MODEL QUESTION PAPER : 2020-21

CHEMISTRY (THEORY)

MM : 70 **Time : 3 Hours**

General Instructions. Read the following instructions carefully.

(a) There are 33 questions in this question paper. All questions are compulsory.

(b) Section A: Q. No. 1 to 2 are case-based questions having four MCQs or Reason Assertion type based on given passage each carrying 1 mark.

(c) Section A: Question 3 to 16 are MCQs and Reason Assertion type questions carrying 1 mark each

(d) Section B: Q. No. 17 to 25 are short answer questions and carry 2 marks each.

(e) Section C: Q. No. 26 to 30 are short answer questions and carry 3 marks each.

(f) Section D: Q. No. 31 to 33 are long answer questions carrying 5 marks each.

(g) There is no overall choice. However, internal choices have been provided.

(h) Use of calculators and log tables is not permitted.

Section-A (Objective Type)

Objective Type Questions

1. Read the passage given below and answer the following questions: (1x4=4)

The d-block of the periodic table contains the elements of the groups 3 – 12 and are known as transition elements. In general, the electronic configuration of these elements is $(n - 1)\ d^{1-10}\ ns^{1-2}$. The d-orbitals of the penultimate energy level in their atoms receive electrons giving rise to the three rows of the transition metals i.e., 3d, 4d and 5d series. However, Zn, Cd and Hg are not regarded as transition elements. Transition elements exhibit certain characteristic properties like variable oxidation states, complex formation, formation of coloured ions and alloys, catalytic activity, etc. Transition metals are hard (except Zn, Cd and Hg) and have a high melting point.

The following questions are multiple choice questions. Choose the most appropriate answer:

(i) Electronic configuration of a transition element X in +3 oxidation state is $[Ar]3d^5$. What is its atomic number?

(a) 25 (b) 26 (c) 27 (d) 24

(ii) The electronic configuration of Cu(II) is $3d^9$ whereas that of Cu(I) is $3d^{10}$. Which of the following is correct?

(a) Cu(II) is more stable

(b) Cu(II) is less stable

(c) Cu(I) and Cu(II) are equally stable

(d) Stability of Cu(I) and Cu(II) depends on nature of copper salts

(iii) Which of the following is amphoteric oxide?

Mn_2O_7, CrO_3, Cr_2O_3, CrO, V_2O_5, V_2O_4

(a) V_2O_5, Cr_2O_3 (b) Mn_2O_7, CrO_3

(c) CrO, V_2O_5 (d) V_2O_5, V_2O_4

OR

The magnetic moment is associated with its spin angular momentum and orbital angular momentum. Spin only magnetic moment value of Cr^{3+} ion is _____.

(a) 2.87 B.M. (b) 3.87 B.M. (c) 3.47 B.M. (d) 3.57 B.M.

(iv) Interstitial compounds are formed when small atoms are trapped inside the crystal lattice of metals. Which of the following is not the characteristic property of interstitial compounds?

(a) They have high melting points in comparison to pure metals.

(b) They are very hard.

(c) They retain metallic conductivity.

(d) They are chemically very reactive.

2. Read the passage given below and answer the following questions: (1x4=4)

Read the given passage and answer the questions 1 to 5 that follow :

Colloidal particles always carry an electric charge which may be either positive or negative. For example, when $AgNO_3$ solution is added to KI solution, a negatively charged colloidal sol is obtained. The presence of equal and similar charges on colloidal particles provide stability to the colloidal sol and if, somehow, charge is removed, coagulation of sol occurs. Lyophobic sols are readily coagulated as compare to lyophilic sols.

In these questions (i-iv) a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

(a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

(b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

(c) Assertion is correct statement but reason is wrong statement.

(d) Assertion is wrong statement but reason is correct statement.

(i) **Assertion :** An ordinary filter paper impregnated with collodion solution stops the flow of colloidal particles.

Reason : Pore size of the filter paper becomes more than the size of colloidal particle.

(ii) **Assertion :** Colloidal solutions show colligative properties.

Reason : Colloidal particles are large in size.

(iii) **Assertion :** Colloidal solutions do not show brownian motion.

Reason : Brownian motion is responsible for stability of sols.

OR

Assertion: Animal hide soaked in tannin results in hardening of leather.

Reason: Tanning occurs due to mutual coagulation.

(iv) **Assertion :** Coagulation power of Al^{3+} is more than Na^+.

Reason : Greater the valency of the flocculating ion added, greater is its power to cause precipitation (Hardy Schulze rule).

Following questions (Q.No.3 -11) are multiple choice questions carrying 1 mark each:

3. 50 mL of an aqueous solution of glucose $C_6H_{12}O_6$ (Molar mass : 180 g/mol) contains 6.02×10^{22} molecules. The concentration of the solution will be

(a) 0.1 M (b) 0.2 M (c) 1.0 M (d) 2.0 M

4. If the standard electrode potential of an electrode is greater than zero, then we can infer that its

(a) reduced form is more stable compared to hydrogen gas.

(b) oxidised form is more stable compared to hydrogen gas.

(c) reduced and oxidised forms are equally stable.

(d) reduced form is less stable than the hydrogen gas.

OR

$\wedge^0_{m(NH_4OH)}$ is equal to _____.

(a) $\wedge^0_{m(NH_4OH)} + \wedge^0_{m(NH_4Cl)} - \wedge^0_{m(HCl)}$ (b) $\wedge^0_{m(NH_4Cl)} + \wedge^0_{m(NaOH)} - \wedge^0_{m(NaCl)}$

(c) $\wedge^0_{m(NH_4Cl)} + \wedge^0_{m(NaCl)} - \wedge^0_{m(NaOH)}$ (d) $\wedge^0_{m(NaOH)} + \wedge^0_{m(NaCl)} - \wedge^0_{m(NH_4Cl)}$

5. The incorrect statement about interstitial compounds is

(a) They are chemically reactive.

(b) They are very hard.

(c) They retain metallic conductivity.

(d) They have high melting point.

OR

Total number of unpaired electrons present in Co^{3+} (Atomic number = 27) is

(a) 2 (b) 7 (c) 3 (d) 5

6. The correct IUPAC name of $CH_3-\underset{\displaystyle OH}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-CH_2CH_3$ is

(a) tert-butyl alcohol (b) 2,2-Dimethylpropanol

(c) 2-Methylbutan-2-ol (d) 3-Methylbutan-3-ol

7. One mole of $CrCl_3 \cdot 6H_2O$ compound reacts with excess $AgNO_3$ solution to yield two moles of AgCl (s). The structural formula of the compound is

(a) $[Cr(H_2O)_5\ Cl]\ Cl_2 \cdot H_2O$

(b) $[Cr(H_2O)_3\ Cl_3] \cdot 3H_2O$

(c) $[Cr(H_2O)_4\ Cl_2]\ Cl \cdot 2H_2O$

(d) $[Cr(H_2O)_6]\ Cl_3$

OR

How many ions are produced from the complex $[Co(NH_3)_5Cl]\ Cl_2$ in solution ?

(a) 4 (b) 2 (c) 3 (d) 5

8. Peptide linkage is present in

(a) Carbohydrates (b) Vitamins

(c) Proteins (d) Rubber

OR

An α-helix is a structural feature of

(a) Sucrose (b) Polypeptides (c) Nucleotides (d) Starch

9. Which of the following compounds does not reduce fehling's solution?

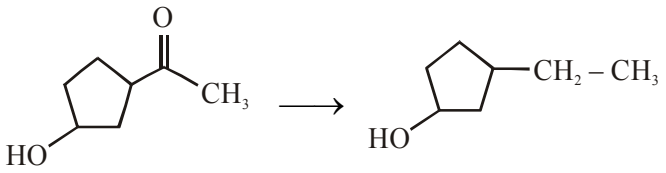
(a) C_6H_5CHO (b) CH_3CHO (c) CH_3COCH_2OH (d) HCOOH

10. IUPAC name of product formed by reaction of methyl amine with two moles of ethyl chloride

(a) N,N-Dimethylethanamine (b) N,N-Diethylmethanamine

(c) N-Methyl ethanamine (d) N-Ethyl ,N-methylethanamine

11. The approprite reagent for transformation



(a) Zn – Hg, HCl (b) $NH_2 - NH_2$, OH^-

(c) H_2 / NI (d) $NaBH_4$

In the following questions (Q. No. 12 - 16) a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

(a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

(b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

(c) Assertion is correct statement but reason is wrong statement.

(d) Assertion is wrong statement but reason is correct statement.

12. **Assertion** : Boiling points of alkyl halides decrease in the order R-I > R-Br > R-Cl > R-F.

Reason : Van der Waals forces decrease with increase in the size of halogen atom.

13. **Assertion :** The molecularity of the reaction $H_2 + Br_2 \rightarrow 2HBr$ appears to be 2.

Reason : Two molecules of the reactants are involved in the given elementary reaction.

OR

Assertion : Hydrolysis of an ester follows first order kinetics.

Reason : Concentration of water remains nearly constant during the course of the reaction.

14. **Assertion :** Albumin is a globular protein.

Reason : Polypeptide chain coils around to give a straight chain.

15. **Assertion :** o-nitrophenol is a weaker acid than p-nitrophenol.

Reason : Intramolecular hydrogen bonding makes ortho isomer weaker than para isomer.

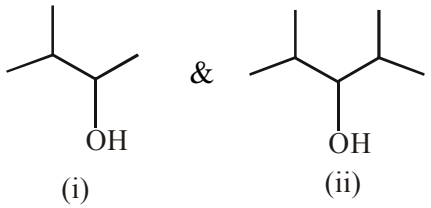
16. **Assertion :** Conductivity of an electrolyte decreases with decrease in concentration.

Reason : Number of ions per unit volume increases on dilution.

SECTION B

The following questions, Q.No 17 – 25 are short answer type and carry 2 marks each.

17. (a) Identify the chiral molecule in the following pair :



(i) (ii)

(b) Write the structure of the alkene formed by dehydrohalogenation of 1-bromo-1-methylcyclohexane with alcoholic KOH.

18. How will you bring about the following conversion ?

(i) Ethanol to but-1-yne (ii) Ethanol to ethyl fluoride

OR

How will you bring about the following conversion ?

(i) Bromomethane to propanone

(ii) But-1-ene to but-2-ene

19. A solution containing 15 g urea (molar mass = 60 g mol^{-1}) per litre of solution in water has the same osmotic pressure (isotonic) as a solution of glucose (molar mass = 180 g mol^{-1}) in water. Calculate the mass of glucose present in one litre of its solution.

OR

For a 5% solution of urea (Molar mass = 60 g/mol), calculate the osmotic pressure at 300K.
[R = 0.0821 $LatmK^{-1}mol^{-1}$] :

20. (a) AgCl shows Frenkel defect while NaCl does not. Give reason.

(b) ZnO turns yellow on heating. Why ?

21. What happens when

(i) a pressure greater than osmotic pressure is applied on the solution side separated from solvent by a semipermeable membrane ?

(ii) acetone is added to pure ethanol ?

OR

State Henry¡¦s law. Calculate the solubility of CO_2 in water at 298 K under 760 mm Hg.
(KH for CO_2 in water at 298 K is 1.25×10^6 mm Hg)

22. Write the IUPAC names and hybridisation of the following complexes :

(i) $[Ni(CN)_4]^{2-}$ (ii) $[Fe(H_2O)_6]^{2+}$

(Given : Atomic number Ni = 28, Fe = 26)

23. Write the reactions showing the presence of following in the open structure of glucose :

(i) a carbonyl group

(ii) Straight chain with six carbon atoms

24. Draw the structures of the following :

(i) $H_2S_2O_8$ (ii) XeF_6

25. What is the difference between an ambidentate ligand and a chelating ligand ?

SECTION C

Q.No 26 -30 are Short Answer Type II carrying 3 mark each.

26. An element 'X' (At. mass = 40 g mol^{-1}) having f.c.c. structure, has unit cell edge length of 400 pm. Calculate the density of 'X' and the number of unit cells in 4 g of 'X'. ($N_A = 6.022 \times 10^{23}$ mol^{-1})

OR

Calculate the number of unit cells in 8.1 g of aluminium if it crystallizes in a face-centred cubic (fcc) structure. (Atomic mass of Al = 27 g mol^{-1})

27. A first order reaction is 40% complete in 80 minutes. Calculate the value of rate constant (k). In what time will the reaction be 90% completed ?

[Given : log 2 = 0·3010, log 3 = 0·4771, log 4 = 0·6021, log 5 = 0·6771, log 6 = 0·7782]

28. Give reasons :

(i) Aniline does not undergo Friedal-Crafts reaction.

(ii) Aromatic primary amines cannot be prepared by Gabriel's phthalimide synthesis.

(iii) Aliphatic amines are stronger bases than ammonia.

OR

Arrange the following compounds as directed :

(i) In increasing order of solubility in water :

$(CH_3)_2NH$, CH_3NH_2, $C_6H_5NH_2$

(ii) In decreasing order of basic strength in aqueous solution :

$(CH_3)_3N$, $(CH_3)_2NH$, CH_3NH_2

(iii) In increasing order of boiling point :

$(C_2H_5)_2NH$, $(C_2H_5)_3N$, $C_2H_5NH_2$

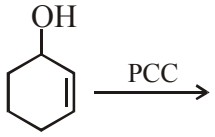
29. Explain the following observations :

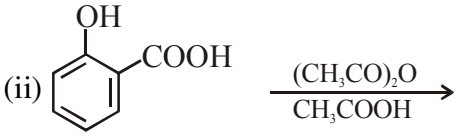
(i) Sulphur has a greater tendency for catenation than oxygen.

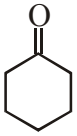
(ii) ICl is more reactive than I_2.

(iii) Despite lower value of its electron gain enthalpy with negative sign, fluorine (F_2) is a srtonger oxidising agent than Cl_2.

30. Write the product(s) of the following reactions :

(i) 

(ii) 

(iii)  $+ CH_3MgBr \xrightarrow{H_3O^+}$

SECTION D

Q.No 31 to 33 are long answer type carrying 5 marks each.

31. (a) The electrical resistance of a column of 0.05 M KOH solution of length 50 cm and area of cross-section 0.625 cm2 is 5×10^3 ohm. Calculate its resistivity, conductivity and molar conductivity.

(b) Predict the products of electrolysis of an aqueous solution of $CuCl_2$ with platinum electrodes.

(Given : $E^\circ_{H+/H_2(g),Pt} = +0.34V$, $E^\circ_{(1/2Cl_2/Cl^-)} = +1.36\,V$

$E^\circ_{H+/H_2(g),Pt} = +0.00V$, $E^\circ_{(1/2O_2/H_2O)} = +1.23\,V$)

OR

(a) Calculate e.m.f. of the following cell :

$Zn(s)/Zn^{2+}$ (0.1 M) || (0.01 M) $Ag^+/Ag(s)$

Given : $E^\circ_{zn^{2+}/Zn} = -0.76V$, $E^\circ_{Ag^+/Ag} = +0.80\,V$

[Given : log 10 = 1]

(b) X and Y are two electrolytes. On dilution molar conductivity of 'X' increases 2.5 times while that Y increases 25 times. Which of the two is a weak electrolyte and why ?

32. (a) An organic compound (A) having molecular formula C_4H_8O gives orange red precipitate with 2, 4-DNP reagent. It does not reduce Tollens¡¦ reagent but gives yellow precipitate of iodoform on heating with NaOH and I_2. Compound (A) on reduction with $NaBH_4$ gives compound (B) which undergoes dehydration reaction on heating with conc. H_2SO_4 to form compound (C). Compound (C) on Ozonolysis gives two molecules of ethanal. Identify (A), (B) and (C) and write their structures. Write the reactions of compound (A) with (i) $NaOH/I_2$ and (ii) $NaBH_4$.

(b) Give reasons : (i) Oxidation of propanal is easier than propanone.

(ii) α-hydrogen of aldehydes and ketones is acidic in nature.

OR

(a) Draw structures of the following derivatives :

(i) Cyanohydrin of cyclobutanone

(ii) Hemiacetal of ethanal

(b) Write the major product(s) in the following :

(i) $CH_3–CH=CH–CH_2–CN \xrightarrow[(ii)\ H_3O^+]{(i)\ DIBAL–H}$

(ii) $CH_3–CH_2–OH \xrightarrow{CrO_3}$

(c) How can you distinguish between propanal and propanone ?

33. (a) Account for the following :

(i) Tendency to show –2 oxidation state decreases from oxygen to tellurium.

(ii) Acidic character increases from HF to HI.

(iii) Moist SO_2 gas acts as a reducing agent.

(b) Draw the structure of an oxoacid of sulphur containing S–O–S linkage.

(c) Complete the following equation : $XeF_2 + H_2O \rightarrow$

OR

(a) Among the hydrides of group 16, write the hydride

(i) Which is a strong reducing agent.

(ii) Which has maximum bond angle.

(iii) Which is most thermally stable.

Give suitable reason in each.

(b) Complete the following equations :

$S + H_2SO_4 \longrightarrow$

(Conc.)

$Cl_2 + NaOH \longrightarrow$

(Cold and dilute)

CBSE MODEL PAPER (SOLUTIONS) : 2020-21

CHEMISTRY

SECTION A

1. (i) (b)

(ii) (a)

(iii) (a) OR (b)

(iv) (d)

2. (i) (c)

(ii) (b)

(iii) (d) OR (a)

(iv) (a)

3. (d)

4. (a) OR (b)

5. (a) **OR** 1 Mark will be given if attempted / if written none of the answer is right / 4

6. (c)

7. (a) OR (c)

8. (c) **OR** (b)

9. (a)

10. (d)

11. (b)

12. (c)

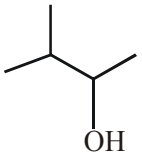
13. (a) OR (a)

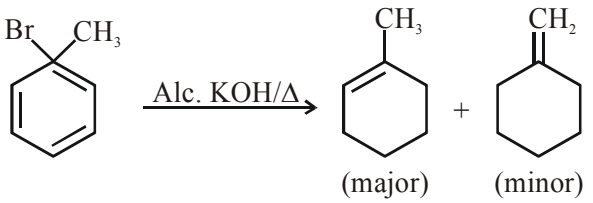
14. (c)

15. (a)

16. (c)

SECTION B

17. (a) The chiral molecule. 

(b) 

18. (i) $\underset{\text{Ethanol}}{CH_3CH_2OH} \xrightarrow{SOCl_2,\text{Pyridine}} \underset{\text{Chloroethane}}{CH_3CH_2Cl} \xrightarrow{Na-C\equiv CH} CH_3-CH_2-C\equiv CH$

(ii) $\underset{\text{Ethanol}}{CH_3-CH_2-OH} \xrightarrow{PCl_5} \underset{\text{Chloroethane}}{CH_3-CH_2-Cl} \xrightarrow{AgF} \underset{\text{Ethyl fluoride}}{CH_3-CH_2-F}$

OR

(i) $\underset{\text{Bromomethane}}{CH_3-Br} \xrightarrow{KCN\ (alc)} \underset{\text{Acetonitrile}}{CH_3-CN} \xrightarrow{CH_3-MgBr} CH_3-\underset{CH_3}{\underset{|}{C}}=NMgBr \xrightarrow[H_3O^+]{\text{Hydrolysis}} \underset{\text{Propanone}}{CH_3-\underset{CH_3}{\underset{|}{C}}=O}$

(ii) $\underset{\text{But-1-ene}}{CH_3CH_2CH=CH_2} \xrightarrow[\text{(Markovnikov addition)}]{HBr} \underset{\text{2-Bromobutane}}{CH_3CH_2\overset{Br}{\overset{|}{C}}HCH_3} \xrightarrow[-HBr]{KOH\ (alc).\Delta} \underset{\text{2-Butene}}{CH_3CH_2=CHCH_3}$

19. For isotonic solution

$$\pi_1 = \pi_2$$

Hence $$C_1 = C_2$$

$$\frac{w_1}{M_1} = \frac{w_2}{M_2}$$

$$\frac{15}{60} = \frac{w_2}{180}$$

$$w_2 = 45 \text{ gm}$$

Hence glucose is 45% by weight present in aqueous solution.

OR

$\pi = CRT$ (Volume of solution = 100 mL)

$$\pi = \frac{n}{v}RT$$

$$\pi = \frac{5}{60} \times \frac{0.0821 \times 300}{0.1}$$

$$\pi = 20.5 \text{ atm}$$

20. (a) Size of Ag+ ion is smaller than Na+ ion

(b) Due to presence of free electrons at interstitial sites, / metal excess defect

21. (i) Reverse osmosis occurs.

(ii) Solution shows positive deviation from Raoult's Law.

OR

The partial pressure of the gas in vapour phase (p) is directly proportional to the mole fraction of gas(x) in the solution.

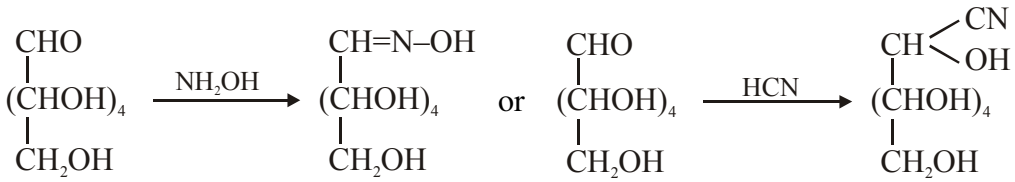
$$p = K_H.x$$

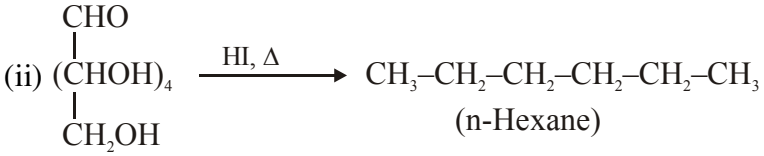
$$x = \frac{p}{K_H}$$

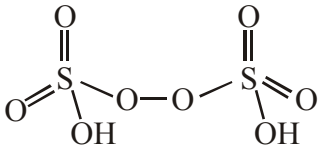
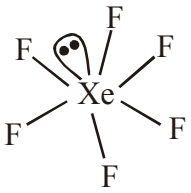
$$x = \frac{760}{1.25 \times 10^6} = 6.08 \times 10^{-4}$$

22. (i) Tetracyanidonickelate(II) / Tetracyanonickelate(II) dsp^2

(ii) Hexaaquairon(II) sp^3d^2

23. (i) 

(ii) 

24. (i)  (ii) 

25. Ligand which can ligate through two different atoms is called ambidentate ligand whereas di- or polydentate ligand uses its two or more donor atoms to bind a single metal ion. / a chelating ligand forms a more stable complex as compared to an ambidentate ligand. / chelating ligand forms a cyclic complex while ambidentate ligand forms a non-cyclic complex.

26. Atomic mass = 40g/mol

A = 400pm = 400×10^{-10} cm or 4×10^{-8} cm

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

$$= \frac{4 \times 40}{(4 \times 10^{-8})^3 \times 6.023 \times 10^{23}}$$

$$d = \frac{160}{64 \times 6.023 \times 10^{-1}} = \frac{160}{6.4 \times 6.023}$$

= 4.18 gm/cc

1 mole of 'X' atom contains = 6.023×10^{23} atoms = 40 g

$$1 \text{ g contains} = \frac{6.023 \times 10^{23}}{40} \text{ atoms}$$

$$4 \text{ g contains} = \frac{6.023 \times 10^{23}}{40} \times 4 \text{ atoms} = 6.023 \times 10^{22} \text{ atoms}$$

$$\text{So, the no. of unit cells} = \frac{6.023 \times 10^{22}}{4} = 1.50 \times 10^{22} \text{ unit cell}$$

OR

n = given mass / molar mass

= 8.1 / 27 mol

Number of atoms = $\frac{8.1}{27} \times 6.022 \times 10^{23}$

Number of atoms in one unit cell = 4 (fcc)

Number of unit cells = $\left[\frac{8.1}{27} \times 6.022 \times 10^{23}\right] / 4$

$= 4.5 \times 10^{22}$

Or

27g of Al contains = 6.022×10^{23} atoms

8.1g of Al contains = $(6.022 \times 10^{23}/27) \times 8.1$

No. of units cells = total no of atoms / 4

$= \left[\frac{8.1}{27} \times 6.022 \times 10^{23}\right] / 4$

$= 4.5 \times 10^{22}$

27. $k = \frac{2.303}{t} \log \frac{[A]_0}{[A]} = \frac{2.303}{80} \log \frac{100}{60}$

$= \frac{2.303}{80} \times (1 - 0.7782) = 0.0064 \text{ min}^{-1}$

$t = \frac{2.303}{k} \log \frac{[A]_0}{[A]} = \frac{2.303}{0.0064} \log \frac{100}{10} = 360 \text{ min}$

28. (i) Aniline forms salt with $AlCl_3$, the Lewis acid.

(ii) Aryl halides do not undergo nucleophilic substitution with the anion formed by phthalimide

(iii) Due to +I effect of alkyl group electron density on N atom increases.

OR

(i) $C_6H_5NH_2 < (CH_3)_2NH < CH_3NH_2$

(ii) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N$

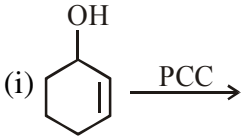
(iii) $(C_2H_5)_3N < (C_2H_5)_2NH < C_2H_5NH_2$

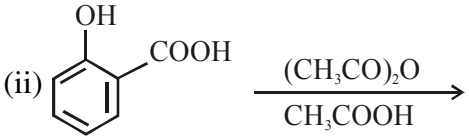
29. (i) Due to formation of pπ-pπ multiple bond in case of oxygen. while sulphur forms single covalent linkage.

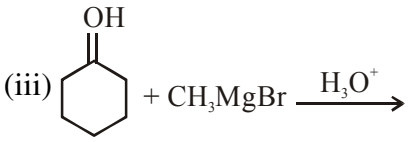
(ii) due to weaker X–X' bonding than X–X bond.

(iii) low enthalpy of dissociation of F–F bond / high hydration enthalpy of F

30. Write the product(s) of the following reactions :

(i) 

(ii) 

(iii) 

31. (a) $R = \frac{\rho l}{A}$

$$\text{Resistivity} \rightarrow \rho = \frac{RA}{l} = \frac{5\times10^{3}\times0.625}{50} = 62.5\ \Omega$$

$$\text{Conductivity } K = \frac{1}{\rho} = \frac{1}{62.5} = 0.016\,\Omega^{-1}\,cm^{-1}$$

$$\text{Molar conductivity } \wedge_m = \frac{K\times1000}{C} = \frac{0.016\times1000}{0.05}$$

$$= 320\,\Omega^{-1}\,cm^{2}\,mol^{-1}$$

(b) At cathode: $Cu^{2+} + 2e^{-} \longrightarrow Cu$

Because $E^{0}_{Cu^{2+}/Cu} > E_{H^{+}/H_2} \longrightarrow Cu$

At anode: $H_2O \rightarrow \frac{1}{2}O_2 + 2H^{+} + 2e^{-}$

This reaction should occur at anode but due to over-potential of O_2, oxidation of Cl^{-} is preferred

$2Cl^{-} \longrightarrow Cl_2 + 2e^{-}$

OR

(a) $E^{0}_{cell} = E^{0}_{C} - E^{0}_{A} = 0.80 - (-0.76) = 1.56\,V$

$$E\ cell = E_{cell} = E^{0}_{cell} - \frac{0.059}{n}\log\frac{[Zn^{2+}]}{[Ag^{+}]^{2}}$$

$$= 1.56 - \frac{0.059}{2}\log10^{3} = 1.47\,V$$

(b) Y, as molar conductivity increases with dilution due to increase in degree of dissociation.

32. (a) A = $CH_3COCH_2CH_3$

B = $CH_3CHOHCH_2CH_3$

C = $CH_3CH{=}CHCH_3$

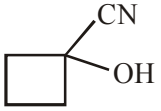
$$CH_3COCH_2CH_3 \xrightarrow{NaOH+I_2} CHI_3 + CH_3CH_2COONa$$

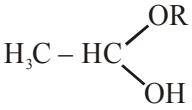
$$CH_3COCH_2CH_3 \xrightarrow{NaBH_4} CH_3CHOHCH_2CH_3$$

(b) i) Cleavage of C-H bond in propanal is easier than C-C bond in propanone.

ii) Due to resonance stabilization of conjugate base / enolate ion or structural representation.

OR

(a) (i) 

(ii) 

(b) (i) $H_3C - CH = CH - CH_2 - CHO$

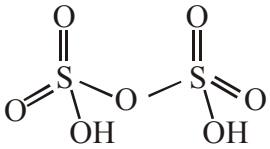
(ii) CH_3CHO

(c) On heating with NaOH + I_2, propanone gives yellow ppt. of CHI_3 while propanal doesn't. (Or any other suitable chemical test)

33. (a) (i) Because of decrease in electronegativity / increase in metallic character.

(ii) Due to decrease in bond dissociation enthalpy from HF to HI.

(iii) Sulphur is more stable in +6 oxidation state.

(b) 

(c) $2XeF_2 + 2H_2O \longrightarrow 2Xe + 4HF + O_2$

OR

(a) (i) H_2Te, because of low bond dissociation enthalpy

(ii) H_2O, because of small size and high electronegativity of oxygen, bond pair–bond pair repulsion is more.

(iii) H_2O, because of high bond dissociation enthalpy.

(b) $S + 2H_2SO_4 \longrightarrow 3SO_2 + 2H_2O$

$Cl_2 + NaOH \longrightarrow NaCl + NaOCl + H_2O$

(Cold and dilute)