CHEMISTRY

Time: 3hours
Max.Marks70

GENERAL INSTRUCTION

- **i.** Question 1 is of 20 marks having four sub parts, all of which are compulsory.
- **ii.** Question no 2 to 8 carry 2 marks each, with **two** question having internal choice.
- **iii.** Question numbers 9 to 15 carry 3 marks each, with **two** question having internal choice.
- **iv.** Question 16 to 18 carry 5 marks each with an internal choice.
- **v.** All working, including rough work, should be done on the same sheet as adjacent to be rest of the answer.
- **vi.** The intended marks for questions of parts of question are given in brackets [ ]
- **vii.** Balanced equation must be given wherever possible and diagrams where they are helpful.
- **viii.** When solving numerical problems, all essential working must be shown
- **ix.** In working out problems, use the following data

Gas constant

$R = 1.987 cal \text{ dig}^{-1} mol^{-1} = 8.314 JK^{-1} = 0.0821 dm^3 \text{ atm K}^{-1} mol^{-1}$

$1 latm = 1 dm^3 atm = 101.3 J.$

$1 Faraday = 96500 coulombs$

$Avagadros \text{ number} = 6.022 \times 10^{23} mol^{-1}$

1. (a) Fill in the blanks by choosing the appropriate words from those given in the brackets.
(More than, primary, cathode, Lucas, regent, two, four, less than, Grignard's reagent, tertiary, anode, zero, equal to, three)

i) The elevation of boiling point of $0.5 MK_2So_4$ solution is……..that of 0.5M urea solution.
The elevation of boiling point $0.5 MKCl$ solution is…….that of $0.5 MK_2So_4$ solution.
Sol:
More than, less than

ii) A mixture of conc. HCL and anhydrous $ZnCl_2$ is called…….which shows maximum reactivity with…… alcohol.
Sol:
Lucas reagent, tertiary

iii) IN electrolyte refining the impure metal is made….. While a thin sheet of pure metal is used as…..

Sol:

Anode, cathode

iv) When the concentration of a reactant of first order reaction is doubled, the rate of reaction becomes…..times, but for a…. order reaction, the rate of reaction remains the same.

Sol:

Two, zero

(b) Select the correct alternative from the choice given:

i) The cell reaction is spontaneous or feasible when emf of the cell is:

a) Negative b) positive c) zero d) either positive or negative

Sol: b

Free energy, ΔG^0 must be negative for a cell reaction to be spontaneous or feasible and $\Delta G^0 = -nFE^0_{cell} = (-)ve$

Where, n is the number of electron

F is the charge in Faraday

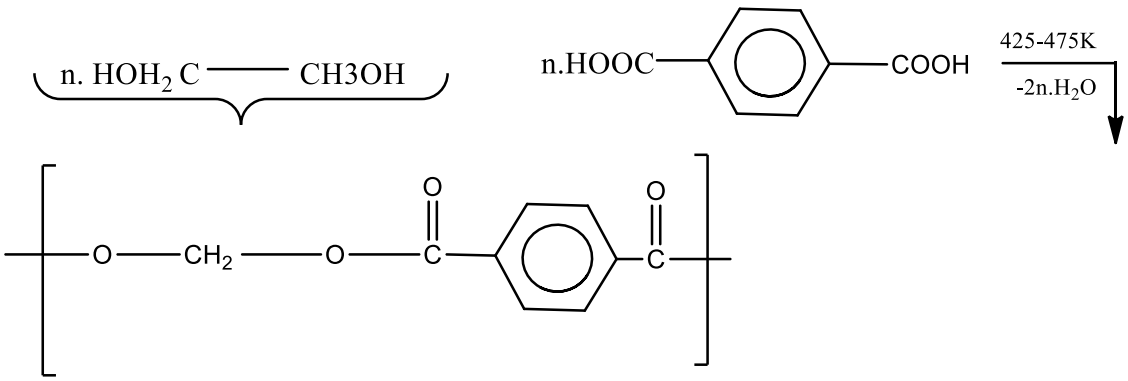
E^0 is the emf of the cell.

Hence, emf of the cell is positive.

ii) Which, among the following polymers, is polyester?

a) Melamine
b) Bakelite
c) Terylene
d) Polythene

Sol: c



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iii) The correct order of increasing acidic strength of the Oxo acids of chlorine is:

a) $HClO_3 < HClO_4 < HClO_2 < HClO$

b) $HClO < HClO_2 < HClO_3 < HClO_4$

c) $HClO_2 < HClO < HClO_4 < HClO_3$

d) $HClO_3 < HClO_4 < HClO < HClO_2$

Sol:

The acidic strength of the Oxo-acid of chlorine can be explained by two ways

If the oxidation number of the chlorine atom, more be its acidic strength.

Therefore,

Oxidation number of Cl in HClO= $+1$

Oxidation number of Cl in $HClO_2$ = $+3$

Oxidation number of Cl in $HClO_3$ = $+5$

Oxidation number of Cl in $HClO_2$ = $+7$

So, the order of stability is

$ClO^- < ClO_2^- < ClO_3^- < ClO_4^-$

And, when more stable in the conjugate base then,

ClO_4^- is more stable due to the presence of four oxygen atoms ClO^- is least stable duee to only one oxygen atom.

Therefore, the order of stability is

$HClO < HClO_2 < HClO_3 < HClO_4$

Iv) A catalyst is a substance which:

a) Changes the equilibrium constant of reaction.
b) Increases the equilibrium constant of the reaction.
c) Supplies energy to the reaction.

d) Shortens the time to reach equilibrium.

Sol: d

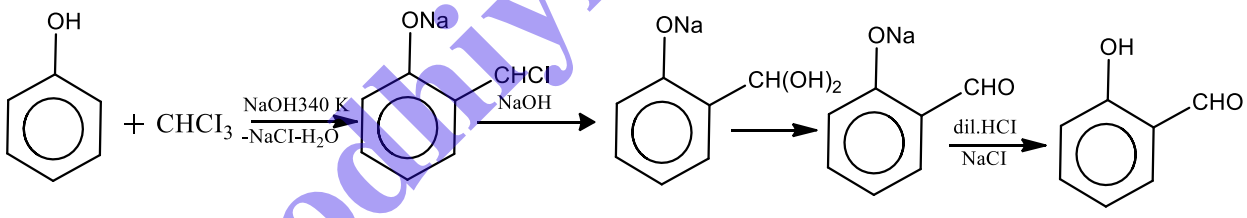
According to the catalyst, the substance which alters the rate of chemical reaction without itself undergoes any chemical change as catalyst.

(c) Match the following:

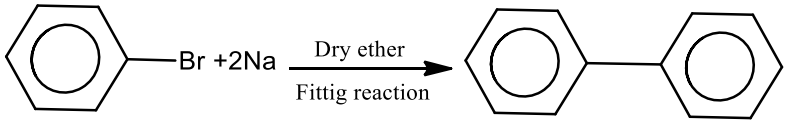
1. Diazotisation	a) Anisotropic
2. Crystalline solid	b) Reimer- Tiemann reaction
3. Phenol	c) Diphenyl
4. Fittig reaction	d) Aniline

Sol:

1. Diazotisation----- Aniline, Conversation of Aniline $\left(C_6H_5-NH_2\right)$ to diazonium salt
2. Crystalline solid----- Anisotropic, Crystalline solids are anistropic, because they don't show same physical property.
3. Phenol--------Reimer- Tiemann reaction, Phenol gives salicyladehyde with $CHCl_3$ in the presence of $NaOH$.



4. Fittig reaction------ Diphenyl,
It is the coupling of two haloarenes in the presence of sodium (Na) in dry ether.



(d) Answer the following question:

i) Which trivalent ion has maximum size in the lanthanoid series, i.e. lanthanum ion $\left(La^{3+}\right)$ to lutetium $\left(Lu^{3+}\right)$?

Atomic number of lanthanum is 57 and lutetium is 71.

ii) Explain why, Cu^{2+} is paramagnetic but Cu^{+} is diamagnetic? (At.no of cu is 29)

iii) Calculate the boiling point of urea solution when 6g of urea is dissolved in 200g of water.

(K_b For water is $0.52K$ kgmol^{-1} , boiling point of pure water is 373K, mol. wt. of urea is 60)

Iv) Identify the compounds A, B, C and D in the given reaction.

$HC \equiv CH$

$T = T° + \Delta T_b = 373 + 0.26 = 373.26$ K.

iv) $HC \equiv CH \xrightarrow[Hg^{2+}/H_2SO_4]{H_2O} \left[CH_2 = CHOH \right] \xrightarrow{\text{Tautomerises}} CH_3CHO$ (Acetaldehyde) (A)

CH_3CHO (A) $\xrightarrow[K_2Cr_2O_7 + H_2SO_4]{[O]}$ CH_3COOH (Acetic acid) (B)

CH_3COOH (B) $\xrightarrow{Ca(OH)_2}$ $(CH_3COO)_2Ca$ (C)

$(CH_3COO)_2Ca$ (C) $\xrightarrow[\text{Dry distillation}]{\Delta}$ CH_3COCH_3 (Acetone) (D) $+ CaCO_3$

$\therefore$ (A) = CH_3—CHO (acetaldehyde)

(B) = CH_3COOH (acetic acid)

(C) = Calcium acetate, i.e. $(CH_3COO)_2Ca$

(D) = Acetone, i.e. CH_3COCH_3

2. (a) For the reaction $A + B \rightarrow C + D$, the initial rate for different reactions and initial concentration of reactants are given below:

S.No	Initial	conc	Initial rate
	[A] $molL^{-1}$	[B] $molL^{-1}$	
1	**1.0**	**1.0**	2×10^{-3}
2	**2.0**	**1.0**	4×10^{-3}
3	**4.0**	**1.0**	8×10^{-3}
4	**1.0**	**2.0**	2×10^{-3}
5	**1.0**	**4.0**	2×10^{-3}

Sol:

$Rate = K[A]^a[B]^b$

Where, a is the order of A and b is the order of B.

S.No (1) and (2) we get,

$$\frac{(Rate)_2}{(Rate)_1} = \frac{[A]_2^a [B]_2^b}{[A]_1^a [B]_1^b}$$

$$\Rightarrow \frac{4\times10^{-3}}{2\times10^{-3}} = \frac{(2)^a (1)^b}{(1)^a (1)^b}$$

$$\Rightarrow 2 = (2)^a$$

$$\Rightarrow a = 1$$

$\therefore Order\ is$ A=1

Similarly, on comparing (1) and (4) , We get

$$\frac{(Rate)_4}{(Rate)_1} = \frac{[A]_4^a [B]_4^b}{[A]_1^a [B]_1^b}$$

$$\Rightarrow \frac{4\times10^{-3}}{2\times10^{-3}} = \frac{(2)^b (1)^a}{(1)^a (1)^b}$$

$$\Rightarrow 1 = (1)^a$$

$$\Rightarrow a = 0$$

$\therefore Order\ is$ B=0

(i) What is the overall order of reaction?

Sol:

Overall order of reaction is $1+0=1$

(ii) Write the rate law equation.

Sol:

And the rate of law is 8×10^{-3}

(b) 25% of first order reaction is completed in 30minutes. Calculate the time taken in minutes for the reaction to go to 90% completion.

Sol:

We have time for25% completion of reaction is 30minutes

Let, [initial concentration]$=100$

Then, [a-x], at $25\% = 100-25 = 75\%$

And, $t = 30\,\text{min}\,utes$

Therefore,

$$k = \frac{2.303}{t}\log\frac{a}{a-x}$$
$$= \frac{2.303}{30}\log\frac{100}{75}$$
$$= 0.0767\log 1.333$$
$$= 0.0767 \times 0.1250$$
$$= 0.00958$$
$$K = 0.0096\,\text{min}^{-1}$$

So, Time taken to complete 90% of reaction will be

$$t = \frac{2.303}{k}\log\frac{100}{10}$$
$$= \frac{2.303}{0.0096}\log 10$$
$$= \frac{2.303}{0.0096} \times 1$$
$$= 239.89$$
$$\approx 240\,\text{min}$$

3. I) Name the type of drug which lowers the body temperature in high fiver condition.

Sol:

In high fever condition antipyretic drug helps on decreasing the body temperature. Like Paracetamol, asperin

II) What are tranquilizers? Give one example of a tranquilizer.

Sol:

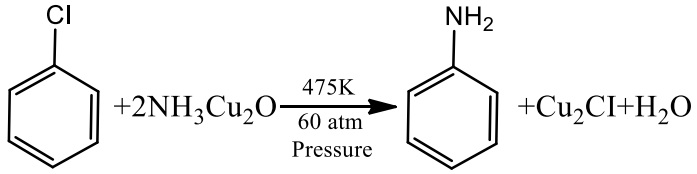
The chemical compounds used for the treatment of stress and mild or severe mental diseases is known as Tranquilizer. It relieves anxiety, stress, irritability or excitement by including a sense of wellbeing. Like equanil

4. Write the balanced chemical equation of each of the following

(a) Chlorobenzene treated with ammonia in the pressure of Cu_2O at 475K and 60atm

Sol:

Aniline is formed when Chlorobenzene when treated with ammonia in the presence of Cu_2O at 475K and 60atm pressure.



(b) Ethyl chloride treated with alcoholic potassium hydroxide.

Sol:

Ethene is formed by the elimination reaction, when ethyl chloride is treated with alcoholic KOH.

$$C_2H_5Cl + KOH \rightarrow C_2H_4 + KCl + H_2O$$

5. I) Name the monomer and the type of polymerization that takes place when PTFE is formed.

Sol:

Polytetrafluoroethylene (PTFE) made by the monomer of tetrafluoroethylene $\left(CF_2 = CF_2\right)$ by free radical vinyl polymerisation.

II) Name the monomers of nylon-6, 6.

Sol:

The monomers of the nylon-6, 6 are as follows

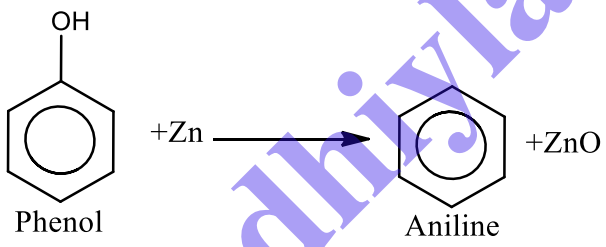
Hexamethylenediamine $\left[NH_2\left(CH_2\right)_6 NH_2\right]$ and Adipic acid $\left[HOOC\left(CH_2\right)_4 COOH\right]$

6. Name two water soluble vitamins and the diseases caused by their deficiency in the diet of an individual.

Sol:

Vitamin-B and Vitamin-C are water soluble and beri-beri and scurvy are the diseases that occurred in the deficiency of Vitamin-B and Vitamin-C

7. How will you obtain the following (give balanced chemical equations)?



(i) Iodoform from ethanol

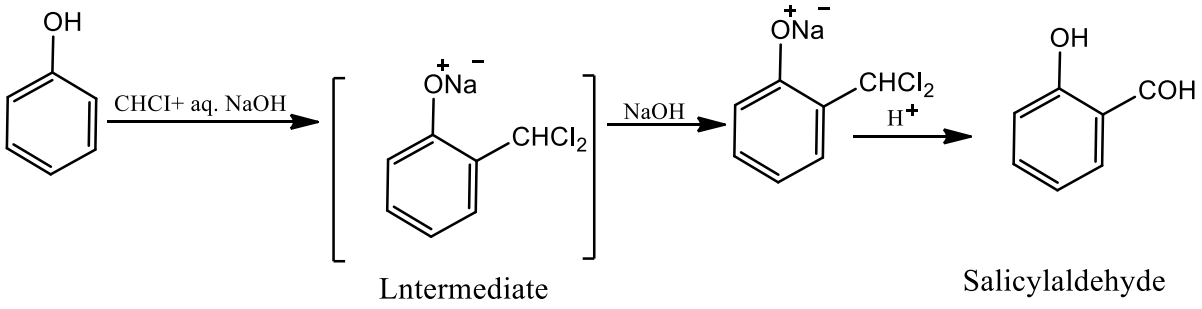
Sol:

$$\underset{\text{Ethanol}}{C_2H_5OH} + 4I_2 + 6NaOH \xrightarrow{\Delta} \underset{\text{Idoform}}{CHI_3} + HCOONa + 5NaI + 5H_2O$$

b. How will you obtain the following? (give balanced chemical equations)?

(i) Salicylaldehide from phenol.

Sol:



Lntermediate

Salicylaldehyde

(ii) Propan-2-ol from Grignard's reagent

Sol:

$$CH_3CHO \xrightarrow{CH_3MgX} CH_3\underset{\underset{Mg(OH)x}{\underset{(propan-2-ol)}{\downarrow}}}{\overset{CH_3}{\overset{\downarrow}{C}}}HOH^+$$

8. Show that the first order reaction the time required to complete 75% of reaction is about 2 times more than that required to complete 50% of the reaction.

Sol:

Let the initial amount is 100.

So, time required to complete $75\%\left(t_{75\%}\right)=t_{75\%}$

Amount at $t_{75\%}$ is $\left(a-x\right)_1=100-75=25$

Amount at $t_{50\%}$ is $\left(a-x\right)_2=100-50=50$

Where the time is required to complete $50\%=t_{50\%}$

Therefore,

$$\frac{t_{75\%}}{t_{50\%}} = \frac{\log\left[\frac{a}{(a-x)_1}\right]}{\log\left[\frac{a}{(a-x)_2}\right]}$$

$$= \frac{\log\frac{100}{25}}{\log\frac{100}{50}}$$

$$= \frac{\log 4}{\log 2}$$

$$= \frac{0.06020}{0.3010}$$

$$= 2$$

Hence, $t_{75\%}$ is $2 \times t_{50\%}$.

9. (a) When 0.4g of oxalic acid is dissolved in the solution is lowered by 0.45K. Calculate the degree of association of acetic acid. Acetic acid forms dimer when dissolved in benzene.

(K_f For benzene $= 5.12\text{K kg mol}^{-1}$**, at wt.** C = 12, H = 1, O = 16)

Sol:

We have,

Mass of oxalic acid $= 0.4g\,(w_B)$

Mass of benzene $= 40g\,(w_A)$

K_f For benzene $5.12k$ kg mol^{-1}

Molar mass of oxalic acid $[\text{C}_2O_4H_2] = 90gmol^{-1}$

$(2\times12 + 4\times16 + 2\times1)$

$i, e.(M_B)$

$$\Delta T_f = i \times k_f \times \frac{W_B}{M_B} \times \frac{1000}{W_A}$$

$$i = \frac{\Delta T_f \times M_B \times W_A}{K_f \times W_B \times 1000}$$

$$= \frac{0.45K \times 90gmol^{-1} \times 40g}{5.12Kkgmol^{-1} \times 0.4g \times 1000}$$

$$= 0.79$$

Also,

$1-\alpha+\frac{\alpha}{2}$ Where, I is the Vant' Hoff factor and

α is the degree of association.

$$0.79=1-\alpha+\frac{\alpha}{2}$$

$$\Rightarrow 0.79=1-\alpha\left[1-\frac{1}{2}\right]$$

$$\Rightarrow 0.79=1-\frac{\alpha}{2}$$

$$\frac{\alpha}{2}=1-0.79=0.21$$

$$\therefore \alpha=0.42$$

$$\Rightarrow 42\%$$

Or

(b) A solution is prepared by dissolving 9.25g of non-volatile solute in 450 mL of water. It has an osmotic pressure of 350mm of Hg at 27^0C. Assuming the solute is non-electrolyte, determine its molecular mass.

($R=$ 0.0821L atm $K^{-1}mol^{-1}$ **)**

Sol:

We have,

Mass of non-volatile solute $(W_B)=9.25g$

Volume of water $(V_A)=450mL$

Osmotic-pressure $(\pi)=\frac{350}{760}=0.46atm$

Temperature $(T)=27+273=300K$

Gas constant $(R)=0.0821LatmK^{-1}mol^{-1}$

Now,

$$\because \pi=CRT=\frac{W_B\times1000\times RT}{M_B\times V}$$

M_B is the molecular mass of non-volatile solute

$$M_B=\frac{W_B\times1000\times R\times T}{V\times\pi}$$

$$=\frac{925g\times1000\times0.0821LatmK^{-1}mol^{-1}\times300K}{450mL\times0.46atm}$$

$$M_B=\frac{227827.5}{20.7}$$

$$=1100.6gmol^{-1}$$

Hence, the molecular mass of non-volatile solute is $1100.6\,gmol^{-1}$.

10. An element occurs in body centered cubic stricture. Its density is $8.0\,g/cm^3$. If the cell edge is 250pm. Calculate the atomic mass of an atom of this element.
($N_A = 6.022\times10^{23}$)

Sol:

We have,

$Z = 2$, (for body center red cubic structure)

Density $(d) = 8.0\,g/cm^3$

Edge-length $(a) = 250\,pm = (250\times10^{-10})\,cm$

Avogadro's number $(N_A) = 6.023\times10^{23}\,mol$

Now, density is:

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

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

$$= \frac{8\,gcm^{-3}\times(250)^3\times10^{-30}\,cm^3\times6.023\times10^{23}}{2}$$

$$= \frac{752875000\times10^{-7}}{2}$$

$$= 376437500\times10^{-7}\,gmol^{-1}$$

$$= 37.64\,gmol^{-1}$$

Hence, the atomic mass of an atom of this element $37.64\,gmol^{-1}$.

11. Describe the role of the following.

I) Cryolite in the extraction of aluminum from pure alumina.

Sol:

The importance of croylite in the metallurgy of aluminum are as follows:

i) On lowering the melting point of Al_2O_3.

ii) On dissolving Al_2O_3.

iii) On increasing the electrical conductivity of Al_2O_3.

II) NaCN in the extraction of silver from a silver ore.

Sol:

NaCn helps in leaching of Ag ore in the presence of air from which the silver is obtained in the extraction of silver.

III) Coke in the extraction of iron from its oxides.

Sol:

We know that coke is the reducing agent. So, in blast furnace at high temperature it is capable of reducing iron from oxide.

$(Fe_2O_3$ or FeO$)$

12.

(i) Write the IUPAC names of the following

(1) $K_3[Fe(C_2O_4)_3]$

Sol:

Potassiumtrioxalato ferate (III)

(2) $\left[CO(NH_3)_5\,Cl\right]SO_4$

Sol:

Pentammine chlorocobalt(III) sulphate

(ii) $Rate = k[A]^a[B]^b$ **is a coordination complex ion.**

(a) Calculate the oxidation number of iron in the complex.

Sol:

Oxidation of iron in the complex compound $\left[Fe(CN)_6\right]^{4-}$

$x+6(-1)=-4, x-6=-4$

$x=6-4=2$

(b) Is the complex ion diamagnetic or paramagnetic?

Sol:

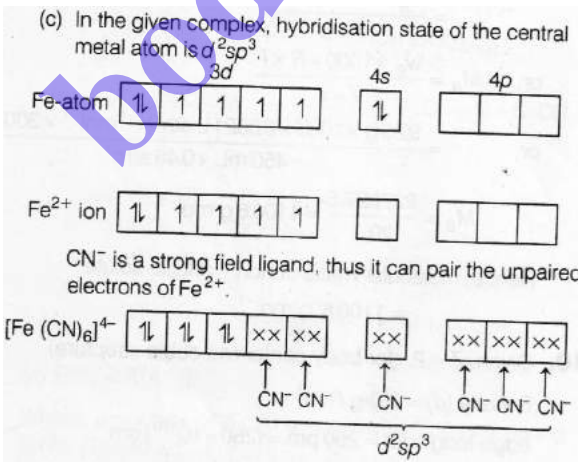
We get that in the given complex compound $\left[Fe(CN)_6\right]^{4-}$ Iron exist in +2 state. So, its electronic configuration of Fe^{2+} is $4s^0 3d^6$.

As CN^- is the strong field ligand.

Therefore, it is the diamagnetic.

(c) What is the hybridization state of the central metal atom?

Sol:



(d) Write the IUPAC name of the complex ion.

Sol:

Hexacyanoferrate (II) ion

13. (a) Explain why

(i) Transition elements from alloys?

Sol:

The atomic radii of the transition elements in any series are not different from each other. Such that it can easily replace in lattice and form solid solution over an appreciable composition range.

(ii) Zn^{2+} **Salts are white whereas** Cu^{2+} **salts are coloured?**

Sol:

Zn^{2+} Salts have a completely filled set of d-orbitals $\left(3d^{10}\right)$, While Cu^{2+} has an incompletely filled set of d- orbitals. $\left(3d^{9}\right)$

(iii) Transition metals and their compounds act as catalyst

Sol:

We know that many transition metals and their compounds are used as catalysts because it's catalytic activity. It means that the ability to oxidation states and to form complexes. Since, the transition metals have variable valences. Sometimes it forms unstable compounds and provide new path with lower activation energy.

OR

(b)Complete and balance the following chemical equation.

(i) $KMnO_4 + H_2SO_4 + H_2C_2O_4 \rightarrow -+-+-+-$

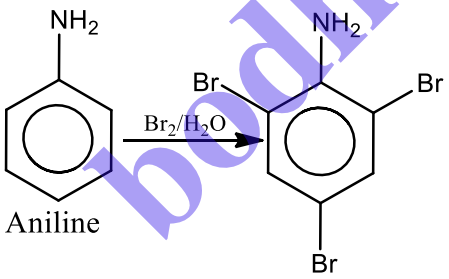
(ii) $K_2Cr_2O_7 + H_2SO_4 + KI \rightarrow -+-+-+-$

(iii) $K_2Cr_2O_7 + H_2SO_4 + FeSO_4 \rightarrow -+-+-+-$

14. Give balanced equations for the following

(i) Aniline is treated with bromine water

Sol:



2,4,6-tribromoaniline

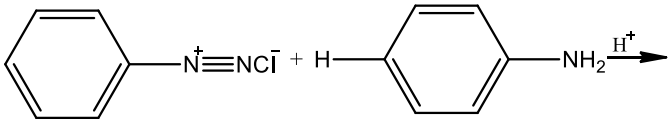
(ii) Ethylamine is heated with chloroform and alcoholic solution of potassium hydroxide.

Sol:

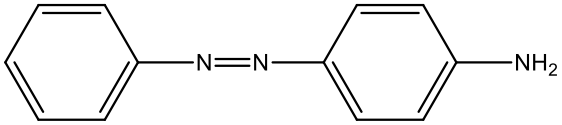
$$\underset{Ethylamine}{CH_3CH_2NH_2} + \underset{Chloroform}{CHCL_3} + 3KOH\left(Alc\right) \xrightarrow{\Delta} CH_3C - N \underset{=}{\rightarrow} C + 3KCL + 3H_2O$$

(iii) Benzene diazonium chloride is treated with ice cold solution of aniline in acidic medium.

Sol:



Benzene diazonium chloride Aniline



p-aminoazobenzene

15. Define the terms with the suitable example

(i) Peptisation

(ii) Electrophoresis

(iii) Dialysis

16. (a) (i) Calculate the mass of silver deposited at cathode when a current of 2 amperes is passed through a solution of $AgNO_3$ for 15minutes.

Sol:

We have,

Current $(i) = 2ampere$

$(t) = 15\min = 15 \times 60 = 900s$

$\therefore Q = i \times t = 2 \times 900 = 1800C$

Time $Ag = 108$

$\because 96500C$ deposite silver $(Ag) = 108g$

$\therefore 1800C$ deposite silver $(Ag) = \dfrac{108 \times 1800}{96500} = 2.01g$

Hence, the silver deposited is $2.01g$

(ii) Calculate the emf and ΔG for the cell reaction at 298K.

$= Mg_{(s)} \left| Mg^{2+}{}_{(0.1M)} \right| \left| Cu^{2+}{}_{(0.01M)} \right| Cu_{(s)}$

Given,

$E^0_{cell} = 2.71V, 1F = 96,500C$

Sol:

$\Delta G^0 = -nFE^0{}_{cell}$

Where, n is the number of electrons participate.

$E^0_{cell} = 2.71V, 1F = 96,500C$

F is 96500C

Therefore,

$\Delta G = -2 \times 96500 \times 2.71$

$= -523030 Jmol^{-1}$

$-\Delta G = -523.030 kJmol^{-1}$

Now,

$E_{cell} = E^0_{cell} = 2.71V, 1F = 96,500C$

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

$= 2.71 - \frac{0.0591}{2} \log \frac{[0.1]}{[0.01]}$

$= 2.71 - 0.029555$

$= 2.68045$

(b) (i) Define the following terms:

1. Specific conductance

Sol:

The specific conductance (conductivity) is defined as the conductance of a solution of 1cm length with area of cross section equal to $1cm^3$. It is also denoted by kappa

$G_{(conductor)} = kappa$

$\left(l = 1cm \text{ And A=1cm}^2\right)$

$G = \kappa(kappa).\frac{A}{l}$

$\kappa = G.\frac{l}{A}$

2. Kohlrausch's law

Sol:

This law state that the limiting equivalent conductivity at infinite dilution is the sum of the equivalent or molar conductivity at infinite dilution is the sum of the equivalent cations and anions.

Na^+ Cl^- ions $\wedge^0_{eq}$ $\wedge^0_m = \lambda^0_c + \lambda^0_a$

(ii) The resistance of a conductivity cell containing 0.001M KCl solution at 298k is 1500ohm. What is the cell constant and molar conductivity of 0.001 M KCl solution, if the conductivity of this solution is $0.146 \times 10^{-3} ohm^{-1} cm^{-1} at 298K$

Sol:

We have,

Concentration (C) of KCl

Solution $= 0.001M$

Resistance (R) of 0.001MKCl=1500Ω

Conductivity (K) at298K of KCl solution

$= 0.146 \times 10^{-3} \Omega^{-1} cm^{-1}$

Now,

$\because \kappa(kappa) = \frac{1}{R} \times \frac{l}{a}$

$Where,\ \frac{l}{a}$ is the cell constant

$\therefore \frac{l}{a} = \kappa(kappa) \times R$

$= 0.146 \times 10^{-3} \times 1500$

Cell constant $= 219 \times 10^{-3} cm^{-1}$

And

$\wedge_m (molar\ \text{conductivity}) = \frac{\kappa \times 1000}{C}$

$= \frac{0.146 \times 10^{-3} \times 1000}{0.001}$

$= 146 Scm^2 mol^{-1}$

Hence, molar conductivity is $146 Scm^2 mol^{-1}$.

17. (a) (i) Explain why

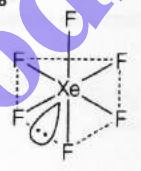
(1) Fluorine has lower electron affinity than chlorine?

(2) Red phosphorus is less reactive than white phosphorous?

(3) Ozone acts as a powerful oxidizing agent?

(ii)Draw the structure of the following:

(ii) (1) **Structure of XeF_6:**



(XeF_6)

Hybridisation of Xe = sp^3d^3

shape = distorted octahedral.

(2) **Structure of IF_7 :**

IF_7

Hybridisation of I = sp^3d^3

Shape = pentagonal bipyramidal.

(b)Explain why,

(i) Interhalogen compounds are more reactive than the related elemental halogens?

Sol:

Interhalogen compounds are more reactive than the related elemental halogens (except fluorine)

(iii) Sulphur exhibits tendency for catenation but oxygen does not?

Sol:

Sulpher have the tendency of catenation due to presence of vacant d-orbitals.

(iii)On being slowly passed through the water PH_3 forms bubbles, but NH_3 dissolves?

Sol:

NH_3 Has very strong proton affinity (due to high electronegative). So, it dissolved in water. Whereas PH_3 form PH_4OH

$$PH_3 + H_2O \rightarrow \underset{\text{lighter than water}}{PH_4OH}$$

(a) Complete and balance the following reaction:

(i) $P_4 + H_2SO_4 \rightarrow 4H_3PO_4 + 10SO_2 + 4H_2O$

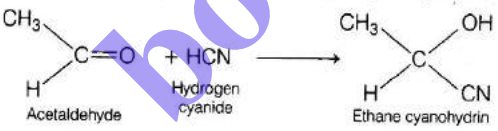
(ii) $3Ag + 4H\,\underset{\text{Dilute}}{NO_3} \rightarrow 3AgNO_3(l) + NO(g) + 2H_2O(l)$

18. (i) Give balanced chemical equations for the following reaction.

(1) Acetaldehide reacts with hydrogen cyanide.

Sol:

(i) (a) (1) Acetaldehyde reacts with hydrogen cyanide.

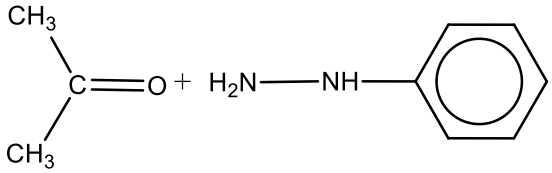


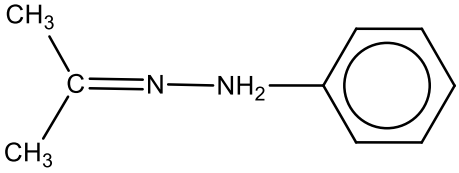
Acetaldehyde — Ethane cyanohydrin

Above reaction is a nucleophilic addition reaction when acetaldehyde reacts with hydrogen cyanide, it gives ethane cyanohydrin.

(2) Acetone reacts with phenyl hydrazine.

Sol:





(3) Acetic acid is treated with ethanol and a drop of Conc H_2SO_4.

Sol:

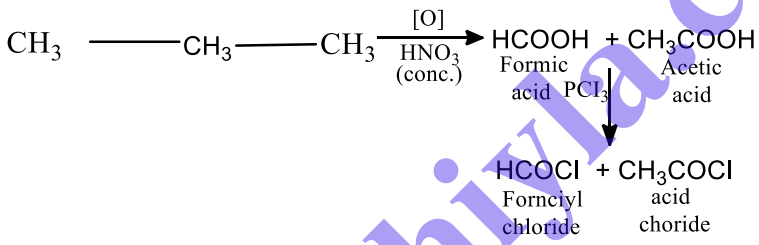
Acetic acid is treated with ethanol and a drop of conc H_2SO_4.

$$CH_3COOH(l)+C_2H_5OH(l)\xrightarrow{\Delta.cONCH_2SO_4}CH_3COOC_2H_5(l)+H_2O$$

(ii)

(a) Identify the compounds A and B in the given reaction.

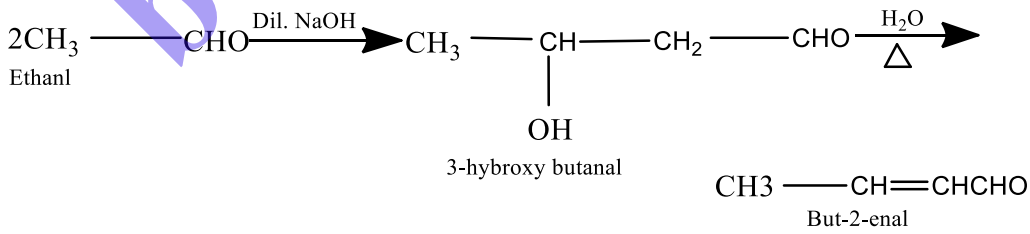
Sol:



(b) Write chemical equations to illustrate the following name reactions.

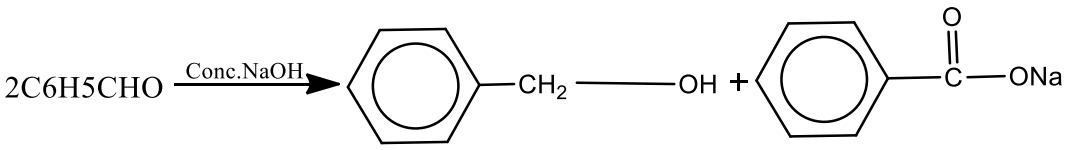
(i) Aldol Condensation

Sol:



Cannizzaro reaction

Sol:



(ii) Benzoin condensation.

Sol: