second order.

b) Rate = 3/2 + (-1) = 1/2, i.e., half order.

**22) Identify the reaction order from each of the following rate constants ?**

**i) K = 2.3 X 10 -5 L Mol-1 5 -1. Ii) K = 3 X 10 -4 5-1.**

Ans :- i) The unit of second rate constant is L Mol-1 S -1 ,there fore K = 2.3 X 10 -5 L Mol-1 5 -1. Represents a second order reaction.

ii) The unit of first order rate constant is S -1 ,there fore K = 3 X 10 -4 5 -1. Represents a first order reaction.s.

**23) A first order reaction is found to have a rate constant. K = 5.5 X 10 -14 5 -1 . Find the half-life of the reaction?**

Ans :- . Half - life for a first order reaction is

= 1.26 X X 5.

**24) Write the examples of third order reaction?**

**a) 2NO + O2 2NO2. b) 2SO2  + O2  2SO3 .**

Ans :-  The chemical equation you provided 2NO + O2 2NO2.

represents a third-order reaction. In this case, two molecules of N\*O2 react with one molecule of O2 to form two molecules of N\*O2.

A third-order reaction is a type of reaction where the overall reaction rate depends on the concentrations of three reactants raised to the power of their stoichiometric coefficients. In this equation, the stoichiometric coefficients of N\*O2 and O2 are both 2,

indicating that the reaction is third order with respect to these two reactants.

Please note that the notation "N\*O2" is unusual. If you meant to write "NO2," which represents nitrogen dioxide, the equation would be:

2NO + O2 2NO2.

The chemical equation you provided:

2SO2  + O2  2SO3 .

represents a third-order reaction. In this case, two molecules of sulphur dioxide (SO2) react with one molecule of oxygen (O2) to form two molecules of sulphur trioxide (SO2).

A third-order reaction is a type of reaction where the overall reaction rate depends on the concentrations of three reactants raised to the power of their stoichiometric coefficients. In this equation, the stoichiometric coefficients of SO2 and O2 are both 2, indicating that the reaction is third order with respect to these two reactants.

The reaction you mentioned is known as the oxidation of sulphur dioxide to sulphur trioxide and is an important step in the production of sulfuric acid.

**END**

**5. SURFACE CHEMISTRY**

1. **What is an interface? Give one example.**

Ans: The boundary between two phases (gas, liquid, solid) is called interface. It is Represented by separating the bulk phase by a hyphen (-) (or) a slash (/).

Ex: The interface between a solid and a gas may be represented by solid-gas (or) solid/ gas.

1. **What is adsorption? Give one example.**

Ans: i) Accumulation (or) concentration of a substance on the surface of a solid (or) liquid is known as adsorption.

Ex: Adsorption of gases on the surface of the charcoal.

1. **What is absorption? Give one example.**

Ans : The phenomenon in which the substances is not only present on the surface but also passes through the surface into the bulk of the solid (or) liquid is called absorption.

Example: Absorption of water by sponge.

1. **Distinguish between adsorption and absorption, Give one example of each?**

Ans: Adsorption is a Surface phenomena.

Example: - Accumulation of dust on books.

Absorption is buik phenomena.

Example: - Absorption of water by sponge.

1. **What is desorption?**

Ans: The process of removing an adsorbed substance from a surface an which it is adsorbed is called desorption.

1. **What emption?**

Ans: The phenomenon in which both adsorption and absorption can takes place Simultaneously is called sorption.

1. **The critical temperature of S02, is 630 k and that of CH4 is 190 K. Which is adsorbed easily son activated charcoal? why?**

Ans: SO2is easing adsorbed on activated charcoal because critical temperature of SO2, is higher than CH4 .

**11) Amongst So2, H₂ which will be adsorbed more readily on the surface of chances and why?**

Ans: So2, is adsorbed more reading on the surface of charcoal due to its high critical temperature than H2 .

**14) What is the role of MnO₂ in the preparation of by from KClO3?**

Ans: MnO2, acts as a catalyst in the preparation of O2 from KclO3

MnO₂ increases the decomposition of KclO3to O2

**15) Define "Promoters" and "poisons" in the phenomenon of catalysis?**

Ans: Promoter: The substance enchance the activity of a catalyst.

Example: 'Mo' in Haber's process.

Poisons: The substance decrease the activity of a catalyst.

Example: “Co” in Haber’s process.

**17) Name the enzymes obtained from soya been source?**

Ans: Urease enzyme is obtained from soya been source.

**18) What enzymes are obtained from yeast?**

Ans: Invertase, Maltase, and zymase enzymes are obtained from yeast.

**19) What are lyophilic and Iyo phobic sols? Give one example for each type.**

Ans: 1) colloidal solutions in which a great affinity exists between the displaced phase and dispersion medium are called as lyophilic sols. (lyo = Liquid, Phallic = affinity on love).

Ex: - stanch, Protein, polymer solutions.

**20) Explain the terms with suitable examples?**

**i) aerosol ii) hydrosol**

Ans: i) Aerosol:- in aerosol, depression medium is air.

Ex. smoke Islan aerosol. Dispensed Phase- Solid (carbon particles). Dispersion Medium-gas (air).

ii) Hydrosol: - in hydrosol, dispersion medium is water.

Ex. cloud is an hydrosol, dispersion Phase -water droplets, dispersion Medium - gas (air)

**21) What are micelles? Give one example.**

Ans:- "A colloids sized particle (aggregate) formed in water by the association of simple molecules, each having a hydrophobic end and hydrophilic end" is known as micelle.

Ex: - concentrated soap solution is an associated colloid.

**22) How do micelles differ from a normal colloidal Solutions?**

Ans:- in normal colloidal solutions Conoidal particles are associated to form aggregated large sized colloidal particle (micelle).

**23) Give two examples of associated colloids?**

Ans: - Soap and detergents are associated colloids.

**Soap:** Soap is a sodium (or) Potassium Salts of higher fatty acids.

**Detergent:** Detergents are sodium salts of a long chain benzene Sulphonic acid.

**24) lyophobic colloids one called irreversible colloids?**

Ans:- once lyophobic so is precipitated, it does not give back the colloids sol by addition of dispersion medium to it. Hence these are also called as irreversible colloids.

**25) What is peptization?**

Ans:- The process of converting a precipitate into colloidal sol by shaking it with the dispersion medium in the presence of small amount of electrolyte is known as peptization.

the electrolyte used for this purpose is called peptsizing agent.

**26) Con Tyndall effect be used to distinguish between a colloidal solution and a love solutions? Explain.**

Ans:

i) Tyndall effect is used to distinguish between conoidal solution and a True solution.

ii) True Solution does not exhibit Tyndall effect. colloidal solutions exhibit Tyndall effect because in colloidal solution particle size is nearing equal to wavelength of light used.

**27) Sky appcars blue in colour?. Explain.**

Ans: Blue colour of Sky is due to scattering of light by colloidal sized dust Particles in air.

**28) What is electro kinetic potential (or) zeta potential?**

Ans: The potential difference between the fixed layer and the diffused layer of opposite change is called electrokinetic potential (on) Zeta potential.

**29) What is electro osmosis?**

Ans: The movement of colloidal particles is arrested by some Suitable dis - Pension medium moves in the opposite direction. This phenomenon is called as electro osmosis.

**30) Define flocculation value?**

Ans: The Minimum concentration ( in millimoles per lit ) of an electrolyte required to cause the coagulation of a sol is called the flocculation value of the electrolyte.

**31) State Hardly - Schulze rule?**

Ans:- i) The ion with change, opposite to the change of colloid particles is effective in coagulating the colloid.

ii) Grater the change of the ion Greater is the coagulating ability of the ion.

1. Thus positive colloids are coagulated by negative ions (or) anions of the Salt added.

.

1. Negative colloids are coagulated by positive ions (or) elation of the salt added.

.

**32) What is protective colloid?**

Ans: **protective colloid:** A lyophobic sol can be protected from coagulation by adding lyophilic colloid to the lyophobic Sol Solution. This lyophilic Sol added is called protective colloid (or) protective agent..

**33) What is an emulsion? Give two examples?**

Ans: **Emulsions :**

1. A dispersion of finely divided liquid droplets in another liquid. (dispersion medium) is emulsion.
2. in emulsions one liquid is “water” and other liquid is Immiscible in water is called "oil".

Example: Milk : liquid fat (oil) in water.

Vanishing cream : fat (oil) in water.

**34) What is an emulsifying agent?**

Ans: The third Substance added in a small amounts to an emulsion to keep the emulsion stable is emulsifying (or) emulsifying agent.

Ex: “casein” emulsifies milk.

**36) How is Artificial rain produced?**

Ans: Artificial rain is produced by spraying oppositely changed colloidal dust (or) Sand particles oven a cloud.

This neutralises the change on water molecules and compels them to get coagulated.

i.e: to rain.

**38) Nome any two applications of conoidal solutions?**

Ans: **Applications of conoids :**

1. purification of Hates
2. Electrical precipitation of smoke
3. Some medicines, food stuffs (Milk, Eggs, fruits, etc.) are colloidal in nature.

**41) What is gold number?**

Ans: The mass in milligroms which protects the coagulation of 10 ml of a gold sol on adding 1 ml of 10% Nacl solution.

Ex: Gelatime gold number is 0.005-0.01.

**42) What is the general difference between soop and detergent chemically?**

Ans:-

|  |  |
| --- | --- |
| **SOOP** | **DETERGENT** |
| 1. It is sodium (or) potassium salts of higher fatty acids. | 1. Detergents are sodium salts of sol – phonanted long chain alcohols. |
| 1. It can not give from with hard water. | 1. It give form with hard water. |

**43) What is auto catalysis? Give one example.**

Ans: During a chemical reaction if one of the products formed acts as a catalyst, the phenomenon is called auto catalyst.

Example: Decomposition of A6H3."As” act as auto catalyst.

**44) What is catalysis? How is catalysis classified? Give two examples for each type of catalysis.**

Ans: A catalyst is the substance that increases the male of chemical reaction to which it is added without itself being consumed in the reaction. ThisPhenomenon is known as catalysis. catalysis can classified into two types. These are.

1. Homogeneous catalysis:- The catalysts in which the catalyst and the reactants are present in the Same phase (state) is known as homogeneous catalysis.

Ex:

1. Conversion of carbon monoxide to carbon dioxide in presence of No.

1. catalytic oxidation of SO2 to SO3 in presence of oxides of nitrogen .

1. Heterogeneous catalysis :- The catalysis in which the catalyst and the reactants are present in different phases (states) is known as heterogeneous catalysis.

Ans:- a) In Haber’s process “iron” is used as catalyst

1. M contact Process Platinum (or) Vanadium Pentoxide is used as a catalyst..

**45) Name any six enzyme catalysed reactions?.**

Ans: **Examples:**

1. intension of cane sugar: The enzyme invertase convents came sugar into glucose and fructose.

Cane sugar Glucose + Glucose

1. conversion of glucose into ethyl alcohol:- The enzyme zymase convents glucose into ethyl alcohol and carbon dioxide.

Glucose Ethyl alcohol

iii) Conversion of starch into Maltose:- The enzyme diastase convents starch into maltose.

1. Decomposition of urea into ammonia and carbon dioxide:- The enzyme urease Convents urea into ammonia and carbon dioxide.
2. In stomach, the enzyme pepsin convents proteins into peptides while in intestine, the pancreatic trypsin convent's proteins into amino acids by hydrolysis.
3. Conversion of milk into curd :- It is an enzymatic reaction brought about by enzyme lacto bacilli present in curd.

**46) Describe Ber dig’s are method of preparation of collides with a neat diagram?**

Ans:

This Mothed is used to prepare colloidal sets of Metals such as gold, silver,platinum etc….

1. The metal whose sol is to be prepared is made as two electrodes immersed in dispersion medium such as water.
2. The dispersion medium is kept cooled by surrounding it with freezing an mixture.
3. An electric are is struck between two electrodes.
4. The intense of heat produced vapourises the Metal.
5. which are immediately condensed to form colloidal solution.
6. **Name any four examples of preparation of colloids by chemical methods with necessary chemical equations?**
7. Colloidal solutions are proposed by chemical reactions leading the formation of species by double decomposition. oxidation, reduction on hydrolysis.
8. These species then aggregate leading to the formation of Sols.

+ +

.

1. **Describe the purification of colloidal Solutions by the phenomenon dialysis with a neat diagram?**

Ans: Dialysis:- It is a process of removing a dissolved substance from a Colloidal Solution by Means of diffusion through a suitable membrane.

1. Particles (ions on small moecules) in a true solution can pass through animal membrane (bladder) or parchment paper on cell phone sheet but not the colloidal particles.
2. The apparatus used for this purpose is called dialyser.
3. A bag of suitable membrane containing the colloidal solution is suspended in a vessel containing a continuously flowing water.
4. The Molecules and ions diffuse through the membrane into the hater and pure colloidal Solution is left behind in the bag.

49) **Explain the following teams?**

**i) Electrophoresis ii) Coagulation iii) Tyndall effect.**

Ans : **Electrophoresis:**

1. The Movement of colloidal particles under an applied emf is called electrophoresis.
2. positively changed particles move towards the cathode While negatively changed particles move towards the anode.
3. It is used to determine the nature of change on sol particles.

**Coagulation:** The phenomenon of consider substance loosing charges. and coming down as precipitate on addition of an electrolyte to the calloidal Solution is called coagulation.

Ex: As2s3 is negatively changed sols. It can be precipitated by adding Bacl2 or Alcl3 to keep the positive ion from adding electrolyte and get Precipitated.

**Tyndall effect:** When light passes through a colloidal solution. We Will be able to see the path of the light as a Luminous beam. This is known as Tyndall effect.

1. This luminescent path can be viewed through a microscope placed at night angle to the direction of the path of light.
2. When the diameter of the dispensed particles is not much smaller than the Have length of light used.

**50) Name the dispensed phase and dispersion medium in the following colloidal systems?**

**i) fog ii) smoke iii) Milk iv) cloud v) blood vi) gold sol.**

Ans:

1. The dispensed phase and dispersion Medium in fog are liquid and air.
2. The dispensed phase and dispersion Medium in smoke are carbon Particles and air.
3. The dispensed phase and dispersion Medium in Milk are liquid fat and water.
4. The dispensed phase and dispersion Medium in cloud are water droplets and air.
5. The dispensed phase and dispersion Medium in blood are albuminoid particles and water.
6. The dispensed phase and dispersion Medium in gold Sol are gold particles and water.

**51) Compare and contrast the phenomenon of physiorption and chime sorption?**

Ans: **physical adaption:** The adsorption in which physical or Vander Wall's forces exist between adsorbate and adsorbent is known as physical adsorption or Physisorption.

Ex:- Adsorption of H₂ or O₂ on charcoal.

Chemical adsorption: The adsorption in which chemical forces on chemical bonds exist between adsorbate and adsorbent is known as chemical adsorption on chemisorption.

Ex:- Adsorption of H₂ on "pt" Metal Surface.

**Difference between physical adsorption and chemical adsorption:-**

|  |  |
| --- | --- |
| **physical adsorption** | **chemical adsorption** |
| 1. It is weak. | 1. It is strong. |
| 1. Enthalpy of Adsorption is low. 2. - 40 Kj/mol) | 1. Enthalpy of Adsorption is high.   (40 - 400 Kj/mol) |
| 1. It is reversible and fast. | 1. It is irreversible and slow. |
| 1. It occurs at lower temperature. | 1. It occurs at higher temperature. |
| 1. It decreases with rise in sstemperature. | 1. It increases with increases temperature. |
| 1. It is not specific. | 1. It is highly specific. |
| 1. It is multi layered. | 1. It is Uni layered. |
| 1. It increases with increase of pressure. | 1. The effect of pressure is neglieible. |
| 1. It depends on the nature of the adsorbate only. | 1. It depends on the nature of the adsorbate and adsorbent. |
| 1. Activation energy is low. | 1. Activation energy is high. |
| 1. Desorption is easy due to weak Vander wool forces. | 1. Desorption is not easy due to strong chemical forces. |

**54) Explain the Mechanical properties (Brownian movement)?**

Ans:

The colloidal particles appear to be in a state of continuous Zig-Zag Motion all over the field of view is called Brownian Movement.

1) The Motion becomes less vigonorous as the size of the particle increases and also with the viscosity of the dispersion medium.

2) It increases with rise in temperature.

3) The Brownian Movement does not permit the particles to settle and thus is responsible for the stability of Sols.

**4) Optical properties (Tyndall effect):** when light passes through a colloidal Solution we will be able to see the path of the light as a Luminous beam. This is known as Tyndall effect.

i) This luminescent path can be viewed through a microscope placed at right angle to the direction of the path of light.

ii) When the diameter of the dispensed particles is not much smaller than the wave length of light used.

iii) The refractive indices of the dispensed phase and dispersion medium greatly in magnitude.

iv) Tyndall effect can be observed during the projection of picture in cinema theatre due to Scattering of light by dust and Smoke particles present there.

**THE END**

**6 GENERAL PRINCIPLES OF METALLURGY**

1. **State the role of silica in the metallurgy of copper?**

Ans:- silica is used as acidic flux to remove iron oxide impunity.

Ex Fes is present in the form of impurity with copper sulphide ore. Silica reacts with these impunities and form Ferrous silicate Stag.

1. **Explain ” poling”?**

Ans:= Poling: The process of reduction of metal oxide to metal by using green Wood legs, carbon powder is termed as poling.

The Morten metal is covered with carbon powder and stained hits green wood logs (poles). The hydrocarbons released from wood logs med impure oxides to Metal.

Ex:- Cu & Sn Metals are refined by this method.

1. **Describe a Method for the refining of nickel?**

Ans:- Nickel is purified by Mond's process. The impure nickel is heated with CO to from volatile nickel tetracarbonyl, leaving the impurities.

This carbonyl on subjecting to high temperatures decomposes to give the pure metal.

1. How is cast iron different from pig iron?

Ans:- Pig Iron:- The iron obtained from blast b furnace is called Pig Iron. It contains about 4% carbon and Hany impunities like Si, P, S, Mn.

Cast iron:- The iron Hade by melting pig iron with Serpo iron and coke using a blast of hot air is called cast iron. It contains 3% carbon. It is extremely hand and brittle.

**7) What is the difference between a mineral and an one?**

Ans:- Mineral:- The natural substances available from the earth crust, in which the metals on their compounds occur are called Minerals.

Ore:- The Minerals from which a metal can be extracted easing and cheaply ore called ones. It is the most suitable Mineral to extract Metal. "All ores are Minerals but all Minerals are not ores".

Eg:- Among oxide minerals of aluminium - Bauxite of ore.

**8) What is the role of cryolite in the Metallurgy of aluminium?**

Ans:- Role of cryolite in the Metallurgy of aluminium:

* Role of cryolitic: It Makes alumina a good conductor of electricity.
* Role of Fluorspar: it lower's fusion temperature from 2323 k to about 1140K.

**11) Give the composition of the following alloys?**

**a) Brass b) Bronze c) German silver.**

Ans:-

|  |  |
| --- | --- |
| ALLAY | COMPOSITION |
| **Brass** | Cu : 60%  Zn : 40% |
| **Bronze** | Cu : 75 %– 90%  Sn : 10% - 25% |
| **German silver** | Cu : 25% - 40%  Ni : 40% - 50%  Zn : 25% - 35%. |

**12) Explain the terms gangue and slag?**

Ans:- Gangue :- The earth on or undesired chemical substances present in the ore are called gangue or matrix.

Slog:- The fusible product formed when grange combines with the flux is called slag.

**13) What are the Ellingham diagram?**

Ans:- Limitations of Ellingham diagram:

1. Ellingham diagram simply indicates whether a reduction reaction take place or not.
2. It does not say anything about the rate of a reaction (chemical kinetics).
3. The interpretations of is always based on equilibrium constant (K)
4. It assumes reactants and products are in equilibrium, Which may not be true always.

**14) Write any two ores with formulae of the following metals?**

a) Aluminium b) Zine c) Iron d) Copper**.**

Ans:-

|  |  |  |
| --- | --- | --- |
| **METAL** | **ORE** | **FORMULA** |
| a) Aluminium | Bauxite  Gibbsite | Al2O3 , 2H2O  Al2O3 , 3H2O |
| b) Zine | Zine blende  Zincite | ZnS  ZnO |
| c) Iron | Haematite  Magnetite | Fe3O2  Fe3O4 |
| d) Copper | Cuprite  Copper glance | Cu2O  Cu2S |

15) What is Matte? Give its composition?

Ans:- The Molten mixture of cuprous Sulphide and small quantity of ferrous Sulphide is called matte. It is a product of blast furnace after smiting in the extraction of copper.

Composition:- Cu2S + little Fe S

This copper matte When changed in silica lined convertor, Blister copper is obtained.

**16) What is blister copper? Why is it so called?**

Ans:- The impure copper metal obtained by bessemerisation of copper matte is called bitten copper.

During the Solidification process, the dissolved so₂ escapes leaving blisters on the surface of copper Metal. so, it is commonly called blister copper. It is 98% pure.

**17) What is flux? Give an example.**

Ans:- Flux: The external substance added to the ore for the removal of gangue is called flux. It lowers the Melting point.

Eg: Acidic flux: SiO2, & P 4O10 : Blasic flux : Cao & MgO.

**18) Give two uses each of the following metals?**

**a) Zine b) Copper c) Iron d) Aluminium.**

Ans:-

|  |  |
| --- | --- |
| METAL | USES |
| a) Zine | 1. it is used for galvanizing iron.  2. it is used in batteries and in many alloys like brass. |
| b) Copper | 1. it is used for making electrical wires, water and steam pipes.  2. it is using making of several alloys. |
| c) Iron | 1. cast Iran is used for casting stores, railway sleepers, gutter pipes, toys etc…  2. wrought iron is used in making anchors,bolts,chains. |
| d) Aluminium. | 1. Aluminium fails are used as wrappers for chocolates.  2. The fine dust of al metal is used in points and lacquers. |

**19) Give the uses of**

**a) Cast iron b) Wrought iron c) Nickel steel d) Stainless steel?**

Ans:-

|  |  |
| --- | --- |
| COMPOUND | USES |
| a) Cast iron | It is used for casting stores, railway sleepers, gutter piper, toys etc.. ss |
| b) Wrought iron | It is used in making anchors,wires,bolts,choins and agricultural implements, |
| c) Nickel steel | It is used in making cables, automobile and aeroplane parts. Chrome steel is used in making of cutting tools and crushing machines. |
| d) Stainless steel | It is used in making of cycles,automobiles,utensils,paris,etc.. |

**21) Explain zone refining?**

Ans:- zone refining or fractional crystallization:

This method of purification is used to obtain the metals of high purity.

Principle :-"The impurities are more Soluble in the met than in solid State of the metal".

A circular movable heater is fitted at one end of the immune matai rod. The heater is slowly moved across the rod. The metal maltol at the point of heating. The pure Metal crystallises while the impunities pass on the adjacent Melted zone. This process is repeated several times. At one end, the impunities get concentrated and removed. Highly pure metals are obtained by the process.

Egi- Elements such as Si, Ge, Ga, etc., which are used as Semiconductors are refined by this method.

**23) How is alumina separated from silica in the bauxite are associate With Silica? Give equations.**

Ans:- The bauxite with silica impunity is called white bauxite. It can be purified by two methods.

a) Sen peck’s process.

**Sen peck’s process :-**

**1**) The powdered ore is mixed with coke and heated to 2073k in an atmospheric of nitrogen. Aluminium combines with nitrogen and forms aluminium nitride (AIN). Silicon dioxide is reduced to silicon and escapes out an as a vapour.

AL₂O3 + 3C+ N₂ 2AIN +3Co; SiO₂ +2C + 2Co.

2) Aluminium nitride on hydrolysis with steam gives Al (OH)3 along with ammonia.

ALN+ 3H₂0 Al(OH)3 + NH3.

3) This precipitate is washed, dried and ignited at 1473k to give pure aluminium oxide or alumina..

2Al(OH)3  O.

This alumina is Subjected to electrolytic reduction to get aluminium Metal.

**24) Giving examples to differentiate roasting and calcination?**

Ans:- a) roasting :- The process of strong heating of the ore in presence of air (or) oxygen but below its fusion temperature is called roasting. During roasting the mineral gets oxidized. It is suitable for Sulphide ores.

TYPES of roasting :-

a) oxide sing roasting b) Sulphatising roasting c) chloritizing roasting

**i) oxidising roasting :-**  In this the sulphides are converted into oxides.

Eg 2ZnS + 3O₂ 2ZnO + 2SO₂.

1. **sulphatising roasting :-** Iin this the sulphide ores are converted into. Sulphates. It is done under controlled conditions.

Eg: zinc blende on heating in air at 923k gives a mixture of Zinc Sulphate

and zinc oxide.

.

1. **chloridizing roasting :-** In this sulphide ones are converted into a chloride.

Eg:- When argentite (Ag₂ S) is heated with NaCl at 873 K, Silver chloride is obtained.

**b) calcination :-** The process of strong heating of the one in absence of air or in limited Supply of air but below its fusion temperature is called calcination. During calcination carbonate ores decomposes to oxides leaving all moisture and volatile impunities. The oxides becomes porous. ss

Eg: carbonates, bicarbonates and hydrated oxide ones are generally calcinated.

.

**25) Explain the purification of sulphide one by froth floatation method?**

Ans:- **Froth floatation process :-**  This method is based on the preferential Wetting properties with the frothing agent and water.

This process is mainly used to concentrate low grade sulphide ores.

The powdered ore is added to water containing pire oils (as frothing agent) and taken in a tank.

To this sodium ethyl xanthate (collecting agent) is added. ensouls and aniline are also added which act as froth stabilizers.

The Substances like lime, sodium carbonate are added which help the froth to float.

A vigorous stream of air is passed into the suspension, which thoroughly agitates the mixture and disposes the oil into colloid sized Particles.

The Sulphide one particles stick to the oil droplets and rise to the Surface in the form of froth Supported by air bubbles. Water wets the gangue particles which sink to the bottom.

Finally the fourth is allowed to collapse and day to recover one particles.

Eg: copper pinites, Iron pyrites, Galena (Pbs) and zinc blende (ZnS) are concentrated by this method.

**26) What is the significance of leaching in the extraction of aluminium ?**

Ans:- Leaching is significant as it helps in removing the impunities like SiO₂, Fe₂O3 etc. From the bauxite one. This Lcaching of bauxite one gives Pune alumina.

**THE END**

**7. P-BLOCK ELEMENTS (GROUP – 15,16 & 17 ELEMENTS)**

**1) How is nitrogen prepared in the laboratory? write the chemical equations of the reactions involved?ss**

Ans:- Nitrogen is prepared in the laboratory by trolling an aqueous Silurian of ammonium chloride with sodium nitrite.

**NH4Cl(aq) + NaNO2(aq) N2(g) + 2H2O(1 + NaCl(aq)).**

**2) Nitrogen exists as diatomic molecule and phosphorus as R Why?**

Ans:- Nitrogen atom is Sean in atomic size farms multiple bonds with another Wagen alum to form N2 molecules but phosphorus in Lange in size forms only single bonds with other phosphorous atoms.

**3) Nitrogen molecule is highly stable - Why?**

Ans:- In nitrogen molecule a triple bond is present (one σ and two x). So it is stable due to Stable actet configuration.

**4) Why are the compounds of bismuth more stable in t3 oxidation state?**

Ans:- Bismuth is more stable in t3 oxidation state due to invent pair effect.

**5) What is allotropy? Explain the different allotropic forms of phosphorous?**

Ans:- Existence of same element in different physical forms with same chemical properties is known as allotropy. phosphorus shows many allotropy forms.

Example: White phosphorous, red phosphorus and black phosphorous.

**6) What is inert pain effect?**

Ans:- Reluctance of "ns" electrons to participate in the bond formation is called inert pain effect.

**7) Explain why Ns is basic while BiH, is only feebly basic ?**

Ans:- As the size of the central atom increases, electron density on the Central atom decreases.

The tendency to donate a pain of electrons decreases and basic gith decreases as we move form NH3 to BiH3.ss

**8) Arrange the hydribes of group-15 elements in the decreasing order of basic strength and increasing order of reducing character?**

Ans:- Basil strength decreases from NH3 to BiH3

**.**

Reducing Character increases from NH3 to BiH3

**.**

**9) PH3 is a Weaker base then NH3 Explain?**

Ans:- Due to the bigger size of “P” than “N ”, “P-H” band formed is much weaker than N-H bond as a result, PH3 has less tendency than NH3 to accept a protan,PH3 is a Weaker base than NH3.

**10) A Hydride of Group-15 elements dissolved in water to form a basic solution dissolves the AgCl precipitate. Name the Hydride write the chemical equation involved?**

Ans:- NH3 dissolves in water to from basic Solution NH3 + H2O NH4OH. The solution (Ammonia solution ) disarms AgCl precipitate and forms complex.

**] Cl**

White ppt Colourless.

**11) What happens when white phosphorus is heated with cone NaOH solution in an inext atmosphere of CO2?**

Ans:- When While phosphorus is heated with conc-NOOH Solution is an incrt atmosphere of co, forms phosphine and sodium hypophosphite.

**12) NH3 forms hydrogen bonds but PH3, docs not - Why?**

Ans:- The N-H bond in ammonia is quite polar as nitrogen is highly electro-Negative in nature.

On the other hand, P-H bond is non- polar as both P and H have Some electronegativity. Hence in phosphine no hydrogen bonding present.

**13) How do calcium phosphide and heavy water react?**

Ans:- Calcium phosphide reacts with heavy water to form deuteron phosphine. DeLeon phosphine.

**14) Ammonia is a good complexing agent explain with an example?**

Ans:- Due to the presence of a lone pain of elections on nitrogen, NH3 acts as complexing agent as a result, it combines with transition Metal cations to form complexes.

Diammine silven (1) chionide

**15) A Mixture of Ca3P2, and Ca C2, is used in Making Holme's signal explain?**

Ans:- Containers containing a mixture of Ca3P2, and Ca C2, packed and thrown into Sea. in contact with water,, a mixture of phosphine and acetylene gases is produced. PH3 contains trances of highly inflammable P₂H4 (Di - Phosphine). it catches fine and ignites acetylene which burns with luminous fame and then serves as a Holmes signal to the approaching ship.

**16) which chemical compound is formed in the brown ring test of Nitration’s ?**

Ans:- [(NO)] 24 Complex is responsible for the colour in the brown – ring test for nitration’s.

**17) Why does R3P = 0 exist but R3N = O does not (R = alkyl group)?**

Ans;- Nitrogen can not form d-P bond as phosphorous forms d-P bond. So R3P=0 exists and R3N0 does not exist.

18) How is nitric oxide (NO) Prepared?

Ans:- Preparation of nitric oxide.

No is prepared by the action of sodium nitrite on sulphuric acid .

**19) Give one example each of normal oxide and mixed oxide of nitrogen?**

Ans :- Normal oxide: No

Mixed oxide : N2O3  (NO + NO2).

**20) No is paramagnetic in gaseous state but diamagnetic in liquid and solid states why?**

Ans :- No has add number of elections (it Valence electrons) and hence is paramagnetic in gaseous state. But in liquid and solid states, it exist as a Symmetrical dimes and hence is diamagnetic in these states.

**21) Give an example of a) acidic oxide of phosphorous , b) neutral oxide of nitrogen ?**

Ans:-

a) Acidic oxide of phosphorous : P4 O6

b) Neutral oxides of nitrogen: NO, N2O.

**22) How does Pcl3 react with a) CH3 COOH, b) C2H5OH and c) water ?**

Ans:- **a)**  **.**

Acetyl chloride

**OH +**

Ethyl chloride

Phosphoryl’s acid.

**23) PCl3 can act as oxidizing as well as reducing agent-justify ?**

Ans:- PCl3  can acts as oxidizing and reducing agent.

**i)**  in this striction it acts like oxidizing agent.

**ii)** in this reaction it acts like reducing agent.

**24) Which of The following is more covalent – SbCl5 (or) SbCl3?**

Ans :- SbCl5  is more covalent than SbCl3 because the elements in the higher. oxidation State exert more polarising power. In SbCl5  ,Sb shows +5 oxidation state So it is more covalent in nature.

**25) Tron becomes passive in cone.HNO3Why ?**

Ans:- Iron do not dissolve in cone. HNO3 due to the formation of oxide fam over the surface of the metal it becomes passive.

**26) Give use of a) Nitric acid, (b) Ammonia?**

Ans:-

Usse of HNO3 : 1) Used in the Manufacture of NH4NO3 For fertilizer’.

2) Used in the preparation of nitro-glycerine, TNT etc….

Uses of NH3 : 1) Used to produce various nitrogenous fertilizers.

2) Liquid ammonia is used as refrigerant.

**27) H3PO3 is diprotic while H3PO2 is monoprotic – Why?**

Ans:-

Orth phosphorous acid Hypo phosphorus acid

H3 PO3 Is diprotic (di basic ) because it contains only two ionizable.

H – atoms

H3 PO2 Is monoprotic (mono basic) because it contains only two ionizable.

H – atom.

**28) H3PO3, is good reducing agent- Explain with an example ?**

Ans:- Hypo phosphorous acid (HPA),is a good reducing agent as it contains two p-H bonds and reduces, AgNO3, to Metallic Silver.

**4AgNO3 + 2H₂O + H3PO₂ 4Ag+4 HNO3 + H3PO4.**

**29) How does P4 react with the following?**

**a) SoCl2 b) SO2 Cl2.**

Ans:- a) Phosphorus reacts with thionyl chloride to form phosphorus trichloride and sulphur dioxide.

b) Phosphorus reacts withSO2 Cl2. to form phosphorus Pentachloride.

**30) How does PCl5 react with the following?**

**a) Water b) c) d) Ag.**

Ans:-

1. **.**
2. **.**

**31) How is ammonia Manufactured by Haber’s process? Explain the reactions of ammonia with**

**a) ZnSo4(aq)**

**b) CuSo4(aq)**

**c) Agcl(s)**

**Ans: Ammonia can be Manufactured by Haber’s process by the direct reaction between nitrogen and hydrogen.**

**N2(g) + 3H2(g) → 2NH3(g) ; Hf = -46.1 kjmol-1**

**1) The above reaction is reversible reaction**

**2) The forward reaction is exothermic reaction**

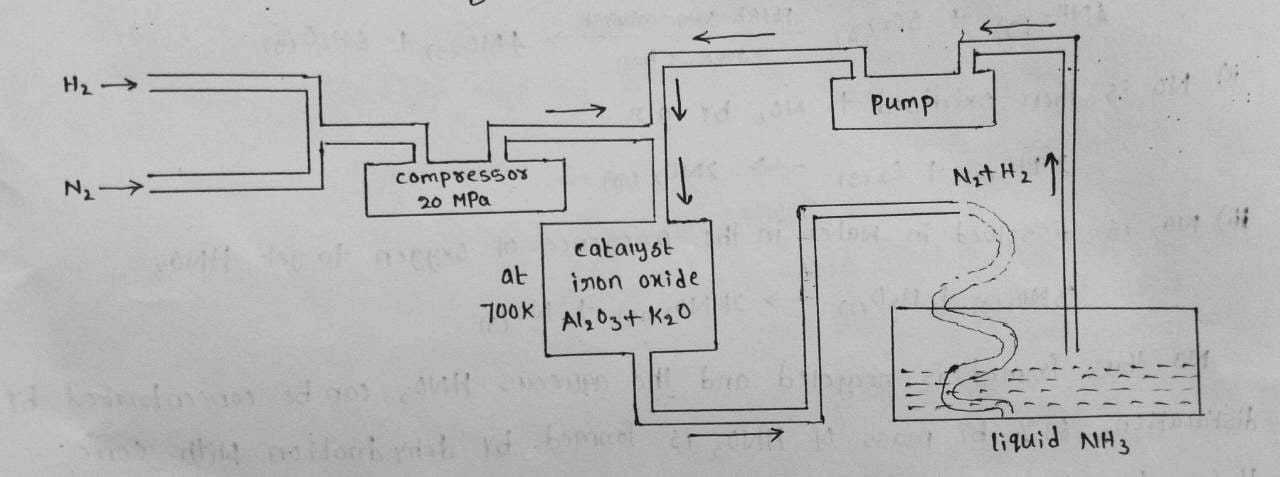
**3) one mole of N2 and Three moves of H₂ combined to give to two moles of NH3**

**synthesis of NH3 Haber's process**

**optimum conditions:**

**According to Lechotelier's principle:-**

1. **Ammonia is Manufactured at about 725-775K.**
2. **Pressure of 200 atm**
3. **iron powder mixed with Molybdenum is used as catalyst.**
4. **Molybdenum acts as a promoter to iron catalyst**
5. **The moisture present in ammonia may be removed by using quick lime Cao**
6. **Ammonia cannot be dried by conc. H2SO4 , anhydrous Cacl2 and P4O10 as it reacts with these reagents.**



**CHEMICAL RECATIONS: -**

1. **Reaction with ZnSo~~4~~: zine sulphate reacts with ammonium Solution to**

**Form zine hydroxide & ammonium sulphate.**

**ZnSO4 (aq)+ 2 NH4OH(aq)Zn (OH)2 (s) + (NH4)2, SO4 (aq)**

**White ppt**

1. **Reaction with CuSo4 (aq) :- copper sulphate reacts with ammonia to foam cupra ammonium sulphate.**

**CuSO4(aq)+4NH3(aq) [Cu(NH3)4]So4(aq)**

**(Blue) (deep blue)**

1. **Reaction with Agcl: silver chloride reacts with ammoniasolution to form Di ammine silver chloride**

**Agcl(s) +2NH3(aq) [Ag(NH3)2]Cl(aq) (colour less)**

33) How is nitric acid Manufactured by Ostwald's process ! How does react with the following?

a) copper b) zn c) S8 d) P4

Ans: Ostward's Process: on a large scale NH3 is prepared by ostward's Process

1. catalytic oxidation of ammonia by atmospheric oxygen, nitric oxide is formed

4NH3(g) + 5O2(g) 4NO(g) + 6H₂O(g)

1. NO is then oxidised to NO2 , by air

2 NO(g) + O2(g)→ 2NO2(g)

1. NO2, is dissolved in water in the presence of oxygen to get HNO3 .

3 NO2(g) + O2(g) 2HNO3(aq) +NO(g)

No thus formed is recycled and the aqueous HNO3, can be concentrated by distillation, 68% by mass of HNO3, is formed by dehydration with conc H₂S04 to get 98% HNO3

**CHEMICAL REACTIONS:-**

a) Reaction with copper:- cu reacts with dil HNO3 to form cupric Nitrate and nitric oxide

3cu + 8HNO3(Dilute) →3cu (NO3)2 + 2N0 + 4H₂0

cu reacts with cone HNO3 to form cupric nitrate and Nitrogen dioxide.

Cu + 4 HNO3(conc) → cu (NO3)2 + 2N0+ 2H2o

b) Reaction with zn: "Zn' reacts with dil. HNO3 to form zine nitrate and nitrous oxide

4Zn+10mno3(dilute) → Zn(NO3)2+5H2o + N20

‘Zn’ reacts with conc. HND to form zine nitrate and nitrogen dioxide.

4 stamps (Nos) SH₂+N20

Zn + 4HNO3(conc) →Zn (NO3)2+ 2H2O +2NO₂

c) Reaction with S8: Sulphur reacts with nitric acid to form Sulphuric acid & nitrogen dioxide

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d)Reaction with P4 :- Phosphorous reacts with nitric acid to from phosphoric acid & nitrogen dioxide.

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**33) Though nitrogen exhibits +5 oxidation state, it does not form pentahalide?**

**Give reason.**

Ans:- Nitrogen with n = 2, has S and P orbitals only. It does not have d-orbitals to expand it's valency beyond four. That is why it does not form Pentahalide.

34) PH3 has lower boiling point than NH3. Why?

Ans:- Unlike NH3, PH3 molecules are not associated through hydrogen bonding in liquid state. That is why the boiling point of PH3 is lower than NH3.

**35) write the reaction of thermal decomposition of sodium aside?**

Ans:- Thermal decomposition of sodium aside gives dinitrogen gas.

**2NaN3  2Na + 3N2 .**

**36) Why does NH3 act as a Lewis base?**

Ans:- Nitrogen atom in NH3 has one lone pair of elections which is available for donation. Therefore, it acts as a Lewis base.

**37) Why does NO2 dimerise?**

Ans:- NO2 contains odd number of Valence electrons. It behaves as a typical odd Molecule. On dimerization, it is converted to stable N2 O2 molecule with even number of electrons.

**38) in What can it be proved that PH3 is basic in nature?**

Ans:- PH3 reacts with acids like HI to form PH4I Which shows that it is' basic in nature.

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Due to lone pair on phosphorous atom, PH3 is a acting as a Lewis in the above reaction.

**39) Why does PCl3 fume in moisture?**

Ans:- PCl3 hydrolyses in the presence of moisture giving fumes of HCl.

**PCl3 + 3H₂O H3PO₂ + 3HCl.**

**40) Are all the five bonds in PCl3 molecule equivalent ? Justify Your answer.**

Ans:- PCl3 has a trigonal bipyramidal structure and the three equatorial P-cl bonds are equivalent, while the two axial bonds are different and longer than equatorial bonds.

**41) How do you account for the redacting behaviour of H3PO₂ on the basis of its structure?**

Ans:- In H3Po₂, two H atoms are bonded directory to P atom which imports redacting character to the acid.

**42) Why one pentahalides more covalent than trihalides?**

Ans:- Pentahalides are more cove sent then trihalides because the elements in the higher oxidation state exist more polemizing power.

**43) Why is No less reactive at room temperature?**

Ans:- Due to high bond enthalpy of N = N band nitrogen is inert at noun temperature.ss

**44) How does ammonia react with a solution of cu2+ ?**

Ans:-

**2+(aq).**

**45) Bond angle in PH4+ is higher than that in PH3, why?**

Ans:- According the VSEPR theory, lone pain band pair repulsion in PH3 is higher than that of band pair - band pair repulsion in PH4+.

**46) What happens when H3PO3, is heated?**

Ans:-

Orthoboric,phospacid phosphine.

**47) Why is dioxygen a gas but sulphur a solid ?**

Ans:- Oxygen forms weak P- P multiple bonds intermolecular attractions are very strong. 's' forms only single σ – bonds between 's' atoms in puckered ring solid.

**48) What happens When**

**a) KClO3, is heated with MnO2, b) O3 is passed through KI Solution.**

Ans:- a) when **KClO3** heated with M**nO2**, dioxygen formed.

b) O3 passed through KI solution to form iodine.

1. **Give two examples each for amphoteric oxides and neutral oxides?**

Ans:- Amphoteric oxides: Melanoid.

Ex Al2O3,H2O,BeO.

Neutral oxides: Ex CO, No and N₂0.

1. **Oxygen Molecule has the formula O₂ While Sulphur has S8- Explain?**

Ans:- The reason for such a difference is the tendency of O- atom to from Multiple bonds (P- P bonds) which is Missing in the case of Sulphur.

**51) Why is H₂O a liquid while H2S is a gas?**

Ans:-Wakes is a liquid due to presence of inter. Molecular hydrogen bonds, While H2S is a gas because it does not have such types of bonds.

1. **H₂o is neutral while H2S is acidic - Explain?**

Ans:- Increase in acidic Strength of hayrides can be easing exposited on the basis of increase in the size of central atom from O to te.

1. **Nome the Host abundant element present in earth's crust?**

Ans:- Oxygen is most abundant element on earth and constitutes 46.6% weight of earth crust.

1. **Give the hybridization of sulphur in the following?**

**a) SO2 b) SO3 c) SF4 d)SF6**

Ans:-

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1. **Explain the structure of** **SF4 andSF6?**

Ans:- In SF4 sulphur undergoes hybridization and it posses distorted trigonal bipyramidal structure bond angle in SF4 are 1020, 1730,.It has one lone pair present on sulphur.

In sulphur under goes hybridization and it posses octahedral geometry, bond angle in is 900 it has 6

1. **Give one example each for**
2. **Neutral oxide b) peroxide c) super oxide.**

Ans**:-** a) Neutral oxide = NO

1. Peroxide = H2O2
2. super oxide = KO2.
3. **What is toiling of mercury? How it is removed.**

**Ans:-** When ozone gas is passed through liquid mercury, the mercury loses it’s meniscus and sticks to the glass surface due to formation of Hg2O.

How ever the meniscus can be regained by shaking it with water which dissolves Hg2O.

1. **SO2 C an be used as anti-chlor? explain.**

Ans:- Removal of excess of chlorine is called anti-chlor SO2 remove chlorine as HCl.

**S02 + 2H20 + cl₂ H₂S04+2HCl.**

1. **How is ozone detected ?**

Ans:- ozone is detected by 1) Tailing of Hg ii) with KI + Starch Solution it give blue colour

iii) it turns benzidine paper brown iv) It has a fishy odour.

1. **Write any two uses each for O2 and H₂S04 ?**

Ans:- O3 uses :- 1) used as a germicide, disinfectant 2) in fertilization of water.

H₂SO4 uses: - 1) H2SO4  used in the Manufacture of fertilizers

2) it is used the Manufacture of hundreds of other compounds .

**61) Which form of Sulphur shows Para magnetism?**

Ans: In Vapour State Sulphur partly exists as S2, Molecule which has two unpaired electrons in the anti-bonding orbitals like O2, and hence exhibits Para magnetism.

**(62) How is the presence of 50₂ detected?**

**Ans:** SO2, reduces acidified K2Cr2O7 into green colour cri(III) Sulphate.

K2cr2O7+ H₂SO4 +3SO2 K2SO4 + cr2 (SO4)3+ H₂O

green ppt

**63) Why are group -16 elements called chalcogens?**

**Ans:** Metal ores normally occurs in the form of oxides, sulphides etc. So first four elements of 16th group are called chalcogens (Means one forming)

**64) which hybride of group -16 has highest boiling point and weakest acidic.characters?**

**Ans:** In in group-16 highest boiling point hybride is water (H₂O). due to inter Molecular H-bond, weakest acidic character hybride is H₂O.

**65) Jus Describe the manufacture of 11,504 by contact process?**

Sulphuric acid is Hanufactured by the contort process which involves three