Class XII Session 2023-24
Subject - Chemistry
Sample Question Paper - 2

Time Allowed: 3 hours **Maximum Marks: 70**

General Instructions:

Read the following instructions carefully.

1. There are **33** questions in this question paper with internal choice.
2. SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
3. SECTION B consists of 5 very short answer questions carrying 2 marks each.
4. SECTION C consists of 7 short answer questions carrying 3 marks each.
5. SECTION D consists of 2 case-based questions carrying 4 marks each.
6. SECTION E consists of 3 long answer questions carrying 5 marks each.
7. **All questions are compulsory.**
8. **Use of log tables and calculators is not allowed.**

Section A

1. Which one of the following is a synthetic halogen compound? **[1]**

a) Chloramphenicol b) Diphenyl hydramine

c) Chloroquine d) Omeprazole

2. ____ are joined together by phosphodiester linkage between 5′ and 3′ carbon atoms of the pentose sugar. **[1]**

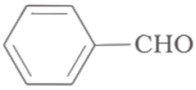
a) Nucleosides b) Nucleic acids

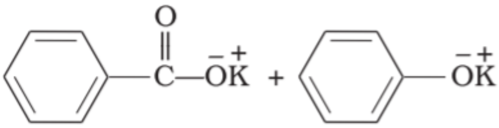
c) Proteins d) Nucleotides

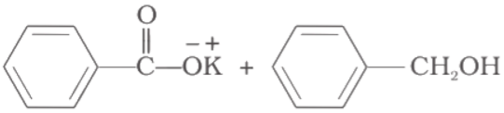
3. Williamson's synthesis is used for the preparation of **[1]**

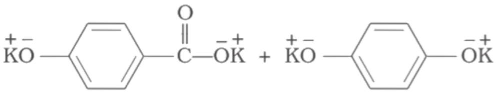
a) aldehydes b) ethers

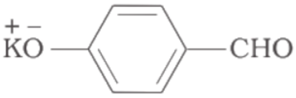
c) alkyl halides d) alcohols

4. Which product is formed when the compound  is treated with concentrated aqueous KOH solution? **[1]**

a) 

b) 

c) 

d) 

5. The reaction A+2B → C+D obeys the rate equation, Rate = $k[A]^x[B]^y$ what would be the order of this reaction? **[1]**

a) x

b) x + y

c) x – y

d) Cannot be predicted with the equation

6. Match the items given in column I with that in column II. **[1]**

Column I	Column II
(a) Molarity	(i) $\frac{\text{Mass of solute}}{\text{Mass of solution}} \times 10^6$
(b) Molality	(ii) Number of gram moles of a solute per litre of solution
(c) Normality	(iii) Number of gram moles of a solute per kg of solvent
(d) ppm	(iv) Number of gram equivalent of a solute per litre of solution

a) (a) - (ii), (b) - (iii), (c) - (iv), (d) - (i)

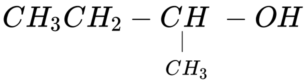
b) (a) - (iv), (b) - (iii), (c) - (ii), (d) - (i)

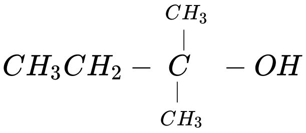
c) (a) - (iii), (b) - (ii), (c) - (i), (d) - (iv)

d) (a) - (i), (b) - (ii), (c) - (iii), (d) - (iv)

7. The order of reactivity of following alcohols with halogen acids is ________. **[1]**

A. $CH_3CH_2—CH_2—OH$

B.

$CH_3CH_2-\underset{\underset{CH_3}{|}}{CH}-OH$

C.

$CH_3CH_2-\overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}}-OH$

a) (A) > (C) > (B)

b) (C) > (B) > (A)

c) (B) > (A) > (C)

d) (A) > (B) > (C)

8. Which among the following is a synthetic element? **[1]**

a) Pa

b) U

c) Fm

d) Th

9. The reaction $2\,NO + Br_2 \rightarrow 2NOBr$ follows the mechanism given below: **[1]**

$NO + Br_2 \rightleftarrows NOBr_2(fast)$

$NOBr_2 + NO \rightarrow 2NOBr$ (slow)

If the concentration of both NO and Br_2 is increased two times, the rate of reaction would become:

a) 2 times

b) 8 times

c) 4 times

d) 6 times

10. One mole of a symmetrical alkane on ozonolysis gives two moles of an aldehyde having a molecular mass of 44u. The alkene is: **[1]**

a) 1 – butene

b) 2 – butene

c) Propene

d) Ethene

11. Alcoholic compounds react: **[1]**

a) only as nucleophiles.

b) both as nucleophiles and electrophiles.

c) only as electrophiles.

d) None of these

12. Benzene diazonium chloride reacts with phenol in which the phenol molecule attack para position of phenol to **[1]**

form p – hydroxyazobenzene. This reaction is called________.

a) Carbon tetra chloride
b) DDT
c) Iodoform
d) Coupling reaction

13. **Assertion (A):** β-pleated sheet structure of protein shows maximum extension. **[1]**

Reason (R): Intermolecular hydrogen bonding is present in them.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

14. **Assertion (A):** Formic acid reduces Tollen’s reagent. **[1]**

Reason (R): Compounds containing -CHO group reduce Tollen’s reagent.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

15. **Assertion (A):** p-Dichlorobenzene is less soluble in organic solvents than the corresponding o-isomer. **[1]**

Reason (R): o-Dichlorobenzene is polar while p-dichlorobenzene is not.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

16. **Assertion:** Addition reaction of water to but-1-ene in acidic medium yields butan-1-ol. **[1]**

Reason: The addition of water in acidic medium proceeds through the formation of a primary carbocation.

a) Assertion and reason both are correct and reason is correct explanation of assertion.
b) Assertion and reason both are wrong statements.
c) The assertion is a correct statement but the reason is the wrong statement.
d) The assertion is a wrong statement but the reason is the correct statement.

Section B

17. Write IUPAC names of the following coordination compounds: **[2]**

a. $K_3[Cr(C_2O_4)_3]$
b. $Hg[Co(SCN)_4]$
c. $[Co(NH_3)_5(CO_3)]Cl$

18. How is the magnetic moment of a species related to the number of unpaired electrons? **[2]**

19. **Answer the following:** **[2]**

(i) Identify the order of reaction from the following rate constant: **[1]**
$k = 2.3 \times 10^{-5}\ L\ mol^{-1}\ s^{-1}$

(ii) Identify the reaction order if the unit of rate constant is sec^{-1}. **[1]**

20. Define molal elevation constant or ebullioscopic constant. **[2]**

OR

Give an example of compound in which hydrogen bonding results in the formation of a dimer.

21. How will you bring about the following conversions (any two)? **[2]**

i. Propanone to propane.
ii. Benzoyl chloride to benzaldehyde.
iii. Ethanal to but-2-enal.

Section C

22. What is the cell potential for the cell at 25^{0}C [Cr/Cr^{3+}10.1m]//Fe^{2+}(0.01m)/Fe **[3]**

$E^0{}_{cr+/cr} = -0.74V$; E^{0}Fe^{2+}/Fe = -0.44V.

23. In a reaction 2A → Products, the concentration of A decreases from 0.5 mol L^{-1} to 0.4 mol L^{-1} in 10 minutes. Calculate the rate during this interval. **[3]**

24. The carbon-oxygen bond in phenol is slightly stronger than that in methanol. Why? **[3]**

OR

How do you convert the following:

a. N-phenylethanamide to p-bromoaniline
b. Benzene diazonium chloride to nitrobenzene
c. Benzoic acid to aniline

25. An aliphatic compound 'A' with a molecular formula of C_3H_6O reacts with phenyl hydrazine to give compound 'B'. Reaction of 'A' with I_2 in alkaline medium on warming gives yellow precipitate 'C'. Identify the compounds A, B and C. **[3]**

26. In the button cell widely used in watches and other devices the following reaction takes place: **[3]**

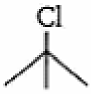
$Zn(s) + Ag_2O(s) + H_2O(l) \rightarrow Zn^{2+}(aq) + 2Ag(s) + 2OH^-(aq)$

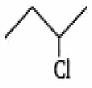
Determine $\Delta_r G^{(-)}$ and E$^{(-)}$ for the reaction

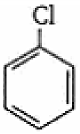
Given $Zn \rightarrow Zn^{2+} + 2e^-$, E^0 = 0.76V

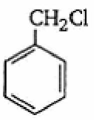
Given $Ag \rightarrow Ag^+ + 2e^-$, E^0 = 0.344V

27. In each of the following pairs of compounds, identify the compound which will undergo S$_N$1 reaction faster. **[3]**

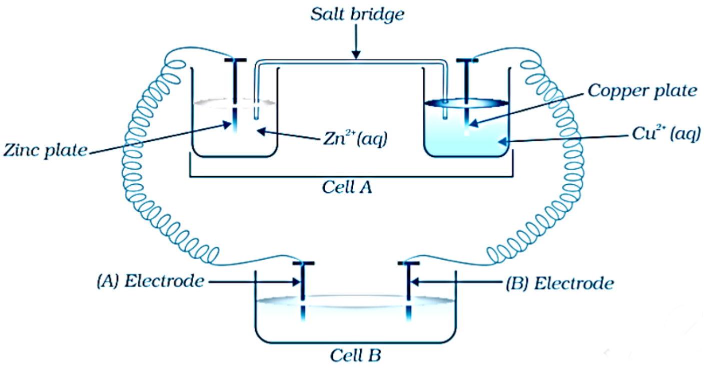
i. 

and 

ii. 

and 

28. Consider the given Figure and answer the following questions. **[3]**



i. Cell **A** has E$_{Cell}$ = 2V and Cell **B** has E$_{Cell}$ = 1.1V. Which of the two cells **A** or **B** will act as an electrolytic cell? Which electrode reactions will occur in this cell?
ii. If cell **A** has E$_{Cell}$ = 0.5V and cell **B** has E$_{Cell}$ = 1.1V then what will be the reactions at anode and cathode?

Section D

29. **Read the text carefully and answer the questions:** **[4]**

The transition metals when exposed to oxygen at low and intermediate temperatures form thin, protective oxide films of up to some thousands of Angstroms in thickness. Transition metal oxides lie between the extremes of ionic and covalent binary compounds formed by elements from the left or right side of the periodic table. They range from metallic to semiconducting and deviate by both large and small degrees from stoichiometry. Since d-electron bonding levels are involved, the cations-exist in various valence states and hence give rise to a large number of oxides. The crystal structures are often classified by considering a cubic or hexagonal close-packed lattice of one set of ions with the other set of ions filling the octahedral or tetrahedral interstices. The actual oxide structures, however, generally show departures from such regular arrays due in part to distortions caused by packing of ions of different size and to ligand field effects. These distortions depend not only on the number of d-electrons but also on the valence and the position of the transition metal in a period or group.

(i) Why does copper, which is in first series of transition metal exhibits +1 oxidation state most frequently?

OR

Crystal structure of oxides of transition metals often show defects. Given reason.

(ii) The lowest oxide of transition metal is basic. Why?

(iii) The variability in oxidation states of d-block different from that of the p-block elements. Explain.

30. **Read the text carefully and answer the questions:** **[4]**

A raw mango placed in concentrated salt solution loses water via osmosis and shrivel into pickle. Wilted flowers revive when placed in fresh water. A carrot that has become limp because of water loss into the atmosphere can be placed into the water making it firm once again. Water will move into its cells through osmosis. When placed in water containing less than 0.9% (mass/volume) salt, blood cells swell due to flow of water in them by osmosis.

(i) People taking a lot of salt or salty food suffer from puffiness or edema. What is the reason behind this?

(ii) The preservation of meat by salting and of fruits by adding sugar protects against bacterial action. How?

(iii) Why the direction of osmosis gets reversed if a pressure larger than the osmotic pressure is applied to the solution side? Write its one application.

OR

What care is generally taken during intravenous injections and why?

Section E

31. **Attempt any five of the following:** **[5]**

(i) Name the base that is found in nucleotide of RNA only. **[1]**

(ii) Write uses of B-Complex. **[1]**

(iii) Name the sugar present in milk. How many monosaccharide units are present in it? What are such oligosaccharides called? **[1]**

(iv) What is the basic structural difference between glucose and fructose? **[1]**

(v) Give one example of each- Monosaccharide, disaccharide and polysaccharide. **[1]**

(vi) Deficiency of which vitamin causes scurvy? **[1]**

(vii) Name purines present in DNA? **[1]**

32. $[Cr(NH_3)_6]^{3+}$ is paramagnetic while $[Ni(CN)_4]^{2-}$ is diamagnetic. Explain why? **[5]**

OR

a. Amongst the following, the most stable complex is:

i. $[Fe(H_2O)_6]^{3+}$

ii. $[Fe(NH_3)_6]^{3+}$

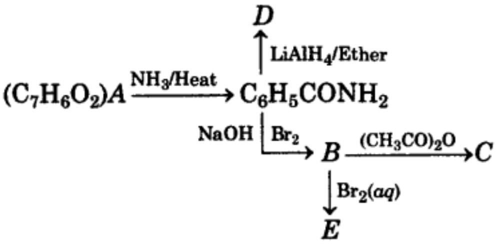
iii. $[Fe(C_2O_4)_3]^{3-}$

iv. $[FeCl_6]^{3+}$

b. What will be the correct order for the wavelength of absorption in the visible region for the following:

$[Ni(NO_2)_6]^{4-}$, $[Ni(NH_3)_6]^{2+}$, $[Ni(H_2O)_6]^{2+}$

33. An aromatic compound 'A' of molecular formula $C_7H_6O_2$ undergoes a series of reactions as shown below. Write the structures of A, B, C, D and E in the following reactions. **[5]**



OR

a. Give plausible explanation for each of the following:

i. Why are amines less acidic than alcohols of comparable molecular masses?

ii. Why are primary amines highest boiling than tertiary amines?

iii. Why are aliphatic amines stronger bases than aromatic amines?

b. Complete the following reactions:

i. $C_6H_5N_2Cl + C_2H_5OH \rightarrow$

ii. $C_6H_5NH_2 + (CH_3CO)_2O \rightarrow$

Solution

Section A

1.

(c) Chloroquine

Explanation: Chloroquine is a synthetic halogen compound. It is used for the treatment of malaria.

2.

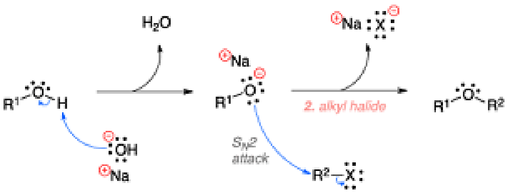
(d) Nucleotides

Explanation: When nucleoside is linked to phosphoric acid at 5′-position of sugar moiety, we get a nucleotide and nucleotides are joined by a phosphodiester bond between 5′ and 3′ carbon atoms of the pentose sugar.

3.

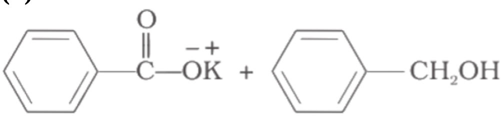
(b) ethers

Explanation: The Williamson ether synthesis is an organic reaction, forming an ether from an organohalide and deprotonated alcohol (alkoxide). This reaction was developed by Alexander Williamson in 1850. Typically it involves the reaction of an alkoxide ion with a primary alkyl halide via an $S_N{}^2$ reaction.



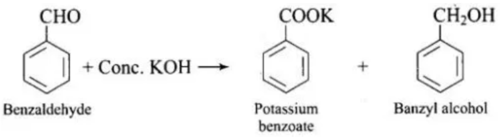
4.

(b)



Explanation:

Benzaldehyde has no hydrogen. So, on reaction with aqueous KOH solution, it undergoes Cannizzaro's reaction. One molecule of aldehyde is reduced and other is oxidized to carboxylic acid salt.



5.

(b) x + y

Explanation: Order of reaction with respect to A is x and w.r.t to B is y so total order of reaction is x+y.

6. **(a)** (a) - (ii), (b) - (iii), (c) - (iv), (d) - (i)

Explanation: (a) - (ii), (b) - (iii), (c) - (iv), (d) - (i)

7.

(b) (C) > (B) > (A)

Explanation: Haloalkanes are prepared from alcohol and halogen acids where the hydroxyl group of the alcohol is replaced by the halogen. Options (A) (B) and (C) are primary, secondary, tertiary alcohols respectively. Tertiary alcohols are more reactive than secondary and primary alcohol, the secondary halide is more reactive than primary halide and they form haloalkanes from haloacids at room temperature without catalysts. The order of reactivity of alcohols is 3°>2°>1°.

8.

(c) Fm

Explanation: In chemistry, a synthetic element is a chemical element that does not occur naturally on earth, and can only be created artificially. So far, 24 synthetic elements have been created (those with atomic numbers 95–118). All are unstable, decaying with half-lives ranging from 15.6 million years to a few hundred microseconds. Fm have an atomic number of 100.

9.

(b) 8 times

Explanation:

1. $NO + Br_2 \leftrightarrow NOBr_2[Fast, reversible]$
2. $NOBr_2$ + NO → 2NOBr [Slow, RDS]

$\Rightarrow$ Rate = $Rate_2$ = $k_2[NO][NOBr_2]$

$\rightarrow Rate1 = Rate_{-1} \rightarrow k_1[NO][Br_2] = k_{-1}[NOBr_2]$
$\rightarrow [NOBr_2] = (k_1/k_{-1})[NO][Br_2]$
$\Rightarrow Rate = k_2[NO][NOBr_2] = k_2[NO](k_1/k_{-1})[NO][Br_2]$
$\Rightarrow Rate = (k_2k_1/k_{-1})[NO]^{2[}Br_2] = k[NO]^2[Br_2]$

Rate=$k[NO]^2[Br_2]$, since rate of reaction w.r.t [NO] is second order and w.r.t [Br] is first order, then rate of reaction become 8times when conc. of [NO] and [Br] is doubled.

$rate^{'} = k[2NO]^2\ [2Br_2]$

$rate^{'} = 8 \times Rate$

10.

(b) 2 – butene

Explanation: 2-butene on reductive ozonolysis with O_3/Zn will give CH_3CHO which has a molecular mass of 44u.

$CH_3CH=CHCH_3 + O_3/Zn \rightarrow 2CH_3CHO$

Molecular mass of CH_3CHO = 12 + 3 + 12 + 1 + 16 = 44u

11.

(b) both as nucleophiles and electrophiles.

Explanation: Alcohols as nucleophile: The bond between O−H is broken when alcohol react as nucleophiles.
Alcohols as electrophile : The bond between C−O is broken when alcohol reacts as electrophiles

12.

(d) Coupling reaction

Explanation: In Coupling reaction, benzene and phenol get coupled through -N=N- linkage. The compounds containing this type of linkage are called azo compounds.

$C_6H_5N_2^+Cl^- + C_6H_5OH \longrightarrow p\text{-}C_6H_5N=NC_6H_4OH$ (dye)

13.

(b) Both A and R are true but R is not the correct explanation of A.

Explanation: In β-pleated sheet structure, the polypeptide chains are held together by intermolecular H-bonds. Extension and contraction of β-pleated sheet structure of protein depends on the size of R.

14.

(b) Both A and R are true but R is not the correct explanation of A.

Explanation: Formic acid (HCOOH) is not true acid, it contains both aldehyde (-CHO) as well as a carboxyl group (-COOH), and it behaves as a reducing agent because it can be easily oxidized to CO_2 and H_2O and hence reduces Tollens reagent.

15.

(b) Both A and R are true but R is not the correct explanation of A.

Explanation: p-Dichlorobenzene being more symmetrical than o-isomer fits closely in the crystal lattice and hence greater amount of energy is needed to break the crystal lattice. Thus, p-isomer is less soluble than o-isomer.

16.

(b) Assertion and reason both are wrong statements.

Explanation: Addition of water to but-1-ene in acidic medium yields butan-2-ol. Addition of water proceeds through the formation of a secondary carbocation.

Section B

17. a. Potassium trioxalato electromate III
b. Mercuric tetrathiiocyanatocobaltate III
c. Pentaamminecarbonatocobalt (III) chloride.

18. **Magnetic moment:** Magnetic moment is determined by the number of unpaired electrons and it is calculated by using the spin-only formula.

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

Where n = no. of unpaired electrons

μ = magnetic moment

Its SI unit is Bohr Magneton(μ_B), BM.

19. Answer the following:

(i) Second order, because unit is $L\,mol^{-1}\ s^{-1}$.

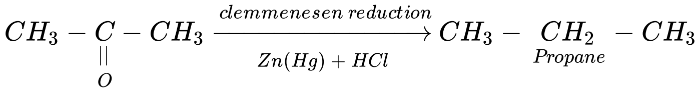
(ii) First order reaction.

20. Molal elevation constant is defined as increase in boiling point of the solvent, when one mole of solute is dissolved in 1000g of solvent. The elevation is proportional to the number of particles dissolved and given by $\triangle T_b$ = K_b m, where m is the molal concentration of solute. The constant K_b is the ebullioscopic constant of the solvent.

OR

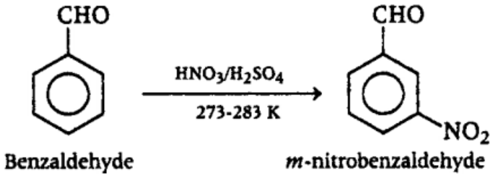
Benzoic acid (C_6H_5COOH) dimerises having 2 monomer units connected by 2 hydrogen bonds. The 2 hydrogen bonds stabilise the dimer.

21. i. **Conversion of Propanone to Propane.**

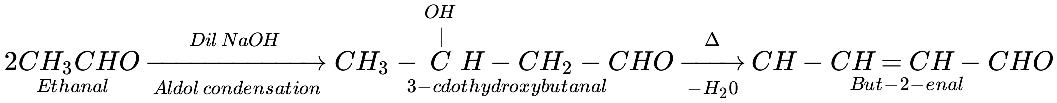


$$CH_3 - \underset{\underset{O}{||}}{C} - CH_3 \xrightarrow[Zn(Hg) + HCl]{clemmenesen\ reduction} CH_3 - \underset{Propane}{CH_2} - CH_3$$

ii. **Conversion of Benzoyl Chloride to Benzaldehyde**



iii. **Conversion of Ethanal to but-2-enal**



$$\underset{Ethanal}{2CH_3CHO} \xrightarrow[Aldol\ condensation]{Dil\ NaOH} CH_3 - \underset{3-cdothydroxybutanal}{\overset{\overset{OH}{|}}{C}\ H - CH_2 - CHO} \xrightarrow[-H_20]{\Delta} \underset{But-2-enal}{CH - CH = CH - CHO}$$

Section C

22. The cell reaction is

$2Cr + 3Fe^{2+}6e^- \rightarrow 2Cr^{3+} + 3Fe$

Nernst Equation-

$E_{cell} = \left(E^0{}_{Fe}{}^2 + /_{Fe} - E^0{}_{cr}{}^{3+}{}_{/cr}\right) - \frac{0.059}{6}\log\frac{[Cr^{3+}]^2}{[Fe^{2+}]^3}$

= (-0.44v - (-0.74v) - $\frac{0.059}{6}\log\frac{(0.10)_2}{(0.01)^3}$

$= 0.3V - \frac{0.059}{6}\log 10^4$

= 0.3 V - 0.0394 V

= +0.2606 V

23. Average rate $= -\frac{1}{2}\frac{\Delta[A]}{\Delta t}$

$= -\frac{1}{2}\frac{[A_2]-[A]_1}{t_2-t_1}$

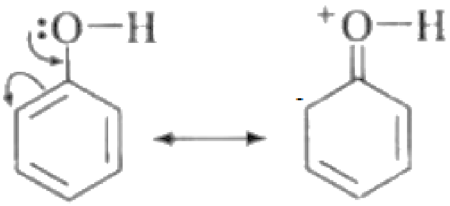
$= -\frac{1}{2} \times \frac{0.4M-0.5M}{10\ \text{min}}$

$= -\frac{1}{2} \times \frac{-0.1M}{10\ \text{min}}$

The rate of reaction is $= 5 \times 10^{-3} M\,\text{min}^{-1}$

24. This can be explained as under:

a. In phenol, the conjugation of unshared electron pairs over oxygen with the aromatic ring shows the +M effect that results in partial double bond character in C - O bond.



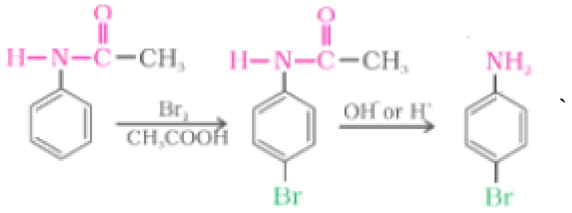
In methanol, no such conjugation (resonance) is possible.

b. In phenol, oxygen is attached to sp^2 hybridized carbon while in methanol, oxygen attached to sp^3 hybridized carbon. An sp^2 hybridized carbon is more electronegative (because of greater s -character than sp^3 hybridized carbon atom. Therefore, the bond between oxygen and sp^2 hybridized carbon is more stable than the bond between oxygen and sp^3, hybridized orbital.

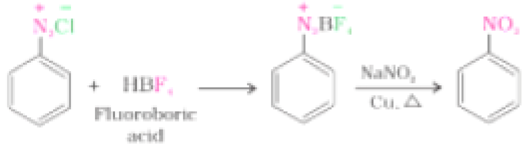
Due to these reasons, the bond strength of carbon and oxygen in phenol is high.

OR

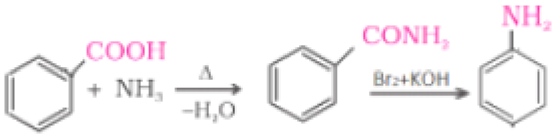
a. Conversion of N-phenylethanamide to p-bromoaniline:



b. Conversion of Benzene diazonium chloride to nitrobenzene:



c. Conversion of Benzoic acid to aniline:



25. A, B and C are:

A = Acetone

B = Acetone Phenylhydrazone

C = Idoform

Completed reactions are given below:

$$CH_3-\underset{\underset{Acetone}{'A'}}{\overset{\overset{O}{||}}{C}}-CH_3+C_6H_5NHNH_2\rightarrow \underset{\text{Acetone phenylhydrazone}}{\underset{'B'}{CH_3-\underset{\underset{CH_3}{|}}{C}=N-NH-C_6H_5}}+H_2O$$

$$CH_3-\underset{Acetone}{\overset{\overset{O}{||}}{C}}-CH_3+3I_2+4NaOH\rightarrow \underset{\text{Iodoform}}{\underset{'C'}{CHI_3}}+CH_3COONa+3NaI+3H_2O$$

26. Zn is oxidized and Ag_2O is reduced (as Ag^+ions change to Ag)

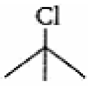
$E^0_{cell}=E^0[Ag_2O/Ag](red)+E^0[Zn/Zn^{2+}](ox)$

= 0.344 + 0.76

= 1.104 V

$\Delta_rG^0=-nFE^0cell=-2\times 96500\times 1.104J$

$=-2.13\times 10^5J$

27. i. Since 3° carbocations are more stable than 2° carbon cations therefore  will react faster.

ii. Benzyl chloride readily forms benzyl cation which is stabilized by resonance. Thus, benzyl chloride undergoes S_N1 reaction faster than chlorobenzene.

28. i. Cell 'B' will act as an electrolytic cell because the electrode potential of 'B' is less than that of 'A'. Electrode process in the cell 'B' may be given as

$Zn^{2+} + 2e^- \longrightarrow Zn(s)$ (at Cathode)

$Cu(s) \longrightarrow Cu^{2+} + 2e^-$ (at Anode)

ii. Cell 'B' at higher potential will act as the galvanic cell. The electrode process may be given as,

At anode: $Zn(s) \longrightarrow Zn^{2+} + 2e^-$

At Cathode $Cu^{2+} + 2e^- \longrightarrow Cu(s)$

Section D

29. **Read the text carefully and answer the questions:**

The transition metals when exposed to oxygen at low and intermediate temperatures form thin, protective oxide films of up to some thousands of Angstroms in thickness. Transition metal oxides lie between the extremes of ionic and covalent binary compounds formed by elements from the left or right side of the periodic table. They range from metallic to semiconducting and deviate by both large and small degrees from stoichiometry. Since d-electron bonding levels are involved, the cations-exist in various valence states and hence give rise to a large number of oxides. The crystal structures are often classified by considering a cubic or hexagonal close-packed lattice of one set of ions with the other set of ions filling the octahedral or tetrahedral interstices. The actual oxide structures, however, generally show departures from such regular arrays due in part to distortions caused by packing of ions of different size and to ligand field effects. These distortions depend not only on the number of d-electrons but also on the valence and the position of the transition metal in a period or group.

(i) Copper readily loses one electron from its 4s orbital, to form stable 3d electronic configuration.

OR

The actual oxide structures, generally show departures from a regular arrays due in part to distortions caused by packing of ions of different size and to ligand field effects.

(ii) The lower oxide of transition metal has low oxidation states. This means some of the valence electrons of the metal atoms do not participate in bonding. Thus, they can donate electrons and can behave as bases.

(iii) In p-block, lower oxidation state is more stable due to inert pair effect, whereas in d-block elements higher oxidation states states are more stable. In d-block, oxidation states differ by one, whereas in p-block, it differs by two.

30. **Read the text carefully and answer the questions:**

A raw mango placed in concentrated salt solution loses water via osmosis and shrivel into pickle. Wilted flowers revive when placed in fresh water. A carrot that has become limp because of water loss into the atmosphere can be placed into the water making it firm once again. Water will move into its cells through osmosis. When placed in water containing less than 0.9% (mass/volume) salt, blood cells swell due to flow of water in them by osmosis.

(i) People experience water retention in tissue cells and intercellular spaces due to osmosis.

(ii) Through the process of osmosis, a bacterium on salted meat or candid fruit loses water, shrivels and dies.

(iii) The pure solvent flows out of the solution through the semi permeable membrane due to reverse osmosis. It is used in desalination of sea water.

OR

During intravenous injection, the concentration of the solution should be same as that of blood so that they are isotonic. Because if the solution concentration is hypertonic than blood cell will shrink and if it is hypotonic than blood cell will swells/burst.

Section E

31. Attempt any five of the following:

(i) Uracil.

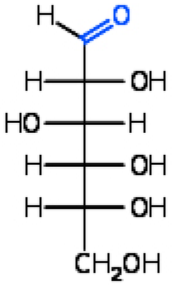
(ii) It is required for making red blood cells, muscles.

(iii) Lactose is present in milk as sugar. Two monosaccharide units (i.e., glucose and galactose) are present in it. Such oligosaccharides are called disaccharides.

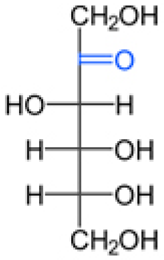
(iv) Glucose has aldehydic group. Glucose is called as aldose

Fructose has ketonic group. Fructose is called as ketose.

Structures:



Glucose



Fructose

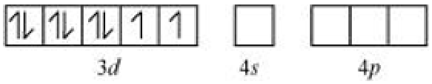
(v) Monosaccharide - Glucose, Fructose etc.
Disaccharide - Sucrose, maltose etc.
Polysaccharide - Cellulose, starch etc.

(vi)Vitamin C

(vii)Adenine and guanine

32. Cr is in the +3 oxidation state i.e.,d^3 configuration. Also, NH_3 is a weak field ligand that does not cause the pairing of the electrons in the 3d orbital. Cr^{3+} :

Therefore, it undergoes d^2sp^3 hybridization and the electrons in the 3d orbitals remain unpaired. Hence, it is paramagnetic in nature. In $[Ni(CN)_4]^{2-}$ Ni exists in the +2 oxidation state i.e., d^8 configuration. Ni^{2+}



As there are no unpaired electrons, it is diamagnetic.

OR

a. Complexes containing didentate or polydentate ligands are more stable than those containing monodentate ligands. In each of the given complex, Fe is in +3 state.

   As $C_2O_4^{2-}$ is didentate chelating ligand, hence is the most stable complex.

b. As metal ion is fixed, the wavelength of absorption will decided by the field strengths (CFSE values) of the ligands.

   From the spectrochemical series, the order of CFSE is: $H_2O < NH_3 < NO_2$

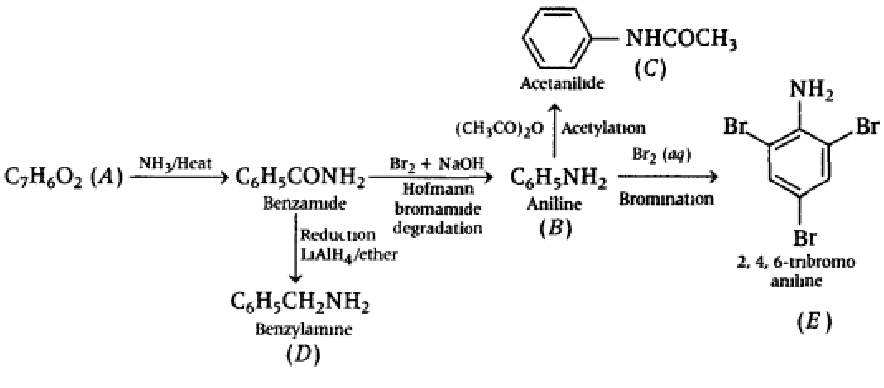
   Thus, the energies absorbed for excitation will be in the order:

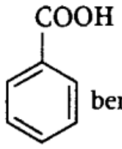
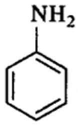
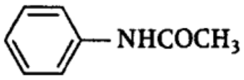
   $[Ni(NH_3)_6]^{2+} < [Ni(H_2O)_6]^{2+} < [Ni(NO_2)_6]^{4-}$

   As wavelength and energy are inversely related.The wavelengths absorbed will be in the opposite order:

   $[Ni(NH_3)_6]^{2+} > [Ni(H_2O)_6]^{2+} > [Ni(NO_2)_6]^{4-}$

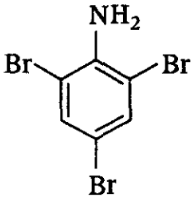
33.



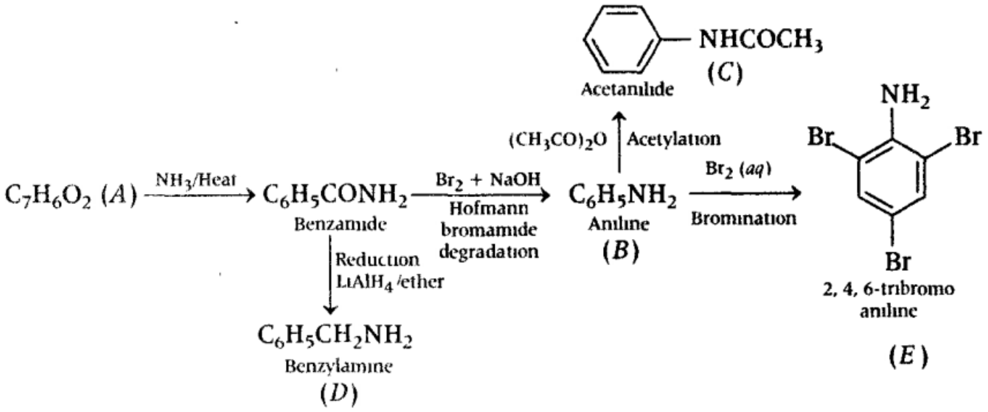
A is  benzoic acid, *B* is  aniline, *C* is 

N-phenylethanamide
(Acetanilide)

D is $C_6H_5CH_2NH_2$
Benzylamine

E is 

2, 4, 6-tribromoaniline



OR

a. i. Loss of proton from amines give ion whereas loss of a proton from alcohol gives an alkoxide ion.

Since O is more electronegative than N, therefore, RO^- can accommodate the -ve charge more easily than RNH^-.

Consequently, RO^- is more stable than RNH^-. Thus, alcohols are more acidic than amines.

ii. Primary amines (RNH_2) have two hydrogen atoms on the N atom and therefore, form intermolecular hydrogen bonding. Tertiary amines (R_3N) donot have hydrogen atoms on the N atom and therefore, these donot form hydrogen bonds. As a result of hydrogen bonding in primary amines, they have higher boiling points than tertiary amines of comparable molecular mass.

iii. Both arylamines and alkylamines are basic in nature due to the presence of lone pair on N-atom. But arylamines are less basic than alkylamines.

b. i. $C_6H_5N_2Cl + C_2H_5OH \xrightarrow{Reduction} \underset{Benzene}{C_6H_6} + \underset{Ethanal}{CH_3CHO} + N_2 + HCl$

ii. $C_6H_5NH_2 + (CH_3CO)_2O \xrightarrow{CH_3COOH} \underset{Ace\tan ilide}{C_6H_5CONHCH_3} + CH_3COOH$