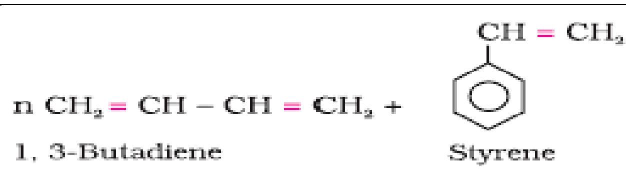
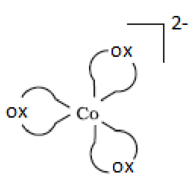
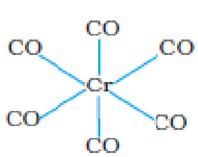
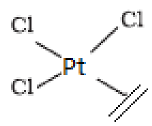
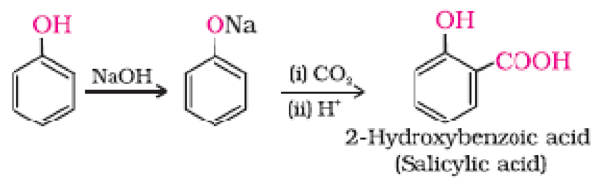
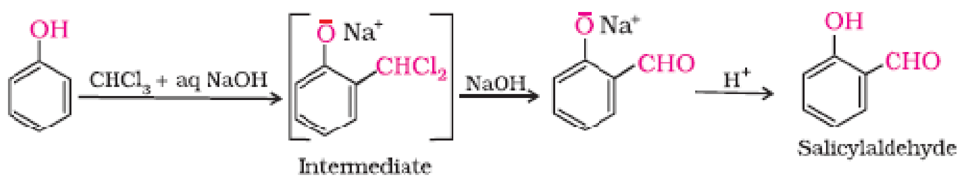
CHEMISTRY MARKING SCHEME
OUTSIDE DELHI -2014
SET -56/1

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

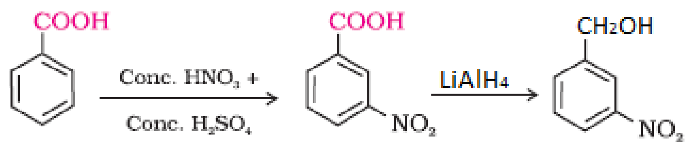
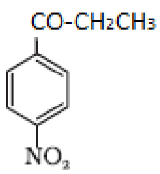
19	$N_A = \frac{Z \times M}{a^3 \times d}$ $= \frac{2 \times 56g\, mol^{-1}}{(2.866x10^{-8})\ ^3cm \times 7.874g\ cm^{-3}}$ $= 6.04x10^{23}\ mol^{-1}$ Or $286.65x10^{-10}cm = 2.866x10^{-8}cm$ Mass of Fe atom = $(2.866x10^{-8}cm)^3x7.874g\ cm^{-3}x1/2 = 23.54x10^{-24}x3.94\ g = 92.59\ x\ 10^{-24}\ g$ $N_A = 56g\ mol^{-1}/92.59x10^{-24}g$ $= 6.04x10^{23}\ mol^{-1}$	1 1 1 1½ 1½
20	$R=200\Omega$ Cell constant = $\frac{l}{a} = 1cm^{-1}$ Conductivity, $k = \frac{1}{R} \times \frac{l}{a} = \frac{1}{200\Omega} \times cm^{-1}$ $= 5.0x\ 10^{-3}\ \Omega^{-1}\ cm^{-1}$ $\wedge = \frac{K(Scm^{-1}) \times (1000\ cm^3L\text{-}1)}{C(mol^{-1}\ )}$ $= \frac{(5.0x10^{-3}Scm^{-1})\ (1000\ cm^3\ L^{-1})}{0.01\ mol\ L^{-1}}$ $= 500\ Scm^2\ mol^{-1}$	1 1 1
21	$Log \frac{k_2}{k_1} = \frac{Ea}{2.303R}\ [\frac{1}{T_1} - \frac{1}{T_2}]$ $Log \frac{2.39x10^{-7}L/(mol.s)}{2.15x10^{-8}L/(mol.s)} = \frac{Ea}{2.303x8.314x10^{-3}\ kJ/Kmol}\ [\frac{1}{650K} - \frac{1}{700K}]$ $Log\ 11.12 = \frac{Ea}{2.303x8.314x10^{-3}\ kJ} \times \frac{700\text{-}650}{4.5x10^5}$ $1.046 = \frac{Ea}{2.303x8.314x10^{-3}\ kJ} \times \frac{700\text{-}650}{4.5x10^5}$ $Ea = \frac{1.046x2.303x8.314x10^2x4.5}{50} = 180.16kJ$	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) 	1
	ii) 	1
	iii) $R{-}X + R'{-}\ddot{\underset{..}{O}}\,Na \longrightarrow R{-}\ddot{\underset{..}{O}}{-}R' + Na\,X$	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 $0.1 \text{ x } V_{HCl} = \frac{3x10^3}{190}$ $V_{HCl} = \frac{3x10^3}{190x0.1}$ = 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	
	$= \frac{6.00\ g}{322 gmol^{-1}} = \frac{6}{322}$ mol	½
	Since there is complete dissociation, van't Hoff factor, i= 3	
	$\Delta T_f = i\ K_f m = i \times K_f \times n_b/w_A$	1
	$= \frac{3x\ (1.86 K\ kg\ mol) x \frac{6}{322} mol}{0.10\ kg}$ = 1.04 K	1/2
	Freezing point 273.15K -1.04K = 272.1K	
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) $CH_3\,CH_2OH \xrightarrow{[O]} CH_3\,CHO \xrightarrow{OH^-} CH_3\text{-}CH(OH)\text{–}CH_2\text{-}CHO$	1
	ii) 	1
	iii) $CH_3COCH_3 \xrightarrow{LiAlH_4} CH_3CH(OH)CH_3 \xrightarrow{Conc.\ H_2SO_4} CH_3\text{-}CH\text{=}CH_2$	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

Sr. No.	Name		Sr. No.	Name	
1	Dr. (Mrs.) Sangeeta Bhatia		4	Sh. S.K. Munjal	
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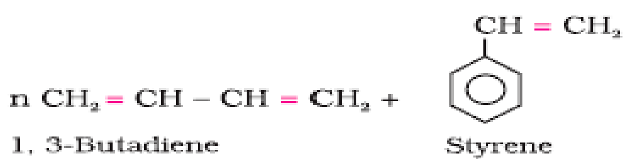
3	Sh. D.A. Mishra		6	Ms. Garima Bhutani	

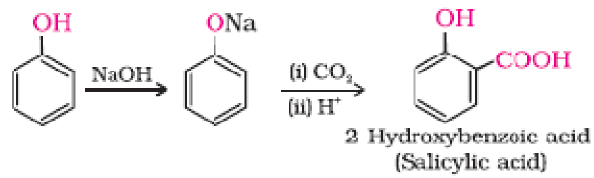
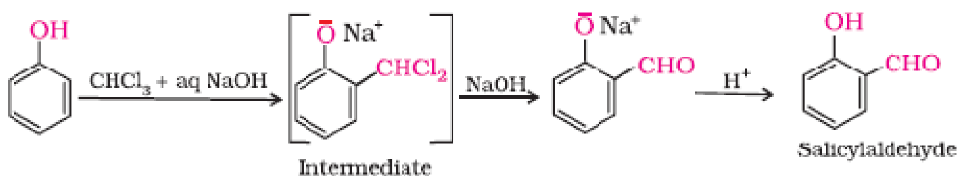
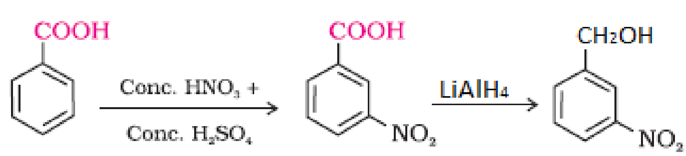
CHEMISTRY MARKING SCHEME
OUTSIDE DELHI -2014
SET -56/2

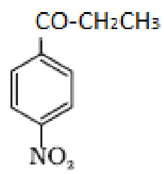
Qn	Answers	Marks
1	Domains are oppositely oriented and cancel out each other's magnetic moment.	1
2	It is a process of removing dissolved substance from a colloidal solution by means of diffusion through a suitable membrane.	1
3	The aluminate in solution is neutralized by CO_2 gas and hydrated Al_2O_3 is precipitated	1
4	Because of N≡N triple bond / high bond dissociation enthalpy.	1
5	On heating with NaOH +I_2, propan – 2-one forms yellow ppt of iodoform whereas pentan-3-one does not.	1
6	2-propanol / propan-2-ol	1
7	The linkage between two amino acids i.e. – CO-NH – is known as peptide linkage.	1
8	Homopolymer is fomed by repeating the same monomer unit whereas copolymer is formed by repeating two different monomers.	1
9	Conductivity of solution is inverse of resistivity ^{k} = G l/A Limiting molar conductivity – when concentration approches zero the conductivity is known as limiting molar conductivity	1 1
10	a) Rate of change in concentration of reactants / products per unit time under specified conditions. b) The energy required to form an intermediate, called as activated complex, is known as energy of activation.	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) $2KClO_3 \xrightarrow[MnO2]{\Delta} 2\ KCl + 3O_2$ b) $6XeF_4 + 12H_2O \rightarrow 4Xe + 2XeO_3 + 24HF + 3O_2$ (Note: balancing is not necessary)	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 muliple bonds	1 1
14	i) $CH_3\ CH_2\ CH(I)CH(C(CH_3)_3)\ CH_2\ CH_2\ CH_3$ ii) $CH_3\ CH{=}C(\ CH_3)\ CH(Br)\ CH_3$	1 1
15	a) $C_6H_5NH_2 < C_6H_5N(CH_3)_2 < CH_3NH_2 < (C_2H_5)_2\ NH$ b) $C_6H_5NH_2 > C_6H_5NHCH_3 > C_2H_5NH_2 > (C_2H_5\ )_2NH$	1 1
16	An ambidient nucleophile it that which possesses two nucleophilic centres For e.g. CN^- (it forms cyanides and isocyanides) (or any other correct example)	1 1
17	a) 1,3 - Butadiene and styrene /  b) Hexamethylenediamine and adipic acid / $n\,HOOC(CH_2)_4COOH + n\ H_2N\ (CH_2)_6\ NH_2$	½+ ½ ½+ ½
18	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

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

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) Because it undergoes disproportionation reaction / $2Cu^{+}(aq) \rightarrow Cu(s) + Cu^{2+}(aq)$ b) Because of the involvement of greater number of electrons from (n-1) d in addition to ns electrons in the interatomic metallic bonding c) The 5f electrons provide poor shielding from elements to elements in the actinoid series.	1 1 1
24	i) Some important extraction processes of metals, like those of silver and gold, make use of complex formation. Gold, for example, combines with cyanide in the presence of oxygen and water to form the coordination entity [Au(CN)2]– in aqueous solution. Gold can be separated in metallic form from this solution by the addition of zinc. ii) The familiar colour reactions given by metal ions with a number of ligands (especially chelating ligands), as a result of formation of coordination entities, form the basis for their detection and estimation by classical and instrumental methods of analysis. Examples of such reagents include EDTA, DMG (dimethylglyoxime)	1½ 1½
25	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

26	i)  ii)  iii) $R{-}X + R'{-}\ddot{\underset{..}{O}}\,Na \longrightarrow R{-}\ddot{\underset{..}{O}}{-}R' + Na\,X$	1 1 1
27	i) Because of the harmful side effects / if taken in more than the required dose, it acts as a poison. ii) Antibiotics which kill or inhibit a wide range of Gram-positive and Gram-negative bacteria are said to be **broad spectrum antibiotics**. iii) It is a mixture of chloroxylenol and terpileol	1 1 1
28	a) i) Heptan – 2-one ii) 3-phenylpropan–2ene-1-al b) i) $CH_3\,CH_2OH \xrightarrow{[O]} CH_3\,CHO \xrightarrow{OH^-} CH_3\text{-}CH(OH)\text{–}CH_2\text{-}CHO$ ii)  iii) $CH_3COCH_3 \xrightarrow{LiAlH_4} CH_3CH(OH)CH_3 \xrightarrow{Conc.\ H_2SO_4} CH_3\text{-}CH{=}CH_2$	1 1 1 1 1

	OR	
28	a) i) CH_3-CO-CH_2-CH(Cl)-CH_3 ii)  b) i) On heating with NaOH +I_2, ethanal forms yellow ppt of iodoform whereas propanal does not. ii) Phenol gives neutral $FeCl_3$ test / $NaHCO_3$ test iii)Acetophenone- On heating with NaOH +I_2, forms yellow ppt of iodoform Benzaldehyde- gives tollen's test / Schiff Test	1 1 1 1 1
29	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	1 ½ ½ 1½

	$0.1 \times V_{HCl} = \frac{3x10^3}{190}$ $V_{HCl} = \frac{3x10^3}{190x0.1} = 157.9$ mL	½ 1
	OR	
29	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. / Molality (m) = $\frac{\text{Moles of solute}}{\text{Mass of solvent in kg}}$ 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 $Na_2\ SO_4.10H_2O$ 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	1 1 1 ½ 1 1/2
30	a) i) XeF_2 - linear ii) XeO_3 - pyramidal b) i) Because sulphur is sterically protected by six F atoms ii) Bond dissociation enthalpy of F_2 is lower than that of Cl_2 involved in the process. iii) Bond dissociation enthalpy of HCl is lower than that of HF	½+½ ½+½ 1 1 1
	OR	

30	a) $N_2 + 3H_2 \overset{Fe}{\rightleftharpoons} 2NH_3$ Haber's process Catalyst –iron oxide + K_2O + $Al_2\ O_3$ Conditions: low temperature / 700 K and high pressure b) i) Bond dissociation enthalpy of S-H bond is lower than that of O-H bond. ii) Due to small size of N than P, lone pair is readily available for donation in NH_3 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.	½ ½ ½+ ½ 1 1 1

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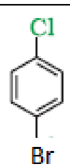
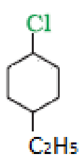
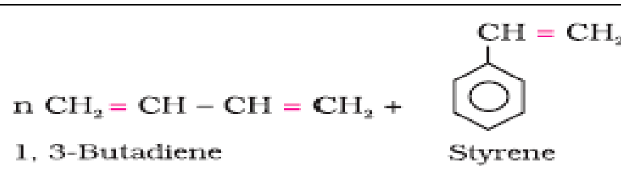
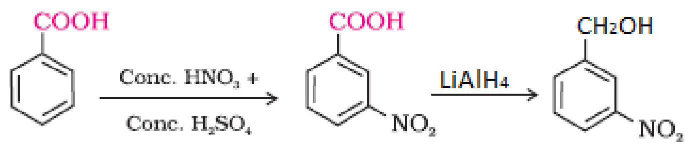
CHEMISTRY MARKING SCHEME
OUTSIDE DELHI -2014
SET -56/3

Qn	Answers	Marks
1	Conductance in metallic solid is through electrons whereas in ionic solid is through ions in molten state or aqueous state. (or any other)	1
2	Enzymes are biocatalyst which increases the rate of metabolism	1
3	Bauxite Zinc blend	½ ½
4	$[PCl_4]^+ [PCl_6]^-$	1
5	On heating with NaOH $+I_2$, propan – 2-one forms yellow ppt of iodoform whereas pentan-3-one does not.	1
6	2-propanol / propan-2-ol	1
7	The linkage between two amino acids i.e. – CO-NH – is known as peptide linkage.	1
8	Homopolymer is fomed by repeating the same monomer unit whereas copolymer is formed by repeating two different monomers.	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	i) Rate increases by four times ii) Rate decreases by four times	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	

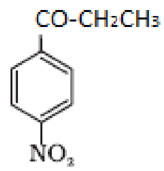
11	a) It is based on the principle that the impurities are more soluble in the melt than in the solid state of the metal. b) In this, the metal is converted into its volatile compound which is then decomposed to give pure metal.	1 1
12	a) $P_4 + 8SOCl_2 \rightarrow 4PCl_3 + 4SO_2 + 2S_2Cl_2$ b) $Cl_2 + \underset{(excess)}{3F_2} \xrightarrow{300^{0}C} 2ClF_3$	1 1
13	i) Because they exhibit variable oxidation state ii) Becasuse of d-d transition (or any other suitable explanation)	1 1
14	a)  b) 	1 1
15	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
16	An ambidient nucleophile is that which possesses two nucleophilic centeres For example CN^- (it forms cyanides and isocyanides) (or any other correct example)	1 1
17	a) 1,3 - Butadiene and styrene /  b) Hexamethylenediamine and adipic acid / $n\,HOOC(CH_2)_4COOH + n\,H_2N\,(CH_2)_6\,NH_2$	½+ ½ ½+ ½

18	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
19	$N_A = \frac{Z \times M}{a^3 \times d}$ $= \frac{2 \times 56g\ mol^{-1}}{(2.866 \times 10^{-8})\ ^3 cm \times 7.874 g\ cm^{-3}}$ $= 6.04 \times 10^{23}\ mol^{-1}$ Or $286.65 \times 10^{-10} cm = 2.866 \times 10^{-8} cm$ Mass of Fe atom = $(2.866 \times 10^{-8} cm)^3 \times 7.874 g\ cm^{-3} \times 1/2 = 23.54 \times 10^{-24} \times 3.94\ g = 92.59 \times 10^{-24}\ g$ $N_A = 56 g\ mol^{-1}/92.59 \times 10^{-24} g$ $= 6.04 \times 10^{23}\ mol^{-1}$	1 1 1 1½ 1½
20	$\text{Log}\ \frac{k_2}{k_1} = \frac{Ea}{2.303R}\ [\frac{1}{T_1} - \frac{1}{T_2}]$ $\text{Log}\ \frac{2.39 \times 10^{-7} L/(mol.s)}{2.15 \times 10^{-8} L/(mol.s)} = \frac{Ea}{2.303 \times 8.314 \times 10^{-3}\ kJ/Kmol}\ [\frac{1}{650K} - \frac{1}{700K}]$ $\text{Log}\ 11.12 = \frac{Ea}{2.303 \times 8.314 \times 10^{-3}\ kJ} \times \frac{700-650}{4.5 \times 10^5}$ $1.046 = \frac{Ea}{2.303 \times 8.314 \times 10^{-3}\ kJ} \times \frac{700-650}{4.5 \times 10^5}$ $Ea = \frac{1.046 \times 2.303 \times 8.314 \times 10^2 \times 4.5}{50} = 180.16 kJ$	1 1 1
21	$R = 200\Omega$ Cell constant = $\frac{l}{a} = 1 cm^{-1}$ Conductivity, $k = \frac{1}{R} \times \frac{l}{a} = \frac{1}{200\Omega} \times cm^{-1}$ $= 5.0 \times 10^{-3}\ \Omega^{-1}\ cm^{-1}$ $\wedge = \frac{K(Scm^{-1}) \times (1000\ cm^3 L\text{-}1)}{C(mol^{-1}\ )}$	 1

	$= \frac{(5.0\times10^{-3} Scm^{-1})\ (1000\ cm^3\ L^{-1})}{0.01\ mol\ L^{-1}}$ $= 500\ Scm^2\ mol^{-1}$	1 1
22	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
23	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	
23	(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
24	a) Pentamminechloridocobalt (III) chloride b) Trichloridotrispyridinechromium (III) c) Potassium hexacyanidomanganate (II) Structure and magnetic moment a) Octahedral / diamagnetic b) Octahedral / paramagnetic	½ ½ ½ ½ ½

	c) Octahedral / paramagnetic	½
25	i) $CH_2{=}CH\text{-}CH_3 \xrightarrow{H_2O / H^+} CH_3\text{-}CH(OH)\text{-}CH_3$ ii) $C_2H_5MgCl \xrightarrow[H2O]{HCHO} CH_3CH_2\,CH_2OH$ iii) $C_6H_5CH_2Cl \xrightarrow{\text{aq NaOH}} C_6H_5CH_2OH$	1 1 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) Because it is unstable at cooking temperature b) Disinfectants are applied to inanimate objects like floors, drainage systems whereas antiseptics are applied to living tissue such as wounds, cuts (or any other suitable difference) c) Hard water contains calcium and magnesium ions. These ions form insoluble calcium and magnesium soaps respectively when sodium or potassium soaps are dissolved in hard water. These insoluble soaps separate as scum in water and are useless as cleansing agent.	1 1 1
28	a) i) Heptan – 2-one ii) 3-phenylprop–2en-1-al b) i) $CH_3\,CH_2OH \xrightarrow{[O]} CH_3\,CHO \xrightarrow{OH^-} CH_3\text{-}CH(OH)\text{–}CH_2\text{-}CHO$ ii)  iii) $CH_3COCH_3 \xrightarrow{LiAlH_4} CH_3CH(OH)CH_3 \xrightarrow{\text{Conc. } H_2SO_4} CH_3\text{-}CH{=}CH_2$ (or any other correct method)	1 1 1 1 1
	OR	
28	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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29 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) 1

i) For dissociation, $i > 1$ ½

ii) For association, $i < 1$ ½

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

1½

Morality x volume (ml) = no. of m mole

	$0.1 \times V_{HCl} = \frac{3x10^3}{190}$ $V_{HCl} = \frac{3x10^3}{190x0.1} = 157.9$ mL	½ 1
	OR	
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	Conditions: low temperature / 700 K and high pressure	½+ ½
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