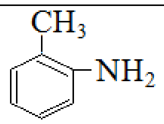
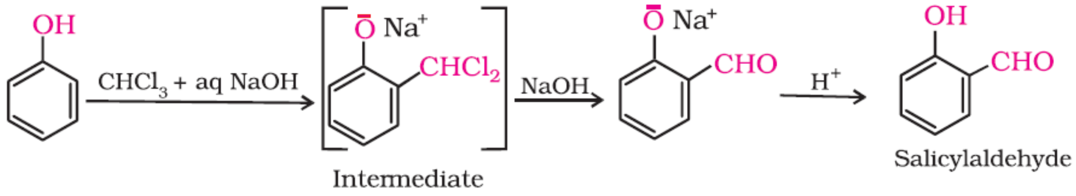
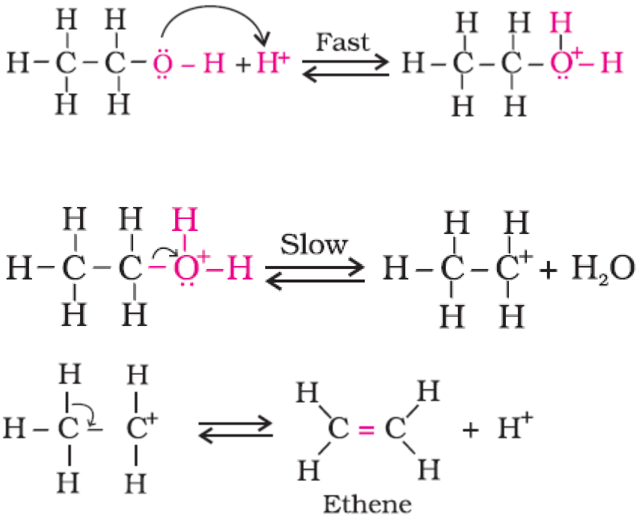
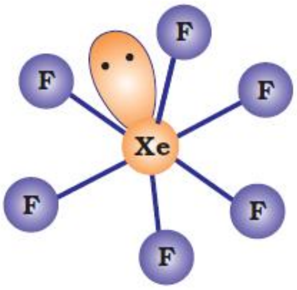
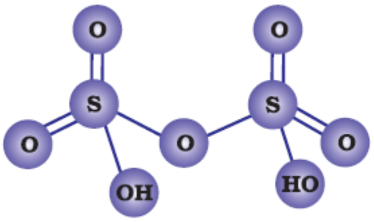
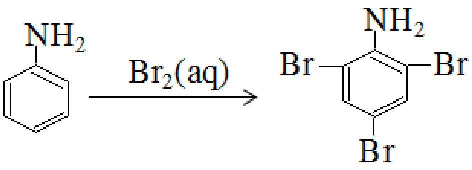
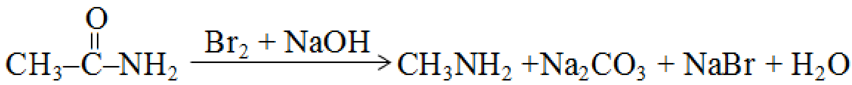
CHEMISTRY MARKING SCHEME
OUTSIDE DELHI - 2013
SET - 56/2

1		1
2	CCl_2F_2 / Freon	1
3	Chemisorption	1
4	Due to H- bonding.	1
5	2- Bromo-4-chloropentane.	1
6.	Electrolytic Refining	
7.	Peptide linkage	1
8.	Dacron / Glyptal / Nylon-66 / Bakelite / Melamine formaldehyde resin / Urea formaldehyde resin (any one)	1
9.	(i) Due to creation of F- center / Anionic vacancies filled by free electrons (ii) PQ	1+1
10	(a) Reimer-Tiemann reaction  (b) Williamson synthesis  $R{-}X + R'{-}\ddot{\underset{\cdot\cdot}{O}}\,Na \longrightarrow R{-}\ddot{\underset{\cdot\cdot}{O}}{-}R' + Na\,X$	1+1
11	**Thermoplastics**. These polymers are easily softened on heating, moulded and then hardened on cooling. **Examples:** polythene, polypropylene, polystyrene, polyvinyl chloride, teflon, polyvinyl acetate,	½+½

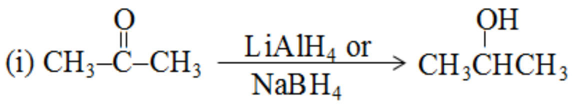
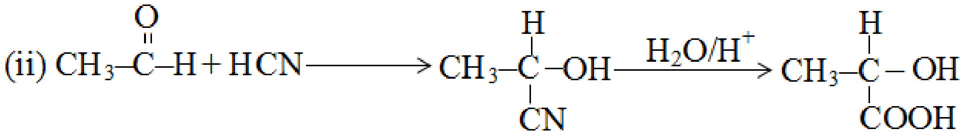
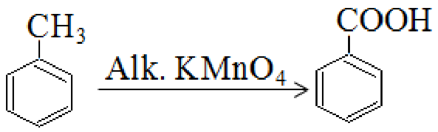
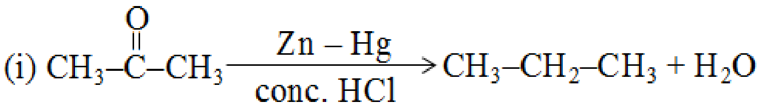
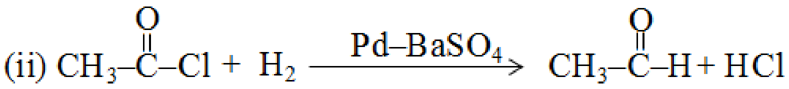
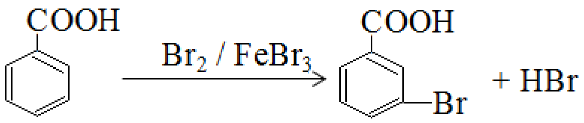
11	etc. (any one) **Thermosetting polymers** These polymers on heating become infusible and form an insoluble hard mass thus, cannot be remoulded. **Examples**: Bakelite, urea-formaldelyde resins, etc. OR The polymers which can be degraded by the micro organism **Example:** PHBV (or any other correct one example)	½+½ 1 1
12	 Fast Slow Ethene	½ ½ 1
13	The interhalogen compounds can be prepared by the direct combination or by the action of halogen on lower interhalogen compounds. General composition XX□n (where n = 1, 3, 5, 7 &X□ is more electronegative)	1 1

14	(i)  (ii) 	1+1
15	For f.c.c unit cell $r = \frac{a}{2\sqrt{2}}$ $a = 2r \times \sqrt{2}$ $= 2 \times 125$ pm $\times 1.414$ $= 353.5$ pm	½ 1 ½
16	$\Delta G^0 = -nFE^0_{cell}$ $= -2 \times 96500$ C mol^{-1} $\times 1.1$ V $= -212300$ J mol^{-1} or -212.3 kJ mol^{-1}	½ ½ 1
17	(a) order $= 2 + ½ = 5/2$ (b) $t_{½} = \frac{0.693}{k}$ $= \frac{0.693\ s}{5.5 \times 10^{-14}}$ $= 1.26 \times 10^{13}$ s	½ ½ 1
18	**(i) Zone refining:** the impurities are more soluble in the melt than in the solid state of the metal. **(ii) Vapour phase refining:** In this method, the metal is converted into its volatile compound	

	and is then decomposed to give pure metal.	1+1
19	**(i) Associated Colloids:** There are some substances which at low concentrations behave as normal strong electrolytes, but at higher concentrations exhibit colloidal behaviour due to the formation of aggregates. The aggregated particles thus formed are called **micelles**. These are also known as **associated colloids**. **Example:** Soap solution **(ii) Lyophilic Sol:** In which there is affinity between disperse phase & disperssion medium. (or solvent loving) **Example:** Starch sol, Gum sol, Gelatin sol (any one) **(iii) Adsorption:** The accumulation of molecular species at the surface rather than in the bulk of a solid or liquid is termed adsorption. **Example:** Adsorption of poisonous gases on charcoal	½+½ ½+½ ½+½
20	**Given cell notation is incorrect** **Correct cell formula is** $Cu^{2+}(10^{-1} M) \vert Cu_{(s)} \Vert Ag^{+}(10^{-3} M) \vert Ag_{(s)}$ Given $E^{o}cell = 0{\cdot}46V$ $E_{cell} = E^{o}_{cell} - \frac{0{\cdot}0591}{n} \log \frac{[Cu^{2+}]}{[Ag^{+}]^{2}}$ $E_{cell} = 0{\cdot}46 - \frac{0{\cdot}0591}{2} \log \frac{[0.1]}{[10^{-3}]^{2}}$ $E_{cell} = 0{\cdot}46 - 0{\cdot}02955 \log \frac{[0.1]}{[10^{-6}]}$ $E_{cell} = 0{\cdot}46 - 0{\cdot}02955 \log 10^{5}$ $E_{cell} = 0{\cdot}46 - 0{\cdot}02955 \times 5$	1 1

	$E_{cell} = 0{\cdot}46 - 0{\cdot}146$ $E_{cell} = 0{\cdot}314\,V$ or $E_{cell} = E^0_{cell} - \frac{0.059}{2} \log \frac{[Ag^+]^2}{[Cu^{2+}]}$ $= 0.46\,V - \frac{0.059}{2} \log \frac{[10^{-3}]^2}{[0.1]}$ $= 0.46\,V - \frac{0.059}{2} \log \frac{[10^{-3}]^2}{[0.1]}$ $= 0.46\,V + 0.0295 \text{ x } 5$ $= 0.6075\,V$	1 1 1 1
21	(i) Ms. Anuradha has shown generosity / caring / helping / kindness attitude towards poor (ii) Vit. B_{12}. (iii) Vitamin B / C	1x3=3
22	(i) $C_6H_5N_2Cl \xrightarrow{H_3PO_2 + H_2O} C_6H_6 + H_3PO_3 + HCl + N_2$. (ii)  (iii) $CH_3\text{–}\overset{\overset{\displaystyle O}{\Vert}}{C}\text{–}NH_2 \xrightarrow{Br_2 + NaOH} CH_3NH_2 + Na_2CO_3 + NaBr + H_2O$	1x3=3
23	Given if rate at 293K is R thus at 313K rate becomes 4R $\text{Log}\,\frac{k_2}{k_1} = \frac{E_a}{2{\cdot}303R}\left[\frac{T_2 - T_1}{T_1 \text{ x } T_2}\right]$	1

	$\text{Log}\ \frac{4R}{R} = \frac{E_a}{2{\cdot}303 \times 8{\cdot}314}\left[\frac{313-293}{293 \times 313}\right]$ $\text{Log}\ 4 = \frac{E_a}{19{\cdot}1471}\left[\frac{20}{91709}\right]$ $0{\cdot}6021 = \frac{E_a}{19{\cdot}1471}\left[\frac{20}{91709}\right]$ $\frac{0{\cdot}6021 \times 19{\cdot}1471 \times 91709}{20} = Ea$ $Ea = 52863{\cdot}2177J$ or $52{\cdot}863\ KJ$	1 1
24	(i) tetrachloridonickelate(II) ion (ii) sp^3 (iii) Tetrahedral. OR	1x3=3
24	The energy involved in splitting the degenerate d-orbitals into two sets t_{2g} and e_g is called crystal field splitting energy. (i) $t_{2g}^4 e_g^o$ (ii) $t_{2g}^3 e_g^1$	1 1+1
25	(i) I, is better leaving group / C-I bond is weeker then C- Br bond. (ii) Because it is a racemic mixture / equal & opposite rotation of two enantiomers cancel each other. (iii) Due to resonance in halobenzene / sp^2 hybridization of C - atom in halobenzene & sp^3 hybridization of C - atom in CH_3X	1x3=3
26	(i) Antacid / Antihistamine (ii) Synthetic detergents (iii) 0·2 % Phenol	1x3=3

27	(i) Being small in size pπ - pπ bonding / multiple bond is possible in oxygen & not in sulphur. (ii) It decomposes to give nascent oxygen. (iii) As Bi - H bond is weakest.	1x3=3
28	(a)  $(i)\ CH_3-\overset{\overset{O}{\|}}{C}-CH_3 \xrightarrow[NaBH_4]{LiAlH_4\ or} CH_3\overset{\overset{OH}{\|}}{C}HCH_3$  $(ii)\ CH_3-\overset{\overset{O}{\|}}{C}-H + HCN \longrightarrow CH_3-\underset{\underset{CN}{\|}}{\overset{\overset{H}{\|}}{C}}-OH \xrightarrow{H_2O/H^+} CH_3-\underset{\underset{COOH}{\|}}{\overset{\overset{H}{\|}}{C}}-OH$ (iii) 	1x3=3
	(b) (i) Add I_2 & NaOH in both the solutions pentan-2-one gives yellow coloured precipitate, but pentan-3-one does not. (ii) Add I_2 & NaOH in both the solutions ethanal gives yellow coloured precipitate, but propanal does not. (or any other correct suitable test)	1+1
	OR	
28	(a)  $(i)\ CH_3-\overset{\overset{O}{\|}}{C}-CH_3 \xrightarrow[conc.\ HCl]{Zn-Hg} CH_3-CH_2-CH_3 + H_2O$  $(ii)\ CH_3-\overset{\overset{O}{\|}}{C}-Cl + H_2 \xrightarrow{Pd-BaSO_4} CH_3-\overset{\overset{O}{\|}}{C}-H + HCl$ (iii) 	1x3=3

	(b) (i) $F-CH_2-COOH$ (ii) $CH_3\,COOH$	1+1
29	(a) Partial vapour pressure of a liquid component is directly propertional to its mole fraction in its solution.	1
	The partial pressure of the volatile component or gas is directly proportional to its mole fraction in solution. Only the proportionality constant K_H differs from P^o_A. Thus, Raoult's law becomes a special case of Henry's law in which K_H becomes equal to P^o_A.	1
	(b) Given $W_B = 1{\cdot}00g$; $W_A = 50g$; $K_f = 5{\cdot}12\ K\ kg/mol^{-1}$; $\Delta T_f = 0{\cdot}40\ K$ $\Delta T_f = K_f \dfrac{W_B \times 1000}{M_B \times W_A \text{(in grams)}}$	1
	$M_B = K_f \dfrac{W_B \times 1000}{\Delta T_f \times W_A}$	1
	$M_B = \dfrac{5{\cdot}12 \times 1 \times 1000}{0{\cdot}40 \times 50}$ $= 256g\ mol^{-1}$	1
	Or	
29	(a) **(i) Ideal Solution:** Those solutions which follows Raoult's law under all conditions of temperature and pressure. **(ii) Azeotrope:** A liquid mixture which distills at constant temperature without undergoing any change in composition is called Azeotrope. **(iii) Osmotic Pressure:** The minimum excess pressure that has to be applied on the solution side to prevent the entry of the solvent into the solution through the semi - permeable membrane is called **osmotic pressure**.	1x3=3
	(b) Given Molecular mass of Glucose = 180, % by wt = 10	

	$m = \frac{1000 \times wt\%}{(100 - wt\%) \times mol.\ wt.\ of\ solute}$ or $m = \frac{w \times 1000}{M \times W}$ $m = \frac{1000 \times 10}{(100-10) \times 180}$ $m = \frac{10000}{90 \times 180}$ $m = 0\cdot617\,m$	½+ ½ 1
30	(a) (i) Mn^{3+} ($3d^4$) good electron acceptor as resulting species is more stable ($3d^5$) (ii) The $E^o(M^{2+}/M)$ values are not regular which can be explained from the irregular variation of ionisation enthalpies ($\Delta_i H_1 + \Delta_i H_2$), sublimation enthalpies and hydration enthalpies. (iii) Due to multiple bond formation ability of oxygen with Mn in Mn_2O_7. (b) (i) $2CrO_4^{2-} + 2H^+ \longrightarrow Cr_2O_7^{2-} + H_2O$ (ii) $2KMnO_4 \xrightarrow{Heat} K_2MnO_4 + MnO_2 + O_2$. OR	1x3=3 1+1
30	(a) Because of incomplete filling of d-orbitals	1x3=3

(i) Mn

(ii) Scandium (Sc)

(b) There is a steady decrease in the size of atoms/ions with increase in atomic number in lanthanoid. 1+1

Misch metal

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