136) Answer : 2
Solution:

$$n = \frac{0.00224}{22.4} = 10^{-4} mole$$

$10^{-4}$ x Na molecules
18 mL of water means 18g $H_2O$

$$n = \frac{18}{18} = 1 mole$$

1 x Na molecules
$10^{-3}$ mol of water
$10^{-3}$ x Na molecules

$$n = \frac{0.18}{18} = 0.01 mole$$

0.01 x NA molecules

137) Answer : 4
Solution:
For first order
$t_{1/2}$ is independent from initial concentration
For second order

$$t_{1/2} = \frac{1}{k[A]_0}$$

depends on initial concentration $[A]_0$

138) Answer : 3
The following combination only give positive value of $E^0_{cell}$

$$\overset{+1}{HBr} \longrightarrow \overset{+5}{Bro_5^-} \quad oxidation\,(Anode)$$

$$\overset{+1}{HBro} \longrightarrow \overset{o}{Bro_2} \quad reduction\,(Athode)$$

$E^0_{cell}$ = SRP of cathode - SRP of Anode
= 1.595 - 1.5 = 0.095 V
$\therefore$ HBro undergoes disproportionation

139) Answer : 2
According to Fajans' Rules
Ionic character $\propto$ size of cation [$Be^{+2} < Ca^{+2} < Ba^{+2}$]
Ionic character increasing order is $BeH_2 < CaH_2 < BaH_2$

140) Answer : 3

$$MnO_4^{2-} \longrightarrow Mn^{+1} = [Ar]3d^1$$

Due to unpaired electron in d-orbital, $MnO_4^{2-}$ paramagnetic and showes d-d transition
$d^0$ and $d^{10}$ complex ions dont's show d-d transiton

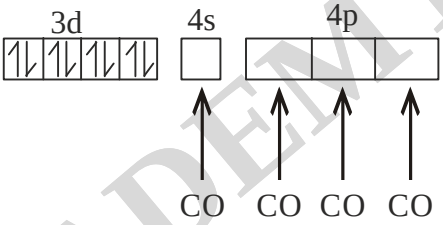
141) Answer : 4
$Fe(CO)_5$ is mononuclear carbonyl because it contain one metal itom.

142) Answer : 2

Magnetic moment $(\mu) = \sqrt{n(n+2)}$ where in is equal to no. of unpaired electrons

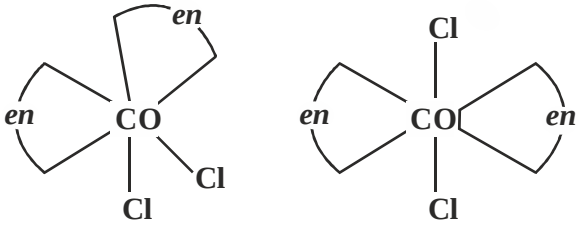
$$CO^{+3} = [Ar]3d^6 \;\; n = 4 \;\; \mu = \sqrt{24}$$
$$Cr^{+3} = [Ar]3d^3 \;\; n = 3 \;\; \mu = \sqrt{15}$$
$$Fe^{+3} = [Ar]3d^5 \;\; n = 5 \;\; \mu = \sqrt{35}$$
$$Ni^{+2} = [Ar]3d^8 \;\; n = 2 \;\; \mu = \sqrt{8}$$

143) Answer : 4
$Ni(CO)_4$ : Ni = $[Ar]3d^8 4s^2$




$Ni(CO)_4$ is a diamagnetic and $sp^3$ hybridisation so shape is tetrahedral

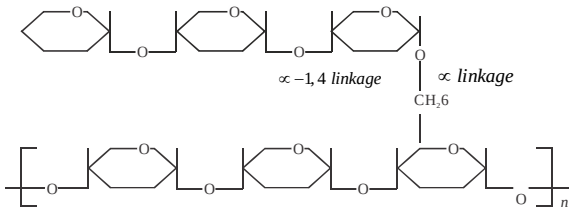
144) Answer : 2




Cis Trans

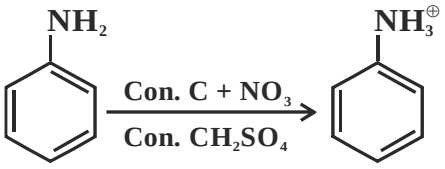
$[COCl_2(en)_2]$ Exist in cis and transforms

145) Answer : 2
Amylopectin have $1 \rightarrow 4 \propto -$ linkage and $1 \rightarrow 6 \propto -$ linkage




146) Answer : 3
Cross linked or network polymer containstrong covalent bonds between various linear polymer chains.

147) Answer : 3




**Anilinium ion**

Deactivating and m - directing group $-\overset{\oplus}{N}H_3$

148) Answer - 4

Basic strength of oxide $\propto \frac{1}{I.E}$

$\xrightarrow{BeO\ MgO\ CaO\ BaO}$ *Basic Strength*

$\longleftarrow$ *Acidic Strength*

149) Answer : 1

$HCOOH \xrightarrow{H_2SO_4} H_2O + CO$

| | | | |
|---|---|---|---|
| Initial | 0.05 mol | – | – |
| final | 0 | 0.05 mol | 0.05 mol |

$H_2C_2O_4 \xrightarrow{H_2SO_4} H_2O + CO + CO_2$

| | | | | |
|---|---|---|---|---|
| Initial | 0.05 mol | – | – | – |
| final | 0 | 0.05 mol | 0.05 mol | 0.05 mol |

KOH will absorb $CO_2$ and conc. $H_2SO_4$ will absorb obtain water, So final solution only

0.05 mol + 0.05 mol = 0.1 mol

CO CO CO

will obtain

0.1 mol of CO means = $0.1 \times 28 = 2.8$ g of CO.

150) Answer : 3

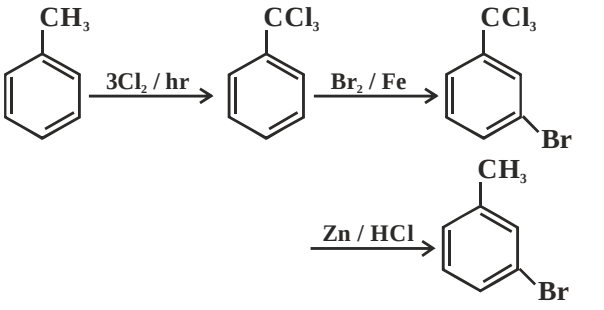
$CH_4 \xrightarrow[h\nu]{Br_2} CH_3 - Br \xrightarrow[ether]{Na} CH_3 - CH_3$.

(A) (less than 4 carbons)

151) Answer : 2

No and $NO_2$ are produced in automobile engine and when fossil is burnt. $N_2O$ occurs in naturally in environment. $N_2O_5$ doesn't easily due to it's higher oxidation state.

152) Answer : 2




**m - Bromotoluene**

153) Answer : 3

$C_2H_5OH \xrightarrow{Pcl_5} C_2H_5Cl$

(A) (C)

$\downarrow$ Na

$C_2H_5O^{\ominus}Na^{\oplus} + \frac{1}{2}H_2 \uparrow$

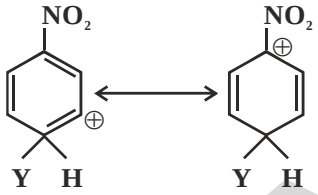
(B)

$C_2H_5O^{\ominus}Na^{\oplus} + C_2H_5Cl \rightarrow C_2H_5OC_2H_5$

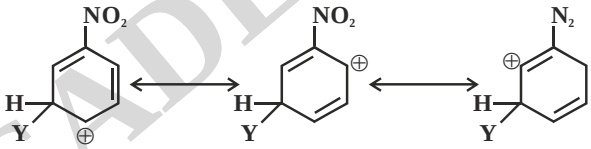
(B) (C) Diethylether.

154) Answer : 1

$NO_2$ is meta-directing group.




[ less stable due to electron with drawing group - $NO_2$ on $C^{\oplus}$ ]




[ More stable due to absence of electron with drawing group $NO_2$ on $C^{\oplus}$ ]

155) Answer - [2/4]

Based on EN

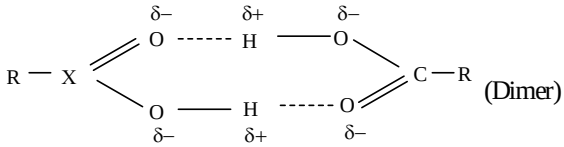
- $NH_2$ < - OR < - F
- $NR_2$ < - OR < - F

156) Answer - 4

$CH_2 = CH - C \equiv C - H$

$sp^2$ $sp^2$ sp sp

157) Answer - 3

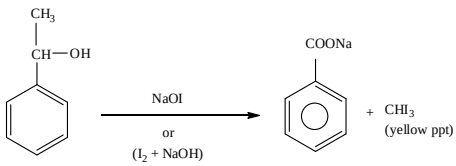



(Dimer)

Intermolecular H-Bonding.

158) Answer - 1

Solution - Haloform reaction




159) Answer - 3

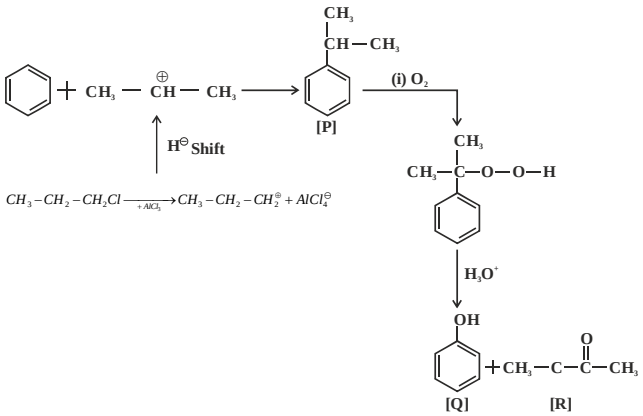
Solution - Reimer Tiemaan Reaction.

$CHCl_3 + NaOH \rightarrow :CCl_2$

dichlorocarbene

electrophile.

160) Answer - 3




161) Answer - 3

$NH_2 - CH_2 - COOH$ *f* $\overset{\oplus}{N}H_3 - CH_2 - COO^{\ominus}$

Glycine Zwitter ion

162) Answer - 3

B < Ga < Al < In < Tl

Ga is slightly smaller than A1 due to poor sheilding effect of detectrons. As a result Zeff increases.

163) Answer - 1

B - doesn't have vaccant d-orbitals, so it doesn't form $MF_6^{3-}$ ion.

164) Answer - 2

$H\overset{+5}{N}O_3$, $\overset{+2}{N}O$, $N_2^0$, $\overset{-3}{N}H_4Cl$

165) Answer - 1

Fluorine shows - "1" oxidation state.

Other halogen elements shows positive and negative oxidation states.

166) Answer - 4

$Sp^3d$ - Hybridisation, T-shape.

167) Answer - 1

Mg is below A1 in Ellingham diagram, therefore it can reduces $Al_2O_3$.

168) Answer - 4

$MnO_4^- \rightarrow Mn^{2+}$ $5e^-$ gain - ①

$C_2O_4^{2-} \rightarrow Co_2$ $2e^-$ lost - ②

(1) × 2 and (2) × 5 to balance electrons

$2MnO_4^- + 5C_2O_4^{2-} \rightarrow 2Mn^{2+} + 10CO_2$

on balance charge

$2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \rightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$.

169) Answer - 1

$\frac{1}{2}\times 2 + \frac{1}{2}y_2 \rightarrow xy$ $\qquad x_2 : y_2 : xy = x : 0.5x : x$

$\Delta H = -200 = \Sigma$ (BE Reactants) - $\Sigma$ (BE products)

$$-200 = \left[\frac{1}{2}\times(x) + \frac{1}{2}\times(0.5x)\right] - [1\times(x)]$$

$x = 800$ kJ/mol.

BE of $x_2 = x = 800$ kJ/mol

170) Answer - 3

Attraction forces $\alpha$ "a"

171) Answer - 2

Application of Lechatelier's principle.

$\uparrow p \times n \uparrow$, therefore equilibrium shift to less 'n' side [product formation] for exothermic reactions lower temperature favourable for forward reaction [product formation]

172) Answer - 4

$t_{1/2}$ of zero order = $\frac{[A]_0}{2k}$

$t_{1/2} \times [A]_0$

If $[A]_0$ is doubled. $t_{1/2}$ is doubled.

173) Answer - 2

Attracting forces × vander waal constant.

More attracting forces are responsible for easy liquifaction.

174) Answer - 3

$$\text{N final solution} = \frac{N_1V_1 - N_2V_2}{V_1 + V_2} = \frac{\frac{1}{5}\times 75 - \frac{1}{5}\times 25}{75+25} = 10^{-1}$$

pH = -log $[10^{-1}]$ = 1

175) Answer - 1

According to the Hardy Schulze rule:

176) Answer - 2

$$\text{solubility(s)} = \frac{2.42\times10^{-3}}{233}\ \text{mol/L}$$

$$sp = s^2 = \left(\frac{2.42\times10^{-3}}{233}\right)^2 = 1.08 \times 10^{-10}\ mol^2/L^2$$

177) Answer - 3

X = Nitrogen ($15^2\ 2s^2\ 2p^3$)

$Mg_3N_2$ or $Mg_3X_2$

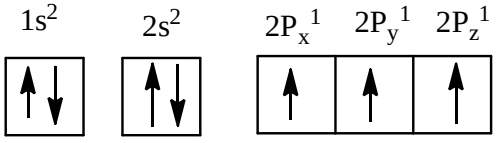
178) Answer - 1

BCC → $4r = \sqrt{3}a$, $a = \frac{4r}{\sqrt{3}}$ $\qquad$ FCC → $4r = \sqrt{2}a$, $a = \frac{4r}{\sqrt{2}}$

$$\frac{\rho_{BCC}}{\rho_{FCC}} = \frac{\frac{Z_{BCC}M}{NA\,a^3}}{\frac{Z_{FCC}M}{NA\,a^3}} = \frac{\frac{2M}{NA\left(\frac{4r}{\sqrt{3}}\right)^3}}{\frac{4M}{NA\left(\frac{4r}{\sqrt{2}}\right)^3}} = \frac{3}{4}\sqrt{\frac{3}{2}}$$

179) Answer - 1

The correct configuration




180) Answer - 4

Bond order of NO = 2.5

$CN^+$ = 2.0

CN = 2.5

$CN^-$ = 3.0