

PRE-FINAL-2-2024

RJC CHEMISTRY

Prepared by
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Pattern Classes

9864089106

Q1

1 molar or 1 molal,
which has higher concentration?

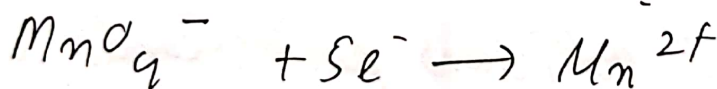
Ans. 1 molar aqueous solⁿ is more concentrated than
1 molal aqueous solution.

1 molar = 1 mol L⁻¹ = 1 mol of solute in 1 L of the
solution which include both solute & solvent.
So, mass of solvent (H₂O) is less than 1000 gram

Q2

1 mol MnO₄⁻ to Mn²⁺? How much charge?

Ans



$$5 \text{ mol of } e^- = 5 \times 96500 = 4.825 \times 10^5 \text{ C}$$

Q3

$k = 2.5 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$, order of rxn?

Ans

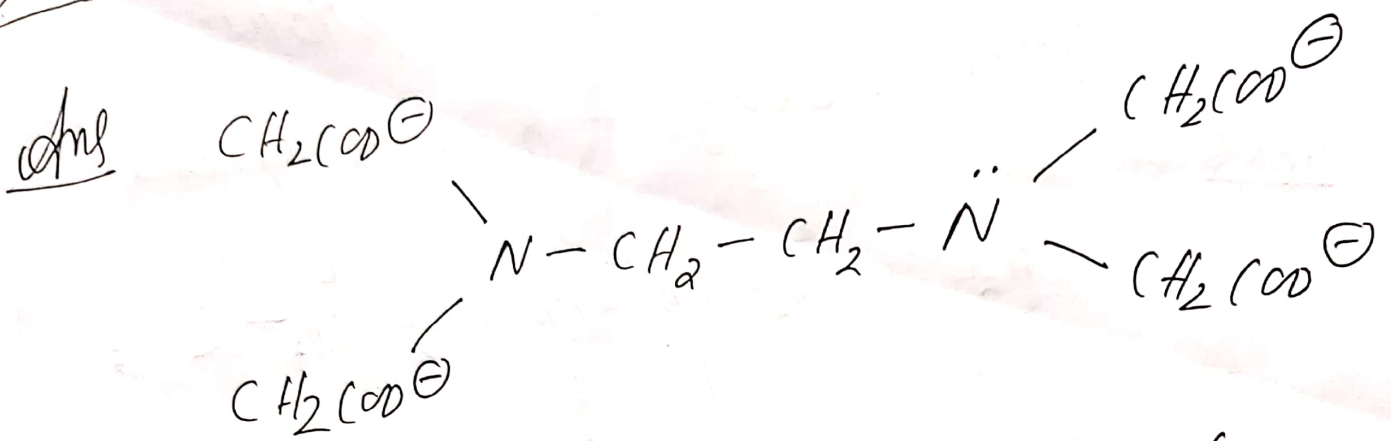
unit of rate constant = $(\text{mol L}^{-1})^{1-n} \text{ s}^{-1}$

$$\text{A/Q } (\text{mol L}^{-1}) \text{ s}^{-1} = (\text{mol L}^{-1})^{1-n} \text{ s}^{-1}$$

$$(\text{mol L}^{-1})^{1-0} = (\text{mol L}^{-1})^{1-0}$$

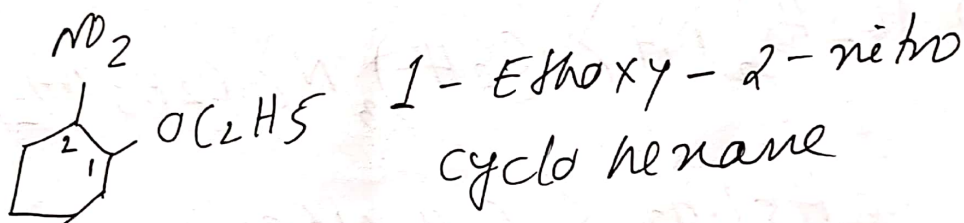
$$\therefore n = 0 \quad \text{zero order rxn}$$

Q4 What is EDTA?



Oxidation state = -4 C.N. = 4

Q5 Write the IUPAC name?

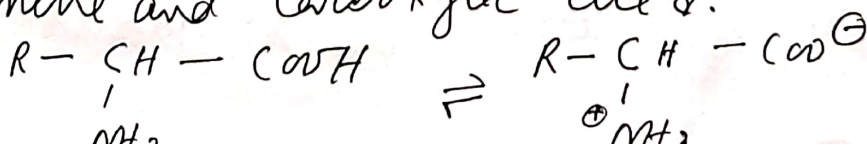


Q6 What is collision frequency?

Ans The no. of collisions per second per unit volume of a reaction mixture between reacting molecules is known as collision frequency.

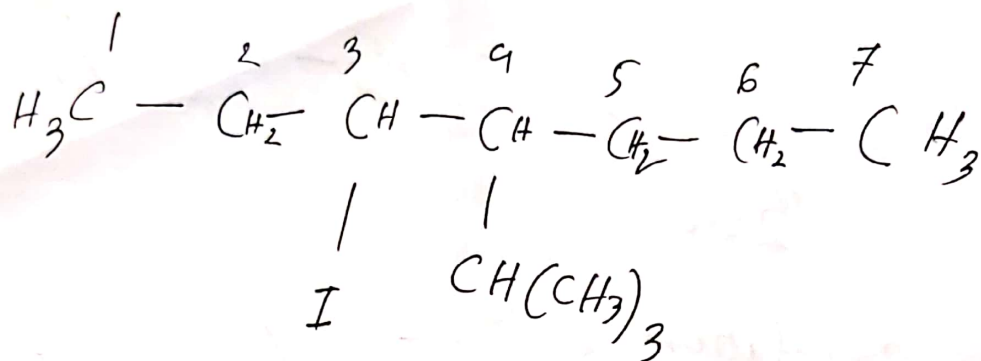
Q7 What is zwitter ion?

Ans Ion that contains two functional groups, amine and carboxylic acid.



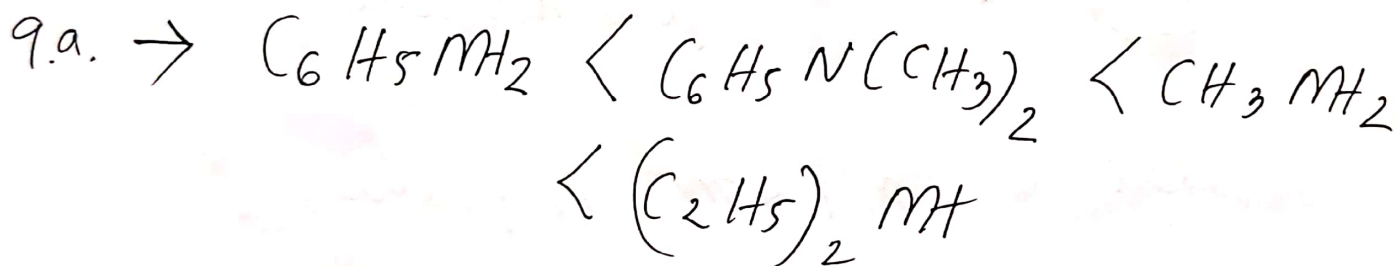
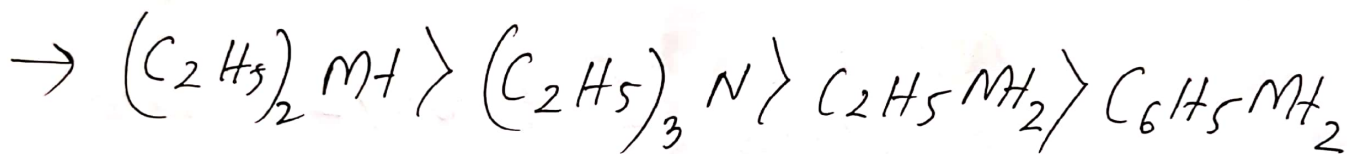
Q8 write structure of following
 4-tert. Butyl - 3-iodo heptane

Ans

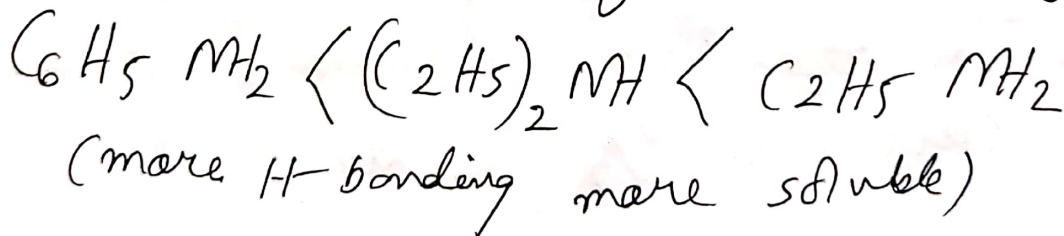


Q9

(a) Increasing order of basic strength



(b) increasing order of solubility

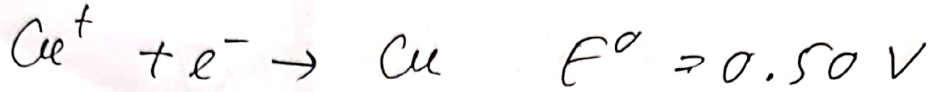
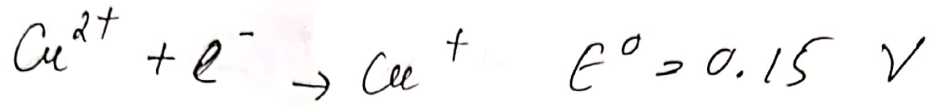


Q10

what do you mean by positive deviation from Raoult's law?

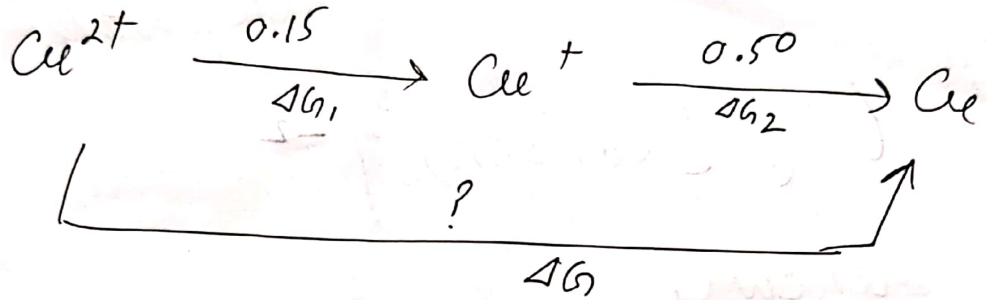
Ans Already answered in previous lectures.

Q11



Calculate E° for $\text{Cu}^{2+} + 2e^- \rightarrow \text{Cu}$

soln



$$\Delta G = \Delta G_1 + \Delta G_2$$

$$\rightarrow -nE^\circ F = -nE_1^\circ F - nE_2^\circ F$$

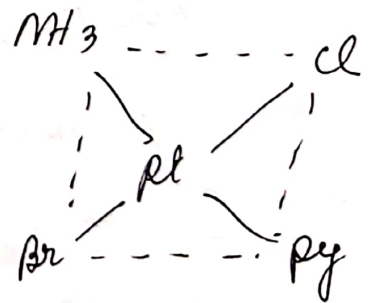
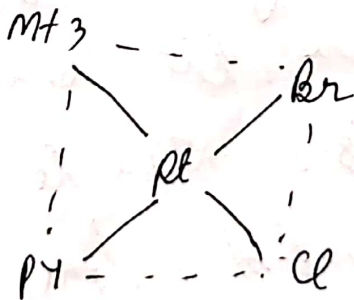
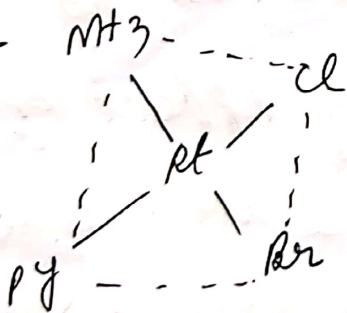
$$\rightarrow 2 \times E^\circ = 0.15 + 0.50$$

$$\rightarrow E^\circ = \frac{0.65}{2} = 0.325 \text{ V}$$

Q12

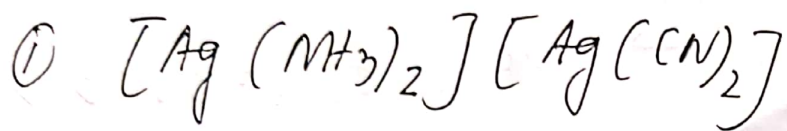
write all G.I. of $[\text{Pt}(\text{NH}_3)(\text{Br})\text{Cl}(\text{PY})]$
and how many of these will show optical isomer

soln

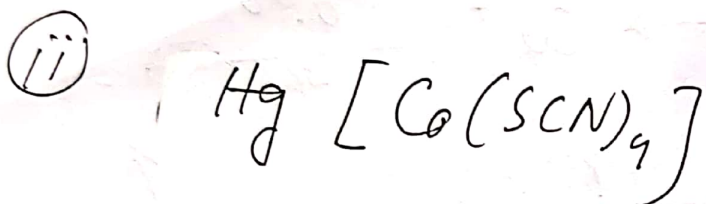


No optical isomer is present. Square planar complexes show O.I. only when square planar complexes have unsymmetrical chelating ligands.

Q8 IUPAC name of the following



diammine silver (I) dicyanido
argentate (I)



Mercury (II) tetrathiocyanato-N-
cobaltate (II)

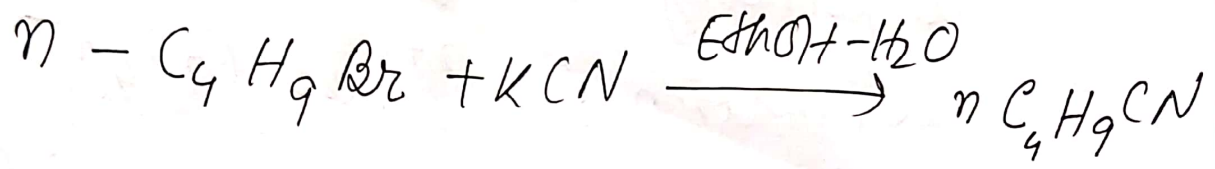
Q15 What is lanthanide contraction?
Why actinoid is greater from element
to element than lanthanide contraction

Ans The shielding effect of 5f orbitals is
poorer than the shielding effect of
4f orbitals. Due to this, the valence
shell electrons of actinide experiences
greater effective nuclear charge than
that experienced by lanthanides.
Hence A.C. is greater than L.C.

in water react with

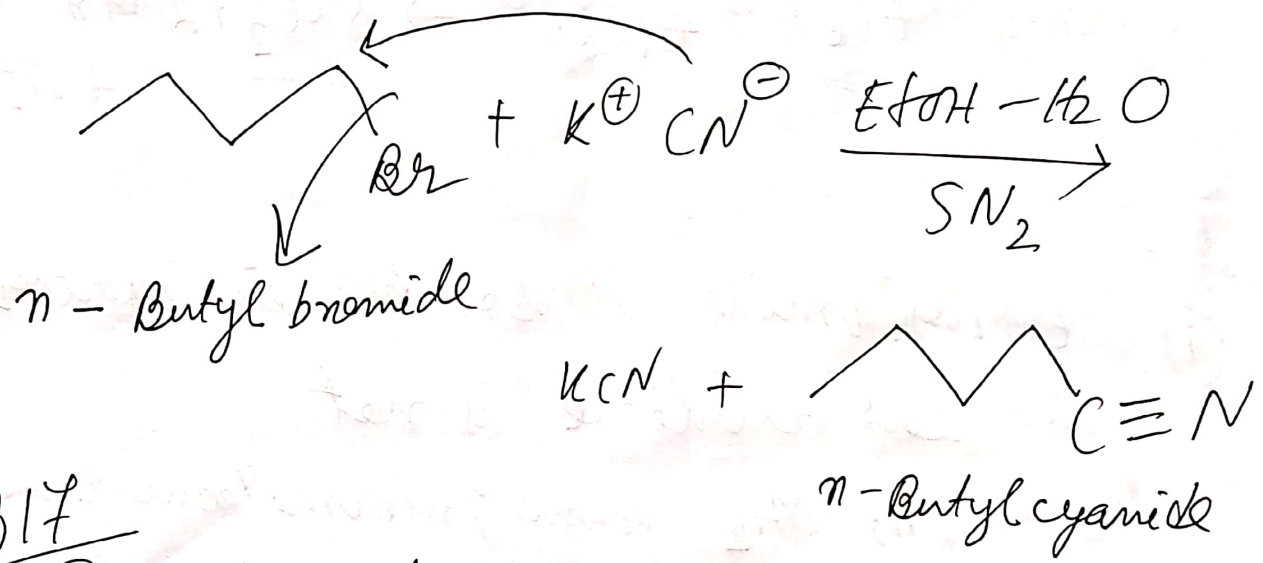
Q16

Write mechanism of the following reaction



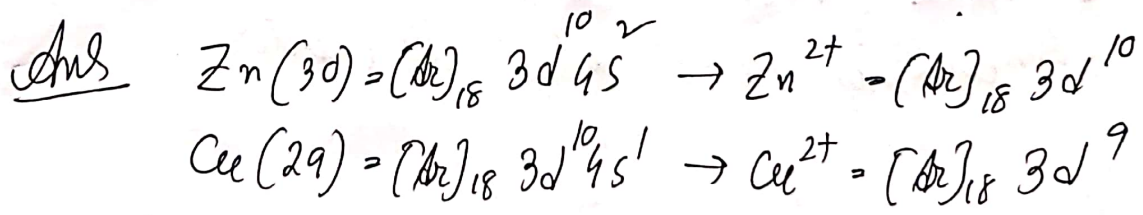
Ans

This is an example of S_N2 rxn. CN^\ominus acts as a Nucleophile and bromide ion act as leaving group. Single step process.



Q17

(a) Cu and Zn has $3d^{10}$ atomic orbitals. Cu is considered as transition element but Zn is not. Explain?



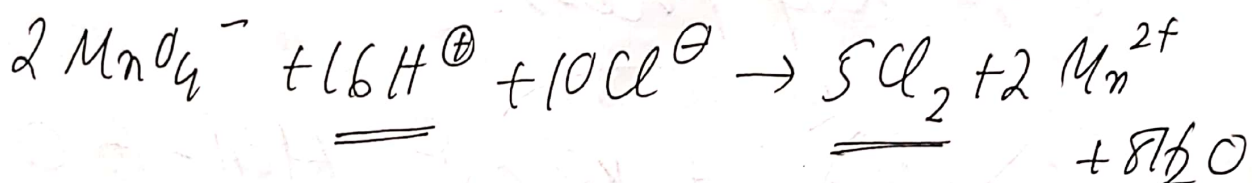
$3d$ subshell of Cu is a transition element, due to $3d^9$ configuration.

Q 17

(b)

why HCl is not used to acidify a permanganate solution in volumetric estimation of Fe^{2+} or $C_2O_4^{2-}$

Ans $KMnO_4$ is a very strong oxidising agent and it can oxidize HCl to liberates Cl_2 gas.



Q 18

(i) Ethylamine is soluble in water whereas aniline is not

Ans $C_2H_5-NH_2$ forms intermolecular hydrogen bonding with water. Aniline does not undergo H-bonding because of presence of benzene which is hydrophobic. Therefore aniline is insoluble in water.

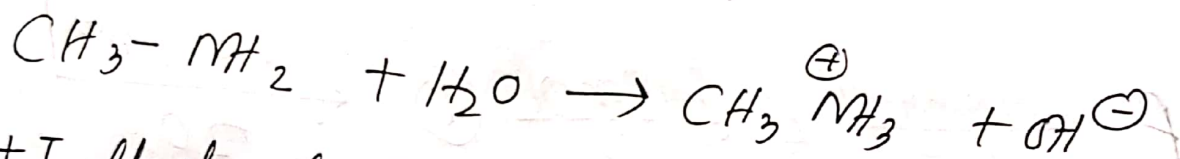
Q18

(ii)

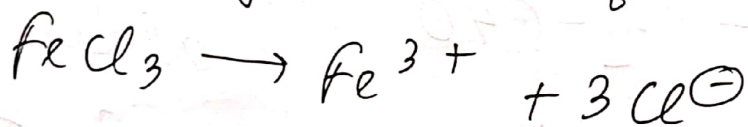
Methylamine in water react with ferric chloride to ppt. hydrated ferric oxide.

ans

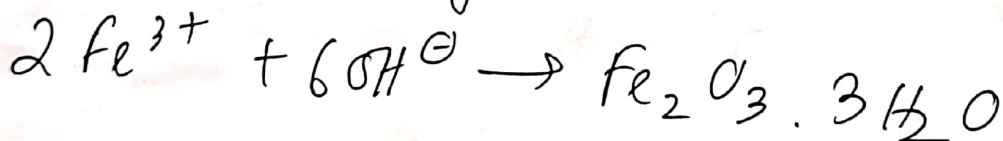
$\text{CH}_3\text{-NH}_2$ in water reacts with FeCl_3 to precipitate hydrated ferric oxide.



+I effect of (CH_3) group, methylamine is more basic than water. Therefore, in water, CH_3NH_2 produces OH^- ions by accepting H^+ ions from H_2O .



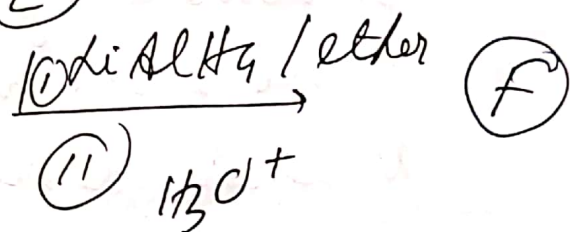
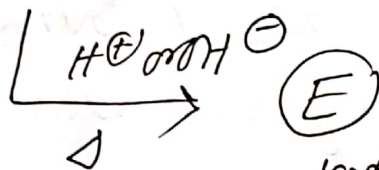
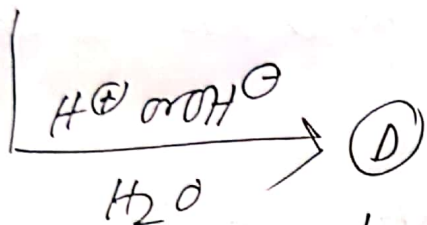
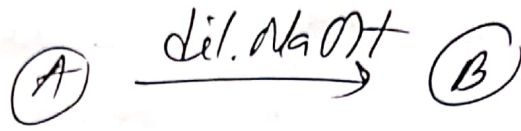
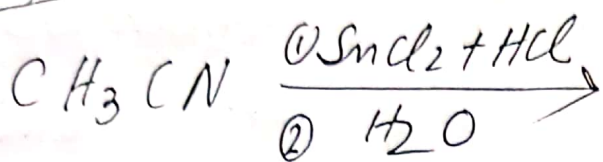
OH^- ions react with Fe^{3+} ion to form a ppt. of hydrated ferric oxide.



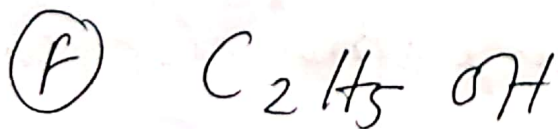
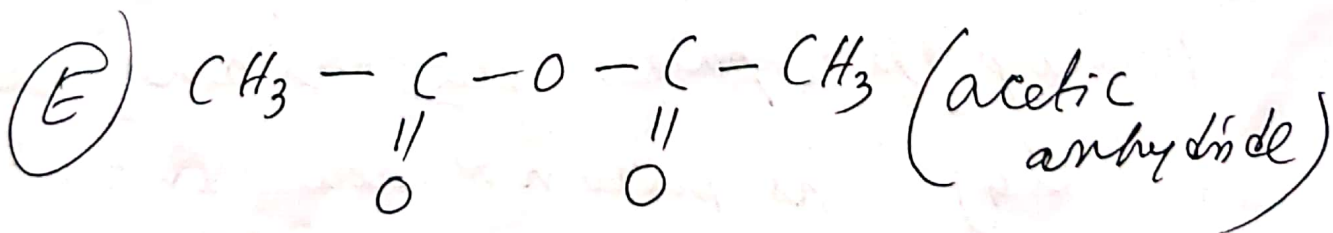
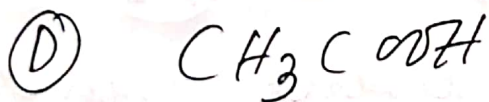
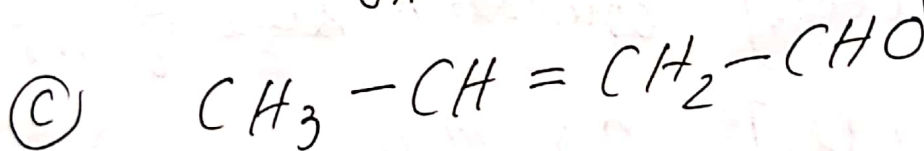
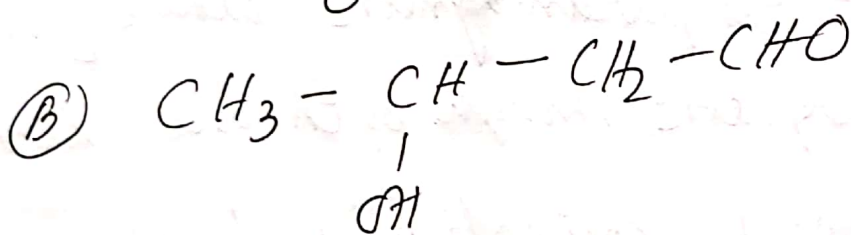
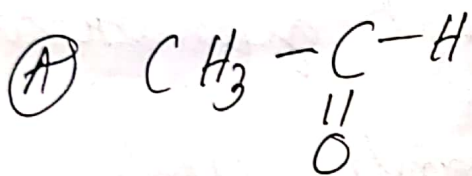
Hydrated ferric oxide

Patern
Classes

Q 19



Ans



Porter
Clamsy
Nagran

Q 20

Q Why is GI not possible in tetrahedral complexes having two different unidentate ligands co-ordinated with the central metal ion?

Ans Because the relative positions of the unidentate ligands attached to the central metal atom are the same with respect to each other. Hence show optical isomerism and not geometrical.

Q $[NiCl_4]^{2-}$ is paramagnetic while $[Ni(CO)_4]$ is diamagnetic though both are tetrahedral

Ans $[Ni(CO)_4]$ oxidation state of Ni is zero but $[NiCl_4]^{2-}$ O.S. of Ni is $(+2)$ and being (Cl^-) weak field ligand, unable to pair up the unpaired electrons and thus $[NiCl_4]^{2-}$ is paramagnetic in nature due to presence of unpaired electron.

20

Q) What is isotonic solution?

Ans When solutions have equal osmotic pressures are known as isotonic solution

eg, blood serum is isotonic to a physiologic salt solution.

Q 2) A certain rxn is 50% complete in 20 min at 300 K; the reaction is 50% complete in 5 min at 350 K. Calculate activation energy, if it is a first order reaction.

Ans $k_1 = \frac{0.693}{20}$ $k_2 = \frac{0.693}{5}$

$$\log \frac{k_2}{k_1} = \frac{E_a}{2.303 \times R} \left(\frac{1}{T_1} - \frac{1}{T_2} \right)$$

$$\log 4 = \frac{E_a}{2.303 \times 8.314} \left(\frac{1}{300} - \frac{1}{350} \right)$$

$$\text{D) } E_a = 24.2 \text{ kJ mol}^{-1}$$

Q24

Calculate the amount of CaCl_2 which must be added to 500 g H_2O to lower its freezing point by 2 K, assuming CaCl_2 is completely dissociated

Ans We know that,

$$\Delta T_f = K_f \times \text{molarity}$$

$$\Rightarrow 2 = 1.86 \times \frac{x/111}{500/1000}$$

$$\Rightarrow x = 60 \text{ g}$$

Q27

Define the following terms related to proteins?

- (a) peptide linkage
- (b) Primary structure
- (c) denaturation.

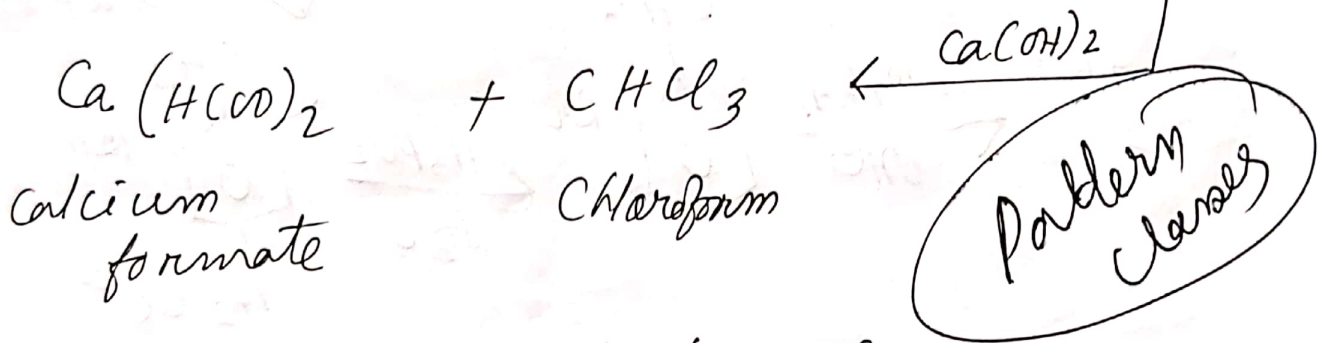
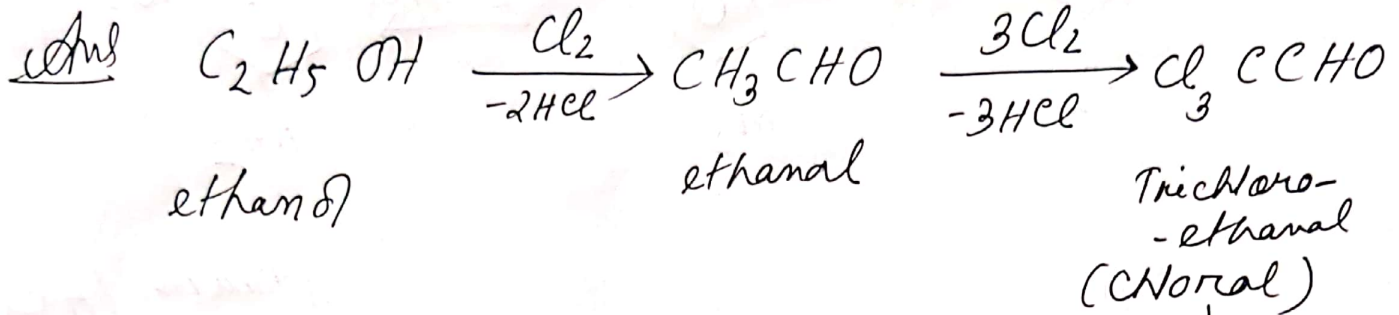
Q28

Write

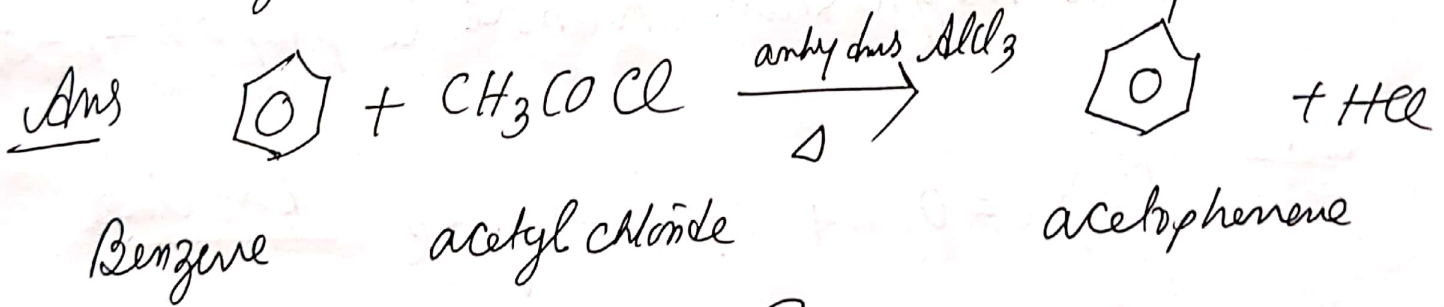
- (a) carbylamine reaction
- (b) Hoffmann bromamide reaction

Q 28 Complete the following conversion

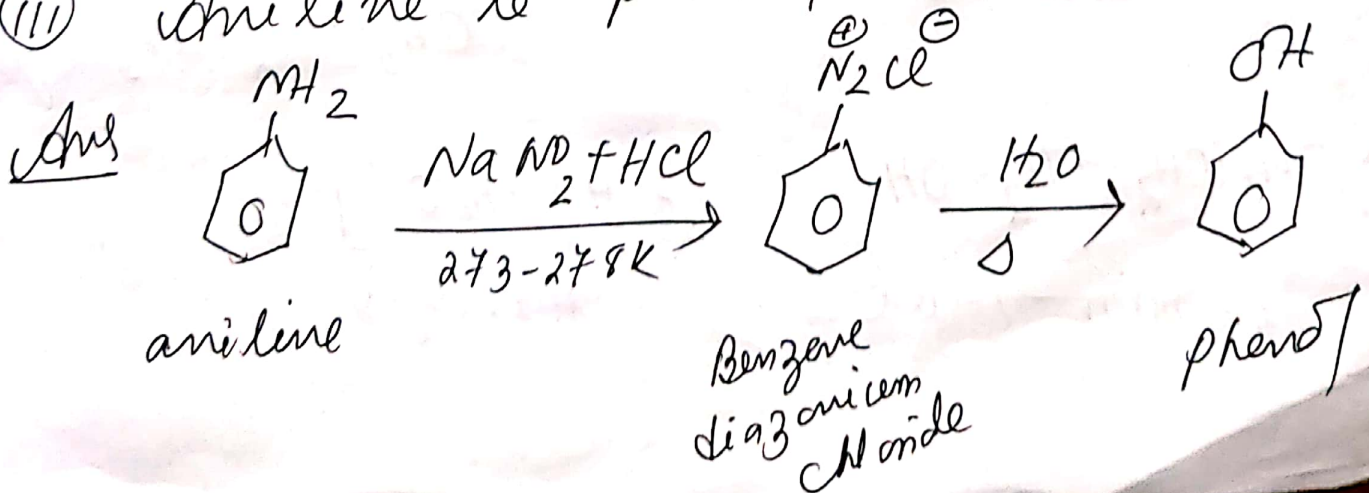
(i) Ethanol to chloroform



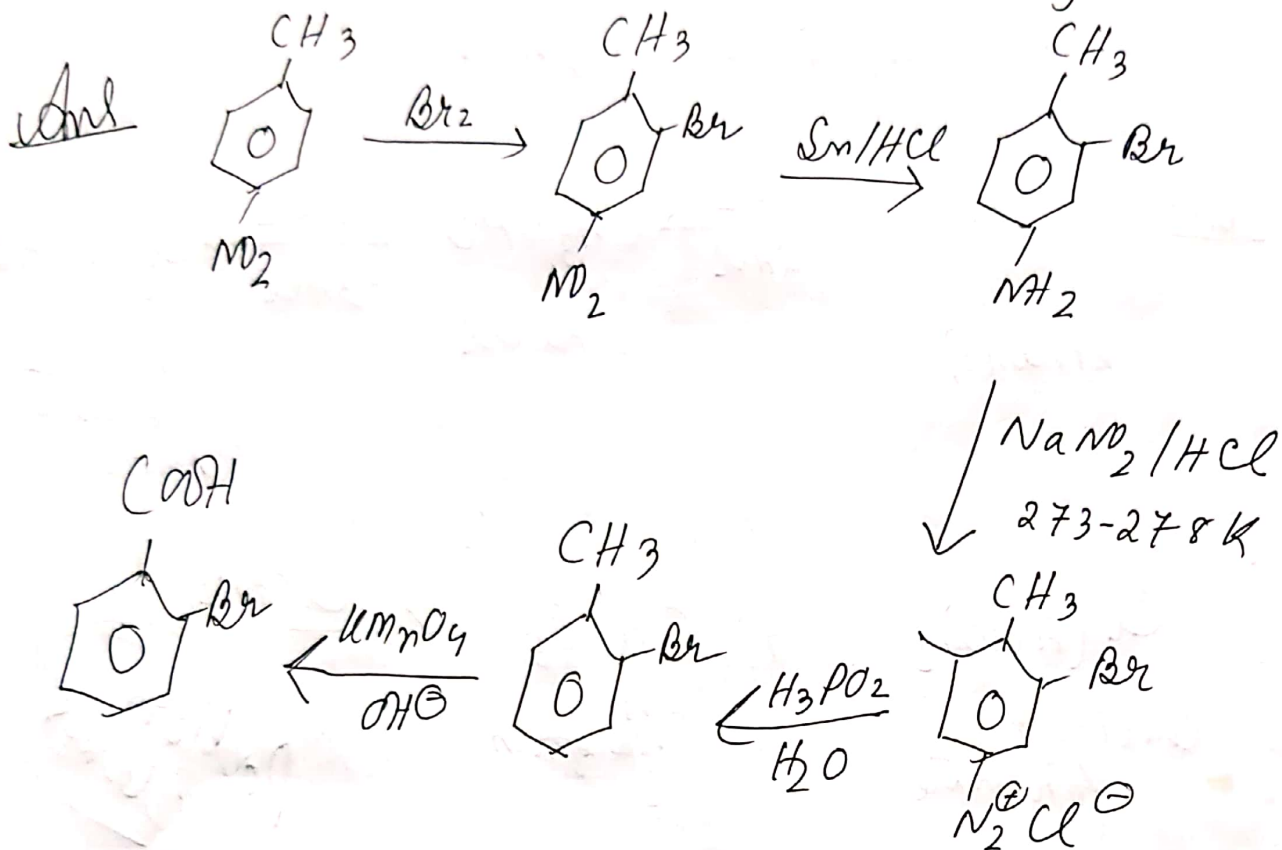
(ii) Benzene to acetophenone



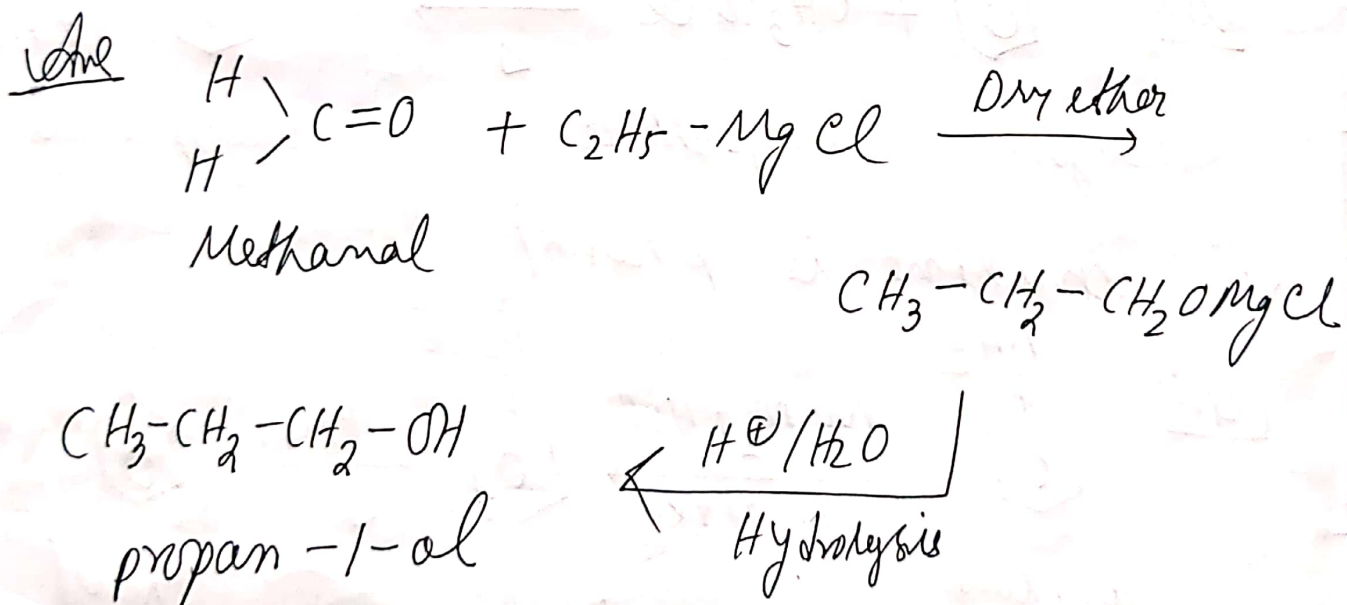
(iii) Aniline to phenol



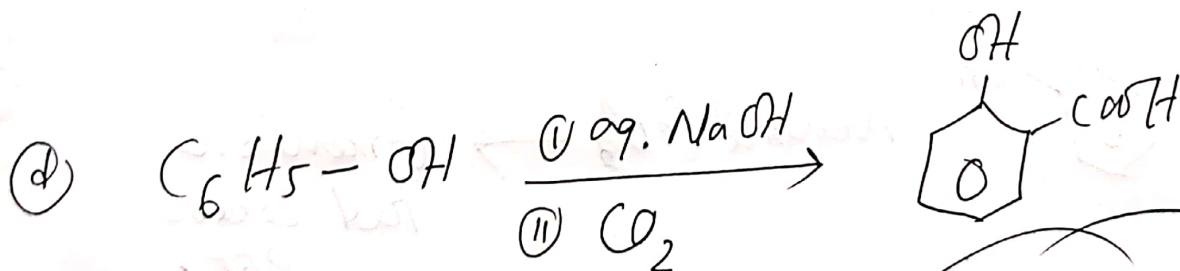
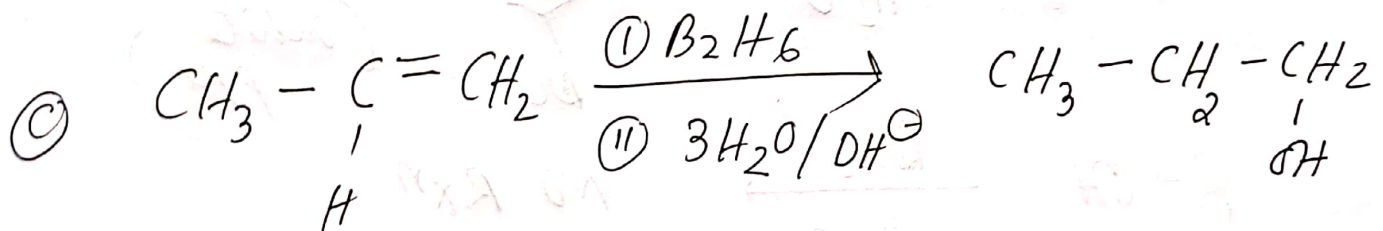
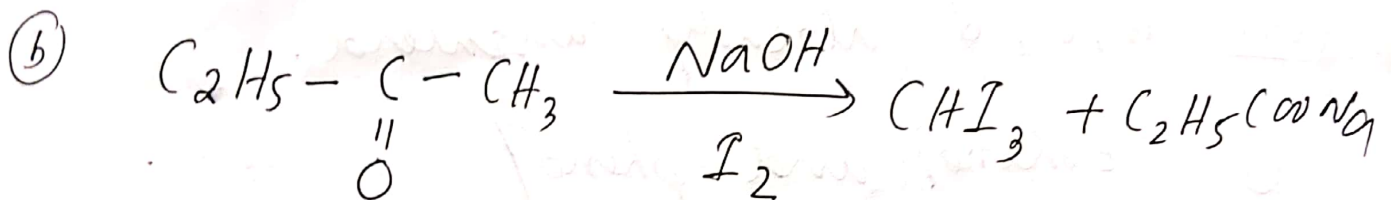
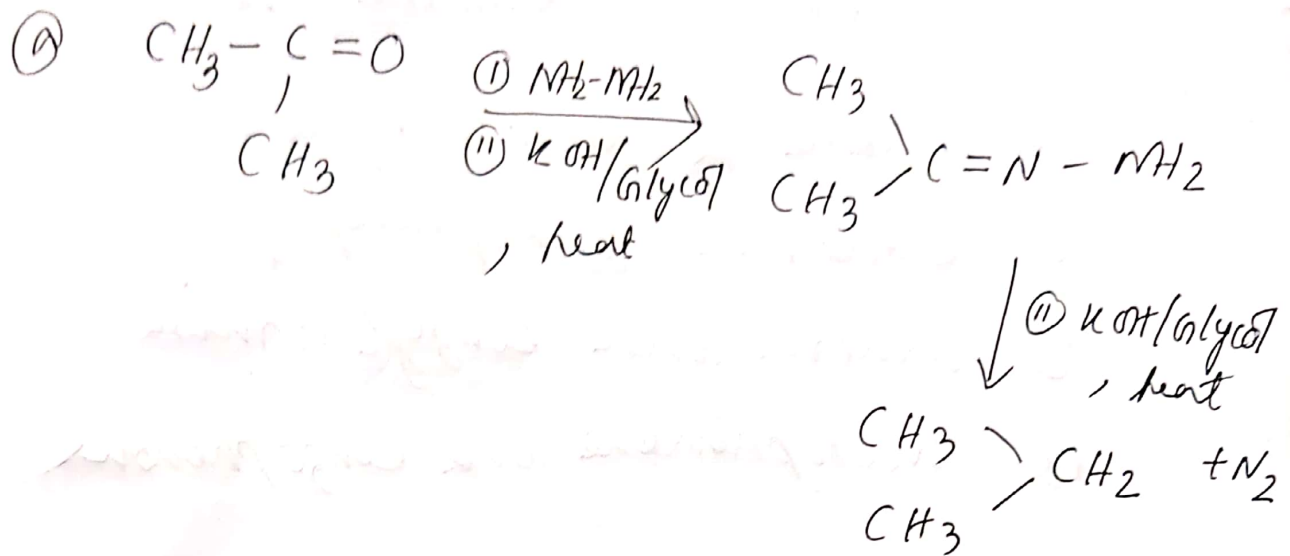
(d) 4-nitrotoluene to 2-bromobenzoic acid



(e) Ethyl magnesium chloride to propan-1-ol



Q 29



Pattem
Classy

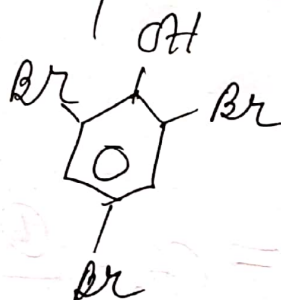
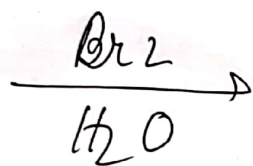
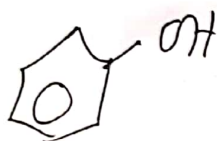
829
(11)

distinguish between the following

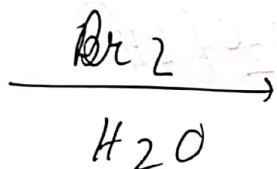
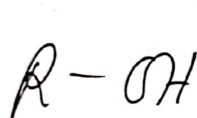
- (a) acetone & acetaldehyde
- (b) Ethanol and phenol
- (c) aniline and benzyl amine
- (d) acetophenone and benzophenone

Ans a, c, d already answered.

(b) Ethanol and phenol

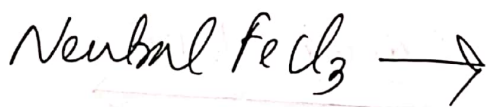
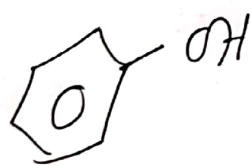


(white ppt)



NO Rxn

OR



Greenish
red colour
ppt.

aliphatic alcohol does not show it.

An organic compound contains 69.77% carbon, 11.63% hydrogen and rest oxygen. The molecular mass of the compound is 86. It does not reduce Tollen's reagent but forms an addition compound with sodium hydrogen sulphite and give positive iodoform test. On vigorous oxidation it gives ethanoic and propanoic acid. Write the possible structure of the compound.

Solution

SetP I: To determine the molecular formula of the compound.

Element	Percentage	Atomic mass	No. of moles	Simplest molar ratio
C	69.77	12	$\frac{69.77}{12} = 5.81$	$\frac{5.81}{1.16} = 5$
H	11.63	1	$\frac{11.63}{1} = 11.63$	$\frac{11.63}{1.16} = 10$
O	(100 - 69.77 - 11.63) = 18.60	16	$\frac{18.60}{16} = 1.16$	$\frac{1.16}{1.16} = 1$

Empirical formula of the given organic compound = $C_5H_{10}O$.

Molecular formula = $n \times$ (empirical formula)

$$\text{where, } n = \frac{\text{Molecular mass of the compound}}{\text{Empirical formula mass of the compound}}$$

Given, molecular mass = 86

$$\begin{aligned} \text{Empirical formula mass of } C_5H_{10}O &= (12 \times 5) + (10 \times 1) + (16) \\ &= 60 + 10 + 16 = 86 \end{aligned}$$

$$\therefore n = \frac{86}{86} = 1$$

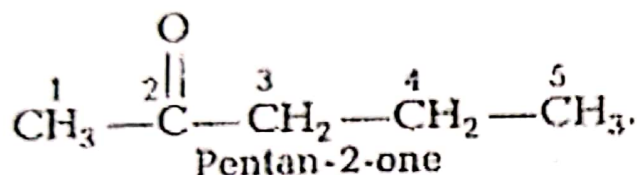
$$\text{Molecular formula} = 1 \times C_5H_{10}O = C_5H_{10}O$$

Step II: Predicting the structure of the compound.

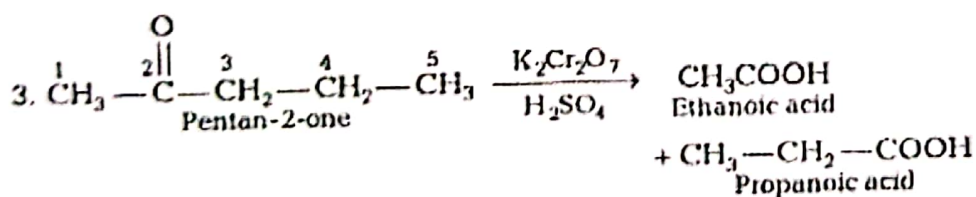
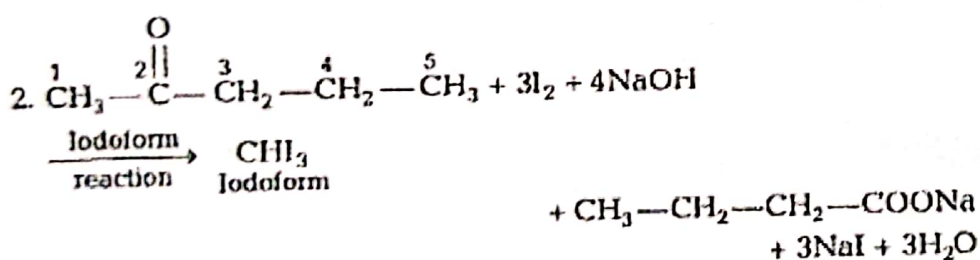
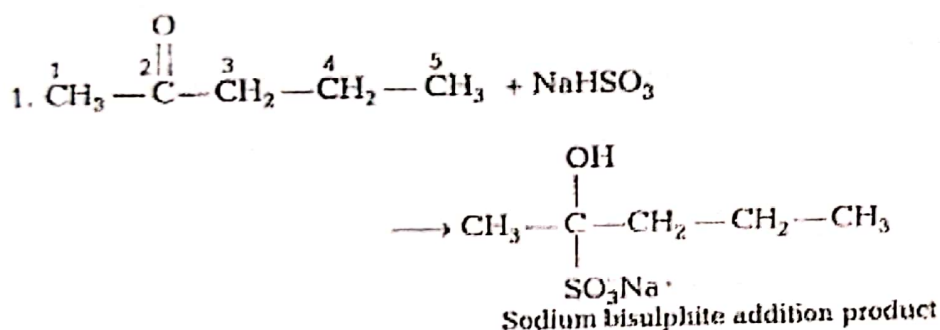
Criteria:

Padern
Classes

1. Formation of addition compound with NaHSO_3 depicts the presence of aldehyde or ketone.
2. The given compound does not reduce Tollen's reagent but gives positive iodoform test, so it is a methyl ketone.
3. On oxidation, the compound forms a mixture of ethanoic and propanoic acid, so it is



Step III: Chemical equations:



*Paldern
Classes
Nagpur
9864089106*