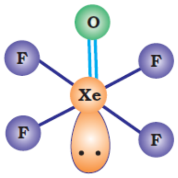
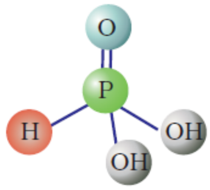
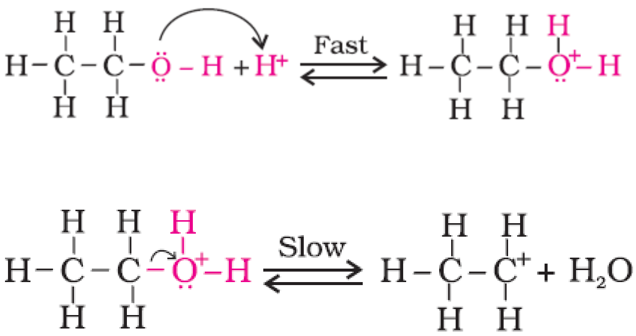
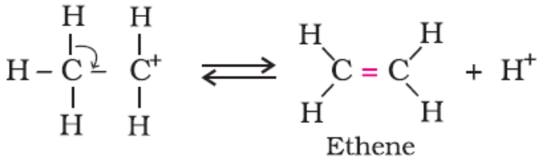
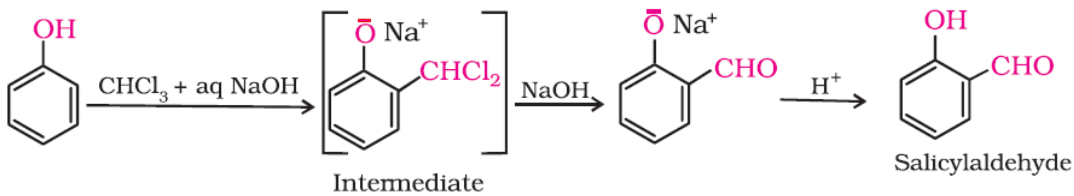
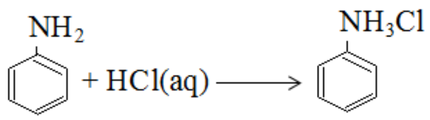
CHEMISTRY MARKING SCHEME
OUTSIDE DELHI -2013
SET -56/1

Qn	Answers	Marks
1	Chemisorption	1
2	Electrolytic Refining	1
3	Phosgene gas ($COCl_2$), Cholorpicrin (or tear gas) (CCl_3NO_2), Mustard gas ($ClCH_2CH_2SCH_2CH_2Cl$) (any two names or formulae)	½+½
4	3-Chloro-2,2-dimethylbutane / 2-Chloro-3,3-dimethylbutane	1
5	$CH_3CH_2CH_3 < CH_3CHO < CH_3CH_2OH$	1
6.	$CH_3CH_2–N(H)–CH_3$	1
7.	Glucose & Fructose	1
8.	Homopolymer	1
9.	(i) In Schottky defect some ions are missing (or due to vacancies) from their normal lattice sites due to which density decreases. (ii) This is due to availability of unpaired or odd electron provided by P	1 1
10	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 ½ 1
11	$\Delta G^o = -nFE^o_{cell}$ $= -2 \times 96500\ C\ mol^{-1} \times 1.1\ V$ $= -212300\ J\ mol^{-1}$ or $-212.3\ kJ\ mol^{-1}$	½ ½ 1

12	(a) order = 2 + ½ = 5/2 (b) $t_{1/2} = \frac{0.693}{k}$ $= \frac{0.693\ s}{5.5 \times 10^{14}}$ $= 1.26 \times 10^{13}$ s	½ ½ 1
13	(a) Froth Floatation Method (b) Wrought iron is the pure form of iron & Steel is an alloy of iron. or any other suitable difference.	1+1
14	(a)  (b) 	1+1
15	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
16		½ ½

		1
17	(a) Reimer-Tiemann reaction  (b) Williamson synthesis $R–X + R'–\ddot{O}\,Na \longrightarrow R–\ddot{O}–R' + Na\,X$	1+1
18	**Thermoplastics**. These polymers are easily softened on heating, moulded and then hardened on cooling. **Examples:** polythene, polypropylene, polystyrene, polyvinyl chloride, teflon, polyvinyl acetate, 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. (any one)	½+ ½ ½+ ½
	OR	
18	The polymers which can be degraded by the micro organism **Example:** PHBV (or any other correct one example)	1 1
19	Given if rate at 293K is R thus at 313K rate becomes 4R $\text{Log}\,\frac{k_2}{k_1} = \frac{E_a}{2.303R}\left[\frac{T_2 - T_1}{T_1 \times T_2}\right]$ $\text{Log}\,\frac{4R}{R} = \frac{E_a}{2.303 \times 8.314}\left[\frac{313 - 293}{293 \times 313}\right]$	1

	$\text{Log } 4 = \frac{E_a}{19 \cdot 1471}\left[\frac{20}{91709}\right]$ $0 \cdot 6021 = \frac{E_a}{19 \cdot 1471}\left[\frac{20}{91709}\right]$ $\frac{0 \cdot 6021 \times 19 \cdot 1471 \times 91709}{20} = Ea$ $Ea = 52863 \cdot 2177 J$ or $52 \cdot 863 KJ$	1 1
20	(a) **Multi molecular colloids** are the aggregate of large number of atoms or smaller molecules held together by van der waal forces **Example:** Any metal sol, sulphur sol. (any one) (b) **Lyophobic sol:** In which there is no affinity between disperse phase & disperssion medium (or solvent hating) **Example:** Any metal sol, As_2S_3 sol, $Fe(OH)_3$ sol. (any one) **(c) Emulsion:** A colliodal system in which disperesed phase & dispersion medium both are liquids **Example:** Milk, Cod liver oil, Hair cream, vainishing cream, butter, cold cream (any one)	½ ½ ½ ½ ½ ½
21	(i) Because 'N' can't extend its covalency beyond 4 whereas 'P' can, due to the presence of d-orbital. (ii) Because 'Pb' is in +4 oxidation state in $PbCl_4$ and has high charge/ size ratio than Pb^{2+} (iii) Due to very high bond dissociation enthalpy of $N\equiv N$	1x3=3
22	(i) tetrachloridonickelate(II) ion (ii) sp^3 (iii) Tetrahedral. OR	1x3=3

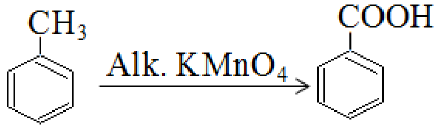
22	The energy involved in splitting the degenerate d-orbitals into two sets t_{2g} and e_g is called crystal field splitting energy. (i) $t_{2g}^4 e_g^o$ (ii) $t_{2g}^3 e_g^1$	1 1+1
23	(i) I, is better leaving group / C-I bond is weeker then C-Br bond. (ii) Because it is a racemic mixture / equal & opposite 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
24	(i) $CH_3CH_2NH_2 + CHCl_3 + alc\ 3KOH \longrightarrow CH_3CH_2NC + 3KCl + 3H_2O$ (ii) $C_6H_5N_2^+Cl^- \xrightarrow{H_2O\ ;\ Room\ Temperature} C_6H_5OH + N_2 + HCl$ (iii) 	1x3=3
25	(i) Antacid / Antihistamine (ii) Synthetic detergents (iii) 0·2 % Phenol	1x3=3

26	**Given cell notation is incorrect**	
	Correct cell formula is	
	$Cu^{2+}\ (10^{-1}\ M)\ \vert Cu_{(s)}\ \vert\vert\ Ag^{+}\ (10^{-3}\ M)\ \vert\ Ag_{(s)}$	
	Given $E^{o}cell = 0{\cdot}46\ V$	
	$E_{cell} = E^{o}_{cell} - \frac{0{\cdot}0591}{n} \log \frac{[Cu^{2+}]}{[Ag^{+}]^{2}}$	1
	$E_{cell} = 0{\cdot}46 - \frac{0{\cdot}0591}{2} \log \frac{[0.1]}{[10^{-3}]^{2}}$	1
	$E_{cell} = 0{\cdot}46 - 0{\cdot}02955 \log \frac{[0.1]}{[10^{-6}]}$	
	$E_{cell} = 0{\cdot}46 - 0{\cdot}02955 \log 10^{5}$	
	$E_{cell} = 0{\cdot}46 - 0{\cdot}02955 \times 5$	
	$E_{cell} = 0{\cdot}46 - 0{\cdot}146$	
	$E_{cell} = 0{\cdot}314\ V$	1
	or	
	$E_{cell} = E^{0}_{cell} - \frac{0.059}{2} \log \frac{[Ag^{+}]^{2}}{[Cu^{2+}]}$	1
	$= 0.46\ V - \frac{0.059}{2} \log \frac{[10^{-3}]^{2}}{[0.1]}$	1
	$= 0.46\ V - \frac{0.059}{2} \log \frac{[10^{-3}]^{2}}{[0.1]}$	
	$= 0.46\ V + 0.0295 \times 5$	
	$= 0.6075\ V$	1

27	(i) Ms. Anuradha has shown generosity / caring / helping / kindness attitude towards poor (ii) Vit. B_{12}. (iii) Vitamin B / C	1x3=3
28	(a) Partial vapour pressure of a liquid component is directly proportional to its mole fraction in its solution. 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. (b) Given $W_B = 1{\cdot}00g$; $W_A = 50g$; $K_f = 5{\cdot}12\,K\,kg/mol^{-1}$; $\Delta T_f = 0{\cdot}40\,K$ $\Delta T_f = K_f \frac{W_B \,X\, 1000}{M_B \,X\, W_A (\text{in grams})}$ $M_B = K_f \frac{W_B \,X\, 1000}{\Delta T_f \,X\, W_A}$ $M_B = \frac{5{\cdot}12 \times 1 \times 1000}{0{\cdot}40 \times 50}$ $= 256 g\ mol^{-1}$	1 1 1 1 1
	Or	
28	(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**. (b) Given Molecular mass of Glucose = 180, % by wt = 10 $m = \frac{1000 \times wt\,\%}{(100 - wt\,\%) \times \text{mol. wt. of solute}}$ or $m = \frac{w \times 1000}{M \times W}$	1x3=3 ½+½

	$m = \frac{1000 \times 10}{(100-10) \times 180}$ $m = \frac{10000}{90 \times 180}$ $m = 0.617\,m$	1
29 29	(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 (a) Because of incomplete filling of d-orbitals (i) Mn (ii) Scandium (Sc) (b) There is a steady decrease in the size of atoms/ions with increase in atomic number in lanthanoid. Misch metal	1x3=3 1+1 1x3=3 1+1
30	(a) (i) $CH_3-\overset{\overset{O}{\parallel}}{C}-CH_3 \xrightarrow[NaBH_4]{LiAlH_4 \text{ or}} CH_3\overset{\overset{OH}{\vert}}{C}HCH_3$	

(ii) $CH_3-\overset{O}{\overset{||}{C}}-H + HCN \longrightarrow CH_3-\underset{CN}{\overset{H}{C}}-OH \xrightarrow{H_2O/H^+} CH_3-\underset{COOH}{\overset{H}{C}}-OH$

(iii) 

(b) (i) Add I_2 & NaOH in both the solutions pentan-2-one gives yellow coloured precipitate, but pentan-3-one does not. 1x3=3

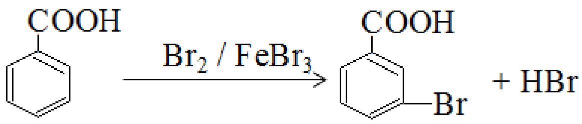
(ii) Add I_2 & NaOH in both the solutions ethanal gives yellow coloured precipitate, but propanal does not. (or any other correct suitable test)

OR 1+1

30 (a)

(i) $CH_3-\overset{O}{\overset{||}{C}}-CH_3 \xrightarrow[\text{conc. HCl}]{Zn-Hg} CH_3-CH_2-CH_3 + H_2O$

(ii) $CH_3-\overset{O}{\overset{||}{C}}-Cl + H_2 \xrightarrow{Pd-BaSO_4} CH_3-\overset{O}{\overset{||}{C}}-H + HCl$

(iii) 

(b) (i) $F-CH_2-COOH$

(ii) CH_3COOH 1x3=3

Sh. S.K.Munjal — Dr (Mrs.) Sangeeta Bhatia 1+1
Prof. R.D.Shukla — Mr. K.M. Abdul Raheem
Dr. K.N.Uppadhya — Mr.D. A Mishra
Mr. Rakesh Dhawan — Mr.Deshbir Singh
Ms. Neeru Sofat — Mr. Akhileshwar Mishra
Mr. Virendra Singh