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)**

In 1962, Neil Bartlett prepared a complex compound by reacting molecular oxygen and PtF_6. Then he carried out the reaction between a noble gas and PtF_6 and obtained a red coloured compound. The noble gases have completely filled electronic configuration in their valence shell and are monoatomic under normal conditions. They possess low boiling points. The direct reaction of Xenon with Fluorine leads to a series of compounds with oxidation states + 2, + 4 and + 6. XeF_4 reacts violently with water to give XeO_3. The geometries of compounds of Xenon can be deduced considering the total number of electron pairs in the valence shell.

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

(i) In the preparation of compounds of Xe, Bartlett had taken $O_2^+ Pt\ F_6^-$ as a base compound. This is because

(a) both O_2 and Xe have same size.

(b) both O_2 and Xe have same electron gain enthalpy.

(c) both O_2 and Xe have different ionisation enthalpy.

(d) both Xe and O_2 are gases.

(ii) Helium is added to oxygen used by deep sea divers because :

(a) It is less soluble in blood than nitrogen under high pressure

(b) It is lighter than nitrogen

(c) It is readily miscible with oxygen

(d) It is less poisonous than nitrogen

(iii) XeF_2 reacts with SbF_5 to form :

(a) $[XeF]^+ [SbF_6]^-$ (b) $[XeF_3]^- [SbF_4]^-$

(c) $Xe^- [PtF_6]^+$ (d) XeF_4

OR

The compound that cannot be formed by xenon is

(a) XeO_3 (b) XeF_4

(c) $XeCl_4$ (d) XeO_2F_2

(iv) Which of the following statements are true?

(a) Only type of interactions between particles of noble gases are due to weak dispersion forces.

(b) Ionisation enthalpy of molecular oxygen is very close to that of xenon.

(c) Hydrolysis of XeF_6 is a redox reaction.

(d) Xenon fluorides are not reactive.

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

The substitution reaction of alkyl halide mainly occurs by S_{N^1} or S_{N^2} mechanism. Whatever mechanism alkyl halides follow for the substitution reaction to occur, the polarity of the carbon halogen bond is responsible for these substitution reactions. The rate of S_{N^1} reactions are governed by the stability of carbocation whereas for S_{N^2} reactions steric factor is the deciding factor. If the starting material is a chiral compound, we may end up with an inverted product or racemic mixture depending upon the type of mechanism followed by alkyl halide. Cleavage of ethers with HI is also governed by steric factor and stability of carbocation, which indicates that in organic chemistry, these two major factors help us in deciding the kind of product formed.

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 : It is difficult to replace chlorine by –OH in chlorobenzene in comparison to that in chloroethane.

Reason : Chlorine-carbon (C—Cl) bond in chlorobenzene has a partial double bond character due to resonance.

OR

Assertion : The boiling points of alkyl halides decrease in the order :

RI > RBr > RCl > RF

Reason : The boiling points of alkyl chlorides, bromides and iodides are considerably higher than that of the hydrocarbon of comparable molecular mass.

(ii) Assertion : Aryl iodides can be prepared by reaction of arenes with iodine in the presence of an oxidising agent.

Reason : Oxidising agent oxidises I_2 into HI.

(iii) Assertion : Presence of a nitro group at ortho or para position increases the reactivity of haloarenes towards nucleophilic substitution.

Reason : Nitro group, being an electron withdrawing group decreases the electron density over the benzene ring.

(iv) Assertion : KCN reacts with methyl chloride to give methyl isocyanide

Reason : CN^- is an ambident nucleophile.

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

3. The conversion of an alkyl halide into an alcohol by aqueous NaOH is classified as

(a) a dehydrohalogenation reaction (b) a substitution reaction

(c) an addition reaction (d) a dehydration reaction

OR

Racemisation occurs in

(a) S_{N^2} reaction (b) S_{N^1} reaction

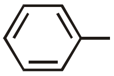
(c) Neither S_{N^2} nor S_{N^1} reactions (d) S_{N^2} reaction as well as S_{N^1} reaction

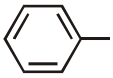
4. CH_3CONH_2 on reaction with NaOH and Br_2 in alcoholic medium gives

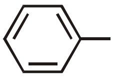
(a) $CH_3CH_2NH_2$ (b) CH_3CH_2Br

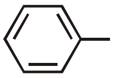
(c) CH_3NH_2 (d) CH_3COONa

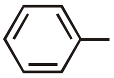
OR


$-CH_2-NH_2$ on heating with $CHCl_3$ and alcoholic KOH gives foul smell of :

(a)  CH_2OH

(b)  CH_2NC

(c)  CH_2CN

(d)  CH_2Cl

5. The oxidation state of Ni in $[Ni(CO)_4]$ is

(a) 0 (b) 2 (c) 3 (d) 4

OR

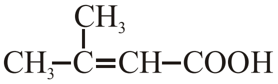
One mole of $CrCl_3 .6H_2O$ compound reacts with excess $AgNO_3$ solution to yield two moles of AgCl(s). The structural formula of the compound is :

(a) $[Cr(H_2O)_5 Cl] Cl_2 . H_2O$ (b) $[Cr(H_2O)_3 Cl_3] . 3H_2O$

(c) $[Cr(H_2O)_4 Cl_2] Cl . 2H_2O$ (d) $[Cr(H_2O)_6] Cl_3$

6. Amino acids are

(a) acidic (b) basic (c) amphoteric (d) neutral

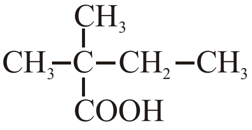
7. The IUPAC name for the formula  $CH_3-\overset{\overset{CH_3}{|}}{C}=CH-COOH$ is

(a) 2-Methylbut-2-enoic acid (b) 3-Methylbut-3-enoic acid

(c) 3-Methylbut-2-enoic acid (d) 2-Methylbut-3-enoic acid

OR

What is the correct IUPAC name of the given compound ?



$$CH_3-\underset{\underset{COOH}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_2-CH_3$$

(a) 2,2-Dimethylbutanoic acid (b) 2-Carboxyl-2-methylbutane

(c) 2-Ethyl-2-methylpropanoic acid (d) 3-Methylbutane carboxylic acid

8. Out of the following, the strongest base in aqueous solution is

(a) Methylamine (b) Dimethylamine (c) Trimethylamine (d) Aniline

9. Iodoform test is not given by

(a) Ethanol (b) Ethanal (c) Pentan-2-one (d) Pentan-3-one

10. Out of the following transition elements, the maximum number of oxidation states are shown by

(a) Sc (Z = 21) (b) Cr (Z = 24) (c) Mn (Z = 25) (d) Fe (Z = 26)

11. Hardening of leather in tanning industry is based on

(a) Electrophoresis (b) Electro-osmosis

(c) Mutual coagulation (d) Tyndall effect

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** : Conductivity of an electrolyte increases with decrease in concentration.

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

13. **Assertion :** The C-O-C bond angle in ethers is slightly less than tetrahedral angle.

Reason : Due to the repulsive interaction between the two alkyl groups in ethers.

14. **Assertion :** Low spin tetrahedral complexes are rarely observed.

Reason : Crystal field splitting energy is less than pairing energy for tetrahedral complexes.

15. **Assertion :** Elevation in boiling point is a colligative property.

Reason : Elevation in boiling point is directly proportional to molarity.

16. **Assertion :** Oxidation of ketones is easier than aldehydes.

Reason : C-C bond of ketones is stronger than C-H bond of aldehydes.

OR

Assertion : All aldehydes do not take part in aldol condensation.

Reason : In aldol condensation, carbanion is generated by the abstraction of α-H atom by the base.

SECTION B

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

17. Why does a solution containing non-volatile solutes have a higher boiling point than pure solvents? Why is elevation in boiling point a colligative property ?

OR

When fruits and vegetables that have dried up are placed in water, they slowly swell and return to original form. Why? Will a temperature increase accelerate the process ? Explain.

18. Write two differences between order and molecularity of a reaction.

OR

Give reasons :

(a) The rate of a reaction does not remain constant throughout the course of reaction.

(b) Powdered sugar dissolves in water faster than crystalline sugar.

19. Give reasons :

(a) True solutions do not show Tyndall effect.

(b) Bleeding stops by rubbing moist alum on the cut.

20. A hydrocarbon 'A', (C_4H_8) on reaction with HCl gives a compound 'B', (C_4H_9Cl), which on reaction with 1 mol. of NH_3 gives compound 'C', ($C_4H_{11}N$). On reacting with $NaNO_2$ and HCl followed by treatment with water, compound 'C' yields an optically active alcohol, 'D'. Ozonolysis of 'A' gives 2 moles of acetaldehyde. Identify compounds 'A' to 'D'. Explain the reactions involved.

21. How do you convert the following :

(a) N-phenylethanamide to p-bromoaniline

(b) Benzoic acid to aniline

22. For a 5% solution of urea (Molar mass = 60 g/mol), calculate the osmotic pressure at 300 K. [$R = 0{\cdot}0821$ L atm K^{-1} mol^{-1}]

OR

State Raoult's law for a solution containing volatile components. What is the similarity between Raoult's law and Henry's law?

23. Draw the shape of the following molecules :

(a) $XeOF_4$ (b) BrF_3

24. Give the formulae of the following compounds :

(a) Potassium tetrahydroxidozincate (II)

(b) Hexaammineplatinum (IV) chloride

25. What happens when

(a) Propanone is treated with methylmagnesium iodide and then hydrolysed, and

(b) Benzene is treated with CH_3COCl in presence of anhydrous $AlCl_3$?

SECTION C

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

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

OR

If the radius of the octahedral void is r and radius of the atoms in closepacking is R, derive relation between r and R.

27. If half-life period for a first order reaction in A is 2 minutes, how long will it take $[A]_0$ to reach 10% of its initial concentration ?

OR

A particular reaction is first order in A and second order in B. Write the differential rate equation. How is the rate affected when

(a) concentration of B is tripled, and

(b) concentrations of both A and B are doubled ?

28. (a) Write the product when D-glucose reacts with conc. HNO_3.

(b) Amino acids show amphoteric behaviour. Why ?

(c) Write one difference between α-helix and β-pleated structures of proteins.

29. Write the structures of A and B in the following :

(a) $CH_3COCl \xrightarrow{H_2,\ Pd\text{-}BaSO_4} A \xrightarrow{H_2NOH} B$

(b) $CH_3MgBr \xrightarrow[(ii)\ H_3O^+]{(i)\ CO_2} A \xrightarrow{PCl_5} B$

(c) $C_6H_5COOH \xrightarrow{NaOH} A \xrightarrow[Heat]{Soda\ Lime} B$

30. Concentrated sulphuric acid is added followed by heating to each of the three test tubes (i) to (iii) containing cane sugar, copper turnings and sulphur powder respectively. Identify in which of the above test tubes the following changes will be observed. Support your answer with the help of equations of chemical reactions.

(a) Disappearance of yellow powder along with evolution of colourless gas.

(b) Formation of a black substance.

(c) Formation of a brown substance which on dilution becomes blue.

SECTION D

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

31. (a) Account for the following :

(i) Copper (I) compounds are white whereas Copper (II) compounds are coloured.

(ii) E^0 value for Mn^{3+}/Mn^{2+} couple is much more positive than that for Fe^{3+}/Fe^{2+}.

(iii) Zn, Cd, Hg are considered as d-block elements but not as transition elements.

(b) Calculate the spin-only moment of Co^{2+} (Z = 27) by writing the electronic configuration of Co and Co^{2+}.

OR

(a) Give three points of difference between lanthanoids and actinoids.

(b) Give reason and select one atom/ion which will exhibit asked property :

(i) Sc^{3+} or Cr^{3+} (Exhibit diamagnetic behaviour)

(ii) Cr or Cu (High melting and boiling point)

32. (a) Out of t-butyl alcohol and n-butanol, which one will undergo acid catalyzed dehydration faster and why ?

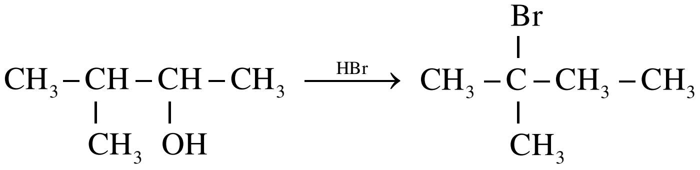
(b) Carry out the following conversions :

(i) Phenol to Salicylaldehyde (ii) t-butylchloride to t-butyl ethyl ether

(iii) Propene to Propanol

OR

(a) When 3-methylbutan-2-ol is treated with HBr, the following reaction takes place:



$$CH_3-\underset{CH_3}{CH}-\underset{OH}{CH}-CH_3 \xrightarrow{HBr} CH_3-\underset{CH_3}{\overset{Br}{C}}-CH_3-CH_3$$

Give a mechanism for this reaction.

(b) Predict the reagent for carrying out the following conversions :

(i) Phenol to benzoquinone (ii) Anisole to p-bromoanisole

(iii) Phenol to 2,4,6-tribromophenol

33. (a) Out of the following pairs, predict with reason which pair will allow greater conduction of electricity:

(i) Silver wire at 30°C or silver wire at 60°C.

(ii) 0.1 M CH_3COOH solution or 1 M CH_3COOH solution.

(iii) KCl solution at 20°C or KCl solution at 50°C.

(b) Calculate ΔG° for the reaction

$Zn (s) + Cu^{2+} (aq) \longrightarrow Zn^{2+} (aq) + Cu (s)$.

Given : E° for $Zn^{2+}/Zn = -0.76$ V and E° for $Cu^{2+}/Cu = +0.34$ V, $R = 8.314\ JK^{-1}\ mol^{-1}$, $F = 96500\ C\ mol^{-1}$.

OR

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

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

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

CBSE MODEL PAPER (SOLUTIONS) : 2020-21

CHEMISTRY

SECTION A

1. (i) (c)

(ii) (a)

(iii) (a) or (c)

(iv) (b)

2. (i) (a) or (b)

(ii) (c)

(iii) (a)

(iv) (d)

3. (b) or (b)

4. (c) or (b)

5. (a) or (a)

6. One mark may be awarded to any option

7. (c) or (a)

8. (b)

9. (d)

10. (c)

11. (c)

12. (d)

13. (d)

14. (a)

15. (c)

16. (d) or (i / (ii)

SECTION B

17. Due to lowering of vapour pressure of solution. Because it depends on molality / number of solute particles.

OR

Due to osmosis. / Due to inward movement of water molecules. Yes, osmosis is directly proportional to temperature of solvent.

18.

	Order	**Molecularity**
i.	Sum of powers to which, the concentration terms are raised in a rate law	The number of reacting species colliding simultaneously in an elementary step.
ii.	May also be zero/ fraction/negative	It is always a positive whole number. (or any other difference.)

OR

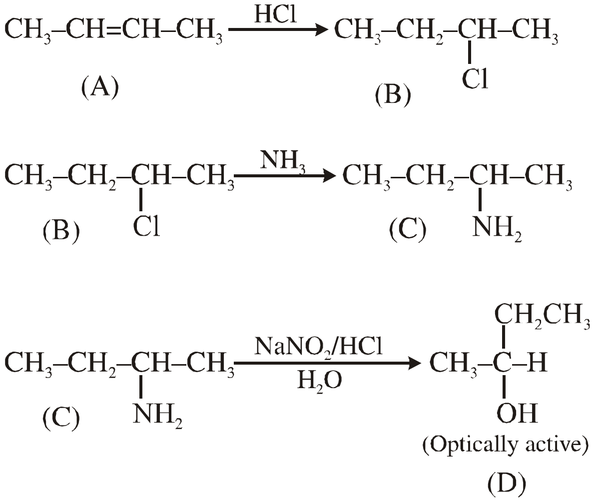
(a) Due to decrease in concentration of reactants with time .

(b) Due to more surface area.

19. (a) Because solute particle size is extremely small.

(b) Due to coagulation of blood.

20. On the basis of structure of ‘A’ reactions can be explained as follows :



$$\underset{(A)}{CH_3{-}CH{=}CH{-}CH_3} \xrightarrow{HCl} \underset{(B)}{CH_3{-}CH_2{-}\underset{\displaystyle Cl}{\underset{|}{CH}}{-}CH_3}$$

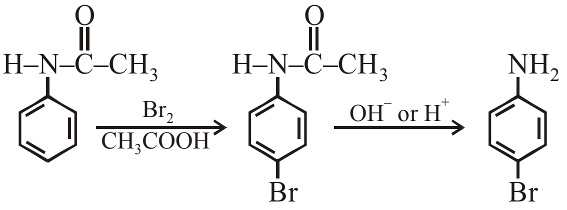
$$\underset{(B)}{CH_3{-}CH_2{-}\underset{\displaystyle Cl}{\underset{|}{CH}}{-}CH_3} \xrightarrow{NH_3} \underset{(C)}{CH_3{-}CH_2{-}\underset{\displaystyle NH_2}{\underset{|}{CH}}{-}CH_3}$$

$$\underset{(C)}{CH_3{-}CH_2{-}\underset{\displaystyle NH_2}{\underset{|}{CH}}{-}CH_3} \xrightarrow[H_2O]{NaNO_2/HCl} CH_3{-}\overset{\displaystyle CH_2CH_3}{\overset{|}{\underset{\displaystyle OH}{\underset{|}{C}}}}{-}H$$

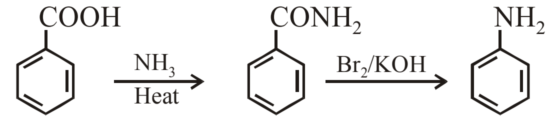
(Optically active)

(D)

21. (a)



(b)



Benzoic acid Benzamide Aniline

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

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

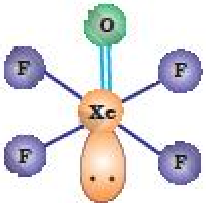
$$\pi = \frac{5}{60}$$

$\pi = 20.5$ atm. (1/2 mark may be deducted for no or incorrect unit)

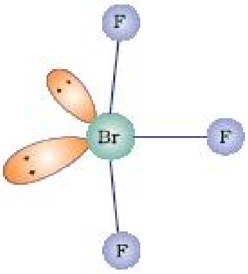
OR

- For a solution of volatile liquids, the partial vapour pressure of each component of the solution is directly proportional to its mole fraction present in solution.
- If we compare the equations for Raoult¡¦s law and Henry's law, it can be seen that the partial pressure of the volatile component or gas is directly proportional to its mole fraction in solution.

23. (a)



(b)



24. (a) $K_2[Zn(OH)_4]$

(b) $[Pt(NH_3)_6]Cl_4$

25. (a) $(CH_3)_3C\text{-}OH$ / tertiary butyl alcohol is formed.

(b) $C_6H_5COCH_3$ / acetophenone is formed (or correct chemical equation)

SECTION C

26. Given that Crystal density = $8.55\ g\ cm^{-3}$ for Bcc, $n = 2$, M_w of niobium = 93

$$\because \quad \text{Crystal density} = \frac{n \times M_w}{V \times N_A}$$

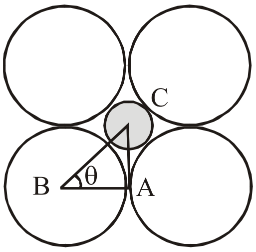
$$\therefore \quad V = \frac{2 \times 93}{8.55 \times 6.023 \times 10^{23}} = 3.6 \times 10^{-23}\ cm^3 \quad \text{or} \quad a^3 = 36 \times 10^{-24}\ cm^3$$

$$\therefore \quad a = 3.3 \times 10^{-8}\ cm$$

for Bcc $4r = \sqrt{3}\,a$

$$\therefore \quad r = \frac{1.732 \times 3.3 \times 10^{-8}}{4} = 1.43 \times 10^{-8}\ cm. = 14.32\ nm$$

OR



In the triangle ABC

$$\cos 45^\circ = \frac{R}{R+r} = \frac{1}{\sqrt{2}}$$

$$1 + \frac{r}{R} = \sqrt{2} \quad \text{or} \quad \frac{r}{R} = 0.414$$

27. $$k = \frac{0.693}{t_{\frac{1}{2}}} = \frac{0.693}{2\,\text{min}}$$

$0.3465\ min^{-1}$

$$t_{\frac{1}{2}} = \frac{2.303}{K} \log \frac{[A]_0}{[A]}$$

$$= \frac{2.303}{0.3465} \log \frac{100}{10}$$

$$t = \frac{2.303}{0.3465\,\text{min}^{-1}} \times \log 10 \;\; = \frac{2.303}{0.3465} \times 1$$

= 6.6 min (deduct half mark if no or incorrect unit)

OR

Rate = k [A] $[B]^2$

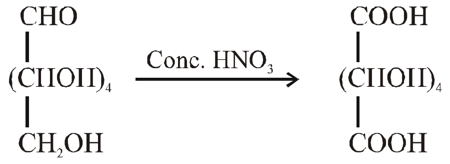
(i) Rate = k [A] $[3B]^2$ = 9k [A]$[B]^2$

So the rate increases by nine times.

(ii) Rate = k [2A] $[2B]^2$ = 8k [A] $[B]^2$

So the rate becomes eight times.

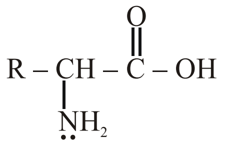
28. (a)



$$\text{CHO}-(\text{CHOH})_4-\text{CH}_2\text{OH} \xrightarrow{\text{Conc. HNO}_3} \text{COOH}-(\text{CHOH})_4-\text{COOH}$$

D-Glucose D-saccharic acid

(b) The amino acids contains both acidic –COOH group & basic –NH2 (amino) group in their structure, due to which they can exist both as acid & base, this nature is called Amphoteric nature



$$\text{R}-\text{CH}(\ddot{\text{N}}\text{H}_2)-\text{C}(=\text{O})-\text{OH}$$

(α-amino acid)

(c) In α-helix, a polypeptide chain form by all possible hydrogen bonds by twisting into a right handed helical structure with –NH group of each amino acid.

In β-pleated all peptide chains are stretched out to nearly extensions & then laid side by side which are held together by intomolecular hydrogen bonding.

29. (i) A → CH_3CHO, B → $CH_3 - CH = N - OH$

(ii) A → CH_3COOH, B → CH_3COCl

(iii) A → C_6H_5COONa, B → C_6H_6

30. (a) In test tube (iii), containing sulphur powder.

$$3S + 2H_2SO_4 \xrightarrow{\text{Heat}} 3SO_2 + 2H_2O$$

(b) In test tube (i), containing cane sugar.

$$C_{12}H_{22}O_{11} + H_2SO_4 \xrightarrow{\Delta} 12C + 11H_2O$$

(c) In test tube (ii), containing copper turnings

$$Cu + 2H_2SO_4 \xrightarrow{\Delta} CuSO_4 + SO_2 + 2H_2O$$

SECTION D

31. (a)

(i) $Cu^{+1}(3d^{10})$ compounds are white because of absence of unpaired electrons while Cu^{+2} $(3d^9)$ compounds are coloured due to unpaired e- / shows d-d transition.

(ii) E° value for Mn^{3+}/Mn^{2+} couple is much more positive than that for Fe^{3+}/Fe^{2+}, due to the Mn^{2+} have higher stability than M^{3+} due to half filled d^5 configuration.

(iii) due to completely filled d-orbitals in their ground state as well as in oxidized state.

(b) Co = $[Ar]4s^23d^7$, Co^{+2} = $[Ar]\ 3d^7$

$$\mu = \sqrt{n(n+2)}$$
$$= \sqrt{3(3+2)} = \sqrt{15} = 3.92 \text{ B.M.}$$

OR

(a)

Lanthanoids	**Actinoids**
(1) most of them are not radioactive	All are radioactive
(2) don't show a wide range of oxidation stat	Show a wide range of oxidation state
(3) Most of their ions are colourless	Most of their ions are coloured

(or any other correct differences)

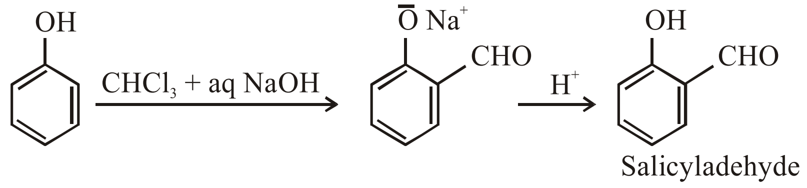
(b) (i) Sc^{+3}, because of absence of unpaired electron.

(ii) Cr, because of presence of strong intermetallic bonding than Cu.

32. (a) Tert-butyl alcohol,

because it forms more stable 3° carbocation than 1° carbocation

(b) (i)

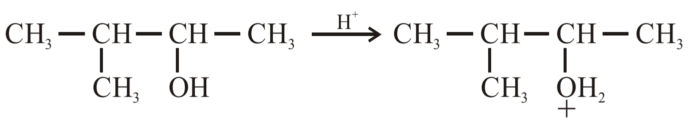


(ii) $(CH_3)_3CCl + NaOH_{(aq.)} \longrightarrow (CH_3)_3COH \xrightarrow{Na} (CH_3)_3CONa \xrightarrow{C_2H_5Cl} (CH_3)_3COC_2H_5$

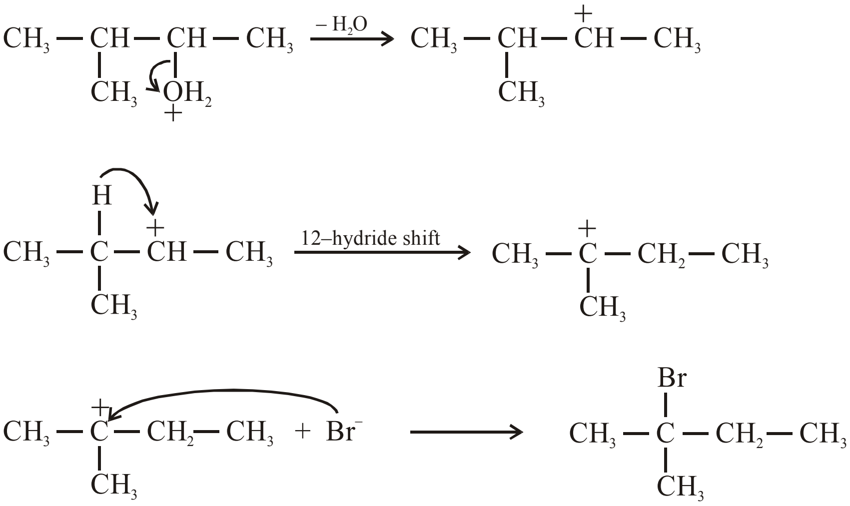
(iii) $CH_3CH = CH_2 \xrightarrow[(ii)H_2O_2/OH^-]{(i)B_2H_6} CH_3CH_2CH_2OH$ (or by any other suitable method)

OR

(a)



$$CH_3-\underset{CH_3}{\underset{|}{CH}}-\underset{OH}{\underset{|}{CH}}-CH_3 \xrightarrow{H^+} CH_3-\underset{CH_3}{\underset{|}{CH}}-\underset{\overset{+}{OH_2}}{\underset{|}{CH}}-CH_3$$



$$CH_3-\underset{CH_3}{CH}-\underset{\overset{+}{O}H_2}{CH}-CH_3 \xrightarrow{-H_2O} CH_3-\underset{CH_3}{CH}-\overset{+}{C}H-CH_3$$

$$CH_3-\overset{H}{\underset{CH_3}{C}}-\overset{+}{C}H-CH_3 \xrightarrow{\text{12–hydride shift}} CH_3-\overset{+}{\underset{CH_3}{C}}-CH_2-CH_3$$

$$CH_3-\overset{+}{\underset{CH_3}{C}}-CH_2-CH_3 + Br^- \longrightarrow CH_3-\overset{Br}{\underset{CH_3}{C}}-CH_2-CH_3$$

(b) (i) $K_2Cr_2O_7 + H_2SO_4$ / $Na_2Cr_2O_7 + H_2SO_4$

(ii) Br_2 in CH_3COOH

(iii) Br_2 aq. / Bromine water

33. (a) (i) Silver wire at 30°C because as temperature decreases, resistance decreases so conduction increases.

(ii) 0.1 M CH_3COOH, because on dilution degree of ionization increases hence conduction increases.

(iii) KCl solution at 50°C, because at high temperature mobility of ions increases and hence conductance increases

(b) E^0 cell = $E^0_C - E^0_A$

$= 0.34 - (-0.76) = 1.10V$

$\Delta G° = -nFE^0 = -2 \times 1.10 \times 96500$

$= -212300$ J/mol or -212.3 kJ/mol

OR

(a). E^0cell = $E^0_C - E^0_A$

$= 0.80 - (-0.76) = 1.56$ V

$$E\ cell = E^0cell - \frac{0.059}{n}\log\frac{[Zn^{2+}]}{[Ag^+]^2} = 1.56 - \frac{0.059}{2}\log 10^3 = 1.47\ V$$

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