1. Chemisorption increases with increases of temperature since it required activation energy.
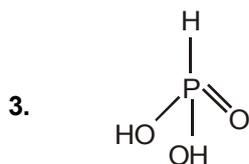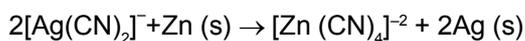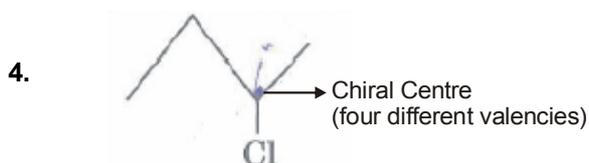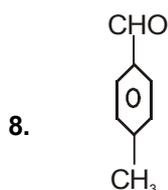
2. Reactivity of the Zn is greater than Ag therefore it displace Ag from its salt solution therefore we can get pure Ag.

$2[Ag(CN)_2]^- + Zn\ (s) \rightarrow [Zn\ (CN)_4]^{-2} + 2Ag\ (s)$

3.

basicity = 2

4.

Chiral Centre
(four different valencies)

5. Proteins

6. Diazotisation

7. Glucose($C_6H_{12}O_6$) + Fructose ($C_6H_{12}O_6$)

8.



9. $M = \dfrac{d \times a^3 \times N_A}{z}$

$M = \dfrac{2.8 \times \left(4 \times 10^{-8}\right)^3 \times 6.022 \times 10^{23}}{4}$

= 26.97 gm/mol.

10. **(i)** Metal excess defect due to anionic vacancies.
(ii) Schottky defect

"OR"

10. **(i) Tetrahedral void and octahedral void :** In HCP packing when we place the 2nd layer of spheres over the first layer, it can be done so only by placing the spheres on the voids/holes of the first layer. Around every sphere of the first layer, there are six voids. Thus the sphere which was touching already six spheres in one layer will also touch there more spheres in the layer above it.
The second layer contains two layers called voids , i.e., voids over the spheres of the first layer called TETRAHEDRAL VOID and the void over the void of the first layer called OCTAHEDRAL VOLD. The tetrahedral void is so called because this void is surrounded by four spheres touching each other and are directed towards the corners of a tetrahedron. It has a triangular shape.
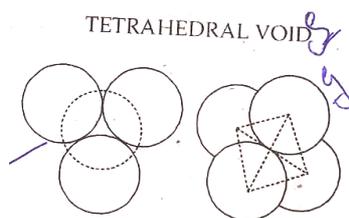
Similarly, the octahedral void is so called because this void is surrounded by six spheres touching each other and directed towards the corners of a actahedron It is a combination of two triangular voids, one of the first layer and the second of the second layer with the triangle vertex upwards and the other triangle vertex downwards.
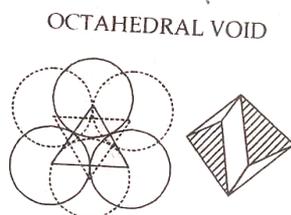
(ii) Crystal lattice it is the three dimensional arragment of lattice point.
Unit cell : It is smallest portion of crystal lattice which when repated bring the geometry of crystal.

11. **Kohlrausch law :** According to this law limiting molar conductivity of an electrolyte the sum of the individual contributions of the anion and cation of the electrolyte.
e.g. limiting molarconductivity of NaCl is -

$$\Lambda^{\circ}_{m(NaCl)} = \overset{\circ}{\lambda}_{Na^+} + \overset{\circ}{\lambda}_{Cl^-}$$

• **Conductivity :** Always decreases with decrease in concentration both, fer weak and strong electrolyte since the number of ions per unit volume that carry the current in a solution decreases on dilution.

12. (i) zero order
(ii) slope = – K

13. **Principle :** By the using of electrolytic refining we can obtained pure metal from crude metal in this method pure metal act as a cathode and crude metal act as a anode.

e.g. In the refining of Cu :

Pure Cu rod act as a cathode
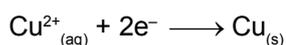
Crude Cu rod act as a anode
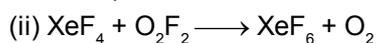
$CuSO_4$(aq) act as a electrolyte

reaction :

at anode :

$Cu_{(s)} \longrightarrow Cu^{+2}_{(aq)} + 2e^-$
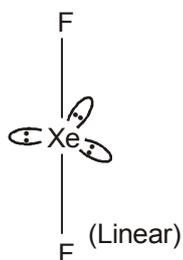
at cathode

$Cu^{2+}_{(aq)} + 2e^- \longrightarrow Cu_{(s)}$

14. (i) $P_4 + H_2O$: Reaction is not possible in ordinary conditions however in different specific condition gives different product.

(ii) $XeF_4 + O_2F_2 \longrightarrow XeF_6 + O_2$

15. (i) XeF_2

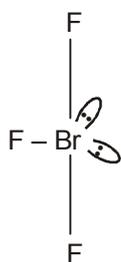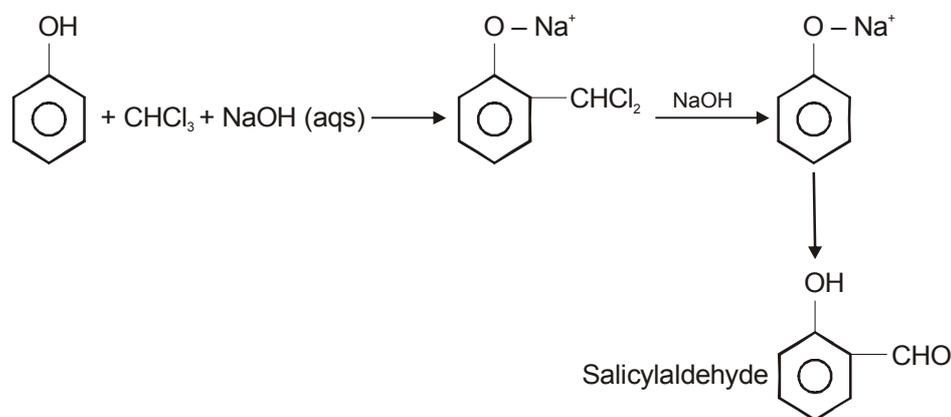$Xe \rightarrow sp^3d$ hybridised geometry is trigonal bypyramidal but due to the presence of 3 lp e^- on Xe atom structure is linear.

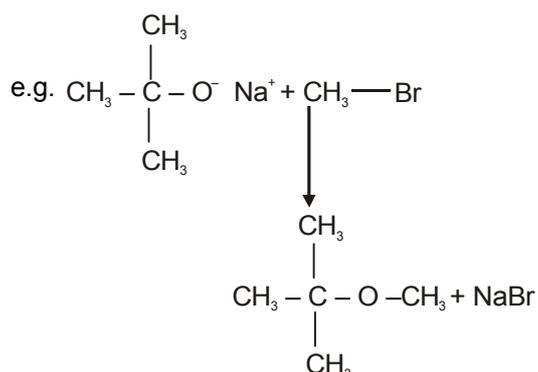(ii) $BrF_3 \rightarrow$ Br is sp^3d hybridised but presence of two lp structure is T-shape.

16. **(i) Reimer-Tiemann reaction :** When phenol react with $CHCl_3$ in presence of NaOH then –CHO group is introduced at – o and –p– position of benzene ring.
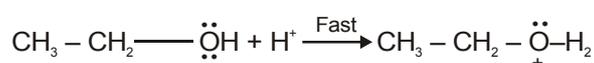
(ii) Williamson synthesis : When sodium alkoxide react with alkyl halide then its gives ether better result are obtained if R – x is primary
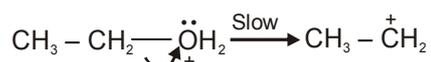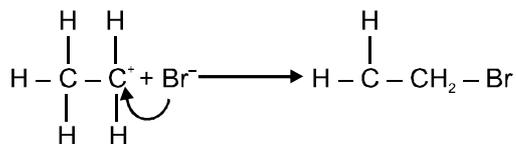
e.g.
$$CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - O^- \ Na^+ + CH_3 \!-\!\!-\! Br$$

$$CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - O - CH_3 + NaBr$$

17. $CH_3 - CH_2 - OH \xrightarrow{\ HBr\ } CH_3 - CH_2 - Br + H_2O$

Machanism :

(i) Protonation of alcohol →

$$CH_3 - CH_2 \!-\!\!-\! \overset{..}{\underset{..}{O}}H + H^+ \xrightarrow{Fast} CH_3 - CH_2 - \overset{..}{O} \!-\! H_2 \atop +$$

(ii) Formation of carbocation →

$$CH_3 - CH_2 \!-\!\!-\! \overset{..}{O}H_2 \xrightarrow{Slow} CH_3 - \overset{+}{C}H_2$$

(iii) Attack of nucleophile on carbocation :

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

18. **Bakelite**

Monomer → Phenol + formaldehyde

$C_6H_5OH + HCHO$
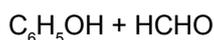
Neoprene

Monomer → Chloroprene

19. (a) $\Delta_r G^o = - nF\epsilon^o{}_{cell}$

$\Delta_r G^o = -2 \times 2.71 \times 96500$

$\Delta_r G^o = - 523030$ J/mol

$\Delta_r G^o = - 5230.30$ KJ/mole

(b) Fuel cell

20. Given that,

$SO_2 Cl_2 (g) \rightarrow SO_2 (g) + Cl_2 (g)$

At t = 0   0.4 atm   0 atm   0 atm

At time t (0.4 – x) atm   x atm   x atm

total pressure at time 't' ie', pt =

pt = pSO$_2$Cl$_2$ + pSO$_2$ + pCl$_2$

= (0.4 – x) + (x) + (x)

= (0.4 + x) atm

$\therefore$ $x = pt - 0.4$

$pSO_2Cl_2 = 0.4 - x$

$= 0.4 - (pt - 0.4)$

$= 0.8 - pt$

At $t = 100$ & , $pt = 0.7$ atm

$\therefore$ $pSO_2Cl_2 = 0.8 - 0.7$

$= 0.1$ atm

for 1st order reaction,

$$k = \frac{2.303}{t} \log_{10} \frac{p_1}{p_2}$$

$$= \frac{2.303}{100} \log_{10} \frac{0.4}{0.1}$$

$$= \frac{2.303}{100} \times 2 \; \log_{10} 2$$

$$= \frac{2.303}{100} \times 2 \times 0.3010$$

$$= 0.0139 \; S^{-1}$$

21.   **Emulsion :** These are liquid - liquid colloidal system dispersion of finially divided droplets in another liquid if a mixture of two immiscible or partially miscible liquids is shaken a coarse dispersion of one liquid in the other, is obtained which is called emulsion.

Types $\longrightarrow$ two types

(a) oil dispersed in water (o/w) e.g. milk

(b) water dispersed in oil (w/o) e.g. cod liver oil

22.   (i) $(CH_3)_3 P = 0$ exist since due to the prsence of d-orbital it can expand octet and become penta valent. $(CH_3)_3 N = 0$ not exist since d-orbital is absent in N therefore it can not expand octet.

(ii) Due to the smaller size of oxygen atom as compared to sulphur atom there is a repultion on incoming electron therefore energy is liberated in less amount.

(iii) H_3PO_2 is a stronger reducing agent than H_3PO_3 it is due to presence of more P – H bond and less oxidation state of phosphorus.
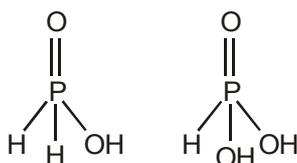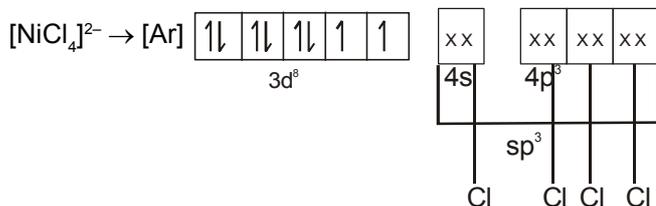
23.   (i) Teraamminedichloridochromium (III) chloride

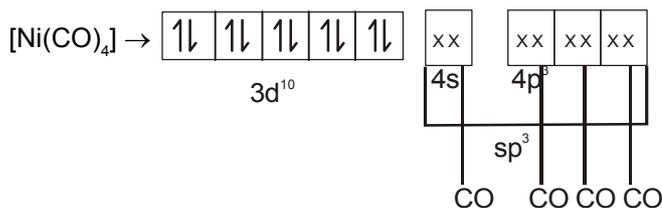(ii) $[Co(en)_3]^{3-}$ exhibited optical isomerism
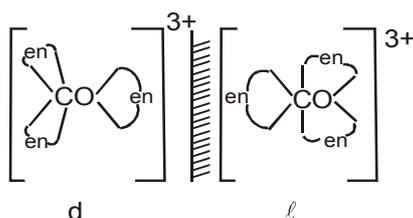
(iii) $[NiCl_4]^{2-}$

$Ni^{+2} \longrightarrow$ In this comes Ni is sp^3 hybridised in which there are two unpaired e^-

∵ it will be paramagnetic

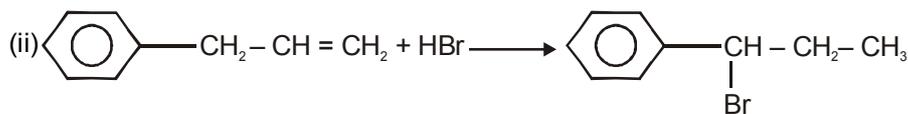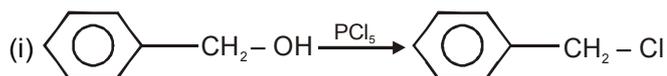$[NiCl_4]^{2-} \rightarrow$ [Ar] $\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}\boxed{\uparrow}\boxed{\uparrow}$ $\underset{4s}{\boxed{xx}}$ $\underset{4p^3}{\boxed{xx}\boxed{xx}\boxed{xx}}$
$3d^8$

sp^3

Cl   Cl Cl Cl

$[Ni(CO)_4] \rightarrow sp^3$ hybridised all e^- are paired
∵ it will be diamagnetic

$[Ni(CO)_4] \rightarrow$ $\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}$ $\underset{4s}{\boxed{xx}}$ $\underset{4p^3}{\boxed{xx}\boxed{xx}\boxed{xx}}$
$3d^{10}$

sp^3

CO   CO CO CO

24. (a)

(i) ⬡—$CH_2 - OH$ $\xrightarrow{PCl_5}$ ⬡—$CH_2 - Cl$

(ii) ⬡—$CH_2 - CH = CH_2$ + HBr $\longrightarrow$ ⬡—$\underset{\underset{Br}{|}}{CH} - CH_2 - CH_3$

(b)
(i) CH_3I

(ii) $CH_3 - Cl$

25. (i) Due to H-bonding boiling point of $R - NH_2$ higher than R_3N

$R - N\overset{\displaystyle H}{\underset{\displaystyle \underset{\delta^+}{H}}{\diagdown}}\cdots\cdots\overset{\displaystyle H}{\underset{\displaystyle \underset{H}{|}}{\underset{\delta^-}{N}} - R$
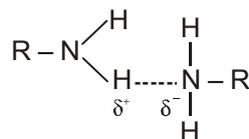
there is no H–bonding in R_3N ∴ H atom is absent with nitrogen.

(ii) Anline does not undergo friedal craft's reaction since. Catalyst of the friedal craft's reaction anhydrous $AlCl_3$ react with anline and form complex which gives deactivated effect on benzene ring for further E.S. reaction.

$\overset{\cdot\cdot}{NH_2}$—⬡ + $AlCl_3$ $\longrightarrow$ $\overset{+}{N}H_2AlCl_3^-$—⬡
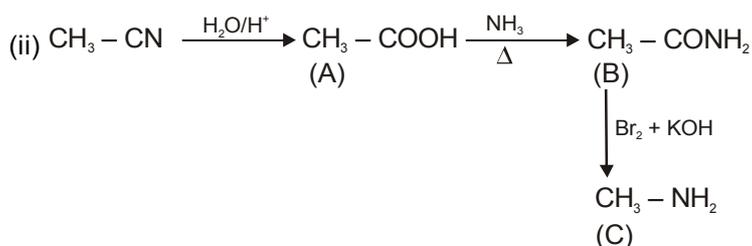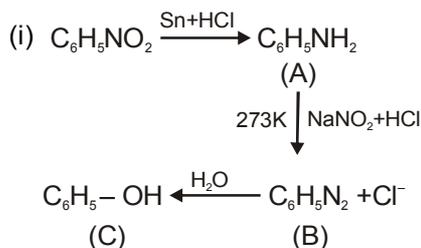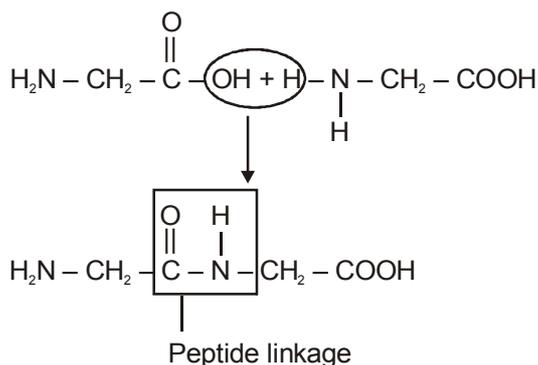(Anhydrous)   (deactivated)
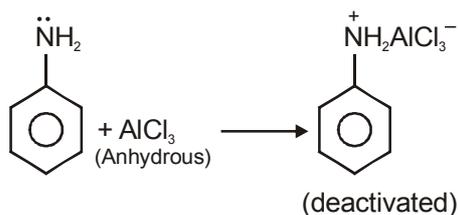
(iii) In aqs solution $(CH_3)_2$ NH form more H-bond with water.

OR

(i) $C_6H_5NO_2 \xrightarrow{\text{Sn+HCl}} C_6H_5NH_2$
         (A)

$273K \downarrow NaNO_2+HCl$

$C_6H_5-OH \xleftarrow{H_2O} C_6H_5N_2 +Cl^-$
   (C)   (B)

(ii) $CH_3-CN \xrightarrow{H_2O/H^+} CH_3-COOH \xrightarrow[\Delta]{NH_3} CH_3-CONH_2$
                              (A)   (B)

$\downarrow Br_2 + KOH$

CH_3-NH_2
   (C)
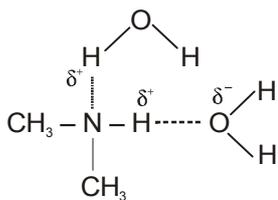
26.   **(i) Peptide linkage :** Bond formed by the reaction of two amino acids called peptide linkage.

Peptide linkage

(ii) Primary structure : It decide the sequence of amino acid in the structure of protein since any change in the sequence gives a new protein or there is a cause of disease.

(iii) Denaturation : When protein is subject to physical change like change in temperature or chemical change like change in pH the H bonds are disturbed due to this globules unfold and helix get uncoiled and protein loses its biological activity this is called denaturation of protein dwing denaturation 2° and 3° structures are disturbe but 1° structure remains intact.

27. (i) Dr. Satpal : He is benevolent person.
NHRC suggested to the government to provide medical care, financial assistance setting up of supper speciality hospitals for treatement and prevention of the deadly diseases in the affected villages all over India.
(ii) Morphine
(iii) Saccharin

28. (a)
(i) Molarity (M) : No. of solute moles present in one litre of solution.

$$M = \frac{no.\ of\ solute\ mole}{volume\ of\ solution\ in\ litre}$$

(ii) When 1 mol of solute dissolve in 1kg solvent then elevation in boiling point called molal elevation constant.

(b) Molar conc . of urea = $\dfrac{w_1}{m_1 \times v_1}$ = $\dfrac{158\,m}{60 \times 1\,Ltr.}$

molar conc. of glucose = $\dfrac{w_2}{m_1 \times v_2}$ = $\dfrac{w_2}{180 \times 1\,Ltr.}$

For isotonic solution

$$\frac{w_1}{m_1 v_1} = \frac{w_2}{m_2 v_2}$$

$$\frac{15}{60 \times 1} = \frac{w_2}{180 \times 1}$$

$$w_2 = 45\ gm.$$

mass of glucose present in one Ltr. of its solution is 45 gm.

<div align="center">OR</div>

(a) Ethanol and acetone shown positive deviation from Raoult's law since strong H bonding present within the C_2H_5OH and strong dipole-dipole force with in acetone.
Bur there is a weak force between C_2H_5OH and acetone.

(b) In 10% of glucose solution :
wt of glucose = 10 gm
wt. of water = 90 gm
total weight of solution = 100 gm.

Total volume of solution = $\dfrac{Total\ wt.\ of\ solution}{density}$ = $\dfrac{100}{1.2}$ = 83.3 ml

Moles of glucose = $\dfrac{wt.of\ glucose}{molar\ mass\ of\ glucose}$ = $\dfrac{10}{180} = \dfrac{1}{18}$ mol.

Molarity = $\dfrac{no.\ of\ mole\ of\ solute}{vol.\ of\ solution\ (in\ ml)} \times 1000$

= $\dfrac{\frac{1}{18}}{18 \times 83.3} \times 1000 = 0.66\,M$

Molality = $\dfrac{no.\ of\ moles\ of\ solute}{wt.\ of\ solvent\ in\ gm} \times 1000$

= $\dfrac{1 \times 1000}{18 \times 90}$ = 0.62 m

29. (a)

(i) $Cr_2O_7^{2-} + 2OH^- \longrightarrow 2CrO_4^{2-} + H_2O$

(ii) $MnO_4^{2-} + 4H^+ + 3e^- \longrightarrow MnO_2 + 2H_2O$
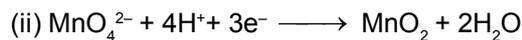
(b)

(i) Zn has full filled 3d orbital means $3d^{10}$ electronic configuration.

(ii)

      (A) due to variable valencies

      (B) vacant (n –1) d -orbitals

      (C) high charge density

(iii) Mn^{3+}/Mn^{2+} couple is much more positive since Mn^{2+} is stable due to the stable half filled (d^5) d-orbital.
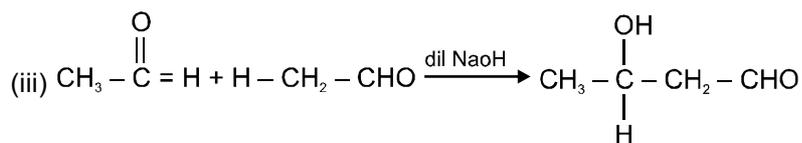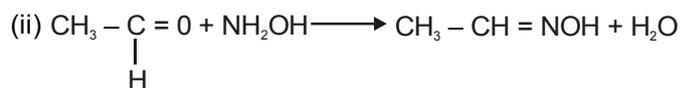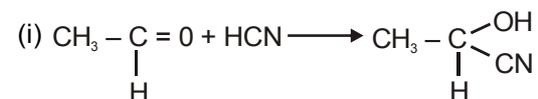
OR

(i) lanthanide is normal elements except Pm but all actinides are radioactive and artificial prepared. in actinides there is small energy difference between 5f 6d 7s orbital they can show more o.s up to +7 but lanthanides shows only +3, +2,+4 o.s. there is no existance of actinoid compound since they are un-stable.
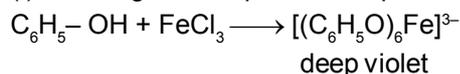
(ii) Ce (cerium) $\rightarrow$ + 4 o.s.

(iii) $MnO_4^- + 8H^+ + 5e^- \longrightarrow Mn^{+2} + 4H_2O$

(iv) Electronic configuration of Mn^{+3} - $[Ar]3d^4$ and Cr^{3+} $[Ar]3d^3$. Mn^{+3} is more paramagnetic because its contains more number of unpaired electrons.
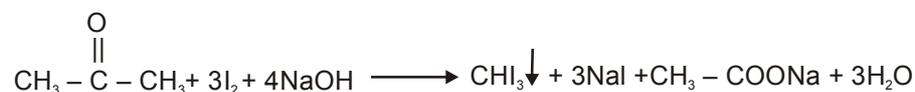
30. (a)

(i) $CH_3 - \underset{\underset{H}{|}}{C} = 0 + HCN \longrightarrow CH_3 - \underset{\underset{H}{|}}{C}\overset{OH}{\underset{CN}{<}}$

(ii) $CH_3 - \underset{\underset{H}{|}}{C} = 0 + NH_2OH \longrightarrow CH_3 - CH = NOH + H_2O$

(iii) $CH_3 - \overset{O}{\overset{||}{C}} = H + H - CH_2 - CHO \xrightarrow{\text{dil NaoH}} CH_3 - \underset{\underset{H}{|}}{\overset{\overset{OH}{|}}{C}} - CH_2 - CHO$

(b)

(i) Phenol gives deepviolet complex with $FeCl_3$ solution.

$C_6H_5- OH + FeCl_3 \longrightarrow [(C_6H_5O)_6Fe]^{3-}$

                   deep violet

$C_6H_5 - COOH \longrightarrow$ not react with $FeCl_3$

(ii) $CH_3 - \overset{O}{\overset{||}{C}} - CH_3 \longrightarrow$ gives haloform reaction

$CH_3 - \overset{O}{\overset{||}{C}} - CH_3 + 3I_2 + 4NaOH \longrightarrow CHI_3 \downarrow + 3NaI + CH_3 - COONa + 3H_2O$

OR

(a)

(i) due to –I effect of CH_2–Cl

Cl – CH_2 – COOH is a stronger acid than CH_3–COOH

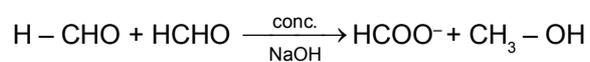(ii) In carboxylic acid due to resonance positive charge not comes at carbonyl carbon atom.

(b)

(i) Rosenmund reduction

$$CH_3 - \overset{\displaystyle O}{\overset{\displaystyle \|}{C}} - Cl + H_2 \longrightarrow CH_3 - CHO + HCl$$

(ii) Cannizarro reaction :

$$H - CHO + HCHO \xrightarrow[\text{NaOH}]{\text{conc.}} HCOO^- + CH_3 - OH$$
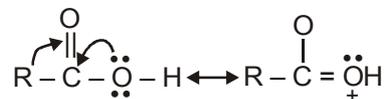
(c $CH_3 - CH_2 - CH_2 - CO - CH_3$ gives iodoferms test due to presence of methyl ketone part.