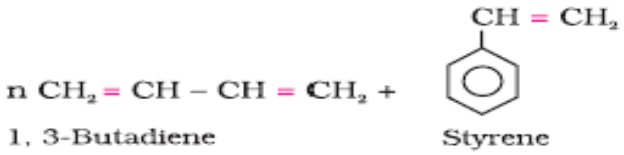
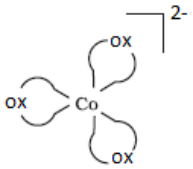
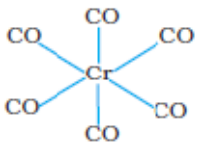
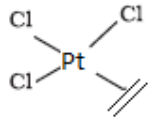
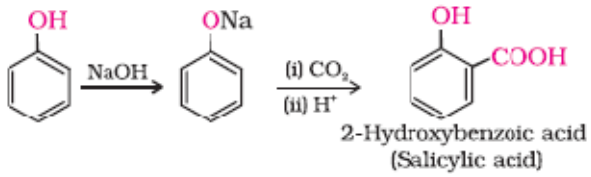
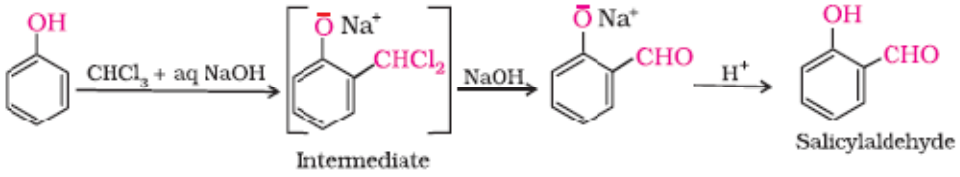
CHEMISTRY MARKING SCHEME
OUTSIDE DELHI -2014
SET -56/1

Qn	Answers	Marks
1	Because of differential arrangement of particles in different directions	1
2	Emulsion – Liquid-liquid colloidal system Eg : milk, vanishing cream (or any other)	½ ½
3	Collectors enhance the non-wettability of mineral particles Pine oil, fatty acids, xanthates (any one)	½ ½
4	Because of low bond dissociation enthalpy and high electron gain enthalpy with negative sign of fluorine	½+½
5	2-propanol / propan-2-ol	1
6	On heating with NaOH +I_2, propan – 2-one forms yellow ppt of iodoform whereas pentan-3-one does not.	1
7	Homopolymer is fomed by repeating the same monomer unit whereas copolymer is formed by repeating two different monomers.	1
8	The linkage between two amino acids i.e. – CO-NH – is known as peptide linkage.	1
9	Anode: $Zn(s) \longrightarrow Zn^{2+} + 2e^-$ Cathode: $MnO_2 + NH_4^+ + e^- \longrightarrow MnO(OH) + NH_3$ Due to the presence of ions in the over all reaction, its voltage decreases with time.	½+½ 1
10	Rate of reaction increases with temperature. Rate of a reaction nearly doubles with 10^0 rise in temperature / graphical representation.	1 1
11	a) Ag with dil NaCN forms a complex i.e. $[Ag(CN)_2]^-$ which dissolves and is subsequently reduced by Zn to give sliver b) Electrolytic refining – in this method impure metal is made to act as an anode and the pure metal as cathode in a suitable electrolytic bath containing soluble salt of the same matel. Pure metal is deposited at cathode.	1 1

	OR	
11	a) It is based on the principle that the impurities are more soluble in the melt than in the solid state of the metal. b) In this, the metal is converted into its volatile compound which is then decomposed to give pure metal.	1 1
12	a) $5SO_2 + 2MnO_4^- + 2H_2O \rightarrow 5SO_4^{2-} + 2Mn^{2+} + 4H^+$ b) $2F_2(g) + 2H_2O(l) \rightarrow 4H^+(aq) + 4F^-(aq) + O_2$	1 1
13	a) Because it undergoes disproportionation reaction / $2Cu^+(aq) \rightarrow Cu(s) + Cu^{2+}(aq)$ b) Because of the ability of oxygen to form multiple bonds	1 1
14	a) 3-bromoprop–1–ene / 3-bromopropene b) Tris-(trichloromethyl)chloromethane	1 1
15	An ambidient nucleophile is that which possesses two nucleophilic centres For example CN^- (it forms cyanides and isocyanides) (or any other correct example)	1 1
16	a) $C_6H_5NH_2 < C_6H_5N(CH_3)_2 < CH_3NH_2 < (C_2H_5)_2NH$ b) $C_6H_5NH_2 > C_6H_5NHCH_3 > C_2H_5NH_2 > (C_2H_5)_2NH$	1 1
17	a) On adding benzene diazonium chloride, aniline forms azo dye whereas ethylamine does not. b) On adding benzene diazonium chloride, aniline forms azo dye whereas benzylamine does not.	1 1
18	a) 1,3 - Butadiene and styrene /  b) Hexamethylenediamine and adipic acid / $n\,HOOC(CH_2)_4COOH + n\,H_2N(CH_2)_6NH_2$	½+ ½ ½+ ½

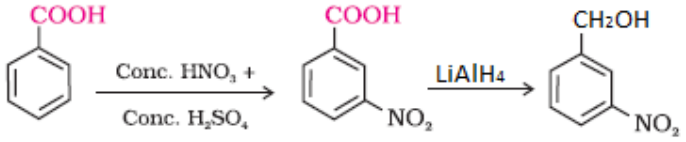
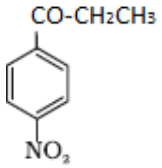
19	$N_A = \frac{Z \times M}{a^3 \times d}$ $= \frac{2 \times 56g\ mol^{-1}}{(2.866x10^{-8})\ ^3cm\ x\ 7.874g\ cm^{-3}}$ $= 6.04x10^{23}\ mol^{-1}$ Or $286.65x10^{-10}cm = 2.866x10^{-8}cm$ Mass of Fe atom = $(2.866x10^{-8}cm)^3x7.874g\ cm^{-3}x1/2 = 23.54x10^{-24}x3.94\ g = 92.59\ x\ 10^{-24}\ g$ $N_A = 56g\ mol^{-1}/92.59x10^{-24}g$ $= 6.04x10^{23}\ mol^{-1}$	1 1 1 1½ 1½
20	R=200Ω Cell constant = $\frac{l}{a} = 1cm^{-1}$ Conductivity, k = $\frac{l}{R}\ x\ \frac{l}{a} = \frac{1}{200\Omega}\ x\ cm^{-1}$ $= 5.0x\ 10^{-3}\ \Omega^{-1}\ cm^{-1}$ $\wedge = \frac{K(Scm^{-1})\ x\ (1000\ cm^3L-1)}{C(mol^{-1}\ )}$ $= \frac{(5.0x10^{-3}Scm^{-1})\ (1000\ cm^3\ L^{-1})}{0.01\ mol\ L^{-1}}$ $= 500\ Scm^2\ mol^{-1}$	1 1 1
21	$Log\ \frac{k_2}{k_1} = \frac{Ea}{2.303R}\ [\frac{1}{T_1} - \frac{1}{T_2}]$ $Log\ \frac{2.39x10^{-7}L/(mol.s)}{2.15x10^{-8}L/(mol.s)} = \frac{Ea}{2.303x8.314x10^{-3}\ kJ/Kmol}\ [\frac{1}{650K} - \frac{1}{700K}]$ $Log\ 11.12 = \frac{Ea}{2.303x8.314x10^{-3}\ kJ}\ x\ \frac{700-650}{4.5x10^5}$ $1.046 = \frac{Ea}{2.303x8.314x10^{-3}\ kJ}\ x\ \frac{700-650}{4.5x10^5}$ $Ea = \frac{1.046x2.303x8.314x10^2x4.5}{50} = 180.16kJ$	1 1 1

22	Effect of temperature- physisorption decreases with increase of temperature and chemisorption first increases then decreases with increase of temperature Surface area – greater the surface area greater is the physisorption and chemisorption In physisorption, no appreciable activation energy is needed. In chemisorption, sometimes high activation energy is needed.	1 1 1
	OR	
22	(i) Production of high vacuum: The remaining traces of air can be adsorbed by charcoal from a vessel evacuated by a vacuum pump to give a very high vacuum. (ii) Heterogeneous catalysis: Adsorption of reactants on the solid surface of the catalysts increases the rate of reaction. (iii) Froth floatation process: A low grade sulphide ore is concentrated by separating it from silica and other earthy matter by this method using pine oil and frothing agent	1 1 1
23	a) Due to incomplete filling of d-orbitals b) Because energy released in the formation of bond between Co(III) and ligand is more than the energy required for the conversion of Co(II) to Co(III). c) Due to comparable energies of 5f, 6d, 7s orbitals	1 1 1
24	a) Trioxalatocobaltate(III)  b) Hexacarbonylchromium(0)  	½+½ ½+½

	c) Trichloridoetheneplatinum(IV)  	½+½
25	i)  2-Hydroxybenzoic acid (Salicylic acid)	1
	ii)  Intermediate Salicylaldehyde	1
	iii)  	1
26	The amino acids, which can be synthesised in the body, are known as nonessential amino acids. for example : glycine, alanine (or any other) The amino acids which cannot be synthesised in the body and must be obtained through diet, are known as essential amino acids for example :valine, leucine (or any other)	1+½ 1+½
27	a) Drugs usually interact with biomolecules such as carbohydrates, lipids, proteins and nucleic acids. These are called target molecules or drug targets which possess some common structural features, that may have same mechanism of action on target. b) Food preservatives prevent spoilage of food due to microbial growth. For example table salt / sugar / vegetable oils / sodium benzoate (any one) c) Non-ionic detergents do not contain any ion in their constitution. One such detergent is formed when stearic acid reacts with polyethyleneglycol.	1 1 1

28	a) $i = \frac{\text{Normal molar mass}}{\text{Abnormal molar mass}}$ $= \frac{\text{Observed colligative property}}{\text{Calculated colligative property}}$ $i = \frac{\text{Total number of moles of particles after association/dissociation}}{\text{Number of moles of particles before association/dissociation}}$ (any one) i) For dissociation, i > 1 ii) For association, i < 1 b) Reaction $Na_2CO_3 + 2HCl \longrightarrow 2NaCl + H_2O + CO_2$ 106g $NaHCO_3 + HCl \longrightarrow NaCl + H_2O + CO_2$ 84g A mixture of 1 mol Na_2CO_3 and 1 mol $NaHCO_3$ reacts with 3 mol of HCl 1 mol Na_2CO_3 and 1 mol $NaHCO_3$ = 106+84 = 190 g 190g mixture reacts completely with 3 mol HCl Mol of HCl that will reacts with 1g = $\frac{3\ mol}{190g}$ x 1g = $\frac{3}{190}$ mol = 3x$\frac{3x10^3}{190}$ m mol We know that Morality x volume (ml) = no. of m mole 0.1 x $V_{HCl} = \frac{3x10^3}{190}$ $V_{HCl} = \frac{3x10^3}{190x0.1}$ = 157.9 mL	1 ½ ½ 1½ ½ 1
	OR	
28	a) i) It is defined as the number of moles of the component to the total number of moles of all the components / Mole fraction of a component = $\frac{\text{Number of moles of the component}}{\text{Total number of moles of all the components}}$ ii) It is defined as the number of moles of the solute per kg of the solvent. /	1 1

	$\text{Molality (m)} = \frac{\text{Moles of solute}}{\text{Mass of solvent in kg}}$	1
	iii) According to Raoult's law, the partial pressure of a volatile component or gas is directly proportional to its mole fraction in solution	
	b) Molar mass $Na_2SO_4.10H_2O$ =2x23+32+16x4+20x1+16x10 =322g mol^{-1} No. of mol $Na_2SO_4.10H_2O$ dissolved in 01.10kg of water $= \frac{6.00\ g}{322 g mol^{-1}} = \frac{6}{322}$ mol Since there is complete dissociation, van't Hoff factor, i= 3 $\Delta T_f = i K_f m = i \times K_f \times n_b/w_A$ $= \frac{3x\ (1.86K\ kg\ mol) x \frac{6}{322} mol}{0.10\ kg} = 1.04$ K Freezing point 273.15K -1.04K = 272.1K	½ 1 1/2
29	a) i) XeF_2 - linear	½+½
	ii) XeO_3 - pyramidal	½+½
	b) i) Because sulphur is sterically protected by six F atoms	1
	ii) Bond dissociation enthalpy of F_2 is lower than that of Cl_2 involved in the process.	1
	iii) Bond dissociation enthalpy of HCl is lower than that of HF	1
	OR	
29	a) $N_2 + 3H_2 \overset{Fe}{\rightleftharpoons} 2NH_3$ Haber's process	½
	Catalyst –iron oxide + K_2O + Al_2O_3	½
	Conditions: low temperature / 700 K and high pressure	½+ ½
	b) i) Bond dissociation enthalpy of S-H bond is lower than that of O-H bond.	1
	ii) Due to small size of N than P, lone pair is readily available for donation in NH_3	1
	whereas in PH_3 lone pair is delocalized due to larger size of P	
	iii) Because S-S single bond is stronger than O-O single bond.	1

30	a) i) Heptan – 2-one	1
	ii) 3-phenylprop–2en-1-al	1
	b) i) $CH_3CH_2OH \xrightarrow{[O]} CH_3CHO \xrightarrow{OH^-} CH_3\text{-}CH(OH)\text{–}CH_2\text{-}CHO$	1
	ii) 	1
	iii) $CH_3COCH_3 \xrightarrow{LiAlH_4} CH_3CH(OH)CH_3 \xrightarrow{Conc.\ H_2SO_4} CH_3\text{-}CH{=}CH_2$	1
	(or any other correct method)	
	OR	
30	a) i) $CH_3\text{-}CO\text{-}CH_2\text{-}CH(Cl)\text{-}CH_3$	1
	ii) 	1
	b) i) On heating with NaOH +I_2, ethanal forms yellow ppt of iodoform whereas propanal does not.	1
	ii) Phenol gives red or violet ppt. with neutral $FeCl_3$ whereas benzoic acid does not (or any other test)	1
	iii)Acetophenone- On heating with NaOH +I_2, forms yellow ppt of iodoform whereas Benzaldehyde does not (or any other test)	1

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