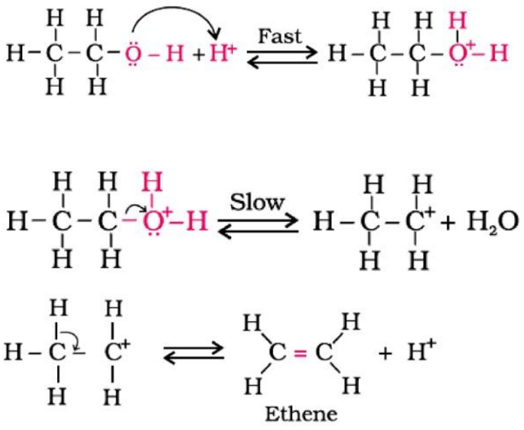
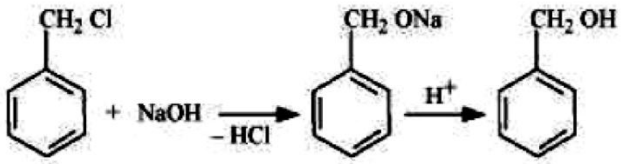
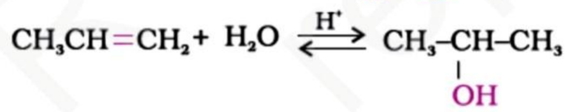
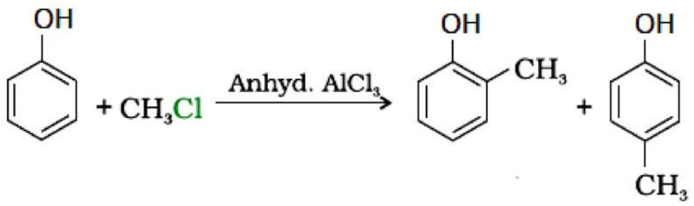
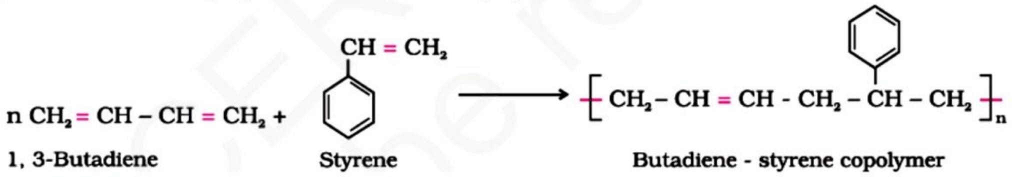
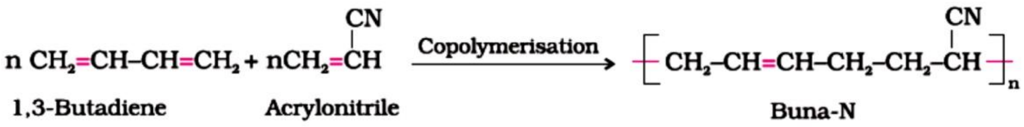
CHEMISTRY MARKING SCHEME
SET -56/1
Compt. July, 2015

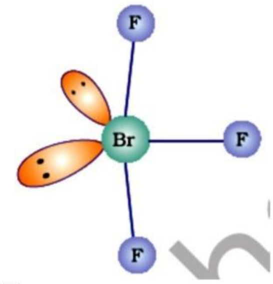
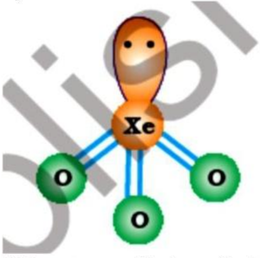
Ques.	Value points	Marks
1	Frenkel defect	1
2	Emulsions are liquid – liquid colloidal systems. For example – milk, cream (or any other one correct example)	½ + ½
3	Formation of stable complex by polydentate ligand.	1
4	Propanal	1
5	p-Nitroaniline < Aniline < p-Toluidine	1
6	i) $\text{Mole fraction of a component} = \dfrac{\text{Number of moles of the component}}{\text{Total number of moles of all the components}}$ ii) Molality (m) is defined as the number of moles of the solute per kilogram (kg) of the solvent. Or $\text{Molality (m)} = \dfrac{\text{Moles of solute}}{\text{Mass of solvent in kg}}$	1 1
7	Zero order : mol $L^{-1}s^{-1}$ Second order : L $mol^{-1}s^{-1}$	1 1
8	i) Due to high bond dissociation enthalpy of $N \equiv N$ ii) Due to low bond dissociation enthalpy of F_2 than Cl_2 and strong bond formation between N and F	1 1
9	Potassium permanganate is prepared by fusion of MnO_2 with an alkali metal hydroxide and an oxidising agent like KNO_3. This produces the dark green K_2MnO_4 which disproportionates in a neutral or acidic solution to give permanganate. $2MnO_2 + 4KOH + O_2 \rightarrow 2K_2MnO_4 + 2H_2O$ $3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$ Oxalate ion or oxalic acid is oxidised at 333 K: $5C_2O_4^{2-} + 2MnO_4^- + 16H^+ \longrightarrow 2Mn^{2+} + 8H_2O + 10CO_2$ OR	1 1
9	i) Iodine is liberated from potassium iodide : $10I^- + 2MnO_4^- + 16H^+ \longrightarrow 2Mn^{2+} + 8H_2O + 5I_2$ ii) Hydrogen sulphide is oxidised, sulphur being precipitated: $H_2S \longrightarrow 2H^+ + S^{2-}$ $5S^{2-} + 2MnO^-_4 + 16H^+ \longrightarrow 2Mn^{2+} + 8H_2O + 5S$	1 1

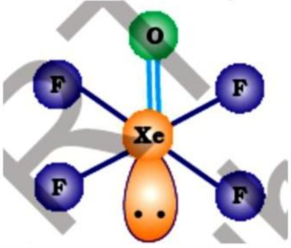
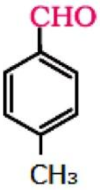
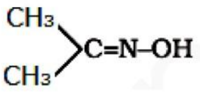
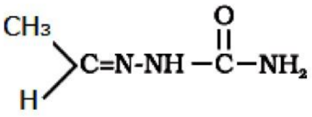
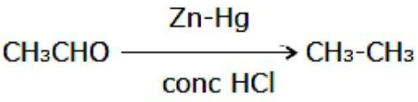
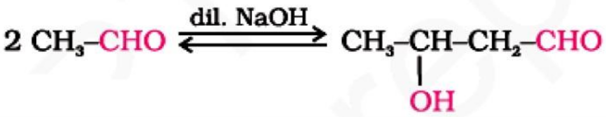
10		½ ½ 1
11	$r = \frac{\sqrt{2}a}{4}$ $r = \frac{1.414\ x\ 4.077\ x\ 10^{-8} cm}{4}$ r = 1.44 x 10^{-8} cm	1 1 1
12	$\pi_{\text{cane sugar}} = \pi_X$ Therefore, $c_{\text{cane sugar}} = c_X$ (where c is molar concentration) $\frac{W_{cane\ sugar}}{M_{cane\ sugar}} = \frac{W_X}{M_X}$ $\frac{5\ g}{342\ g\ mol^{-1}} = \frac{0.877}{M_X}$ $M_X = \frac{0.877\ x\ 342}{5}$ $gmol^{-1}$ $M_X =$ 59.9 or 60 $gmol^{-1}$	1 1 1
13	$k = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$ 60 s^{-1} = $\frac{2.303}{t} \log \frac{[R]_0}{\frac{[R]_0}{10}}$ $t = \frac{2.303}{60\ s^{-1}} \log 10$ $t = \frac{2.303}{60}$ s t= 0.0384 s	1 1 1
14	i) It is a process of removing the dissolved substance from a colloidal solution by means of diffusion through a semi - permeable membrane. ii) The movement of colloidal particles under an applied electric potential towards oppositely charged electrode is called electrophoresis.	1 1

<table>
<tr><td></td><td>iii)</td><td>Colloidal particles scatter light in all directions in space. This scattering of light illuminates the path of beam in the colloidal dispersion.</td><td>1</td></tr>
<tr><td>15</td><td>i)
ii)

iii)</td><td>It lowers the melting point of alumina / acts as a solvent.
<table><tr><td>Roasting</td><td>Calcination</td></tr><tr><td>Ore is heated in a regular supply of air</td><td>Heating in a limited supply or absence of air.</td></tr></table>(Or with equation)
It is a process of separation of different components of a mixture which are differently adsorbed on a suitable adsorbent.
OR</td><td>1
1
1</td></tr>
<tr><td>15</td><td></td><td>$3Fe_2O_3 + CO \rightarrow 2Fe_3O_4 + CO_2$
(Iron ore)
$Fe_3O_4 + CO \rightarrow 3FeO + CO_2$
$CaCO_3 \rightarrow CaO + CO_2$
(Limestone)
$CaO + SiO_2 \rightarrow \underset{(Slag)}{CaSiO_3}$
$FeO + CO \rightarrow Fe + CO_2$
$C + CO_2 \rightarrow 2CO$
Coke
$C + O_2 \rightarrow CO_2$
$FeO + C \rightarrow Fe + CO$
(any 6 correct equations)</td><td>6 x ½
= 3</td></tr>
<tr><td>16</td><td colspan="2">Disproportionation : The reaction in which an element undergoes self-oxidation and self-reduction simultaneously. For example –
$2Cu^+ (aq) \longrightarrow Cu^{2+} (aq) + Cu(s)$
(Or any other correct equation)</td><td>1 ½
1 ½</td></tr>
<tr><td>17</td><td>i)
ii)
iii)</td><td>Hexaamminecobalt(III) chloride
Tetrachlorido nickelate(II)
Potassium hexacyanoferrate(III)</td><td>1
1
1</td></tr>
<tr><td>18</td><td>i)
ii)
iii)</td><td>2-bromobutane
1, 3-dibromobenzene
3-choloropropene</td><td>1
1
1</td></tr>
<tr><td>19</td><td>i)
ii)</td><td>
$CH_3CH_2MgCl \xrightarrow[H_2O]{HCHO} CH_3\text{-}CH_2\text{-}CH_2\text{-}OH$</td><td>1
1</td></tr>
</table>

	 $CH_3CH{=}CH_2 + H_2O \overset{H^+}{\rightleftharpoons} CH_3\text{-}CH(OH)\text{-}CH_3$	1
20	i) $CH_3\text{-}CH_2OH \xrightarrow{PCl_5} CH_3CH_2Cl$ ii)  iii) $CH_3Cl + CH_3CH_2\text{-}ONa \longrightarrow CH_3CH_2\text{-}O\text{-}CH_3$	1 1 1
21	i) Peptide linkage – in proteins, ∝-amino acids are connected to each other by **peptide bond** or **peptide linkage (-CONH- bond).** ii) Primary structure - each polypeptide in a protein molecule having amino acids which are linked with each other in a specific sequence. iii) Denaturation - When a protein is subjected to physical change like change in temperature or chemical change like change in pH, protein loses its biological activity.	1 1 1
22	Copolymerisation is a polymerisation reaction in which a mixture of more than one monomeric species is allowed to polymerise and form a copolymer.   (or any other correct example)	1 1 1
23	i) Aspartame, Saccharin (any one) ii) No iii) Social concern, empathy, concern, social awareness (any 2)	1 1 2
24	$E^0cell = E^0_{Sn2+/Sn} - E^0_{Zn2+/Zn}$ $= -0.14V - (-0.76V)$ $= 0.62V$ $\Delta_rG^0 = -n F E^0_{cell}$ $= -2 \times 96500 \text{ C mol}^{-1} \times 0.62 \text{ V}$ $= -119660 \text{ J mol}^{-1}$	1 1 1 1

	$E_{cell} = E^0_{cell} - \frac{0.059}{n} \log \frac{[Zn^{2+}]}{[Sn^{2+}]}$ $E_{cell} = 0.62 - \frac{0.059}{2} \log \frac{[Zn^{2+}]}{[Sn^{2+}]}$ OR	1
24	a) The conductivity of a solution at any given concentration is the conductance of one unit volume of solution kept between two platinum electrodes with unit area of cross section and at a distance of unit length. Molar conductivity of a solution at a given concentration is the conductance of the volume V of solution containing one mole of electrolyte kept between two electrodes with area of cross section A and distance of unit length. Molar conductivity increases with decrease in concentration. b)$E^0cell = E^0_C - E^0_A$ $= 0.80V – 0.77V$ $= 0.03V$ $\Delta_rG^0 = -n F E^0_{cell}$ $= - 1 x 96500 C mol^{-1} x 0.03 V$ $= - 2895 J mol^{-1}$ Log $K_c = \frac{n E^o_{cell}}{0.059}$ Log $K_c = \frac{1 x 0.03}{0.059}$ Log $K_c = 0.508$	½ ½ 1 ½ ½ 1 ½ ½
25	a) Due to relatively stable half – filled p-orbitals of group 15 elements b) i) $CaF_2 + H2SO_4 \rightarrow CaSO_4 + 2HF$ ii) $SO_2(g) + Cl_2(g) \rightarrow SO_2Cl_2(l)$ iii) $2NH_4Cl + Ca(OH)_2 \rightarrow 2NH_3 + 2H_2O + CaCl_2$ OR	2 1 1 1
25	a) i)  ii)  b) i)Due to small size of nitrogen, the lone pair of electron on nitrogen is localized/ easily	1 1 1

	available for donation. ii)Because they need only one electron to attain stable/noble gas configuration. iii) 	1 1
26	a) i)  ii) $(CH_3)_2C{=}CHCOCH_3$ b) i)Add $NaHCO_3$, benzoic acid will give brisk effervescence of CO_2 whereas ethylbenzoate will not. ii)Add NaOH and I_2, acetophonone forms yellow ppt of iodoform on heating whereas benzaldehyde will not. iii)Add neutral $FeCl_3$, phenol gives violet colouration whereas benzoic acid does not. (or any other correct test) OR	1 1 1 1 1
26	a) i)  ii)  b) i)  $CH_3CHO \xrightarrow[\text{conc HCl}]{\text{Zn-Hg}} CH_3\text{-}CH_3$ ii)  $2\,CH_3\text{–}CHO \underset{}{\overset{\text{dil. NaOH}}{\rightleftharpoons}} \underset{\displaystyle OH}{CH_3\text{–}CH}\text{–}CH_2\text{–}CHO$	1 1 1 1

	iii) $CH_3CHO \xrightarrow{LiAlH_4} CH_3CH_2OH$	1