II PUC
CHEMISTRY
SCORING PACKAGE

PRAKASH C K
MDR PU COLLEGE
TEGURU
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STRICTLY FOR

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CHAPTER 1

SOLIDS

I Questions carrying 2marks

1. Write any two differences between amorphous and crystalline solids.

Crystalline solids	Amorphous solids
They possess definite geometrical shape.	They do not possess definite geometrical shape.
They have sharp melting point.	They do not have sharp melting point
They possess long range order.	They possess short range order.
These are anisotropic in nature.	These are isotropic in nature.
True solids	Pseudo solids

2. Write any two differences between Frenkel defect and Schottky defect in ionic solids.

Frenkel defect	Schottky defect
This defect results when smaller ion [cation] is dislocated from its normal lattice site to an interstitial site.	This defect is due to missing equal number of both cations and anions from their lattice points.
This is dislocation defect.	This is basically vacancy defect.
Density of the solid remains same.	Density of the solid decreases.
This defect is shown by those solids which have large difference in size of cation and anion.	This defect is shown by those solids in which cation and anion are of almost similar sizes.

3.Write differences b/n N-type & P-type semiconductors

n-type semiconductors	p-type semiconductors
They are obtained by doping pentavalent impurities atoms.	They are obtained by doping trivalent impurity atoms.
Conduction is due to electrons.	Conduction is due to holes.
P, As, Sb, Bi are used for doping.	B, Al, Ga, In are used for doping.

4.Calculate the number of particles per unit cell of FCC [CCP].

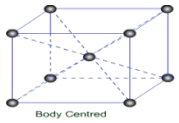
Corners contribution $= \frac{1}{8} \times 8 = 1$

Faces contribution $= \frac{1}{2} \times 6 = 3$

Total number of particles per unit cell= Corners contribution + Faces contribution

=1+3=4

5.Calculate the number of particles per unit cell of BCC.



Corners contribution $= \frac{1}{8} \times 8 = 1$

Contribution from the body centre = 1

Total number of particles per unit cell= Corners contribution + body centre contribution

=1+1=2

6.What is unit cell? What is the number of particles present in a simple unit cell?

It is the smallest repeating unit, which when arranged in three dimension gives entire crystal lattice.

Number of particles per simple unit cell $= \frac{1}{8} \times 8 = 1$

7.What are F-centers? Write the consequence due to the presence of F- centers.

The anionic vacancies occupied by electrons are called F-centers. The compounds show colour.

8.What is meant by the term co-ordination number in solids? What is co-ordination number in FCC crystal structure?

The number of nearest neighboring particles of a given particle in close packing of solids is called co-ordination number.

Co-ordination number in FCC = 12

9.What are paramagnetic substances? Give an example

The substances which are weakly attracted by a magnetic field are called paramagnetic substances.

Eg: O_2 or Fe^{2+}or Cr^{3+}

10.What are diamagnetic substances? Give an example

The substances which are weakly repelled by a magnetic field are called diamagnetic substances.

Eg: H_2O or NaCl or C_6H_6

11.What are ferromagnetic substances? Give an example.

The substances which are strongly attracted by a magnetic field are called ferromagnetic substances.

Eg: Iron or Cobalt or Nickel

12.Atoms of the element B forms hcp lattice and those of the element A occupy 2/3rd of tetrahedral voids. What is the formula of the compound formed by these elements A and B?

Solution: B forms hcp = N

A occupy 2/3rd of Tetrahedral voids = 2N

A :B

$\frac{2}{3}$x2N:N

$\frac{4}{3}$N : N

4:3

So the formula of the compound is A_4B_3

13.A compound is formed by two elements M and N . The element N forms ccp lattice and atom of M occupy 1/3rd of tetrahedral voids. What is the formula of the compound?

Solution:

N forms ccp lattice =N

1/3rd of tetrahedral voids = M

$\frac{1}{3}$x 2N=M

M:N

$\frac{1}{3}$x 2N : N

2:3

Hence the formula of the compound is M_2N_3

Problems on density of solids.

d $= \frac{Z \times M}{a^3 \times N_A}$

a = edge length d = density of solid in g/cm^3

1. X-Ray diffraction studies show that, copper crystallizes in a fcc unit cell with cell edge of 3.608 x 10^{-8}cm . In a separate experiment copper is determined to have a density of 8.92 gcm^{-3}. Calculate the atomic mass of copper.

Solution:

$M = \frac{da^3N_A}{Z}$

$M = \frac{8.92\ X\ 6.023\ X10^{23}\ X\ (3.608\ X10^{-8})^3}{4}$

M = 63.1 g mol^{-1}

Given : a=3.608 x 10^{-8} cm

d = 8.92 gcm^{-3}

N_A=6.023 X 10^{23}

For fcc Z= 4 atoms

2. Silver forms ccp lattice and X-Ray studies of its crystals show that the edge length of its unit cell is 408.6 pm. Calculate the density of silver (atomic mass= 107.94).

Solution :

$d = \frac{zM}{a^3N_A}$

d$= \frac{4\ X\ 107.9}{(408.6\ X10^{-10})^3 X\ 6.023\ X10^{23}}$

Given :

a = 408.6 pm

N_A=6.023 X 10^{23}

M= 107.94

d = 10.5 gcm^{-3}

3. An element has a body centred cubic (bcc) structure with a cell edge of 288 pm. The density of the element is 7.2 gcm^{-3}. How many atoms are present in 208 g of the element?

Solution:

Atomic mass of element

$$M = \frac{da^3N_A}{Z}$$

Given:

d = 7.29gcm^{-3}

a = 288X 10^{-10} cm

for bcc Z=2 atoms

$$M = \frac{7.29\,X(288\,X10^{-10})^3X\,6.023\,X10^{23}}{2}$$

M= 15.79$gmol^{-1}$

51.79 g contains .... 6.023 x 10^{23} atoms

208 g element contains x

$$x = \frac{208\ X\ 6.023\,X10^{23}}{51.79}$$

x = 24.19 x 10^{23} atoms.

4. **Silver crystallises in fcclattice . If edge length of the cell is 4.07 X 10^{-8}cm and density is 10.5 gcm^{-3}. Calculate the atomic mass of silver**.

Solution:

Given:

d = 10.5gcm^{-3}

a= 4.07 X 10^{-8}

forfcc Z= 4 atoms

$$M = \frac{da^3N_A}{Z}$$

$$M = \frac{10.5\,X(4.07\,X10^{-8})^3X\,6.023\,X10^{23}}{4}$$

M = 106.59 $gmol^{-1}$

5. Niobium crystallises in body centred cubic structure. If density is 8.55 gcm^{-3}, calculate the atomic radius of niobium using its atomic mass 93u.

Solution:

As the lattice is bcc Z=2 atoms.

$$d = \frac{zM}{a^3N_A}$$

$$a^3 = \frac{zM}{dN_A} = \frac{2\,X\,93}{8.55\,X\,6.022\,X10^{23}} = 3.612\,X10^{-23}\text{cm}^3$$

So, a=3.306 X 10^{-8} cm.

For bcc unit cell ,

r = $\frac{\sqrt{3}}{4}a = \frac{\sqrt{3}}{4}X3.306$ X 10^{-8}

r = 1.432 X 10^{-8} cm = 14.32 X 10^{-9} cm.

6. Copper crystallises into afcc lattice with edge length 3.61x10-8 cm. Show that the calculated density is in agreement with its measured value of 8.92 gcm^{-3}.

Solution:

For fcc Z= 4 atoms

Atomic mass M= 63.5 $gmol^{-1}$

$d = \frac{zM}{a^3 N_A} = \frac{4\ X\ 63.5}{(3.61\ X10^{-8})^3 X\ 6.023\ X10^{23}}$= 8.97$gcm^{-3}$

Hence the calculated density is in agreement with the measured value.

7. Gold(atomic radius = 0.144nm) crystallises in a face centred unit cell. What is the length of a side of the cell?

Solution:

For fcc a = $2\sqrt{2}r$

It is given that atomic radius r=0.144nm.

So, a = $2\sqrt{2}X\ 0.144 = 0.407\ nm$

Hence, length of the side of the cell = 0.407nm.

8. Aluminium crystallises in a cubic closed packed structure. Its metallic radius is 125pm.

i)What is the length of the side of the unit cell. ii) How many unit cells are there in $1cm^3$ of aluminium.

Solution :

i) In fcc, unit cell a = $2\sqrt{2}r$ = $2\sqrt{2}X\ 125 = 354\ pm = 354\ X10^{-10}$ cm

ii) Volume of the unit cell = a^3 = (354 x 10^{-10}cm)^3 = 44174155 x 10^{-30} cm^3

Number of unit cells in $1cm^3$ of Al = $\frac{1}{44174155\ X10^{-30}}$= 2.26 x 10^{22}

III Questions carrying 3 marks

1. **What is Packing Efficiency? Calculate packing efficiency in simple cubic crystal.**

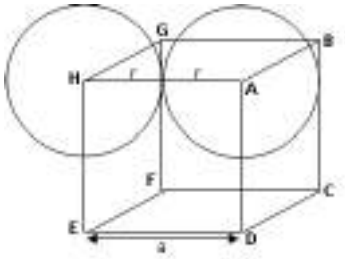
   "The percentage of total space of the unit cell filled by particles is called packing efficiency".

   Let the radius of the sphere be 'r' and edge length of the cube is 'a'

   a=2r

   Volume of the unit cell = a^3 = $(2r)^3$ = $8r^3$

   Packing efficiency = $\frac{\text{volume occupied by 1 sphere} \times 100}{\text{Total volume of the unit cell}}$ %



Packing efficiency = $\frac{\frac{4}{3}\pi r^3 \times 100}{8r^3}\%$

Packing efficiency = 52.4%

2. Calculate packing efficiency in body centeredcubic[BCC] crystal.

Let the edge length of the unit cell = a

Radius of the sphere=r

Body centered particle is in contact with corner particles AB = Body diagonal = 4r.

In Δ EFD,

$FD^2 = EF^2 + ED^2$

$b^2 = a^2 + a^2 = 2a^2$

Now in Δ AFD

$AF^2 = AD^2 + FD^2$

$c^2 = a^2 + b^2$

$c^2 = a^2 + 2a^2 = 3a^2$

$c = \sqrt{3}\, a$

But $c = 4r$

Therefore, $4r = \sqrt{3}\, a$

$a = \frac{4r}{\sqrt{3}}$

∴Total volume of the unit cell = $a^3 = \left[\frac{4r}{\sqrt{3}}\right]^3$

volume of one atom (one sphere) = $\frac{4}{3}\pi r^3$.

Number of particles per unit cell = 2

Total volume occupied by two sphere = $2 \times \frac{4}{3}\pi r^3$

$$\text{Packing efficiency} = \frac{\text{volume of two sphere in unit cell}}{\text{total volume of the unit cell}} \times 100$$

$$\text{Packing efficiency} = \frac{2 \times \frac{4}{3}\pi r^3}{\left[\frac{4r}{\sqrt{3}}\right]^3} \times 100$$

$$\frac{\frac{8}{3}\pi r^3}{\frac{64r^3}{3\sqrt{3}}} \times 100 = 68\%$$

3.Calculate packing efficiency in face centered cubic [FCC] or ccp and hcp crystal.

Let the edge length of the unit cell =a

Radius of the sphere = r

Length of the face diagonal AC = b = 4r

In Δ ABC, $AC^2 = BC^2 + AB^2$

$b^2 = a^2 + a^2$

$b = \sqrt{2}\, a$

But $b = 4r$

∴ $\sqrt{2}.a = 4r$

$$a = \frac{4r}{\sqrt{2}} = 2\sqrt{2}\ r$$

∴Total volume of the unit cell = $a^3 = (2\sqrt{2}r)^3$

volume of one atom (one sphere) = $\frac{4}{3}\pi r^3$.

Number of particles per unit cell = 4

Total volume occupied by four sphere = $4 \times \frac{4}{3}\pi r^3$

Packing efficiency = $\frac{\text{volume of four sphere in unit cell}}{\text{total volume of the unit cell}} \times 100$

Packing efficiency = $\frac{4 \text{ x } \frac{4}{3} \text{ x } \pi \text{ x } r^3}{\left(2\sqrt{2}r\right)^3} \text{ x } 100$

$$= \frac{\frac{16}{3}\pi r^3}{(2\sqrt{2}r)^3} \times 100 = 74\%$$

CHAPTER 2
SOLUTIONS

I Questions carrying 1 mark

1. **What are binary solutions?**
   Solutions containing two components are called binary solution.

2. **Which type of solution is formed by ornamental gold?**
   Solid solution.

3. **Among molarity and molality, which is temperature dependent?**
   Molarity.

4. **What is the effect of temperature on the solubility of gas in liquid?**
   Increase in temperature decreases the solubility of gas in liquid.

5. **What is the effect of pressure on the solubility of gas in liquid?**
   Increase of pressure increases the solubility of gas in liquid.

6. **State Henry's law.**
   At constant temperature, the solubility of a gas in liquid is directly proportional to the pressure of the gas.

7. **Write mathematical expression for Henry's law.**
   $p = K_H x$

8. **At a given temperature and pressure, nitrogen gas is more soluble in water than helium gas. Which one of them has higher value of K_H?**
   Helium.

9. **Henry's law constant for nitrogen and oxygen are 76.48 and 34.86 K bar respectively at 293 K. Which among the two is more soluble in water?**
   Oxygen.

10. **Soda water bottles are sealed under high pressure. Give reason.**
    To increase the solubility of carbon dioxide gas in liquid.

11. **State Raoult's law for a solution of volatile liquids.**
    For a solution of volatile liquids, the partial vapour pressure of each component of thesolution is directly proportional to its mole fraction present in the solution.

12. **What are ideal solutions?**
    The solutions which obey Raoult's law over the entire range of concentration are called ideal solutions.

13. **What are non-ideal solutions?**
    The solutions which do not obey Raoult's law over the entire range of Concentration are called non ideal solutions.

14. What are azeotropes?

Binary mixtures having same composition in liquid and vapour phase and boil at constant temperature are called azeotropes.

15. What are colligative properties?

The properties of dilute solutions which depend on number of solute particles and not on nature of solute particles are called colligative properties.

16. Write the SI unit of ebullioscopic constant.

K Kg mol^{-1}

17. Define osmotic pressure.

The external pressure applied on the solution just to stop osmosis is called osmotic pressure.

18. What are isotonic solutions?

Two solutions having same osmotic pressure at a given temperature are called isotonic solutions.

19. What happens to blood cell when placed in a solution containing more than normal saline concentration(0.9%**)?**

Blood cell shrinks.

20. What happens to blood cell when placed in a solution containing less than normal salineconcentration(0.9%**)?**

Blood cell swells.

21. What happens to blood cell when placed in a solution containing exact normal saline concentration(0.9%**)?**

No change.

22. What is reverse osmosis?

If a pressure applied on the solution is higher than osmotic pressure, then pure solvent molecules flow out of the solution through the semi permeable membrane. This phenomenon is called reverse osmosis.

23. Mention one application of reverse osmosis?

Desalination of sea water.

24. Define Van'thoff factor (l)

Van'thoff factor to account for the extent of dissociation or association.

Van't hoff factor is defined as

$$i = \frac{\text{normal (theoretical molar mass)}}{\text{Observed (experimental molar mass)}}$$

OR

$$i = \frac{\text{Observed colligative property}}{\text{Normal colligative property}}$$

25.What is the significance of Van't Hoff factor?

It accounts for extent of association or dissociation.

26.If i> 1, what is the conclusion drawn from it?

Solute in the solution undergoes dissociation.

27.If i< 1, what is the conclusion drawn from it?

Solute in the solution undergoes association.

28.What is the value of i for NaCl.

A: 2

29.What is the value of i fo K_2SO_4.

A: 3

30.What is the value of i for sugar.

A: 1

31.What is the value of i for glucose.

A:

II Questions carrying 2 marks.

1. **Write any two applications of Henry's law.**
   a) To increase the solubility of carbon dioxide in soft drinks.
   b) To avoid the disease bends for sea divers.

2. **Give any two differences between ideal solutions and non ideal solutions.**

Ideal solutions	Non ideal solutions
1. They obey Raoult's law at all concentrations.	1) They do not obey Raoult's law at all concentrations.
2. There is no change in enthalpy on mixing the two components. Or $\Delta_{mix}H = 0$	2) There is change in enthalpy on mixing the two components. Or $\Delta_{mix}H \neq 0$
3. There is no change in volume on mixing the two components. Or $\Delta_{mix}V = 0$	2) There is change in Volume on mixing the two components. Or $\Delta_{mix}V \neq 0$

III Questions carrying 3 marks.

3. **The vapour pressure of pure benzene at certain temperature is 0.850 bar. A non volatile solid weighing 0.5 g when added to 39 g of benzene (molar mass 78 g mol^{-1}), vapour pressure of the solution is 0.845 bar. What is the molar mass of solid substance?**

$$M_2 = \frac{w_2 \times M_1 \times P_1^0}{w_1 \times (p_1^0 - p_1)} \qquad M_2 = \frac{0.5 \times 78 \times 0.850}{39 \times (0.850 - 0.845)} = 170\ g mol^{-1}$$

4. **5.8 g of a non volatile solute dissolved in 100 g of carbon disulphide. The vapour pressure of the solution was found to be 190 mm of Hg. Calculate the molar mass of the solute. The vapour pressure of pure carbon disulphide is 195 mm of Hg. (molar mass of carbon disulphide = 76 g mol^{-1})**

$$M_2 = \frac{w_2 \times M_1 \times P_1^0}{w_1 \times (p_1^0 - p_1)} \quad M_2 = \frac{5.8 \times 76 \times 195}{100 \times (195 - 190)} = 171.91 \text{ gmol}^{-1}$$

5. **The boiling point of pure benzene is 353.23 K. When 1.80 g of a non-volatile solute was dissolved in 90 g of benzene, the boiling point is raised to 354.11 K. Calculate molar massof solute. Kb for benzene is 2.53 k Kg mol^{-1}.**

$$M_2 = \frac{1000 \times w_2 \times K_b}{\Delta T_b \times w_1} M_2 = \frac{1000 \times 2.53 \times 1.8}{0.88 \times 90} = 58 \text{ gmol}^{-1}$$

6. **On dissolving 2.34g of non electrolyte solute in 40 g of benzene, the boiling point of solution was higher than benzene by 0.81 K. K_b for benzene is 2.53 K Kg mol^{-1}. Calculate molar mass of solute.**

$$M_2 = \frac{1000 \times w_2 \times K_b}{\Delta T_b \times w_1} M_2 = \frac{1000 \times 2.34 \times 2.53}{0.81 \times 40} = 182.7 \text{ gmol}^{-1}$$

7. **1g of non electrolyte solute dissolved in 50 g of benzene lowered the freezing point of benzene by 0.40 K. The freezing point depression constant of benzene is 5.12 k Kg mol^{-1}. Find the molar mass of solute.**

$$M_2 = \frac{1000 \times w_2 \times K_f}{\Delta T_f \times w_1} \qquad M_2 = \frac{1000 \times 1 \times 5.12}{0.40 \times 50} = 256 \text{ gmol}^{-1}$$

8. **31g of unknown molecular material is dissolved in 500 g of water. The resulting solution freezes at 271.14 K. Calculate the molar mass of the material. (Given : K_f= 1.86 K Kg mol^{-1} andT_f^0 = 273 K)**

$$M_2 = \frac{1000 \times w_2 \times K_f}{\Delta T_f \times w_1} \qquad M_2 = \frac{1000 \times 31 \times 1.86}{1.86 \text{x} 500} = 62 \text{gmol}^{-1}$$

9. **200 cm ^{3} of an aqueous solution of a protein contains 1.26 gof the protein. The osmotic pressure of such a solution at 300 K is found to be 2.57 X 10 $^{-3}$ bar. Calculate the molar mass of the protein. (R = 0.083 L bar mol^{-1} K $^{-1}$)**

$$M_2 = \frac{w_2 \times RxT}{\pi xV} \qquad M_2 = \frac{1.26 \text{ x} 0.083 \text{ x } 300}{2.57 \text{x} 10^{-3} \times 0.2} = 61022 \text{ gmol}^{-1}$$

CHAPTER 3

ELECTROCHEMISTRY

I Questions carrying 1 mark

1. **What is molar conductivity?**
   Conductivity of the ions produced by one mole of the electrolyte in solution is called molar conductivity.

2. **What is limiting molar conductivity?**
   When the concentration of the solution approaches zero, the molar conductivity is called limiting molar conductivity. Or it is the conductivity at infinite dilution.

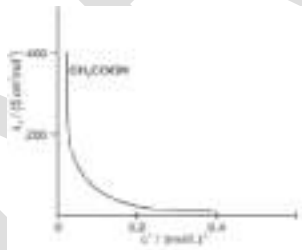
3. **Write the SI unit of molar conductivity.**
   Sm^2mol^{-1}

4. **What is conductivity?**
   The conductivity of unit volume of the solution is called conductivity.

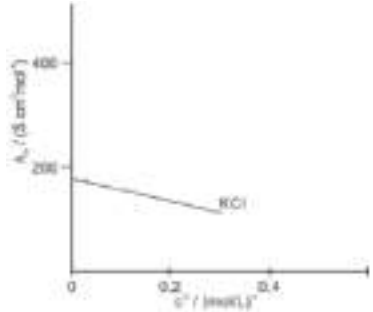
5. **Write the relationship between conductivity and molar conductivity.**
   $\Lambda_m = \frac{\kappa}{c}$

6. **Write the SI unit for conductivity**
   Sm^{-1}

7. **Draw the graph of molar conductivity vs square root of concentration for acetic acid (weak electrolyte)**



8. **Draw the graph of molar conductivity vs square root of concentration for KCl (strong electrolyte)**



9. **What is the electrode potential of SHE?**
   Zero volt

10. Write the Nernst equation for single electrode potential.

$$E_{(M^{n+}/M)} = E^{\ominus}_{(M^{n+}/M)} - \frac{RT}{nF} \ln \frac{1}{[M^{n+}]}$$

11. Write the relation between free energy and emf of cell.

$\Delta_r G = - nFE_{(cell)}$

12. What is fuel cell?

Galvanic cells that convert the energy of combustion of fuels directly into electrical energy are called fuel cells.

13. Represent the Daniel cell symbolically

$Zn|Zn^{2+}||Cu^{2+}|Cu$

14. Write the composition of rust

$Fe_2O_3.xH_2O$

15.Write Debye-Huckel Onsagar equation.'

$$\wedge_m = \wedge_m^0 - AC^{\frac{1}{2}}$$

16.What are Primary batteries?

The batteries which cannot be recharged are called primary batteries.

Example: i) Dry cell, ii) Mercury cells

17. What are Secondary batteries?

A cell which can be recharged by passing current through it in the opposite direction so that it can be used again is called secondary cell.

Example: Lead storage battery, Nickel-Cadmium cell (Nicad)

Questions carrying 2 marks

1. **State Kohlrausch's Law.**
   The law states that limiting molar conductivity of an electrolyte can be represented as the sum of the individual contributions of the anion and cation of the electrolyte.

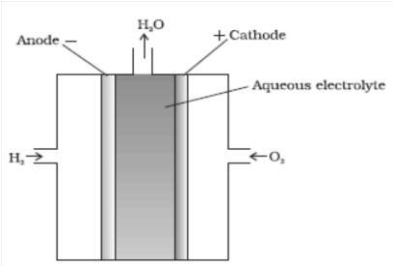
2. **State Faraday's I law of electrolysis.**
   During electrolysis ,the mass of the substance discharged at an electrode is directly proportional to the quantity of electricity passed through the electrolyte.

3. **State Faraday's II law of electrolysis.**
   When the same amount of electricity is passed through the different electrolytes,the masses of the substance discharged at different electrodes are directly proportional to their equivalent weights.

4. **Mention the methods of prevention of corrosion.**
   a) Painting b) Galvanizing. c) Alloying.

5. What are fuel cells?Draw a neat labeled diagram of H_2-O_2 fuel cell.Write the reactions

The cell which are designed to convert the energy from the combustion of fuels such as H_2, CO, CH_4 directly into electrical energy are called fuel cell



The electrode reactions are

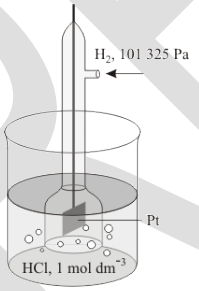
Anode: $2H_2(g) + 4OH^-(aq) \rightarrow 4H_2O(l) + 4e^-$

Cathode:$O_2(g) + 2H_2O(l) + 4e^- \rightarrow 4OH^-(aq)$

Overall reaction is $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$

6. Explain the construction and working of Standard Hydrogen Electrode (SHE).

Construction : It consists of a platinum foil fitted into a glass tube containing mercury. The inner glass tube is enclosed in an outer jar that contains an inlet at the top to pass hydrogen gas. The whole apparatus is placed in 1M HCl solution.



Working: Hydrogen gas passed is adsorbed on platinum surface.

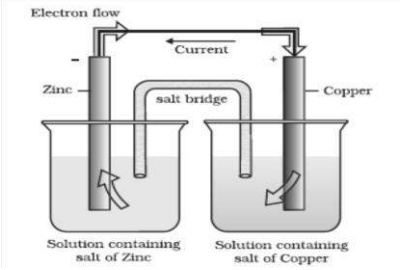
At Anode : $H_{2(g)} \rightarrow 2H^+_{(aq)} + 2e^-$

At Cathode :$2H^+(aq) + 2e^- \rightarrow H_2(g)$

Symbolic representation $Pt_{(s)} | H_2 | H^+_{(aq)}$

Emf of SHE is **0.0 V**

7. Draw a neat labeled diagram of Daniel Cell. Write its symbolic representation and expression for emf of the cell.



Symbolic representation $Zn|ZnSO_4||CuSO_4|Cu$

$$E_{(cell)} = E^{\ominus}_{(cell)} - \frac{RT}{2F}\ln\frac{[Zn^{2+}]}{[Cu^{2+}]}$$

7. Represent the cell in which the following reaction takes place
$Mg_{(s)} + 2Ag^{+}(0.0001M) \rightarrow Mg^{2+}(0.130M) + 2Ag(s)$Calculate its $E_{(cell)}$ if $E^{0}_{(cell)} = 3.17$ V.
The cell can be written as $Mg\,|Mg^{2+}\|Ag^{+}|\,Ag$

$$E_{cell} = E^{0}_{cell} - \frac{0.0591}{n}\log\frac{[Mg^{2+}]}{[Ag^{+}]^2}$$

$$E_{cell} = 3.17 - \frac{0.0591}{2}\log\frac{[0.130]}{[0.0001]^2}\,E_{cell} = 2.96V$$

9.Using the Nernst equation for the following cell at 298K calculate the emf.
$Al\,|Al^{3+}_{(0.001M)}\,\|\,Cu^{2+}_{(0.0001M)}\,|\,Cu$ given $E^{0}_{Al} = -1.66$ V and $E^{0}_{Cu} = +0.34$V

$E^{0}_{cell} = E^{0}_{Cu} - E^{0}_{Al} = 0.34-(-1.66) = 2.0$ V

$$E_{cell} = E^{0}_{cell} - \frac{0.0591}{n}\log\frac{[Al^{3+}]^2}{[Cu^{2+}]^3}$$

$$E_{cell} = 2.0 - \frac{0.0591}{6}\log\frac{[0.001]^2}{[0.0001]^3} = 1.941V$$

10.Λ^{0}_{m} for NaCl, HCl and NaAc are 126.4, 425.9 and 91.0 S cm^2mol^{-1}respectively. Calculate Λo for HAc.

$\Lambda^{0}_{m(HAc)} = \Lambda^{0}_{m(HCl)} + \Lambda^{0}_{m(NaAc)} - \Lambda^{0}_{m(NaCl)}$

$\Lambda^{0}_{m(HAc)} = 425.9 + 91.0 - 126.4$

$\Lambda^{0}_{m(HAc)} = 390.5\ Scm^2mol^{-1}$

CHAPTER 4
CHEMICAL KINETICS

I Questions carrying 1 mark

1. **The unit of rate of a reaction is $mol^{-1}Ls^{-1}$.What is the order of the reaction?**
   Second order reaction.

2. **What is meant by collision frequency?**
   Number of collisions per second per unit volume of the reaction mixture is known as collision frequency.

3. **Write Arrhenius equation in exponential form.**

   $$K = A.e^{-\frac{Ea}{RT}}$$

Where K = rate constant
E_a = activation energy
R = Real gas constant
T = Temperature
A = Arrhenius factor
A & E_a collectively called **Arrhenius parameter**.

4. **What happens to the half life period of a first order reaction is the initial concentration of reactant is increased ?**
   Remains same
5. **The unit of rate constant of a reaction is same as the unit of rate of reaction. What is the order of reaction**?
   Zero order reaction
6. **A chemical reaction has rate expression Rate= $K\{A\}^2\{B\}$ What is the order of reaction?**
   Order= 2+1=3
7. **Give an example for zero order reaction**
   Decomposition of ammonia on the surface of platinum catalyst
8. **Rate of reaction A → B increases two times by increasing the concentration of A by four times. What is the order of reaction**
   Half or ½
9. **Rate constant of a reaction is $K=3.4X\ 10^{-4}$ $mol^{-}LS^{-}$ What is the order of reaction**
   Second order
10. **In a zero order reaction the time taken to reduce the concentration of reactant from 50% to 25% is 30 minutes. What is the time required to reduce concentration from 25% to 12.5%**
    15 minutes

II Questions carrying 2 marks

1. **Write any two differences between order and molecularity of a reaction**

Order of reaction	Molecularity of a reaction
1. It is the sum of the powers of the concentration of the reactants in the rate law expression.	1.It is the number of molecules of reactants taking part in an elementary reaction
2. It is an experimentally determined quantity	2.It is theoretical quantity
3. It can be zero or a fraction or whole number	3. It is always a whole number.

2. **What is pseudo first order reaction? Give an example**
   A reaction of higher order which can be converted into first order by changing experimental condition is called pseudo first order reaction.
   Eg. Acid hydrolysis ethyl acetate

3. **What are two criteria for effective collision according to collision theory?**
   Molecule should have (i) Proper Orientation(ii) Activation energy/Threshold energy.

4. **What is zero order reaction? Give an example**
   Reaction in which rate of reaction is independent of concentration of reactants.
   Eg. (i)Decomposition of ammonia on hot platinum surface at high pressure **OR**
   (ii) Thermal decomposition of HI on gold surface.

5. **Derive half-life period equation for first order reaction. OR Show that half-life period of first order reaction is independent of initial concentration.**

   We know that $k = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$

   When $t = t_{\frac{1}{2}} \Longrightarrow [R] = \frac{[R]_0}{2}$

   $$k = \frac{2.303}{t_{\frac{1}{2}}} \log \frac{[R]_0}{\frac{[R]_0}{2}}$$

   $$k = \frac{2.303}{t_{\frac{1}{2}}} \log 2k$$

   $$= \frac{2.303}{t_{\frac{1}{2}}} \times 0.3010$$

   $$k = \frac{0.693}{t_{\frac{1}{2}}} \Longrightarrow t_{\frac{1}{2}} = \frac{0.693}{k}$$

   The final expression does not contain the initial concentration term. Hence half –life period of first order reaction is independent of initial concentration.

6. **Derive half -life time equation for zero order reaction**

   We know that $k = \frac{[R]_0 - [R]}{t}$

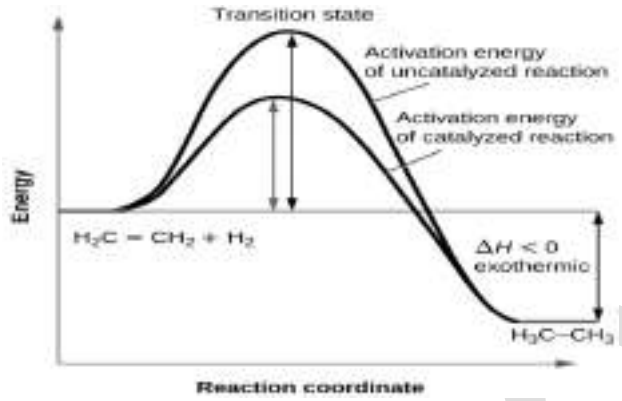
   When $t = t_{\frac{1}{2}} \Longrightarrow [R] = \frac{[R]_0}{2}$

   $$k = \frac{[R]_0 - \frac{[R]_0}{2}}{t_{\frac{1}{2}}}$$

   $$k = \frac{\frac{[R]_0}{2}}{t_{\frac{1}{2}}}$$

   $$\therefore t_{\frac{1}{2}} = \frac{[R]_0}{2k}$$

7. **Draw a graph of potential energy versus Reaction co-ordinate showing the effect of catalyst on Activation energy**



8.If the temperature coefficient of reaction is 2. How many times does the rate increases when the temperature is raised from 300 K to 340 K.

340 – 300 = 40

2^4 = 16 times

The rate increases by 16 times.

9.A first order reaction has a rate constant 1.15× 10^{-3} s^{-1}. How long will 5g of this reactant take to reduce 3g?

Solution:

$[R]_0$ = 5g , [R] = 3g

K = 1.15× $10^{-3}s^{-1}$

$t = \frac{2.303}{K} \log\frac{[R]_0}{[R]}$

$t = \frac{2.303}{1.15\times10^{-3}s^{-1}} \log\frac{5g}{3g}$

t = 2.00 ×10^3 log (1.667) s

t = 2 ×10^3×0.2219 s

t = 444 s

10. Unit of rate constant a reaction is same as that rate. What is the order of reaction?

Solution:

We know that, Unit of the rate is mol $L^{-1}s^{-1}$

Unit of rate constant zero order reaction is mol $L^{-1}s^{-1}$

∴ order is Zero

11. A first order reaction is found to have a rate constant, K = 5.5× 10^{-14} s^{-1}. Find the half life of the reaction.

Solution:

Half-life for a first order reaction is

$t_{\frac{1}{2}} = \frac{0.693}{K}$

$t_{\frac{1}{2}} = \frac{0.693}{5.5 \times 10^{-14} s^{-1}}$

$t_{\frac{1}{2}} = 1.26 \times 10^{13}$s

III Questions carrying 3 marks

1. **Derive integrated rate equation for the rate constant for zero order reaction.**

Consider a zero order reaction R → P

$\frac{-d[R]}{dt} = k[R]^o$

$\frac{-d[R]}{dt} = k$

d[R] = – kdt

On integration

$\int d[R] = -k \int dt$

[R] = – kt + I ⟶ (1)

Where, I is integration constant

When t = 0[R] = $[R]_0$

$[R]_o = -k \times 0 + I$ (since $[R]_o = I$) ∴ Equation (1) becomes

$[R] = -kt + [R]_o$

$kt = [R]_o - [R]$

$$k = \frac{[R]_o - [R]}{t}$$

2. **Derive an Integrated rate equation for rate constant of a first order reaction**

Consider a first order reaction. R → P

$\frac{-d[R]}{dt} = k[R]$ where k is rate constant

$\frac{d[R]}{[R]}$ = – kdt

on integration

$\int \frac{d[R]}{[R]}$ = – k$\int dt$

ln[R] = – kt + I ⟶ (1)

When t = 0, R = $[R]_o$, where $[R]_o$ = initial concentration of the reactant

∴ln$[R]_o$ = – k(0) + II = ln $[R]_o$

Hence equation (1) becomes

ln [R] = – kt + ln $[R]_o$

kt = – $[R]_o$ – ln [R]

kt = $\ln \frac{[R]_o}{[R]}$

k = $\frac{1}{t} \ln \frac{[R]_o}{[R]}$

k = $\frac{2.303}{t}$ log $\frac{[R]_o}{[R]}$

3.A first order reaction takes 40 min for 30% completion. Calculate $t_{\frac{1}{2}}$ (i.e., the time required for 50% decomposition).

Solution:

$[R]_0$ = 100%, [R] = 100 – 30 = 70% ,

t = 40min. $t_{\frac{1}{2}}$ = ?

K = $\frac{2.303}{t}$ log$\frac{[R]_0}{[R]}$

K = $\frac{2.303}{40}$ log$\frac{100}{70}$

K = $\frac{2.303}{40}$ log1.428

K = 8.90 $\times 10^{-3} \text{min}^{-1}$

$t_{\frac{1}{2}}$ = $\frac{0.693}{k}$ = $\frac{0.693}{8.90 \times 10^{-3}}$

$t_{\frac{1}{2}}$ = 0.077 $\times 10^{-3}$

$t_{\frac{1}{2}}$ = 77.77 min

3. **If the rate constant for reaction is 1.6 x 10^{-5}sec^{-1} and 6.36 x 10^{-3}sec^{-1} at 600K and 700K respectively calculate the energy of activation for the reaction [given R = 8.314 kJ mol^{-1}K^{-1}]**

$$\log\frac{k_2}{k_1} = \frac{E_a}{2.303\,R}\left[\frac{T_2 - T_1}{T_1 T_2}\right]$$

$$\log\frac{6.36 \times 10^{-3}}{1.6 \times 10^{-5}} = \frac{E_a}{2.303 \times 8.314}\left[\frac{700 - 600}{600 \times 700}\right]$$

$$E_a = 209 \text{ kJ/ mol}$$

CHAPTER 5
SURFACE CHEMISTRY

I Questions carrying 1 mark

1. **What is adsorption?**
   The process of accumulation of gas or liquid molecules on the surface of a solid is called adsorption.

2. **Solid adsorbents are very effective in finely divided state. Give reason.**
   This is because large surface areain finely divided state

3. **Solution of methylene blue turns colourless, when animal charcoal is added to it. Give reason**
   Due to adsorption of organic dye on the surface of charcoal, filtrate becomes colourless.

4. **What are the values of ΔS during adsorption?**
   ΔS is negative

5. **What are the values of ΔH during adsorption?**
   ΔH is negative

5.Write Freundlich adsorption isotherm:

$$\frac{X}{m} = K \cdot P^{1/n}\,(n > 1))$$

6. **What is emulsion?**
   Emulsion is a colloidal system in which both dispersed phase and dispersion medium are liquid.

7. **Name the dispersed phase and dispersion medium in gel.**
   Dispersed phase – liquid and dispersion medium – solid.

8. **What is sol?**

Sol is a colloidal system in which dispersed phase is solid and dispersion medium is liquid.

9. What is the role of KOH used in the preparation of gold sol?

KOH stabilises the gold sol.

10. What is Peptization?

The process of conversion of freshly prepared precipitate into a colloidal solution by adding an electrolytecontaining common ion is called Peptization.(The electrolyte is called peptizing agent.)

11. What is dialysis?

Dialysis is a process of removing a dissolved substance froma colloidal solution by means ofdiffusion through a semipermeable membrane.

12. What is the role of alum in the purification of drinking water?

It acts as a coagulant.

13. What is electrophoresis?

The movement of colloidal particles towards cathode or anode under an applied electric field is called electrophoresis

14. State Hardy-Schulze rule.

It states that "the larger the valency of the active ion (coagulating ion), the Greater is its precipitation action (power)".

15. Zeolites are good shape selective catalysts. Give reason.

Due to their honeycomb like structures.

(Note;ZSM-5 is used to convert alcohol into petrol.)

16. What is Tyndall effect?

Scattering of light by colloidal particles is called Tyndall effect.

I Questions carrying 2 marks

1.Give any two differences between physical adsorption and chemical adsorption

Physical adsorption (Physisorption)	**Chemical adsorption (Chemisorption)**
It involves weak van der Waal's forces of attraction.	It involves strong chemical bond forces of attraction.
It is reversible.	It is irreversible.
It is not specific in nature.	It is highly specific in nature.
Enthalpy of adsorption is low (20-40 kJ/mol)	Enthalpy of adsorption is high (80-240 kJ/mol)
It forms Multimolecular layer.	It forms unimolecular layer.
Low temperature is favourable.	High temperature is favourable.
Energy of activation is low.	Energy of activation is high.

2.What is homogeneous catalysis? Give example.

A reaction in which the reactants and catalyst are in the same phase is called homogeneous catalysis.

Eg. $2SO_2(g) + O_2(g) \xrightarrow{NO(g)} 2SO_3(g)$

3.What is heterogeneous catalysis? Give example.

A reaction in which the reactants and catalyst are indifferent phase is called heterogeneous catalysis.

Eg. $2SO_2(g) + O_2(g) \xrightarrow{Pt(s)} 2SO_3(g)$

4.Give any two characteristics of enzyme catalysis.

1. Enzymes are highly specific in nature.
2. Enzymes are active under optimum temperature (310 K)
3. Enzymes are highly active under optimum pH (5.7)
4. The enzyme activity is increased by a substance called coenzyme (non-protein part, vitamins)
5. Enzymes activity is poisoned by inhibitors like $Pb2^+$, Ag^+, $Cr3^+$ salts.

5.Give any two differences between lyophilic and lyophobic colloids.

Sl. No	Lyophilic colloids	Lyophobic colloids.
1	They have more affinity for the medium.	They have little or no affinity for the medium.
2	They are reversible sols.	They are irreversible sols.
3	They are more stable.	They are less stable.
4	Particles are solvated.	Particles are not solvated.
5	They may or may not carry any charge.	They always carry positive or negative charge.
6	They cannot be coagulated easily.	They can be coagulated easily.
7	Viscosity is more than that of the medium.	Viscosity is almost same as that of the medium.

6.What is Brownian movement? What is the cause for the Brownian movement?

The zig-zag movement of colloidal particles in a colloidal solution is called Brownian movement.

The Brownian movement is due to the transfer of kinetic energy by the molecules of dispersion medium to colloidal particles during collision.

7.How do you prepare gold sol by Bredig's arc method?

Bredig's arc method is used to prepare metal sols like gold sol, silver sol, platinum sol etc.

In this method two gold rods are dipped in ice cold water containing little KOH (alkali is added to stabilizesol.) The vessel is kept in freezing mixture. An electric arc is struck between two gold rods. Heat produced by the spark causes a small amount of gold to vapourize. The vapours of gold cooledsuddenly to form colloidal gold or gold sol.

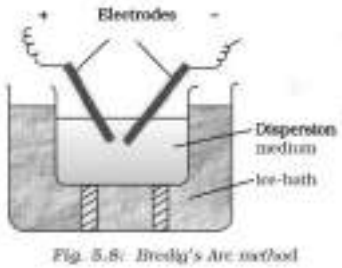


Fig. 5.8: Bredig's Arc method

8.Mention the types of emulsions.

(i) Oil dispersed in water (O/W type)

(ii) Water dispersed in oil (W/O type)

CHAPTER 6
GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF ELEMENTS

I Questions carrying 1 mark

1. **Name the method used to concentrate sulphide ores.**
   Froth flotation process.

2. **What is the principle involved in froth flotation process?**
   The ore particles are wetted by oil and gangue particles are wetted by water.

3. **What is the role of sodium cyanide (NaCN) in froth flotation process?**
   Depressant.

4. **Give the composition of 'copper matte'.**
   Mixture of Cu_2S and FeS.

5. **Name an element refined by zone refining method.**
   Germanium or Silicon

6. **Name a metal refined by van Arkel method.**
   Zirconium or Titanium.

7. **Name the process used for the purification of Nickel.**
   Mond process.

8. **Name a method used to refine tin?**
   Liquation.

9. **Which method is used to refine Zinc and Mercury?**
   Distillation method.

10. **Which metal is refined by electrolysis?**
    Copper or Zinc.

11. **What is the role of NaCN in Froth flotation process?**
    Acts as depressant

II. **Questions carrying 2 marks**

1. Explain Mond process of refining nickel with equations.

Nickel is heated with carbon monoxide to get nickel tetra carbonyl.

$$Ni + 4CO \xrightarrow{330\text{-}350K} Ni(CO)_4$$

Nickel carbonyl is decomposed to get pure nickel

$$Ni(CO)_4 \xrightarrow{450\text{-}470K} Ni + 4CO$$

2. Explain van Arkel method of refining zirconium with equations.

Zirconium is heated with iodine to get zirconium tetra iodide.

$$Zr + 2I_2 \longrightarrow ZrI_4$$

Zirconium carbonyl is decomposed to get pure Zirconium

$$ZrI_4 \xrightarrow{1800K} Zr + 2I_2$$

3. Write equations for reactions taking place at different zones in the blast furnace.

Zones of combustion: $C + O_2 \rightarrow CO_2$

$$CO_2 + C \rightarrow 2CO$$

Zone of reduction:

$$Fe_3O_4 + CO \rightarrow 3FeO + CO_2$$

$$Fe_3O_4 + CO \rightarrow 3FeO + CO_2$$

At higher temperature range (900-1500K)

$$C + CO_2 \rightarrow 2CO$$

$$FeO + CO \rightarrow Fe + CO_2$$

Zone of slag formation :

$$CaCO_3 \rightarrow CaO + CO_2$$

$$CaO + SiO_2 \rightarrow CaSiO_3$$

III. Questions carrying 3 marks

4. Write 3 steps involved in the leaching of bauxite to get pure alumina

The bauxite ore is digested with concentrated solution of sodium hydroxide (caustic soda) at 473-523K in an autoclave under a pressure of 35-36 bar. Aluminium oxide dissolves in NaOH. The oxides of iron and tin which do not dissolve in NaOH are removed by filtration. Al_2O_3 is leached out as sodium aluminate and SiO_2 as sodium silicate.

$$Al_2O_3(s) + 2NaOH(aq) + 3H_2O(l) \rightarrow 2Na[Al(OH)_4](aq)$$

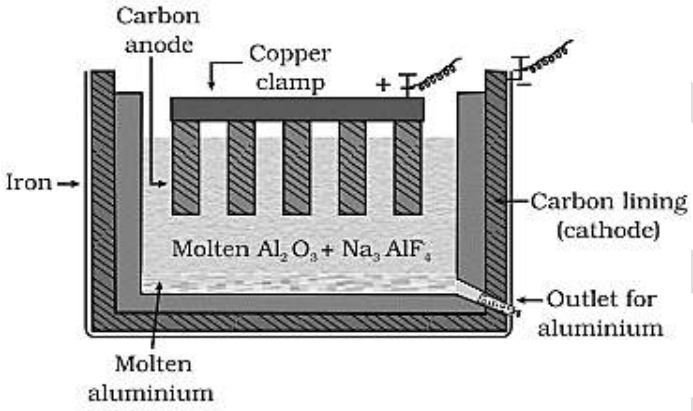
The solution of sodium aluminate is neutralized by passing carbon dioxide gas and hydrated aluminium oxide is precipitated.

$$2Na[Al(OH)_4](aq) + CO_2(g) \rightarrow Al_2O_3.xH_2O(s) + 2NaHCO_3(aq)$$

The precipitate of hydrated alumina is separated by filtration. Then the precipitate is dried and heated strongly to 1470K to get back Al_2O_3. Sodium silicate remains in the solution.

$$Al_2O_3 \,.\, xH_2O(s) \xrightarrow{1470k} Al_2O_3(s) + xH_2O\,(g)$$

5. **In the electrolytic extraction of aluminium by Hall -Heroultprocess,**
   - I. **Write the neat labelled diagram of electrolyte cell.**
   - II. **Write anodic and Cathodic reactions.**
   - III. **Write overall cell reaction.**



ii)Cathode: $Al^{3+} + 3e^- \longrightarrow Al$

Anode: $C + O^{2-} \longrightarrow CO + 2e^-$

OR $C + 2O^{2-} \longrightarrow CO_2 + 4e^-$

iii)Overallreaction: $2Al_2O_3 + 3C \longrightarrow 4Al + 3C$

6. **In the electrolytic extraction of aluminium by Hall process,**
   - I. **Give the composition of electrolyte used.**
   - II. **At which electrode oxygen gets discharged.**
   - III. **Role of Cryolite.**

i) Purified Al_2O_3 mixed with Na_3AlF_6 or CaF_2

ii) Anode

iii) Cryolite decreases the melting point of electrolyte and increases the conductivity.

7. **How copper is extracted from low grade ores and scraps**

In the extraction of copper, copper ions are reduced by using H_2 or scrap iron. This method is effective in low grade ores which are concentrated using bacterial actions or by treatment with acids.

$$Cu^{2+}(aq) + Fe(s) \rightarrow Fe^{+2}(aq) + Cu(s)$$

$$Cu^{2+}(aq) + H_2(g) \rightarrow Cu(s) + 2H^+(aq)$$

(Since the reduction potential of Zn is less than Fe, the above reduction is faster in case of Zn scraps. But zinc is costlier metal than iron. So using Zn scrap reduction is not advisable and is uneconomical)

CHAPTER-7

P- BLOCK ELEMENTS (GROUP 15 &16)

I Questions carrying 1 mark.

1. **Why dinitrogen is inert at room temperature?**
   It is due to high bond enthalpy of N ≡ N bond.

2. **Which property of Conc. sulphuric acid chars sugar?**
   Dehydrating property.

3. **Complete the following reactions.**

   I. $2PbS + 4O_3 \longrightarrow$ -------- + ---------

   II. $SO_2 + Cl_2 \longrightarrow$ ----------

   III. $3S + 2H_2SO_4 \longrightarrow$ ------- +---------

   IV. $2KClO_3 \xrightarrow{MnO_2\ (heat)}$ ____ + ____

   I. $PbSO_4+O_2$

   II. SO_2Cl_2

   III. $3SO_2+2H_2O$

   IV. $2KCl+3O_2$

II Questions carrying two marks.

4. **Explain the laboratory preparation of Phosphine.**
   In the laboratory, phosphine is prepared by heating white phosphorus with concentrated NaOH solution in an inert atmosphere of CO_2.
   $P_4 + 3NaOH + 3H_2O \longrightarrow PH_3 + 3NaH_2PO_2$

5. **Explain the preparation of Ozone.**
   Ozone is prepared by passing silent electric discharge through pure and dry oxygen.
   $3O_2 \longrightarrow 2O_3$

6. **Phosphene has lower boiling point than ammonia .Why**
   Phosphene does not form intermolecular hydrogen bonding in liquid state.

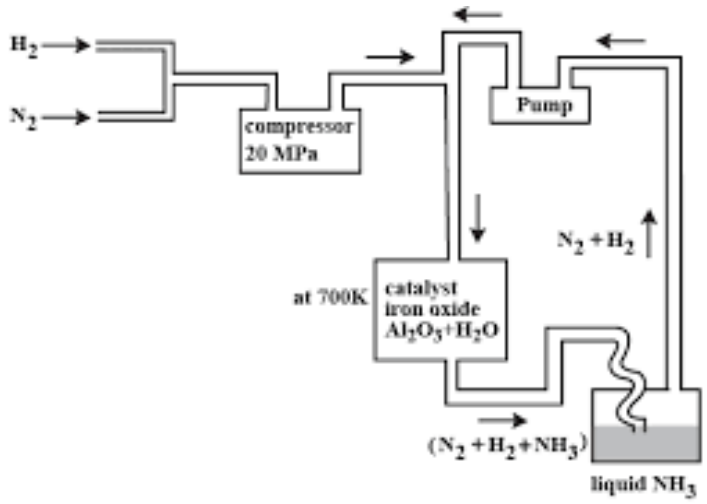
II. Questions carrying 3 marks.

7. **For the manufacture of ammonia by Haber's process,**
   1. **Write the balanced chemical equation.**
   2. **Mention the reaction conditions.**
   3. **Draw the flow chart**

Ammonia is manufactured by Haber's process which involves the direct combination of nitrogen and hydrogen. 1:3 ratio

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)\ \Delta_fH_0 = -46.KJ\ mol^{-1}$

According to Le-chatelier's principle high pressure favor the formation of ammonia.
The optimum conditions for the production of ammonia are;
a) A pressure of $200X10^5$ Pa (about 200 atm).
b) A temperature of 700K.
c) Catalyst such as iron oxide with small amounts of K_2O and Al_2O_3 as promoters.
.



Manufacturing of Ammonia

8. **Write three chemical equations involved in the preparation of nitric acid by Ostwald process.**

It involves three steps;

- Ammonia is oxidised by atmospheric oxygen in presence of platinum or rhodium catalyst at 500K and 9bar pressure.

$$4NH_{3(g)} + 5O_{2(g)} \xrightarrow{\text{Pt-Rh gauze /500K}} 4NO_{(g)} + 6H_2O_{(g)}$$

- Nitric oxide thus formed further oxidized with more oxygen to give nitrogen dioxide.

$$2NO_{(g)} + O_{2(g)} \rightleftharpoons 2NO_{2(g)}$$

- Nitrogen dioxide so formed, dissolves in water to give nitric acid.

$$3NO_{2(g)} + H_2O_{(l)} \rightarrow 2HNO_{3(aq)} + NO_{(g)}$$

Nitric oxide, thus formed is recycled and the aqueous HNO_3 can be concentrated by distillation upto 68% by mass. Further concentration to 98% can be achieved by dehydration with concentrated H_2SO_4

9. **Write chemical equations involved in the manufacture of sulphuric acid by Contact process. Mention the reaction conditions.**

SO_2 is produced by burning iron pyrite in the presence of excess air

$$\mathbf{S + O_2 \rightarrow SO_2}$$

$$4FeS_2 + 11O_2 \longrightarrow 8SO_2 + 2Fe_2O$$

SO_2 is converted into SO_3 in the presence of V_2O_5 catalyst at 720Kand 2atm

$$2SO_2 + O_2 \xrightarrow[720k]{V_2O_5,\ 2\ atm} 2SO_3$$

The SO_3 from the catalytic converter is absorbed by H_2SO_4 to produce oleum.

$$SO_3 + H_2SO_4 \longrightarrow \underset{\textbf{oleum}}{H_2S_2O_7}$$

Oleum is diluted with water to form H_2SO_7 get 96-98% pure H_2SO_4

$$H_2S_2O_7 + H_2O \longrightarrow 2H_2SO_4$$

10. **Write any three reasons for anomalous behavior of Oxygen /Nitrogen / Fluorine**

Anomalous behavior is due to i) Small size ii) High electronegativity iii) Does not have empty d-orbitalsiv)High ionization enthalpy.

Group 17 Elements (Halogens)

I Question carrying 1 mark

11. What are interhalogen compounds?

Compounds formed when two different halogens react with each other are called interhalogen compounds.

12. Why are interhalogen compounds more reactive than halogens?

Because X-X^{I} bond in interhalogen compounds is weaker than X-X bond in halogens.

13. What is the composition of aqua regia?

Mixture of Conc. HCl and HNO_3 in the ratio 3:1.

14. Complete the following chemical equations

I. $8\ NH_{3\ (excess)} + 3Cl_2 \longrightarrow$ ------- + N_2

II. $NH_3 + 3Cl_{2\ (excess)} \longrightarrow$ ------- + 3HCl

III. $2NaOH_{\ (colddilute)} + Cl_2 \longrightarrow$ NaCl + ------- + H_2O

IV. $6NaOH\ (_{hot\ \&conc)} + 3Cl_2 \longrightarrow$ 5NaCl + ------- + $3H_2O$

V. $Br_2 + 3F_2 \longrightarrow$ -------

($6NH_4Cl$, NCl_3,NaClO, $NaClO_3$, $2BrF_3$)

II Question carrying 2 marks.

15. How is chlorine manufactured by Deacon's process? Write the balanced chemical equation.

Chlorine is prepared by the oxidation of HCl gas in atmospheric oxygen in the presence of $CuCl_2$catalyst at 723K.

$4HCl + O_2 \xrightarrow{CuCl2} 2Cl_2 + 2H_2O$

16. How does hot and concentrated NaOH react with chlorine.

Hot and concentrated NaOH react with chlorine to form ***sodium chlorate*** and sodium chloride

$4NaOH + 3Cl_2 \rightarrow 5NaCl + NaClO_3 + 3H_2O$

17. How is chlorine prepared using $KMnO_4$

It is prepared by the action of concentrated HCl on $KMnO_4$

$2KMnO4 + 16HCl \rightarrow 2KCl + MnCl_2 + 8H_2O + 5Cl_2$

18. Mention two anomalous behaviour of oxygen

i) Oxygen is diatomic gas while other elements of the group are solids

ii) Oxygen forms hydrogen bonds while other elements do not

iii) Oxygen has a maximum covalency of four while other show maximum of six

GROUP 18 ELEMENTS (Noble Gases)

1. **Write the chemical formula of the first noble gas compound prepared.**
   $Xe[PtF_6]$.

2. **Name the noble gas which doesnot has general electronic configuration $ns^2\ np^6$.**
   Helium.

3. **Noble gases have low boiling point. Why?**
   Due to weak interatomic forces.

4. **Give a reason for chemical inertness of noble gases.**
   Due to completely filled outermost shell.

5. **Complete the following reaction. $XeF_6 + 2H_2O \longrightarrow ? + 4HF$**
   XeO_2F_2.

6. **Name the main commercial source of helium.**
   Natural gas.

7. **Name the radioactive noble gas.**
   Radon.

8. **Name the most abundant noble gas.**
   Argon.

9. **Give equation for the preparation of XeF_2.**
   $Xe + F_2 \dashrightarrow XeF_2$.

CHAPTER-8
D AND F BLOCK ELEMENTS

I Questions carrying 1 mark:

1. **Name the element of 3d series which shows maximum oxidation state?**
   Manganese (Mn)

2. **Among Zn^{2+} and Co^{3+}, which is diamagnetic?**
   Zn^{2+}

3. **Why Zn^{2+} salts are colourless?**
   Due to the absence of unpaired d-electrons.

4. **What are interstitial compounds?**
   These are the compounds formed when small atoms like H, C, or N are trapped inside crystal lattices of metals.

5. **What is lanthanoid contraction?**
   The gradual decrease in atomic and ionic radii from lanthanum to lutetium is called lanthanide contraction.

6. **What is the cause of lanthanoid contraction?**
   Due to imperfect shielding of 4f- electrons.

7. **What is the common oxidation state of Lanthanoids?**
   +3

8. **Why zirconium and Hafnium occur together in nature?**
   Due to lanthanoid contraction.

Questions carrying 2 marks:

1. **Transition elements show variable oxidation states. Give two reasons.**
   I. Partially filled d-orbitals
   II. Small energy gap between (n-1) d and ns orbitals.

2. **Transition metals form complex compounds. Give two reasons.**
   I. Small size
   II. High ionic charge
   III. Availability of vacant d-orbital (Any two)

3. **Transition elements show catalytic properties. Give any two reasons.**
   i) Variable oxidation states
   ii) Large surface area
   iii) Presence of vacant d-orbitals

4. **Calculate the magnetic moment of Fe^{2+} (Z=26)**

(Number of unpaired electrons=n=4)

$\mu = \sqrt{n(n+2)}$

$\mu = \sqrt{4(4+2)}$

μ = 4.90 BM

5. **Calculate the magnetic moment of M^{2+} (Z=25)**

(Number of unpaired electrons=n=5)

$\mu = \sqrt{n(n+2)}$

$= \sqrt{5(5+2)}$

= 5.92 BM

Questions carrying 3marks:

6. **Write the equations involved in the manufacture of potassium dichromate from chromite ore.**

It is manufactured from chromite ore [$FeCr_2O_4$].

Step I: *Concentration:* The finely powdered ore is concentrated by gravity separation.

Step 2: *Roasting* *[conversion to sodium chromate]:* The concentrated ore is mixed with sodium carbonate in excess of air.

$$4FeCr_2O_4 + 8Na_2CO_3 + 7H_2O \rightarrow \underset{\text{yellowcolour}}{8NaCrO_4} + 2Fe_2O_3 + 8CO_2$$

Step 3: *Conversion to sodium di-chromate:* The yellow solution of sodium chromate is filtered & acidified with H_2SO_4 to give orange colour of sodium di-chromate.

$$2Na_2CrO_4 + H_2SO_4 \rightarrow \underset{\text{orange red}}{Na_2Cr_2O_7} + Na_2SO_4 + H_2O$$

Step 4: *conversion to potassium chromate:* Sodium di- chromate is more soluble then potassium di-chromate hence sodium di-chromate is treated with calculated amount of KCl to give potassium di-chromate. $Na_2Cr_2O_7 + 2KCl \rightarrow K_2Cr_2O_7 + NaCl$

7. **How is $KMnO_4$ is manufactured from MnO_2?**

It is prepared by fusion of pyrolysite ore [Mn_2] with alkaline solution [KOH or NaOH] & in the presence of excess of air & an oxidizing agent like KNO_3.

Step I: MnO_2 is converted into dark green di-potassium magnate [K_2MnO_4].

$$2MnO_2 + 4KOH + O_2 \xrightarrow{KNO_3} 2K_2MnO_4 + 2H_2O\uparrow$$

Step II: Di potassium magnate is acidified or disproportionate to give purple colour of potassium permanganate.

$$3K_2MnO_4 + 2H_2SO_4 \rightarrow 2KMnO_4 + 2K_2SO_4 + MnO_2 + 2H_2O$$

OR

$$3MnO_4^{2-} + 4H^+ \rightarrow 2MnO^-_4 + MnO_2 + 2H_2O$$

The solution is concentrated & cool to form purple black crystals of potassium permanganate.

CHAPTER-9

COORDINATION COMPOUNDS

Questions carrying 1 mark:

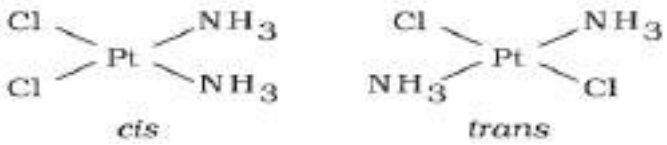
1. **What is the Coordination number of a complex?**
   Total number of Coordinate bonds around central metal atom in a complex is called Coordination number
2. **How many moles of AgCl will be precipitated when excess of $AgNO_3$ solution is added to one molar solution of $\{CrCl(H_2O)_2\}Cl_2$**
   Two moles
3. **What are Ambidentate ligands**
   Ligands which can ligate through two different atoms with in the molecule are called as ambidentate ligands.
4. **Give an example for Ambidentate ligand.**
   NO_2^- or CN^-
5. **Write the IUPAC Name of $K_2\{Zn(OH)_4\}$**
   Potassium tetrahydroxidozincate(II)
6. **What are ligands?**
   The ions or molecules bonded to the central metal atom or ion in a coordination entity are called ligands.
7. **When is linkage isomerism possible for a coordination compound?**
   When a coordination compound contains an ambidentate ligand

Questionscarrying 2 marks:

8. **What are homoleptic complexes? Give an example.**
   Complexes in which central metal ion or atom is bound to only one type of donor groups are called homoleptic complexes. Ex: $K_4[Fe(CN)_6]$

9. **What are heteroleptic complexes? Give an example.**
   Complexes in which central metal ion or atom is bound to more than one type of donor groups are called heteroleptic complexes. Ex: $[Co(NH_3)_5Cl]SO_4$

10. **Draw cis and trans isomers of $[Pt(NH_3)_2Cl_2]$**



11.Draw cis and trans isomers of $[CoCl_2(NH_3)_4]^+$ ion.

12. **What is linkage isomerism? Give an example.**

Linkage isomerism is type of isomerism in which two complex compounds differ in the donor atoms for ligands (different ligating atoms). It is shown by complex compounds containing ambidentate ligands.

Ex: $[Co(NH_3)_5NO_2]Cl_2$ and $[Co(NH_3)_5(ONO)]Cl_2$

13.What is coordination isomerism in complexes? Give one example.

Coordination isomerism is type of isomerism which arises due to interchange of ligands between cationic and anionic entities of different metal ions present in a complex.

Ex: $[Co(NH_3)_6][Cr(CN)_6]$ and $[Cr(NH_3)_6][Co(CN)_6]$

14.What is ionization isomerism in complexes? Give an example.

Ionisation isomerism is type of isomerism in which two complex compounds produce different ions on ionisation in in solution.

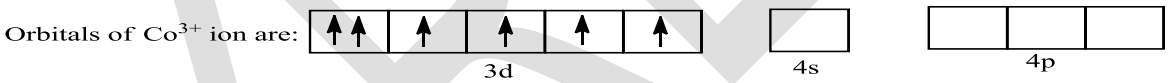
Ex: $[Co(NH_3)_5Cl]SO_4$ and $[Co(NH_3)_5SO_4]Cl$

Questions carrying 3 marks

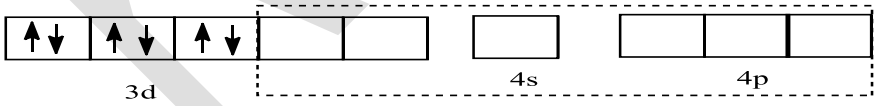
15.On the basis of VBT explain the Hybridisation, geometry and magnetic property of $[Co(NH_3)_6]^{3+}$. [Given atomic number of Co = 27].

Electronic configuration of Co is $[Ar]\ 3d^7\ 4s^2$.

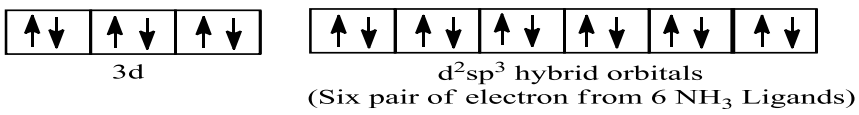
Electronic configuration of Co^{3+} is $[Ar]\ 3d^6 4s^0$.



When strong ligand NH_3 approaches the Co^{3+} ion, pairing of electrons takes place in 3d orbital occurs against Hunds rule.



Co^{3+} ion can undergo d^2sp^3hybridisations. The six hybrid orbitals the overlap with orbitals of six NH_3 ligands.



Hybridisation : d^2sp^3

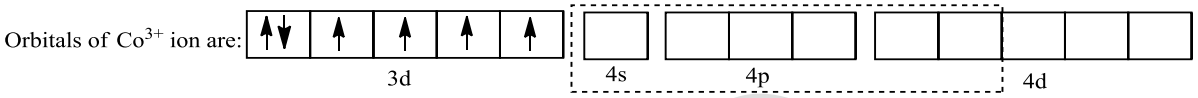
Geometry :Octahedral

Magnetic property : Diamagnetic due to absence of unpaired electrons

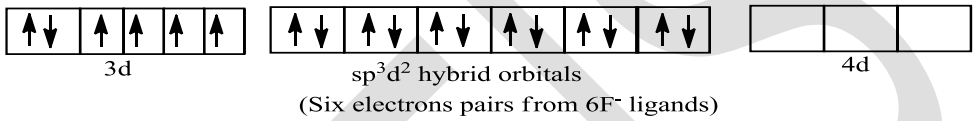
16.On the basis of VBT explain the hybridisation, geometry and magnetic property of $[CoF_6]^{3-}$. [Given atomic number of Co = 27].

Electronic configuration of Co is [Ar] $3d^7 4S^2$

Electronic configuration of Co^{3+} is [Ar] $3d^6 4S^0$.



When weak ligand F^- approaches the Co^{3+} ion, it undergo sp^3d^2hybridisation. The six hybrid orbitals overlap with orbitals of six F^- ligands to form complex.

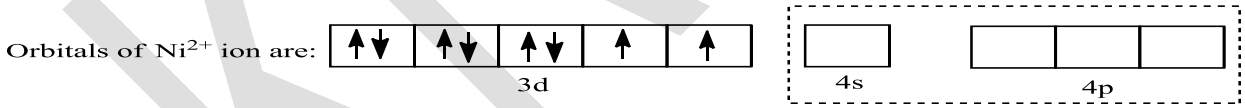


Hybridisation :**sp^3d^2**
Geometry **:Octahedral**
Magnetic property **: Paramagnetic due to presence of unpaired electrons**

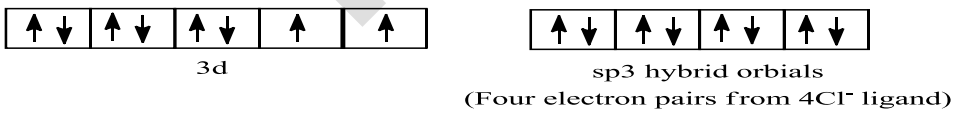
17.With the help of VBT explain hybridisation, geometry and magnetic property of $[NiCl_4]^{2-}$. [Given atomic number of Ni = 28].

Electronic configuration of Ni is [Ar] $3d^8\ 4S^2\ 4P^0$

Electronic configuration of Ni^{2+} is [Ar] $3d^8\ 4S^0\ 4P^0$



When weak ligand, Cl^- approaches the Ni^{2+} ion, it undergo sp^3hybridisation. The four hybrid orbitals overlap with orbitals of four Cl^- ligands.



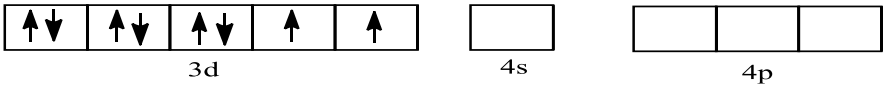
Hybridisation : sp^3
Geometry :Tetrahedral
Magnetic property : Paramagnetic due to presence of unpaired electrons

18.With the help of VBT explain hybridisation, geometry and magnetic property of $[NiCN_4]^{2-}$. [Given atomic number of Ni = 28].

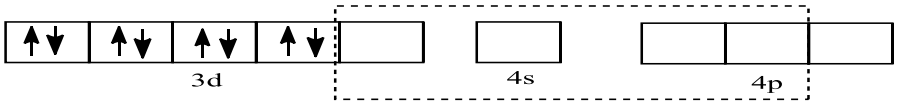
Electronic configuration of Ni is [Ar] $3d^8\ 4S^2$

Electronic configuration of Ni^{2+} is [Ar] $3d^8$

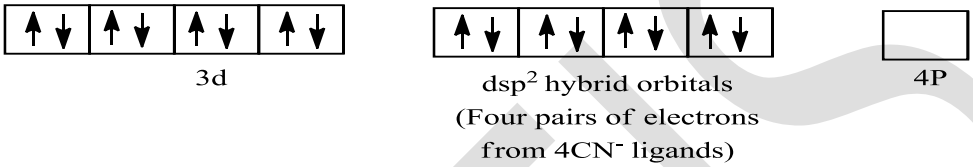
Orbitals of Ni^{2+} ion are:



When strong ligand, CN^- approaches the Ni^{2+} ion pairing of electrons takes place in 3d-orbital against Hunds rule.



Ni^{2+} can undergo dsp^2hybridisation. The four hybrid orbitals then overlap with orbitals of four CN^- ligands to form complex.



Hybridisation : dsp^2
Geometry : Square planar
Magnetic property : Diamagnetic due to absence of unpaired electrons.

19.Write any three postulates of Werner's theory of coordination compounds.

I. In coordination compounds metals show two types of linkages (valences) - primary and secondary.
II. The primary valences are normally ionisable and are satisfied by negative ions.
III. The secondary valences are non-ionisable. These are satisfied by neutral molecules or negative ions.
IV. The ions/groups bound by the secondary linkages to the metal have characteristic spatial arrangements.

CHAPTER-10
HALOALKANES AND HALOARENES

I Questions carrying 1 mark:

1. **What is the hybridisation of the carbon attached with Vinylic halides or Aryl halides?**

   sp^2hybridisation

2. **Why tertiary alkyl halide undergo S_N1 reaction very fast?**

   Because of the high stability of tertiary carbocation.

3. **What are enantiomers?**

   The stereoisomers which have non-super imposable on their mirror images are called enantiomers.

4. **What are racemic mixtures**?

   A mixture containing two enantiomers in equal proportions is called racemic mixture.

5. What is the general formula of Grignard reagents?

R-Mg-X.

6. Write the general equation of Finkelstein reaction.

$$R - X + NaI \xrightarrow{\text{Acetone}} R - I + NaX$$

Ex: $$C_2H_5 - Br + NaI \xrightarrow[\Delta]{\text{dry acetone}} C_2H_5 - I + NaBr$$

7. What is Chiral carbon atom

Carbon atom which is bonded to four different atoms or groups is called Chiral carbon atom

8. **Name the catalyst used in Friedel Craft reaction**

   Anhydrous aluminium Chloride

9. **Ethyl bromide reacts with sodium metal in presence of dry ether to form Butane. What is the name of reaction?**

   Wurtz reaction

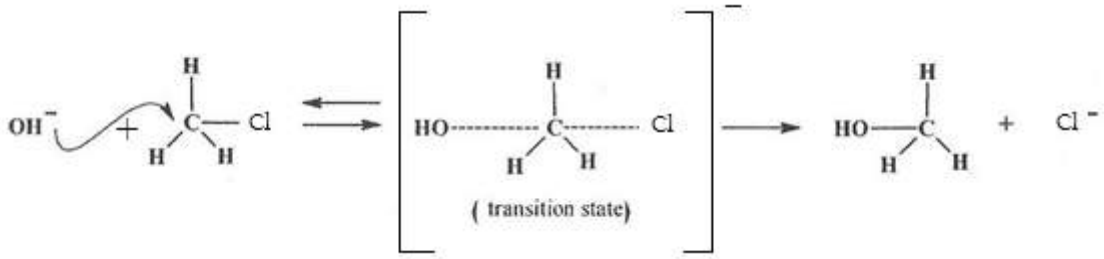
10. **What is the condition to be satisfied for compound to be chiral?**

    The absence of plane of symmetry in the molecule

II Questions carrying 2 marks:

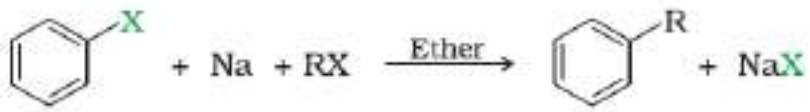
Explain S_N2 mechanism involved in the conversion of (Methyl Chloride) chloromethane into (Methyl alcohol) methanol

In this mechanism the nucleophile OH^- attacks the carbon atom from the side opposite to the chlorine atom to form a new C–OH bond. The formation of C – OH bond and the cleavage of C – Cl bond take place simultaneously through the transition state.



Methyl Chloride Transition state Methyl alcohol

1. **Write general equation of Wurzt – Fittig reaction.**



Haloarene haloalkane Alkylarene

2. **Write the general equation of Fittig's reactions**.

Aryl halide

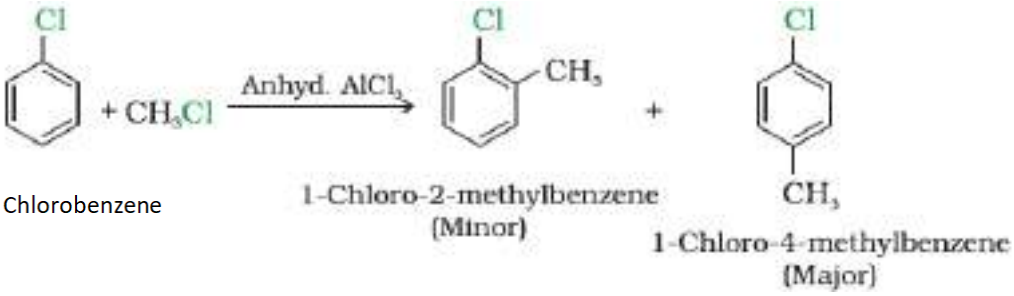
3. **What are freons? Give an example**.

The chlorofluoro compounds of methane or ethane are called as freons.
Example: Chlorofluro methane or CFC

4. **Aryl halides are less reactive towards nucleophilic substitution reaction. Why?**

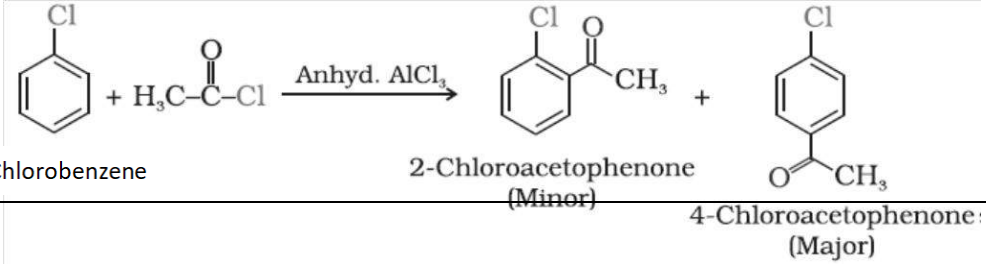
a) Resonance effect
b) Difference in hybridisation of carbon in C – X bond
c) Instability of phyenylcation
d) The possible repulsion to approach electron rich arenes

5. **Explain Friedel Craft's alkylation of chloro benzene with equation**.



Chlorobenzene
1-Chloro-2-methylbenzene (Minor)
1-Chloro-4-methylbenzene (Major)

6.Explain Friedel Craft's acylation of chloro benzene with equation.



Chlorobenzene
2-Chloroacetophenone (Minor)
4-Chloroacetophenone (Major)

III Questions carrying 3 marks:

Explain S_N1 mechanism for the conversion of tertiary butyl bromide(2-bromo-2-methylpropane) into tertiary butyl alcohol (2-methyl- propan-2-ol).

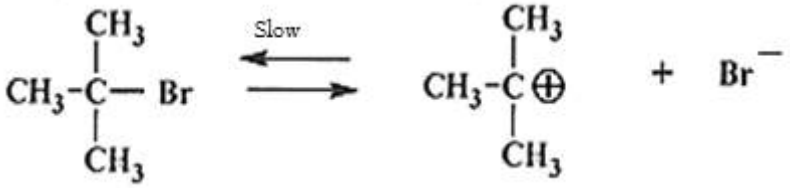
When tertiary butyl bromide is heated with aqueous potassium hydroxide, tertiary butyl alcohol is formed.

.

The mechanism involves two steps

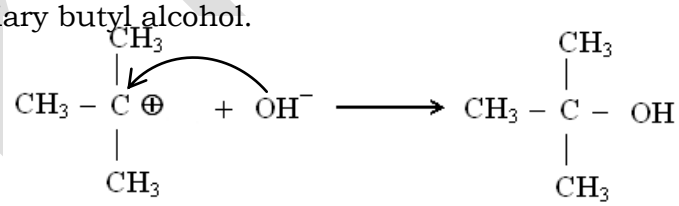
Step 1: Formation of carbocation

Tertiary butyl bromide undergoes ionisation to form tertiary carbocation and bromide ion. The carbocation formed has a planar structure.



Step 2 : Attack of nucleophile on carbocation

The nucleophile OH^- (obtained by the dissociation of KOH) attacks the positive center of carbocation from any one of the directions forming the final product, i.e., tertiary butyl alcohol.



Step-1 is a slow step and hence it is a rate determining step. Since this reaction involves only one molecule, it is called unimolecular substitution reaction. Hence in this type of reaction the rate of the reaction depends only on the concentration of alkyl halide. Therefore, S_N1 reaction is a first order reaction.

CHAPTER-11
ALCOHOLS, PHENOLS AND ETHERS

I Questions carrying 1 mark:

2. **What is Lucas reagent?**
   Mixture of Conc. HCl and anhydrous Zinc chloride.

3. **Among Alcohol and water which is more acidic**
   Water

4. **Name the product formed when phenol is treated with zinc dust.**
   Benzene.

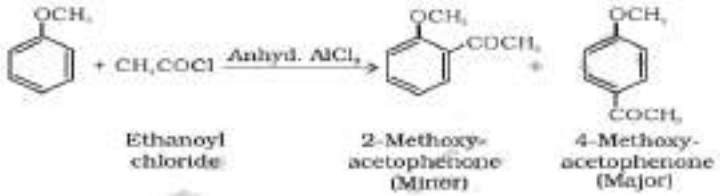
5. **Write general equation for preparation of ether by Williamson synthesis.**

6. **Among Alcohol and Phenol which is more acidic**
   Phenol

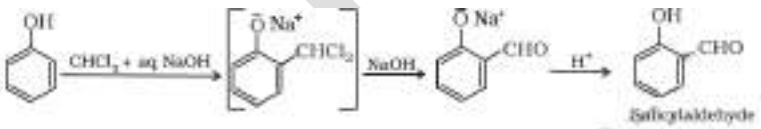
7. **Write the Product in the reaction R - CH_2 - OH ----$\xrightarrow{Cu/573K}$------→**

II Questions carrying 2 marks:

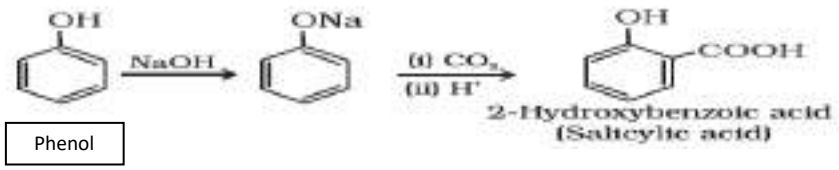
1. **Explain the Friedal-craft acylation of Anisole.**



2. **Explain Reimer-Tiemann reaction with example.**
   Phenol reacts with chloroform in the presence of sodium hydroxide to give salicyladehyde



3. **Explain the Kolbe's reaction.**



III Questions carrying 3 marks:

1.Explain the mechanism of dehydration of ethanol to ethane

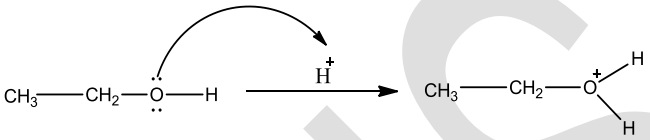
Ethanol on heating with conc.H_2SO_4 or H_3PO_4 undergo dehydration to give ethene.

Ex: $CH_3CH_2-OH \xrightarrow{\text{conc } H_2SO_4} CH_2=CH_2 + H_2O$

Ethylalcohol — Ethene

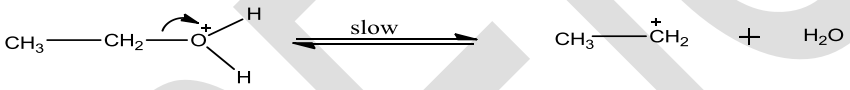
Mechanism of dehydration of ethyl alcohol: It takes place in three steps.

Step1: Protonation of alcohol yields protonated alcohol.



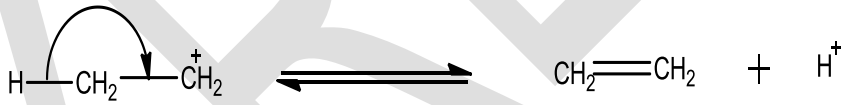
Ethylalcohol — Protonated alcohol

Step2: Protonated alcohol loses water molecule to form ethyl carbocation.



Protonated alcohol — Ethyl carbocation

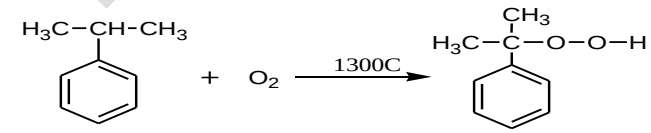
Step3: Ethyl carbocation loses a proton (from β carbon) to form ethene.



2.Explain the preparation of phenol from cumene.

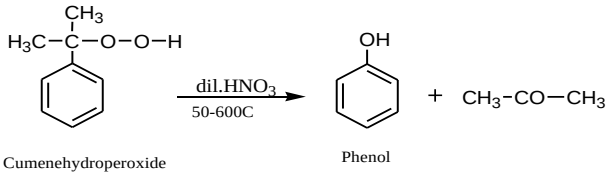
It involves following steps

a) Conversion of cumene to cumene hydroperoxide: Cumene is oxidized by air or oxygen at 130^0C to form cumenehydroperoxide.



Cumene (2-phenylpropane) — Cumenehydroperoxide

b) Conversion of cumene hydroperoxide to phenol: Cumenenhydroperoxide is heated with dilute HNO_3 at 50-60^0C to form phenol.



Cumenehydroperoxide Phenol

3.ExplainWilliamson's ether synthesis:

When an alkyl halide is heated with sodium alkoxide, an ether is obtained. (Both symmetrical and unsymmetrical ethers are obtained).

$$R-O-Na + R-X \longrightarrow R-O-R + NaX$$

Sodium alkoxide Ether

Ex: $C_2H_5-O-Na + C_2H_5-Br \longrightarrow C_2H_5-O-C_2H_5 + NaBr$

Sodiumethoxide Diethylether

CHAPTER-12
ALDEHYDES, KETONES AND CARBOXYLIC ACIDS

I Questions carrying 1 mark:

1. **What is Tollen'sreagent?**
   Ammonical Silver nitrate solution

2. **Give the composition of soda lime**
   Mixture of NaOH and CaO.

3. **What happens to the acidity of carboxylic acids when an electron withdrawing group is present?**
   Increases

4. **Name the oxidising agent used in Etard reaction**
   Chromyl Chloride

5. **Name the product formed when acetaldehyde recats with HCN**
   Acetaldehyde cyanohydrins

6. **Acetaldehyde does not undergo Cannizzaro's reaction. Why?**
   Because it contains alpha hydrogen atoms

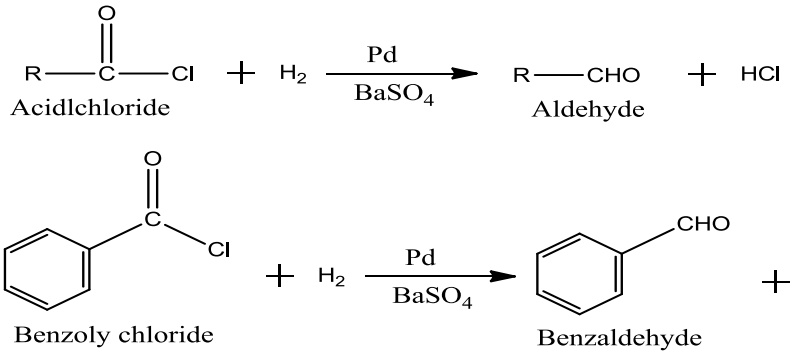
7. **Benzaldehyde undergoes Cannizzaro's reaction. Why?**
   Because it does not contain alpha hydrogen atom

8. **Between Formic Acid and Acetic acid which is more acedic Why?**
   Formic Acid because in acetic acid the $-CH_3$ group cause +I effect and decrease the stability of corboxilate ion

9. **Name product formed when acetone reacts with hydroxyl amine**
   Acetoxime

II Questions carrying 2 marks:

1. **Explain Rosenmund's reduction with example**
   When Acid chloride reacts with hydrogen in presence of palladium catalyst supported with barium sulphate gives aldehydes. This reaction is called **Rosenmund reduction.**



a) Explain Stephen reaction with general equation.

Nitriles are reduced to imine with stannous chloride in presence of conc.hydrochloric acid which on hydrolysis gives an aldehyde.

$$R-C\equiv N+2[H]\xrightarrow{SnCl_2/HCl}R-CH=NH\,HCl\xrightarrow{H_3O^+}R-CHO+NH_4Cl$$

Nitrile — immine — Aldehyde

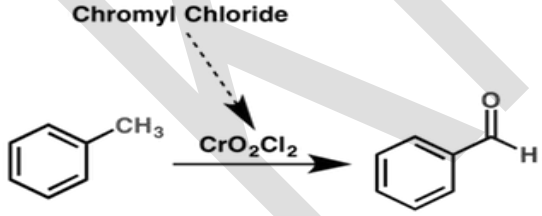
$$CH_3-C\equiv N+2[H]\xrightarrow{SnCl_2/HCl}CH_3-CH=NH\,HCl\xrightarrow{H_3O^+}CH_3-CHO+NH_4Cl$$

Ethanenitrile — acetaldehyde

This reaction is called **Stephen reduction.**

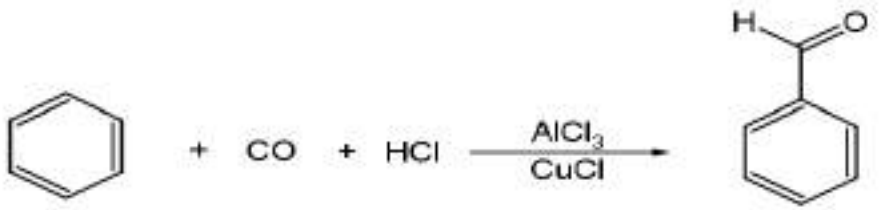
b) Explain Etard reaction with an example.

Toluene reacts with chromyl chloride in the presence of carbon disulphide which on hydrolysis forms benzaldehyde.



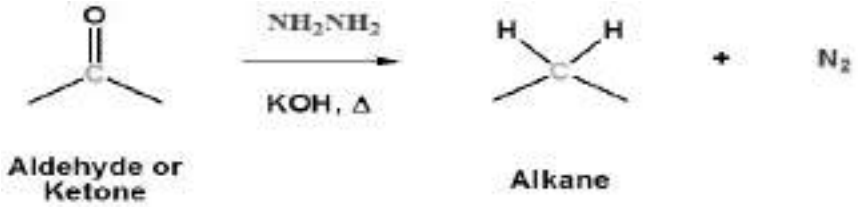
1. Explain Gatterman-Koch reaction with an example.

When benzene is treated with carbon monoxide and HCl in presence of anhydrous $AlCl_3$ to form benzaldehyde



2. **Explain Wolff-Kishner reduction**

Aldehydes or ketones when treated with hydrazine followed by heating with potassium hydroxide form corresponding hydrocarbons.

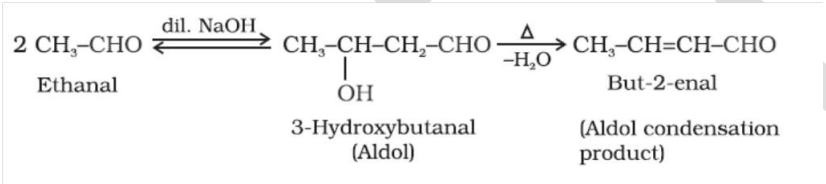


3. **Explain Clemmensen reduction with an example.**

Propanone is reduced with zinc amalgam and conc. HCl to form propane.

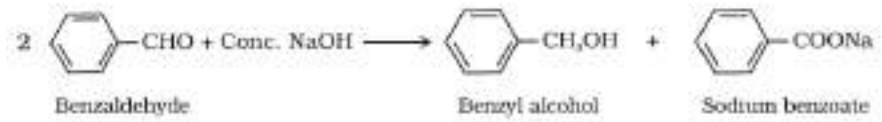
4. **Explain Aldol condensation with an example.**

Aldehyde and Ketones having atleast one α - hydrogen in presence of dilute alkali undergoes condensation to form an aldol, which on heating gives α,β - unsaturated carbonyl compound.



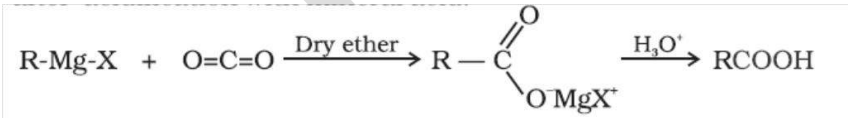
5. **Explain Cannizzaro reaction with an example.**

Aldehyde which do not have α-hydrogen atom undergo self oxidation and reduction on heating with conc. alkali to form alcohol and salt of carboxylic acid



6. **How do you convert Grignard reagent into carboxylic acid using solid carbon dioxide.**

Grignard reagent reacts with solid carbon dioxide in dry ether media followed by acidification with mineral acid to form corresponding carboxylic acids



7. **Describe esterification reaction with an example.**

Carboxylic acids react with alcohols in the presence of conc H_2SO_4 to form an ester. This reaction is called esterification reaction

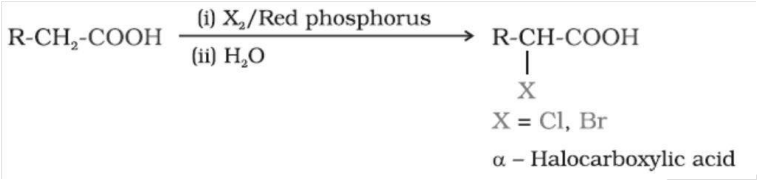
$$R-COOH + HO-R^1 \xrightarrow{Conc H_2SO_4} R-COOR^1 + H_2O$$

Carboxylic acid ester

Ex; $CH_3COOH + C_2H_5OH \rightleftharpoons CH_3COOC_2H_5 + H_2O$

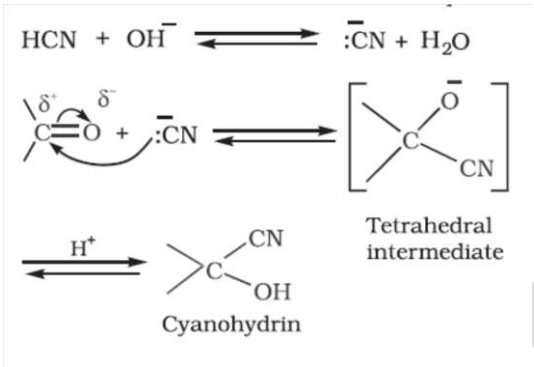
8. Explain H.V.Z reaction with general equation.

Carboxylic acid having an α-hydrogen atom is treated with halogen in presence of red phosphorus to give α-halo carboxylic acid



9. Write the mechanism of addition of HCN to a carbonyl compound.

When an aldehyde or ketone reacts with hydrogen cyanide cyanohydrin is formed.



CHAPTER-13
AMINES

I Questions carrying 1 mark:

1.Write IUPAC name of CH_3-NH-CH_2-CH_3

N-methylethanamine.

2.Name the major product formed when nitrous acid treated with aniline at low temperature.

Benzenediazonium chloride ($C_6H_5N_2^+Cl^-$)

3.Between CH_3NH_2 and $C_6H_5NH_2$ which is more basic?

CH_3NH_2

4.Name the amine produced by Hofmann degradation of benzamide

Aniline ($C_6H_5NH_2$)

5.What is Hinsberg'sreagent?

Benzene sulphonyl chloride (C_6H_5SOCl)

6.Among Ammonia and aliphatic amine which is more basic?

Aliphatic amine

II Questions carrying 2 marks:

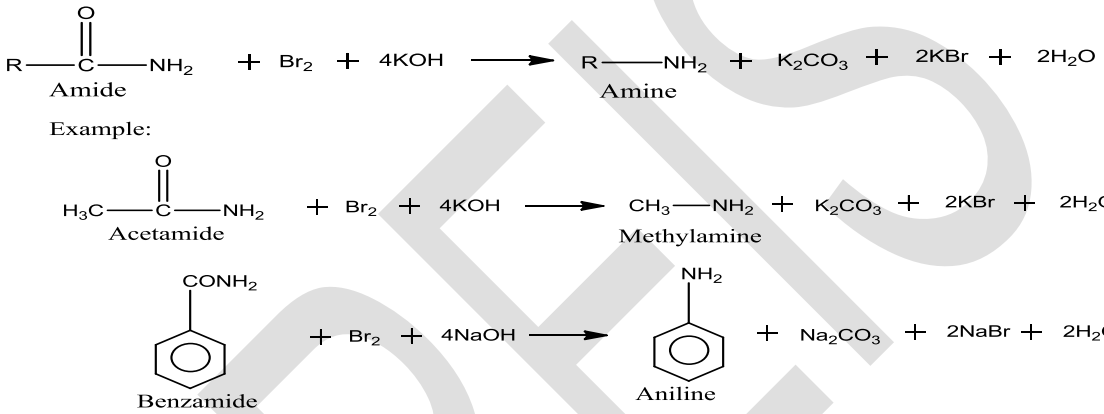
7.Explain carbylamines reaction with equation.

Aliphatic and aromatic primary amines on heating with chloroform and alcoholpotassium hydroxide form isocyanides or carbylamine.

$R\text{-}NH_2 + CHCl_3 + 3KOH \rightarrow R\text{-}NC + 3KCl + 3H_2O$

8.Explain Hofmann bromamide degradation reaction with equation.

When an amide is heated with bromine and sodium hydroxide solution or potassium hydroxide solution, primary amine is obtained. This reaction is called **Hoffmann's degradation.**



9.How do you prepare benzene diazonium chloride by diazotization reaction ?write equation

When aniline is treated with nitrous acid at 273-278K diazonium chloride is formed.

$C_6H_5NH_2 + NaNO_2 + 2HCl \rightarrow C_6H_5N_2^+Cl^- + NaCl$

10.Arrange the following amines in the order of their increasing basic strength in aqueous solution $(CH_3)_3N$, $(CH_3)_2NH$, NH_3 , CH_3NH_2.

$(C_2H_5)_2NH > (C_2H_5)_3N > C_2H_5NH_2 > NH_3$

(2^0) (3^0) (1^0)

UNIT-14

BIOMOLECULES

One marks questions.

1. **Deficiency of which vitamin causes the disease.**

   a) rickets b)scurvy c) Pernicious anaemia d)night blindness

Ans: a) VitaminD

b.vitaminC

c.vitaminB12

d.vitaminA

2. **Name the nitrogenous base present in,**

   a.RNA but not inDNA

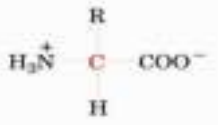
   b.DNAbutnotinRNA

   Ans: a)uracil

   b)thymine

3. **Write the general structure of zwitter ion**.

Ans:



4. **Give one example each for water soluble and fat soluble vitamins?**

   Ans: water soluble are Vitamin B and Vitamin C fat soluble are Vitamin A, D, E, K

5. **Name the fibrous protein present in hair and muscles**

   Ans: a.hair -keratin

   b.muscles - myosin

6. **Name the linkage present between two monomer units of**

   a.Carbohydrates, b.proteins, c.nucleicacids,

   Ans: a.glycosidic Bond.

   b.peptide Bond.

   c.phosphodiester Bond.

7. **Name the hormone which regulate blood sugar level in the body?**

Ans: insulin.

8. **How many peptide bonds are present in tetrapeptide**?

Ans:(n-1). 4-1=3

9. Name water soluble and water insoluble parts in starch?

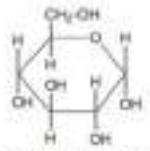
Ans: water soluble - amylose. water in soluble -amylopectin.

Two marks questions.

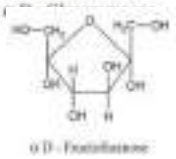
1. Write Haworth structure of.

1. glucose b)fructose c)maltose d)lactose e)sucrose?

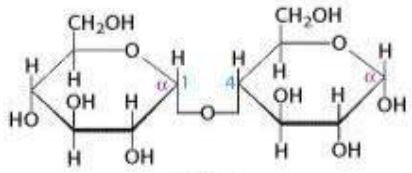
a)



b)

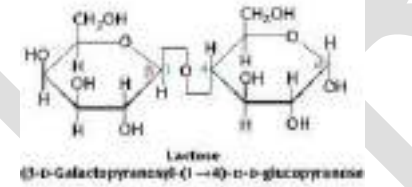


c)



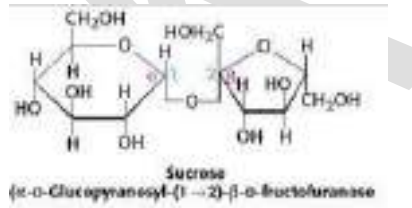
Maltose
(α-D-Glucopyranosyl-(1→4)-α-D-glucopyranose

d)



Lactose
(β-D-Galactopyranosyl-(1→4)-α-D-glucopyranose

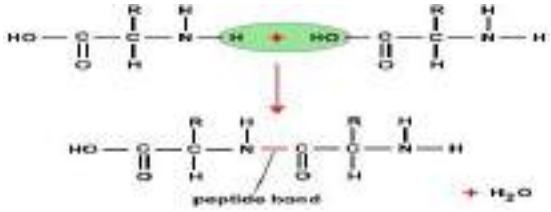
e)



Sucrose
(α-D-Glucopyranosyl-(1→2)-β-D-fructofuranose

2. Explain peptide linkage?

Ans: The linkage formed between amino(-NH2)group of one amino acid and carboxylic acid (-COOH) group of another amino acid to form amide linkage (-CONH-) by the elimination of one water molecule is called peptide linkage



3. Mention the difference between essential and nonessential amino acid and give one example each.

Essential amino acid	Non essential amino acid
The amino acid which cannot be synthesized in the body and must be supplied through diet	The amino acid which can be synthesized in the body and not necessary to consumed through diet
Example: leucine, valine	Example: glycine, alanine

4. What is denaturation of protein?

Ans: Denaturation is a process where the change in the physical as well as the biological activities of proteins take place by the action of heat, acid, alkali or any other denaturing agent.

Example: coagulation of milk, boiling of egg.

Note;;

Reducing sugar	Glucose
Non-reducing sugar	Sucrose
Nitrogen base present only in DNA	Thymine
Nitrogen base present only in RNA	Uracil
Water soluble component of starch	Amylose
Water insoluble component of starch	Amylopectin
Water soluble vitamin	Vitamin C
Fat soluble vitamin	Vitamin D
Deficiency of vitamin A	Night blindness
Deficiency of vitamin C (Ascorbic acid)	Scurvy

Deficiency of vitamin D	Rickets
Deficiency of vitamin B12	Pernicious anaemia
Hormone maintains blood sugar level	Insulin

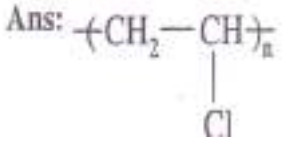
CHAPTER-15

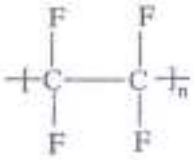
POLYMERS

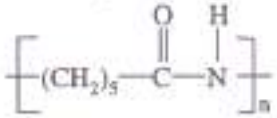
I Questions carrying 1 mark:

1. **Give an Example for Co- Polymers.**
   Buna –N and Buna –S

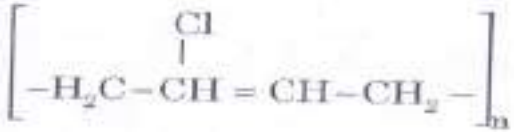
2. **Write the partial Structure of Polyethene.**
   $(-CH_2-CH_2-)_n$

3. **Write the partial Structure of PVC.**
   Ans: 

4. **Write the partial Structure of Teflon.**
   
   Polytetrafluoroethylene (Teflon)

5. **Write the partial Structure of Nylon 6.**
   Ans: 

6. **Write the partial Structure of Polystyrene**
   

7. **Write the partial Structure of Neoprene.**
   

8. **Name the monomer of natural Rubber.**
   Isoprene (OR) 2-methyl-1,3-butadiene

9. What is Vulcanisation?

Heating raw rubber with Sulfur and an additive to improve the properties of rubber.

10. Give an Example for Biodegradable Polymers.

PHBV (OR) Polyhydroxybutyrate-co-ß-hydroxyvalerate

11. Write the IUPAC Name of Isoprene.

2-methyl- 1, 3- butadiene

Note:

Polymer	Monomer unit present
Poly vinyl chloride (PVC)	Vinyl chloride
Polythene	Ethene
Nylon 6,6	Hexamethylene diamine + adipic acid
Nylon-6	Caprolactum
Neoprene	Chloroprene
Natural rubber	Cis-isoprene (IUPAC Name is 2-methyl buta-1,3-diene)

II Questions carrying 2 marks:

1. **Name the monomers used in the preparation of Buna-S**

   1, 3-butadiene and Styrene

2. **Name the monomers used in the preparation of Nylon 6,6**

   Hexamethylenediamine and adipic acid.

3. **What are Thermoplastic Polymers? Give an Example**

   They are linear or slightly branched long chain molecules that soften on heating and become hard on cooling.

4. **What are Thermosetting Polymers? Give an Example**

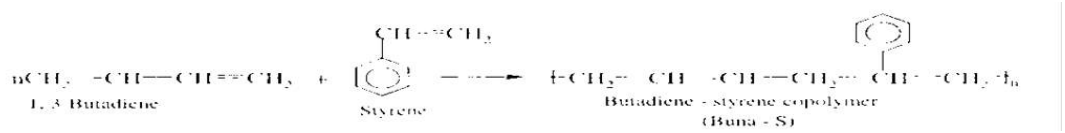
   They are cross linked or heavily branched molecules, which on heating undergo extensive cross linking and become infusible mass.
   Eg: Bakelite, urea-formaldehyde, etc.

5. **Name the Monomers used in the preparation of Bakelite.**

   Phenol and Formaldehyde (or structures)

6. **How is Buna-S Prepared? Give Equation**

   Buna-S is prepared by the copolymerization of 1,3-butadiene and styrene



7. How is Buna-N Prepared? Write Equation.

Buna-N is prepared by the copolymerization of 1,3 –butadiene and acrylonitrile in presence of peroxide catalyst.

8..What are biodegradable and non-biodegradable polymers? Give an example for each.

Polymers which undergo natural break down into raw materials of nature and disappear into nature are called biodegradable polymers

Ex : PHBV

Polymers which cannot undergo natural break down or break down over a long period of time are called non-biodegradable polymers.

Ex : Polythene

9.What are addition and condensation polymers? Give an example.

The polymers formed by repeated addition of monomer molecules possessing double or triple bonds are called addition polymers. Ex : Polythene

The polymers formed by repeated condensation reaction between two different bi-functional monomeric units are called condensation polymers. Ex : Nylon 6,6

CHAPTER-16

CHEMISTRY IN EVERYDAY LIFE

I Questions carrying 1 mark:

1. What are antacids? Give example.

The chemicals which can reduce or neutralize the acidity in stomach
Eg:- Ranitidine, Tegamet (cimetidine)

2. What are antihistamines? Give example.

The drugs used to treat allergy Eg:- Cimetidine, Tegfenadine

3. What are transquilizers? Give example.

The drugs used for the treatment of stress and mild or even severe mental diseases.
Eg:- Equanil. Luminal, Veronal

4. What are antibiotics? Give example.

These are the chemicals which destroy or inhibit harmful microorganisms.
Eg:- Penicillin , Tetracycline

5. What are antiseptics? Give example.

These are the chemicals applied on cuts, wounds, scratches to kill microorganisms.
Eg:- Dettol, Bithional, Iodoform

6. What are antifertility drug? Given example.

The chemicals which prevent the pregnancy in women.
Eg:- Novestrol, Norethindrone

7. What are analgesics? Give an example.

The chemicals used to relieve pain without causing any side effect.
Eg:- Aspirin

8. What are non-norcotic analgesics? Give an example

They reduce pain without causing addiction.
Eg:- Aspirin, Paracetamol

9. What are narcotic analgesics? Give an example

They reduce pain and produce sleep.
Eg:- Heroin, Codeine, Morphine

10. What are artificial sweetening agents? Give example

Artificial sweetening agents are non-nutritive sweeting agents used as substitutes for sugar in foods.
Eg:- Aspartame (used in cold food) Saccharin (first popular sweeting agent)Sucralose, Alitame (high potency sweetener)

11. What are food preservatives? Give example

The chemical substance which are used to control the spoilage of food.
Eg:- Table salt, sodium benzoate, sugar and vegetable oils

12. What are antioxidants? Give example.

The compounds which prevent the oxidation of food material.
Eg:- Vitamin – C, Vitamin –E

13. What is Saponification?

Soaps are prepared by heating fat or oil with aqueous NaOH or KOH solution. This reaction is called saponification.

14. What are cationic detergents? Give example.

The detergents in which surface active group carries positive charge that causes cleansing action

Eg:- ethyl trimethyl ammonium bromide

15. What are anionic detergents? Give example

The detergents in which surface active group carries negative charge that causes cleansing action

Eg:- Sodium lauryl sulphate, Sodium dodecyl benzene sulphonate

16. Why do soaps not work in hard water?

When sodium and potassium soaps are dissolved in hard water, Ca^{2+}andMg^{2+}ions of hard water will form insoluble calcium and magnesium soap. These insoluble soaps separate as scum in water which adheres on to the fibre of the cloth as gummy mass.

17. What are biodegradable and non-bio degradable detergents?

Detergents that can be degraded by bacteria are called biodegradable detergents. Detergents that cannot be degraded by bacteria are called non-biodegradable detergents.

SUBJECT: CHEMISTRY **II PUC** **SUBJECT CODE: 34**

TIME: 3.15MIN **MAX. MARKS: 70**

BLUE PRINT (ONLY FOR ACADEMIC YEAR 2021-22)

Group	Unit	Title	HOURS	Marks	Part-A 15x1 mark	Part B 10 x2 mark	Part C 10x3 mark	Part D 14x5 mark
Group-I Physical Chemistry	1	The Solid state	8	08	1	16	-	36
	2	Solution	9	09	2, 3	17	-	37
	3	Electrochemistry	9	10	4	18, 19	-	38
	4	Chemical Kinetics	9	11	5	-	-	39, 40
	5	Surface Chemistry	6	07	6, 7	-	-	41
		Total of Group-I	**41**	**45**	**07**	**08**	**-**	**30**
Group-II Inorganic Chemistry	6	General Principles and Process of Isolation of Elements	5	06	8	20	26	-
	7	The p-Block Elements	11	12	9	21	27, 28, 29	-
	8	The d and f-block elements	9	10	10	-	30, 31, 32	-
	9	Coordination compounds	7	09	-	-	33, 34, 35	-
		Total of Group-II	**32**	**37**	**03**	**04**	**30**	**-**
Group-III Organic Chemistry	10	Haloalkanes and haloarenes	7	08	11	22	-	42
	11	Alcohols, Phenols and Ethers	8	11	12	-	-	43,44
	12	Aldehydes, Ketones & Carboxylic acid	9	11	13	-	-	45, 46
	13	Amines	6	07	-	23	-	47
	14	Biomolecules	7	10	-	-	-	48,49
	15	Polymers	5	06	14	-	-	50
	16	Chemistry in Everyday Life	5	05	15	24, 25	-	-
		Total of Group-III	**47**	**58**	**05**	**08**	**-**	**45**
		TOTAL	**120**	**140**	**15**	**20**	**30**	**75**

Guidelines for Setting II PUC Chemistry Question Paper

1. The question paper has four parts: A, B, C and D. All parts are compulsory.
2. a. Part-A carries 10 marks. Each question carries 1 mark. Part A (I): Frame questions from all units as required. **Out of FIFTEEN questions** (Question number 01 to 15), **answer any TEN.**

b. Part-B carries 10 marks. Each question carries 2 marks. Part B (II): Frame questions from all units as required. **Out of TEN questions** (Question number 16 to 25), **answer any FIVE.**

c. Part-C carries 15 marks. Each question carries 3 marks. Part C (III): Frame questions from Inorganic chemistry. **Out of TEN questions** (Question number 26 to 35), **answer any FIVE.**

d. Part-D carries 35 marks. Each question carries 5 marks.

(i) (Part-IV) carries 15 marks: Frame questions from physical chemistry. **Out of SIX questions** (Question number 36 to 41), **answer any THREE.**

(ii) (Part-V) carries 20 marks: Frame questions from organic chemistry. **Out of NINE questions** (Question number 42 to 50), **answer any FOUR.**

** A variation of ±1 mark in the unit Weightage is allowed.

3. Intermixing of questions of different units is not allowed. 5 marks question may be framed as (3+2) as far as possible.

In part C:

i) While framing 3 questions for the unit 7 (p-block elements), frame one question each from 15^{th}, 16^{th} and 17^{th} group elements. **One mark & two mark questions for 18^{th} group elements can be framed in Part - A & B respectively.** This division is done to make it easy for the students to learn and attempt these questions.

ii) For d and f block elements, there are more concepts and learning aspects in d-block rather than f block elements. Hence in part-C, frame two questions from d-block part & frame a question from f-block elements.

4. Numerical problems worth of about 10 marks should be given.
5. Avoid questions from: i) Drawings involving 3D diagrams

   ii) Boxed portions of the units given in the text.

   iii) The boxed materials with deep yellow bar in the text book are to bring additional life to the topic and are non evaluative.
6. Questions on numerical data given in the form of appendix, numbered tables containing experimental data and life history of scientists given in the chapters should be avoided.
7. In Organic chemistry R, Ar may be restricted to the groups as defined in the syllabus provided.
8. Frame the questions in such a way to strictly avoid ½ mark evaluation (or value points for ½ marks.).
9. Questions framed should not be vague and ambiguous. Avoid framing questions for which answers/ printing in the text book is not well defined/ wrong.

GOVERNMENT OF KARNATAKA

KARNATAKA STATE PRE-UNIVERSITY EDUCATION EXAMINATION BOARD

II YEAR PUC MODEL QUESTION PAPER (for -2021-22 academic year only)

SUBJECT CODE: 34 **SUBJECT: CHEMISTRY**

ENGLISH VERSION

INSTRUCTIONS:

1. The question paper has four parts. All parts are compulsory.
2. a. Part-A carries 10 marks. Each question carries 1 mark.
   b. Part-B carries 10 marks. Each question carries 2 marks.
   c. Part-C carries 15 marks. Each question carries 3 marks.
   d. Part-D carries 35 marks. Each question carries 5 marks.
3. Write balance chemical equations and draw diagrams wherever necessary.
4. Use log tables and simple calculator if necessary (use of scientific calculator is not allowed).

PART-A

I. ANSWER ANY TEN OF THE FOLLOWING. EACH QUESTION CARRIES 1 MARK. 10X1 = 10

1. What are F-centres?
2. How does the enthalpy change on mixing two volatile liquids to form an ideal solution?
3. Give an example for natural semipermeable membrane.
4. What happens to molar conductivity when one mole of potassium chloride dissolved in one litre is diluted to five litres?
5. Write the energy distribution curve showing temperature dependence of rate of a reaction.
6. Name the shape selective catalyst which converts alcohols directly into gasoline in petroleum industry.
7. What are co-enzymes?
8. Name the method used for concentration of sulphide ores.
9. Complete the reaction: $XeF_6 + 2H_2O \rightarrow \underline{?} + 4HF$
10. Which element of 3d series has more number of unpaired electrons in the ground state?
11. Define the term racemisation.
12. Out of ortho & para nitrophenols, which one less volatile compound?
13. Mention the role of dry HCl in the addition of alcohols to carbonyl compounds.
14. Give an example for synthetic biodegradable polyamide copolymer.
15. Name the first popular artificial sweetening agent.

PART-B

II. ANSWER ANY FIVE OF THE FOLLOWING. EACH QUESTION CARRIES 2 MARKS. 5X2=10

16. Calculate the number of particles present per unit cell in a BCC unit cell.
17. State Henry's law. Write its mathematical form.
18. Calculate the limiting molar conductivity of calcium chloride ($CaCl_2$). Given that the limiting molar conductivities of Ca^{2+} and Cl^- ions are $119.0 Scm^2mol^{-1}$ and $76.3 Scm^2mol^{-1}$ respectively.
19. Write the symbolic representation of standard hydrogen electrode. Mention its standard electrode potential value (E^0).
20. What is the role of coke and lime stone during the extraction of cast iron using blast furnace.
21. Name the noble gas which does not have general noble gas electronic configuration ns^2np^6. Name the commercial source of this noble gas.
22. Explain Friedel-Crafts reaction with equation by taking chlorobenzene as example.

23. How do you prepare propanamine by Hoffmann's bromamide degradation reaction? Write the chemical equation.

24. Why soap does not work in hard water?

25. Give an example each for. a. Anti-fertility drug b. Anionic detergents

PART-C

III. ANSWER ANY FIVE OF THE FOLLOWING. EACH QUESTION CARRIES 3MARKS. 5X3=15

26. Write the chemical equations involved in the leaching of pure alumina from bauxite ore.

27. With reaction conditions write the balanced chemical equations for the preparation of Nitric acid (HNO_3) by Ostwald's process.

28. a. How is ozonised oxygen prepared in the laboratory? Write the chemical equation.

b. Complete the equation: $CaO + H_2O \rightarrow$ ____. (2+1)

29. a. Which is the strongest acid among the hydrogen halides? Give one reason.

b. Write the structure of hypochlorous acid (HOCl). (2+1)

30. What are interstitial compounds? Write any two characteristics of interstitial compounds.

31. Write the balanced equation in the manufacture of potassium dichromate from chromite ore.

32. What is Lanthanoid contraction? Mention any two consequences of it.

33. Using Valence Bond Theory (VBT), explain hybridisation, geometry and magnetic property of $[Ni(CN)_4]^{2-}$ complex ion. (Z for Ni is 28).

34. Write the geometrical isomeric structures of $[Co(NH_3)_4Cl_2]^+$. What is the coordination number of Cobalt in this complex?

35. a. Give any two postulates of Werner's theory of co-ordination compound.

b. Write the formula of the Potassium hexacyanidoferrate(III) (2+1)

PART-D

IV. ANSWER ANY THREE OF THE FOLLOWING. EACH QUESTION CARRIES 5MARKS. 3X5=15

36. a. Calculate the packing efficiency in Simple Cubic lattice.

b. Calcium metals crystallises in FCC with edge length of 556pm. Calculate the density of the metal. (Atomic mass of Calcium = $40 gmol^{-1}$, $N_A = 6.022 \times 10^{23}$atoms). (3+2)

37. a. 1.00g of a non-electrolyte solute is dissolved in 50g of benzene lowers the freezing point of benzene by 0.4K. The freezing point depression constant for benzene is $5.12 KKgmol^{-1}$. Find the molar mass of solute.

b. What is reverse osmosis? Mention its one practical utility. (3+2)

38. a. Calculate equilibrium constant for the reaction:

$Cu(s) + 2Ag^+_{(aq)} \rightarrow Cu^{+2}_{(aq)} + 2Ag_{(S)}$; $E^0_{cell} = +0.46V$.

b. Suggest any two methods to prevent corrosion of iron. (3+2)

39. a. Derive an integrated rate equation for the rate constant of a zero order reaction.

b. According to collision theory, write two factors responsible for effective collision. (3+2)

40. a. The rate of a specific reaction doubles when the temperature changes from 350K to 360K. Calculate the energy of activation. (3+2)

b. Show that the half life period of a first order reaction is independent of initial concentration of reacting species.

41. a. Give any three differences between Lyophilic and Lyophobic Colloids.

b. How does free energy and entropy change during adsorption of gas on solids? (3+2)

V. ANSWER ANY FOUR OF THE FOLLOWING. EACH QUESTION CARRIES 5MARKS. 4X5=20

42. a. Write the equation for the steps in S_N1 mechanism for the conversion of tertiary butyl bromine into tertiary butyl alcohol. Why Tertiary alkyl halides undergo S_N1 reaction very fast?

    b. Explain the reaction between ethyl bromide and magnesium metal. (3+2)

43. a. Write the three steps involved in the mechanism of acid catalyzed dehydration of ethanol to ethene.

    b. How is phenol prepared from Aniline? Write the equation. (3+2)

44. a. Identify the products A and B in the following equation:

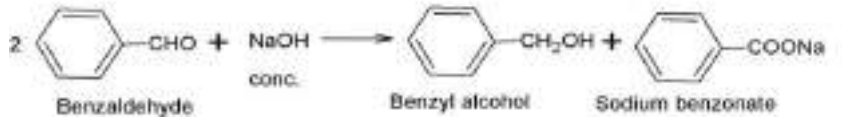
$$(CH_3)_3C - OCH_3 \xrightarrow{HI,\ \Delta} A + B$$

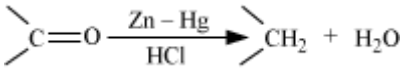
    b. Between phenol and alcohol, which is more acidic? Why? (2+2+1)

    c. Name the enzyme which catalyses the conversion of glucose & fructose into ethanol.

45. a. Write the name of the following reactions:

i. $$RCN + SnCl_2 + HCl \longrightarrow RCH = NH \xrightarrow{H_3O^+} RCHO$$

ii. 

iii. 

    b. Write the chemical equation of Benzaldehyde with Acetophenone in the presence of dilute alkali at 293K. Give the name the major product obtained in this reaction. (3+2)

46. a. What is decarboxylation reaction? Give an example.

    b. Explain Hell-Volhard-Zelinsky reaction.

    c. Give reason: Benzoic acid does not undergo Friedel-Crafts reaction. (2+2+1)

47. a. Write the chemical name & the structure of Hinsberg's reagent.

    b. Explain carbyl amine reaction by taking ethanamine as an example.

    c. Aniline is less basic than ammonia. Give reason. (2+2+1)

48. a. Write chemical reactions to show that

        i. Glucose contains carbonyl groups.

        ii. Glucose contains primary alcoholic group.

    b. Write the Haworth's structure of α-D-Maltose.

    c. Deficiency of which vitamin causes the disease 'Beri-Beri'? (2+2+1)

49. a. What are non-essential amino-acids? Give an example.

    b. what is peptide bond? How many peptide bonds are in tripeptide?

    c. Name the sugar moiety present in DNA. (2+2+1)

50. a. Explain Vulcanization of rubber. Write the structure & IUPAC name of the isoprene.

    b. What are the monomeric repeating units in the Nylon-6, 6. (3+2)

ಕರ್ನಾಟಕ ಸರ್ಕಾರ

ಪದವಿ ಪೂರ್ವ ಶಿಕ್ಷಣ ಇಲಾಖೆ

ದ್ವಿತೀಯ ಪಿಯುಸಿ ಮಾದರಿ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ (2021-22ನೇ ಸಾಲಿಗೆ ಮಾತ್ರ)

ವಿಷಯ: ರಸಾಯನಶಾಸ್ತ್ರ **ವಿಷಯ ಸಂಕೇತ: 34**

ಕನ್ನಡ ಆವೃತ್ತಿ

ಸೂಚನೆಗಳು:

1. ಈ ಪ್ರಶ್ನೆಪತ್ರಿಕೆಯಲ್ಲಿ ನಾಲ್ಕು ವಿಭಾಗಗಳಿವೆ. ಎಲ್ಲಾವಿಭಾಗಗಳು ಕಡ್ಡಾಯ.
2. ವಿಭಾಗ -A ಗೆ ಹತ್ತು ಅಂಕಗಳು. ಪ್ರತಿ ಪ್ರಶ್ನೆಗೆ ಒಂದು ಅಂಕ.

   ವಿಭಾಗ - B ಗೆ ಹತ್ತು ಅಂಕಗಳು. ಪ್ರತಿ ಪ್ರಶ್ನೆಗೆ ಎರಡು ಅಂಕಗಳು.

   ವಿಭಾಗ - C ಗೆ ಹದಿನೈದು ಅಂಕಗಳು. ಪ್ರತಿ ಪ್ರಶ್ನೆಗೆ ಮೂರು ಅಂಕಗಳು.

   ವಿಭಾಗ - D ಗೆ ಮೂವತ್ತೈದು ಅಂಕಗಳು. ಪ್ರತಿ ಪ್ರಶ್ನೆಗೆ ಐದು ಅಂಕಗಳು.
3. ಅಗತ್ಯವಿರುವಲ್ಲಿ ಸರಿದೂಗಿಸಿದ ಸಮೀಕರಣಗಳನ್ನು ಬರೆಯಿರಿ ಮತ್ತು ಚಿತ್ರಗಳನ್ನು ಬಿಡಿಸಿರಿ.
4. ಅಗತ್ಯವಿದ್ದಲ್ಲಿ ಲಾಗ್‌ಟೇಬಲ್ ಮತ್ತು ಕ್ಯಾಲ್ಕುಲೇಟರ್ ಅನ್ನು ಬಳಸಿ. (ವೈಜ್ಞಾನಿಕ ಕ್ಯಾಲ್ಕುಲೇಟರ್ ಬಳಕೆಗೆ ಅವಕಾಶವಿಲ್ಲ).

ವಿಭಾಗ - A

I. ಈ ಕೆಳಗಿನ ಯಾವುದಾದರೂ ಹತ್ತು ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸಿ. ಪ್ರತಿಯೊಂದು ಪ್ರಶ್ನೆಯೂ ಒಂದು ಅಂಕವನ್ನು ಹೊಂದಿರುತ್ತದೆ. **1 X 1= 10**

1. F- ಕೇಂದ್ರಗಳು ಎಂದರೇನು?
2. ಎರಡು ಆವೀಯ ದ್ರವಗಳನ್ನು ಮಿಶ್ರಣ ಮಾಡಿದಾಗ ಆದರ್ಶ ದ್ರಾವಣದ ಎಂಥಾಲ್ಪಿಯು ಹೇಗೆ ಬದಲಾಗುತ್ತದೆ?
3. ಪ್ರಾಕೃತಿಕವಾದ ಅರೆಪಾರಗಮ್ಯ ಪೊರೆಗಳಿಗೆ ಒಂದು ಉದಾಹರಣೆಯನ್ನು ಕೊಡಿ.
4. ಒಂದು ಮೋಲ್ ಪೊಟಾಸಿಯಂ ಕ್ಲೋರೈಡ್ (KCl) ಅನ್ನು ಒಂದು ಲೀಟರ್ ನೀರಿನಲ್ಲಿ ಕರಗಿಸಿ, ಅದನ್ನು ಐದು ಲೀಟರ್ ಅಗಿ ದುರ್ಬಲಗೊಳಿಸಿದಾಗ ಮೋಲಾರ್ ವಾಹಕತೆಯಲ್ಲಿ ಉಂಟಾಗುವ ವ್ಯತ್ಯಾಸಗಳೇನು?
5. ಉಷ್ಣತೆಯನ್ನು ಆಧರಿಸಿ ಕ್ರಿಯೆಯ ವೇಗವನ್ನು ತೋರಿಸುವ ಶಕ್ತಿ ವಿತರಣಾ ವಕ್ರರೇಖೆಯನ್ನು ಬರೆಯಿರಿ.
6. ಪೆಟ್ರೋಲಿಯಂ ಕಾರ್ಖಾನೆಯಲ್ಲಿ ಆಲ್ಕೋಹಾಲ್‌ನ್ನು ಗ್ಯಾಸೋಲಿನ್ (Gasoline) ಅಗಿ ಪರಿವರ್ತನೆಗೆ ಉಪಯೋಗಿಸುವ ಆಕೃತಿ ಆಯ್ಕೆಯ ವೇಗವರ್ಧಕವನ್ನು ಹೆಸರಿಸಿ.
7. ಸಹಕಿಣ್ವಗಳು ಎಂದರೇನು?
8. ಸಲ್ಫೈಡ್ ಅದಿರನ್ನು ಸಾರೀಕರಣಗೊಳಿಸುವ ವಿಧಾನವನ್ನು ಹೆಸರಿಸಿ.
9. ಈ ಸಮೀಕರಣವನ್ನು ಪೂರ್ಣಗೊಳಿಸಿ: $XeF_6 + 2H_2O \rightarrow \underline{?} + 4HF$
10. 3d-ಶ್ರೇಣಿಯ ಯಾವ ಸಂಕ್ರಮಣ ಲೋಹ ಅತೀ ಹೆಚ್ಚಿನ ಸಂಖ್ಯೆಯ ಆಯುಗ್ಮ (ಒಂಟಿ) ಎಲೆಕ್ಟ್ರಾನ್‌ಗಳನ್ನು ಹೊಂದಿದೆ?

11. ರೆಸಿಮೀಕರಣವನ್ನು ವ್ಯಾಖ್ಯಾನಿಸಿ.

12. ಆಥ್ರೊ ಮತ್ತು ಪ್ಯಾರಾ ನೈಟ್ರೋಫೀನಾಲ್‌ಗಳಲ್ಲಿ, ಯಾವ ಸಂಯುಕ್ತವೂ ಬೇಗ ಆವಿಯಾಗುತ್ತದೆ.

13. ಕಾರ್ಬೋನಿಲ್ ಸಂಯುಕ್ತಗಳೊಂದಿಗಿನ ಆಲ್ಕೋಹಾಲ್ ಸಂಕಲನ ಕ್ರಿಯೆಯಲ್ಲಿ ಶುಷ್ಕ HCl ಪಾತ್ರವನ್ನು ತಿಳಿಸಿ.

14. ಜೈವಿಕ ವಿಘಟನೀಯ ಪಾಲಿಅಮೈಡ್ ಸಹಪಾಲಿಮರ್‌ಗೆ ಒಂದು ಉದಾಹರಣೆಯನ್ನು ಕೊಡಿ.

15. ಮೊದಲ ಜನಪ್ರಿಯ ಕೃತಕ ಸಿಹಿಕಾರಕವನ್ನು ಹೆಸರಿಸಿ.

ವಿಭಾಗ - B

II. ಈ ಕೆಳಗಿನ ಯಾವುದಾದರೂ ಐದು ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸಿ. ಪ್ರತಿಯೊಂದು ಪ್ರಶ್ನೆಯೂ ಎರಡು ಅಂಕಗಳನ್ನು ಹೊಂದಿರುತ್ತದೆ. **2 X 5= 10**

16. ಕಾಯಕೇಂದ್ರಿತ ಘಟಕ ಕೋಶದಲ್ಲಿರುವ ಒಟ್ಟು ಪರಮಾಣುಗಳನ್ನು ಲೆಕ್ಕ ಹಾಕಿ.

17. ಹೆನ್ರಿಯ ನಿಯಮವನ್ನು ವ್ಯಾಖ್ಯಾನಿಸಿ. ಅದರ ಗಣಿತ ರೂಪವನ್ನು ಬರೆಯಿರಿ.

18. Ca^{2+} ಮತ್ತು Cl^- ಅಯಾನುಗಳ ಪರಿಮಿತಿಯ ಮೋಲಾರ್ ವಾಹಕತೆಯು ಕ್ರಮವಾಗಿ $119.0 Scm^2mol^{-1}$ ಮತ್ತು $76.3 Scm^2mol^{-1}$ ಆಗಿದ್ದು, $CaCl_2$ ನ ಅನಂತ ಮೋಲಾರ್ ವಾಹಕತೆಯನ್ನು ಲೆಕ್ಕಹಾಕಿ.

19. ಶಿಷ್ಟ ಹೈಡ್ರೋಜನ್ ವಿದ್ಯುದಗ್ರ (SHE)ದ ಕೋಶಕ್ರಿಯೆಯನ್ನು ಸಾಂಕೇತಿಕ ಪ್ರಾತಿನಿಧ್ಯವನ್ನು ಬರೆಯಿರಿ. ಅದರ ಶಿಷ್ಟ ವಿದ್ಯುದಾಗ್ರ ವಿಭವ (E^0)ವನ್ನು ತಿಳಿಸಿ.

20. ಊದುಕುಲುಮೆಯನ್ನು ಉಪಯೋಗಿಸಿ ಎರಕ ಕಬ್ಬಿಣವನ್ನು ಉದ್ಧರಿಸುವಾಗ ಸುಣ್ಣಕಲ್ಲು ಮತ್ತು ಕೋಕ್‌ನ ಪಾತ್ರವೇನು?

21. ns^2np^6 ಎಲೆಕ್ಟ್ರಾನ್ ವಿನ್ಯಾಸವನ್ನು ಹೊಂದಿರದ ಶ್ರೇಷ್ಠ (ರಾಜಾ) ಅನಿಲವನ್ನು ಹೆಸರಿಸಿ. ಆ ಶ್ರೇಷ್ಠ (ರಾಜಾ) ಅನಿಲದ ವಾಣಿಜ್ಯ ಮೂಲವನ್ನು ತಿಳಿಸಿ.

22. ಕ್ಲೋರೋಬೆಂಝೀನ್ ಉದಾಹರಣೆ ತೆಗೆದುಕೊಂಡು ಫ್ರಿಡಲ್ ಕ್ರಾಫ್ಟ್ ರಾಸಾಯನಿಕ ಕ್ರಿಯೆಯನ್ನು ಸಮೀಕರಣವನ್ನು ವಿವರಿಸಿ.

23. ಹಾಫಮನ್ ಬ್ರೋಮಮೈಡ್ ಅವನತಿ ಕ್ರಿಯೆಯಿಂದ ಪ್ರೊಪೇನ್ ಅಮೈನ್‌ನನ್ನು ಹೇಗೆ ತಯಾರಿಸುತ್ತೀರಿ? ರಾಸಾಯನಿಕ ಕ್ರಿಯೆಗಳ ಸಮೀಕರಣಗಳನ್ನು ಬರೆಯಿರಿ.

24. ಸಾಬೂನುಗಳು ಗಡಸು ನೀರಿನಲ್ಲೇಕೆ ಕೆಲಸ ಮಾಡುವುದಿಲ್ಲ?

25. ಇವುಗಳಿಗೆ ಒಂದು ಉದಾಹರಣೆ ಕೊಡಿ:

ಎ. ಗರ್ಭ ನಿರೋಧಕ ಔಷಧಿಗಳು ಬಿ. ಋಣ ಆಯಾನಿಕ ಮಾರ್ಜಕಗಳು

ವಿಭಾಗ - C

III. ಈ ಕೆಳಗಿನ ಯಾವುದಾದರೂ ಐದು ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸಿ. ಪ್ರತಿಯೊಂದು ಪ್ರಶ್ನೆಯೂ ಮೂರು ಅಂಕಗಳನ್ನು ಹೊಂದಿರುತ್ತದೆ. **3 X 5= 15**

26. ಬಾಕ್ಸೈಟನ್ನು ಶುದ್ಧ ಆಲ್ಯೂಮಿನಾ ಆಗಿ ಪರಿವರ್ತಿಸುವ ಕ್ಷಾರದ ವಿಧಾನದಲ್ಲಿಯ ರಾಸಾಯನಿಕ ಕ್ರಿಯೆಗಳ ಸಮೀಕರಣಗಳನ್ನು ಬರೆಯಿರಿ.

27. ಒಸ್‌ವಾಲ್ಡನ ವಿಧಾನದ ನೈಟ್ರಿಕ್ ಆಮ್ಲದ (HNO_3) ತಯಾರಿಕೆಯಲ್ಲಿ ಒಳಗೊಂಡ ಸಮದೂಗಿಸಿದ ರಾಸಾಯನಿಕ ಸಮೀಕರಣಗಳನ್ನು ನಿಬಂಧನೆಗಳೊಂದಿಗೆ ಬರೆಯಿರಿ.

28. ಎ. ಒಜೋನೈಡ್ ಆಕ್ಸಿಜನ್‌ನ್ನು ಪ್ರಯೋಗಾಲಯದಲ್ಲಿ ಹೇಗೆ ತಯಾರಿಸುತ್ತಾರೆ? ರಾಸಾಯನಿಕ ಕ್ರಿಯೆಗಳ ಸಮೀಕರಣಗಳನ್ನು ಬರೆಯಿರಿ.

ಬಿ. ಈ ಸಮೀಕರಣವನ್ನು ಪೂರ್ಣಗೊಳಿಸಿ: $CaO + H_2O \rightarrow$ ____. (2+1)

29. ಎ. ಜಲಜನಕ ಹಾಲೈಡುಗಳಲ್ಲಿ ಯಾವುದು ಹೆಚ್ಚು ಆಮ್ಲೀಯವಾಗಿರುತ್ತದೆ? ಒಂದು ಕಾರಣ ಕೊಡಿ.

ಬಿ. ಹೈಪೊಕ್ಲೋರಸ್ ಆಮ್ಲದ (HOCl) ರಚನೆಯನ್ನು ಬರೆಯಿರಿ. (2+1)

30. ಅಂತರಾಳ ಸಂಯುಕ್ತಗಳೆಂದರೇನು? ಅವುಗಳ ಎರಡು ಗುಣಲಕ್ಷಣಗಳನ್ನು ಬರೆಯಿರಿ.

31. ಕ್ರೊಮೈಟ್ ಅದಿರಿನಿಂದ ಪೊಟಾಸಿಯಂ ಡೈಕ್ರೊಮೇಟನ್ನು ಉತ್ಪಾದಿಸುವಲ್ಲಿ ಅಡಕವಾಗಿರುವ ಸಮದೂಗಿಸಿದ ಸಮೀಕರಣಗಳನ್ನು ಬರೆಯಿರಿ.

32. ಲ್ಯಾಂಥನೈಡ್ ಅಕುಂಚನ ಎಂದರೇನು? ಅದರ ಎರಡು ಪರಿಣಾಮವನ್ನು ತಿಳಿಸಿ.

33. ವೇಲೇನ್ಸ್ ಬಂಧ ಸಿದ್ಧಾಂತ (VBT)ವನ್ನು ಉಪಯೋಗಿಸಿಕೊಂಡು $[Ni(CN)_4]^{-2}$ ಆಯಾನ್‌ನ ಸಂಕರಣ, ಜ್ಯಾಮಿತೀಯ ರಚನೆ ಮತ್ತು ಕಾಂತೀಯ ಗುಣವನ್ನು ವಿವರಿಸಿ. (Ni ನ Z =28).

34. $[Co(NH_3)_4Cl_2]^+$ ನ ಜ್ಯಾಮಿತಿಯ ಸಮಾಂಗಿಗಳ ರಚನೆಯನ್ನು ಬರೆಯಿರಿ. ಈ ಸಂಕೀರ್ಣದಲ್ಲಿ Cobalt ಸಮನ್ವಯೀ ಸಂಖ್ಯೆ ಎಷ್ಟು?

35. ಎ. ವರ್ನರ್‌ನ ಸಮನ್ವಯ ಸಂಯುಕ್ತಶಾಸ್ತ್ರದ ಯಾವುದಾದರೂ ಎರಡು ಊಹೆಗಳನ್ನು ಕೊಡಿ.

ಬಿ. ಪೊಟ್ಯಾಶಿಯಂ ಹೆಕ್ಸಾಸೈನೈಡೊ ಫೆರೇಟ್ (III)ನ ಸೂತ್ರವನ್ನು ಬರೆಯಿರಿ. (2+1)

ವಿಭಾಗ - D

IV. ಈ ಕೆಳಗಿನ ಯಾವುದಾದರೂ ಮೂರು ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸಿ. ಪ್ರತಿಯೊಂದು ಪ್ರಶ್ನೆಯೂ ಐದು ಅಂಕಗಳನ್ನು ಹೊಂದಿರುತ್ತದೆ. **5 X 3= 15**

36. ಎ. ಸರಳ ಘನಾಕೃತಿ ಜಾಲದ ಸಂಕುಲನ ದಕ್ಷತೆಯನ್ನು ಲೆಕ್ಕ ಹಾಕಿ.

ಬಿ. ಕ್ಯಾಲ್ಸಿಯಂ ಲೋಹದ ಮುಖಕೇಂದ್ರಿತ ಘನ ರಚನೆಯ ಅಂಚಿನ ಉದ್ದ 556pm. ಕ್ಯಾಲ್ಸಿಯಂ ಲೋಹದ ಸಾಂದ್ರತೆಯನ್ನು ಲೆಕ್ಕ ಹಾಕಿ. (ದತ್ತಕ: ಕ್ಯಾಲ್ಸಿಯಂನ ಪರಮಾಣು ತೂಕ = $40gmol^{-1}$ ಮತ್ತು $N_A = 6.022 \times 10^{23}$). (3+2)

37. ಎ. 50ಗ್ರಾಂ ಬೆಂಜಿನ್‌ನಲ್ಲಿ 1ಗ್ರಾಂ ಅವಿದ್ಯುದ್ವಿಭಾಜ್ಯ ದ್ರವ್ಯವನ್ನು ಕರಗಿಸಿದಾಗ, ಬೆಂಜಿನ್‌ನ 0.4K ಕಡಿಮೆಯಾಗುತ್ತದೆ. ಬೆಂಜಿನ್‌ನ ಘನಿಸುವ ಬಿಂದುವಿನ ಕುಸಿತದ ನಿಯತಾಂಶವು $5.12KKgmol^{-1}$. ಅವಿದ್ಯುದ್ವಿಭಾಜ್ಯ ದ್ರವ್ಯದ ಅಣುದ್ರವ್ಯರಾಶಿಯನ್ನು ಲೆಕ್ಕಹಾಕಿ.

ಬಿ. ಹಿಮ್ಮುಖ ಅವಿಸರಣ ಎಂದರೇನು? ಇದರ ಒಂದು ಪ್ರಾಯೋಗಿಕ ಉಪಯೋಗ ತಿಳಿಸಿ. (3+2)

38. ಎ. ಈ ಕೆಳಗಿನ ಕ್ರಿಯೆಯ ಸಮಸ್ಥಿತಿ ಸ್ಥಿರಾಂಕವನ್ನು ಲೆಕ್ಕಹಾಕಿ:

$Cu(s) + 2Ag^+_{(aq)} \rightarrow Cu^{+2}_{(aq)} + 2Ag_{(S)}$; $E^0_{cell} = +0.46V$.

ಬಿ. ಕಬ್ಬಿಣದ ಸಂಕ್ಷಾರಣವನ್ನು ತಡೆಗಟ್ಟುವ ಎರಡು ವಿಧಗಳನ್ನು ಹೆಸರಿಸಿ. (3+2)

39. ಎ. ಶೂನ್ಯಕ್ರಿಯಾವರ್ಗದ ರಾಸಾಯನಿಕ ಕ್ರಿಯೆಯ ಅನುಕಲಿಸಿದ ದತ್ತ ಸ್ಥಿರಾಂಕ ಸಮೀಕರಣವನ್ನು ನಿಷ್ಪನ್ನಿಸಿ.

ಬಿ. ಸಂಘಟ್ಟ ಸಿದ್ಧಾಂತದ ಪ್ರಕಾರ, ಪರಿಣಾಮಕಾರಿ ಸಂಘಟನೆಗಳಿಗೆ ಕಾರಣವಾಗುವ ಎರಡು ಅಂಶಗಳನ್ನು ಬರೆಯಿರಿ. (3+2)

40. ಎ. ಕ್ರಿಯೆಯೊಂದರಲ್ಲಿ ತಾಪವನ್ನು 350K ಯಿಂದ 360K ಗೆ ಬದಲಾಯಿಸಿದಾಗ ಕ್ರಿಯಾವೇಗವು ಇಮ್ಮಡಿಗೊಳ್ಳುತ್ತದೆ. ಈ ಕ್ರಿಯೆಯ ಪಟುಕರಣ ಶಕ್ತಿ (Ea) ಎಷ್ಟು ಎಂದು ಲೆಕ್ಕ ಹಾಕಿ.

ಬಿ. ಪ್ರಥಮ ಕ್ರಿಯಾವರ್ಗದ ಕ್ರಿಯೆಯಲ್ಲಿ ಅರ್ಧಾಯುವು ಪ್ರಾರಂಭಿಕ ಅಭಿಕರ್ಮಕಗಳ ಸಾರತೆಯನ್ನು ಅವಲಂಬಿಸಿರುವುದಿಲ್ಲ ಎಂದು ನಿರೂಪಿಸಿ. (3+2)

41. ಎ. ದ್ರಾವಕ ಪ್ರಿಯ ಮತ್ತು ದ್ರಾವಕ ದ್ವೇಷಿ ಕಲಿಲಗಳ ನಡುವಿನ ಯಾವುದಾದರೂ ಮೂರು ವ್ಯತ್ಯಾಸಗಳನ್ನು ನೀಡಿ.

ಬಿ. ಅನಿಲದ ಅಧಿಶೋಷಣೆಯು ಘನ ವಸ್ತುವಿನ ಮೇಲೆ ನಡೆಯುವಾಗ ಎಂಥಾಲ್ಪಿ ಮತ್ತು ಎಂಟ್ರೋಪಿ ಯಾವ ರೀತಿಯಲ್ಲಿ ಬದಲಾವಣೆ ಹೊಂದುತ್ತವೆ? (3+2)

V. **ಈ ಕೆಳಗಿನ ಯಾವುದಾದರೂ ನಾಲ್ಕು ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸಿ. ಪ್ರತಿಯೊಂದು ಪ್ರಶ್ನೆಯೂ ಐದು ಅಂಕಗಳನ್ನು ಹೊಂದಿರುತ್ತದೆ.** **5 X 4= 20**

42. ಎ. ಟರ್ಷಿಯರಿ ಭ್ಯೂಟೈಲ್ ಬ್ರೋಮೈಡ್‌ನ್ನು ಟರ್ಷಿಯರಿ ಭ್ಯೂಟೈಲ್ ಆಲ್ಕೋಹಾಲ್ ಆಗಿ ಪರಿವರ್ತಿಸುವ S_N1 ಕ್ರಿಯಾತಂತ್ರ ಹಂತಗಳ ಸಮೀಕರಣಗಳನ್ನು ಬರೆಯಿರಿ. ಟರ್ಷಿಯರಿ ಭ್ಯೂಟೈಲ್ ಹ್ಯಾಲೈಡ್‌ಗಳು S_N1 ಕ್ರಿಯೆಗಳಿಗೆ ಗರಿಷ್ಠ ಕ್ರಿಯಾಕಾರತೆಯನ್ನು ಪ್ರದರ್ಶಿಸುತ್ತವೆ. ಏಕೆ?

ಬಿ. ಈಥೈಲ್ ಬ್ರೋಮೈಡ್ ಮತ್ತು ಮೆಗ್ನೀಸಿಯಂ ಲೋಹದ ನಡುವಿನ ಕ್ರಿಯೆಯನ್ನು ವಿವರಿಸಿ. (3+2)

43. ಎ. ಈಥನಾಲ್‌ನಿಂದ ಈಥೈನ್ ಪಡೆಯವ ಅಮ್ಲ ವೇಗವರ್ಧಕ ನಿರ್ಜಲೀಕರಣದ ಕ್ರಿಯಾತಂತ್ರದ ಮೂರು ಹಂತಗಳನ್ನು ಬರೆಯಿರಿ.

ಬಿ. ಅನಿಲಿನ್‌ನಿಂದ ಫಿನಾಲ್‌ನ್ನು ಹೇಗೆ ತಯಾರಿಸಬಹುದು? ಸಮೀಕರಣವನ್ನು ಬರೆಯಿರಿ. (3+2)

44. ಎ. ಈ ಕೆಳಗಿನ ರಾಸಾಯನಿಕ ಕ್ರಿಯೆಯಲ್ಲಿ 'A' ಮತ್ತು 'B' ಅನ್ನು ಗುರುತಿಸಿ.

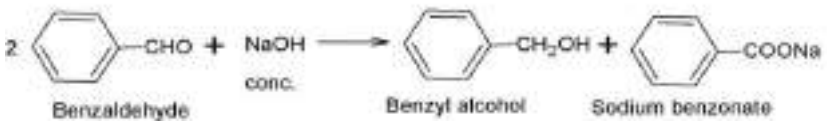
$$(CH_3)_3C - O - CH_3 \xrightarrow{HI,\ \Delta} A + B$$ (2+2+1)

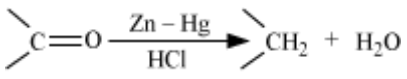
ಬಿ. ಫಿನಾಲ್ ಮತ್ತು ಆಲ್ಕೋಹಾಲ್‌ಗಳ ಮಧ್ಯೆ ಯಾವುದು ಹೆಚ್ಚು ಆಮ್ಲೀಯವಾಗಿದೆ? ಏಕೆ?

ಸಿ. ಗ್ಲೂಕೋಸ್ ಮತ್ತು ಫ್ರುಕ್ಟೋಸ್‌ನಿಂದ ಈಥನಾಲ್‌ನಾಗಿ ಪರಿವರ್ತಿಸುವ ಕಿಣ್ವವನ್ನು ಹೆಸರಿಸಿ.

45. ಎ. ಈ ಕೆಳಗಿನ ರಾಸಾಯನಿಕ ಕ್ರಿಯೆಗಳ ಹೆಸರನ್ನು ಬರೆಯಿರಿ.

i. $$RCN + SnCl_2 + HCl \longrightarrow RCH = NH \xrightarrow{H_3O^+} RCHO$$

ii. 

iii. 

ಬಿ. ಬೆಂಜಾಲ್ಡಿಹೈಡ್ ಮತ್ತು ಎಸಿಟೋಫಿನೋನ್‌ಗಳು ಪ್ರತ್ಯಾಮ್ಲದ ಉಪಸ್ಥಿತಿ 293K ಉಷ್ಣತೆಯಲ್ಲಿ ಪ್ರತಿಕ್ರಿಯಿಸುವ ರಾಸಾಯನಿಕ ಸಮೀಕರಣವನ್ನು ಬರೆಯಿರಿ. ಈ ಕ್ರಿಯೆಯಲ್ಲಿ ಬರುವ ಪ್ರಮುಖ ಉತ್ಪನ್ನದ ಹೆಸರನ್ನು ತಿಳಿಸಿ. (3+2)

46. ಎ. ಹೆಲ್ - ವೊಲ್ಹಾರ್ಡ್ - ಜೆಲೆನ್‌ಸ್ಕಿ (ಹೆಚ್.ವಿ.ಝಡ್) ಕ್ರಿಯೆಯನ್ನು ವಿವರಿಸಿ.

ಬಿ. ಡಿಕಾರ್ಬಾಕ್ಸಿಲೇಷನ್ ಎಂದರೇನು? ಒಂದು ಉದಾಹರಣೆ ಕೊಡಿ.

ಸಿ. ಬೆಂಜೊಯಿಕ್ ಅಮ್ಲವೂ ಫ್ರಿಡಲ್-ಕ್ರಾಫ್ಟ್‌ನ ಕ್ರಿಯೆಗೆ ಒಳಪಡುವುದಿಲ್ಲ. ಕಾರಣ ಕೊಡಿ. (2+2+1)

47. ಎ. ಹಿನ್‌ಸ್‌ಬರ್ಗ್ ಕ್ರಿಯಾಕಾರದ ರಾಸಾಯನಿಕ ಹೆಸರು ಮತ್ತು ರಚನೆಯನ್ನು ಬರೆಯಿರಿ.

ಬಿ. ಕಾರ್ಬೈಲ್ ಅಮೈನ್ ಕ್ರಿಯೆಯನ್ನು ಈಥೇನ್ ಅಮೈನ್‌ನ ಉದಾಹರಣೆಯೊಂದಿಗೆ ವಿವರಿಸಿ.

ಸಿ. ಅಮೋನಿಯಗಿಂತ ಅನಿಲಿನ್ ಕಡಿಮೆ ಪ್ರತ್ಯಾಮ್ಲೀಯವಾಗಿದೆ. ಕಾರಣ ಕೊಡಿ. (2+2+1)

48. ಎ. i. ಗ್ಲುಕೋಸ್‌ನಲ್ಲಿ ಒಂದು ಕಾರ್ಬೊನಿಲ್ ಗುಂಪು ಇದೆ.

ii. ಗ್ಲುಕೋಸ್‌ನಲ್ಲಿ ಒಂದು ಪ್ರಾಥಮಿಕ ಅಲ್ಕೊಹಾಲಿಕ್ ಗುಂಪು ಇದೆ. ಎಂದು ತೋರಿಸುವ ರಾಸಾಯನಿಕ ಕ್ರಿಯೆಗಳನ್ನು ಬರೆಯಿರಿ.

ಬಿ. ಮಾಲ್ಟೋಸ್‌ನ ಹಾವರ್ತನ ರಚನೆಯನ್ನು ಬರೆಯಿರಿ.

ಸಿ. ಯಾವ ವಿಟಮಿನ್ ಕೊರತೆಯಿಂದ ಬೆರಿ-ಬೆರಿ ರೋಗವು ಬರುತ್ತದೆ. (2+2+1)

49. ಎ. ಅನವಶ್ಯಕ ಆಮೈನೋ ಆಮ್ಲ ಎಂದರೇನು? ಒಂದು ಉದಾಹರಣೆ ಕೊಡಿ.

ಬಿ. ಪೆಪ್ಟೈಡ್ ಬಂಧ ಎಂದರೇನು? ತ್ರೈ ಪೆಪ್ಟೈಡ್‌ನಲ್ಲಿ ಎಷ್ಟು ಪೆಪ್ಟೈಡ್ ಬಂಧಗಳಿವೆ?

ಸಿ. ಡಿ ಆಕ್ಸಿ ರೈಬೋ ನ್ಯೂಕ್ಲಿಯಿಕ್ ಅಮ್ಲದಲ್ಲಿ ಇರುವ ಪೆಂಟೋಸ್ ಶರ್ಕರವನ್ನು ಹೆಸರಿಸಿ. (2+2+1)

50. ಎ. ರಬ್ಬರಿನ ವಲ್ಕನೀಕರಣವನ್ನು ವಿವರಿಸಿ. ಐಸೊಪ್ರೀನನ್‌ನ ರಚನೆ ಮತ್ತು IUPAC ಹೆಸರನ್ನು ಬರೆಯಿರಿ.

ಬಿ. ನೈಲಾನ್-6, 6 ನಲ್ಲಿರುವ ಪುನರಾವರ್ತಿತ ಮಾನೋಮರಿಕ್ ಘಟಕಗಳಾವುವು? (3+2)