



Place for Rational & Educational Motivations!!

CHEMISTRY MARKING SCHEME

SET -56/2

Compt. July, 2015

Qu es.	Value points	Marks
1	Emulsions are liquid – liquid colloidal systems. For example – milk, cream (or any other one correct example)	½ + ½
2	Formation of stable complex by polydentate ligand.	1
3	Propanal	1
4	p-Nitroaniline < Aniline < p-Toluidine	1
5	Frenkel defect	1
6	i) Due to high bond dissociation enthalpy of N ≡ N ii) Due to low bond dissociation enthalpy of F ₂ than Cl ₂ and strong bond formation between N and F	1 1
7	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 ₂ MnO ₄ which disproportionates in a neutral or acidic solution to give permanganate. 2MnO₂ + 4KOH + O₂ → 2K₂MnO₄ + 2H₂O 3MnO₄²⁻ + 4H⁺ → 2MnO₄⁻ + MnO₂ + 2H₂O Oxalate ion or oxalic acid is oxidised at 333 K: 5C₂O₄²⁻ + 2MnO₄⁻ + 16H⁺ → 2Mn²⁺ + 8H₂O + 10CO₂ OR	1 1
7	i) Iodine is liberated from potassium iodide : 10I⁻ + 2MnO₄⁻ + 16H⁺ → 2Mn²⁺ + 8H₂O + 5I₂ ii) Hydrogen sulphide is oxidised, sulphur being precipitated: H₂S → 2H⁺ + S²⁻ 5S²⁻ + 2MnO₄⁻ + 16H⁺ → 2Mn²⁺ + 8H₂O + 5S	1 1
8	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\ddot{\text{O}}-\text{H} + \text{H}^+ \\ \quad \\ \text{H} \quad \text{H} \end{array} \xrightleftharpoons{\text{Fast}} \begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{O}^+-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$ $\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\ddot{\text{O}}^+-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array} \xrightleftharpoons{\text{Slow}} \begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}^+ \\ \quad \\ \text{H} \quad \text{H} \end{array} + \text{H}_2\text{O}$	½ ½ 1

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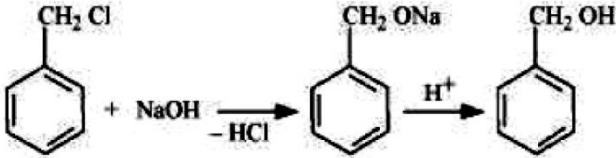
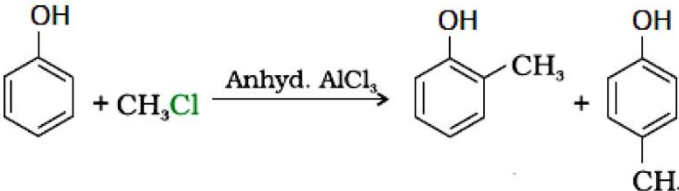
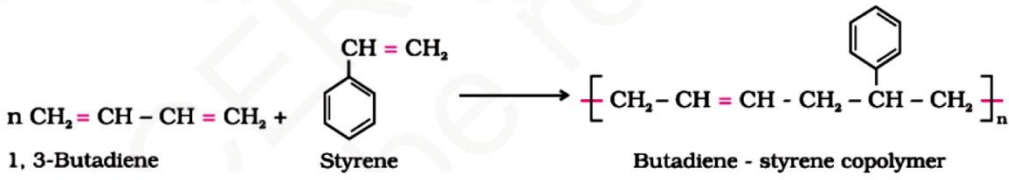


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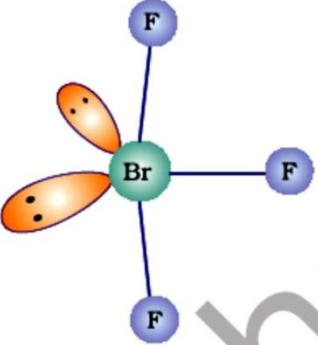
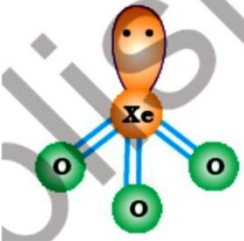
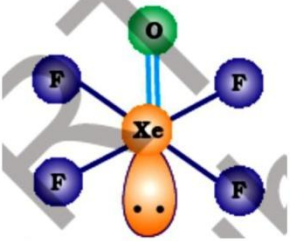
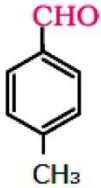
	$ \begin{array}{c} \text{H} & \text{H} \\ & \\ \text{H}-\text{C}-\text{C}^+ \\ & \\ \text{H} & \text{H} \end{array} \rightleftharpoons \begin{array}{c} \text{H} & \text{H} \\ \diagdown & / \\ \text{C} = \text{C} \\ / & \diagdown \\ \text{H} & \text{H} \end{array} + \text{H}^+ $ <p align="center">Ethene</p>					
9	i) Mole fraction of a component = $ \frac{\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)} = \frac{\text{Moles of solute}}{\text{Mass of solvent in kg}} $	1 1				
10	Zero order : mol L ⁻¹ s ⁻¹ Second order : L mol ⁻¹ s ⁻¹	1 1				
11	i) It lowers the melting point of alumina / acts as a solvent. ii) <table border="1" style="margin-left: 20px;"> <tr> <td style="padding: 2px;">Roasting</td> <td style="padding: 2px;">Calcination</td> </tr> <tr> <td style="padding: 2px;">Ore is heated in a regular supply of air</td> <td style="padding: 2px;">Heating in a limited supply or absence of air.</td> </tr> </table> (Or with equation) iii) It is a process of separation of different components of a mixture which are differently adsorbed on a suitable adsorbent. <p align="center">OR</p>	Roasting	Calcination	Ore is heated in a regular supply of air	Heating in a limited supply or absence of air.	1 1 1
Roasting	Calcination					
Ore is heated in a regular supply of air	Heating in a limited supply or absence of air.					
11	$3\text{Fe}_2\text{O}_3 + \text{CO} \rightarrow 2\text{Fe}_3\text{O}_4 + \text{CO}_2$ (Iron ore) $\text{Fe}_3\text{O}_4 + \text{CO} \rightarrow 3\text{FeO} + \text{CO}_2$ $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ (Limestone) $\text{CaO} + \text{SiO}_2 \rightarrow \text{CaSiO}_3$ (Slag) $\text{FeO} + \text{CO} \rightarrow \text{Fe} + \text{CO}_2$ $\text{C} + \text{CO}_2 \rightarrow 2\text{CO}$ Coke $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$ $\text{FeO} + \text{C} \rightarrow \text{Fe} + \text{CO}$ <p align="right">(any 6 correct equations)</p>	6 x ½ = 3				
12	Disproportionation : The reaction in which an element undergoes self-oxidation and self-reduction simultaneously. For example – $2\text{Cu}^+ (\text{aq}) \longrightarrow \text{Cu}^{2+} (\text{aq}) + \text{Cu}(\text{s})$ (Or any other correct equation)	1 ½ 1 ½				
13	i) Hexaamminecobalt(III) chloride ii) Tetrachlorido nickelate(II) iii) Potassium hexacyanoferrate(III)	1 1 1				

14	i) 2-bromobutane ii) 1, 3-dibromobenzene iii) 3-choloropropene	1 1 1
15	i)  $\text{C}_6\text{H}_5\text{CH}_2\text{Cl} + \text{NaOH} \xrightarrow{-\text{HCl}} \text{C}_6\text{H}_5\text{CH}_2\text{ONa} \xrightarrow{\text{H}^+} \text{C}_6\text{H}_5\text{CH}_2\text{OH}$ ii) $\text{CH}_3\text{CH}_2\text{MgCl} \xrightarrow[\text{H}_2\text{O}]{\text{HCHO}} \text{CH}_3\text{-CH}_2\text{-CH}_2\text{-OH}$ $\text{CH}_3\text{CH}=\text{CH}_2 + \text{H}_2\text{O} \xrightleftharpoons{\text{H}^+} \text{CH}_3\text{-CH(OH)-CH}_3$	1 1 1
16	i) $\text{CH}_3\text{-CH}_2\text{OH} \xrightarrow{\text{PCl}_5} \text{CH}_3\text{CH}_2\text{Cl}$ ii)  $\text{C}_6\text{H}_5\text{OH} + \text{CH}_3\text{Cl} \xrightarrow{\text{Anhyd. AlCl}_3} \text{C}_6\text{H}_4(\text{OH})(\text{CH}_3) + \text{C}_6\text{H}_4(\text{OH})(\text{CH}_3)$ iii) $\text{CH}_3\text{Cl} + \text{CH}_3\text{CH}_2\text{-ONa} \longrightarrow \text{CH}_3\text{CH}_2\text{-O-CH}_3$	1 1 1
17	i) Peptide linkage – in proteins, α -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
18	Copolymerisation is a polymerisation reaction in which a mixture of more than one monomeric species is allowed to polymerise and form a copolymer.  $n \text{CH}_2=\text{CH}-\text{CH}=\text{CH}_2 + \text{C}_6\text{H}_5\text{CH}=\text{CH}_2 \longrightarrow \left[\text{CH}_2-\text{CH}=\text{CH}-\text{CH}_2-\text{CH}(\text{C}_6\text{H}_5)-\text{CH}_2 \right]_n$ <p>1, 3-Butadiene Styrene Butadiene - styrene copolymer</p>	1 1



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	$n \text{ CH}_2=\text{CH}-\text{CH}=\text{CH}_2 + n \text{ CH}_2=\overset{\text{CN}}{\text{C}}\text{H} \xrightarrow{\text{Copolymerisation}} \left[\text{CH}_2-\text{CH}=\text{CH}-\text{CH}_2-\overset{\text{CN}}{\text{C}}\text{H} \right]_n$ <p>1,3-Butadiene Acrylonitrile Buna-N (or any other correct example)</p>	1
19	$r = \frac{\sqrt{2}a}{4}$ $r = \frac{1.414 \times 4.077 \times 10^{-8} \text{ cm}}{4}$ $r = 1.44 \times 10^{-8} \text{ cm}$	1 1 1
20	$\pi_{\text{cane sugar}} = \pi_X$ <p>Therefore, $c_{\text{cane sugar}} = c_X$ (where c is molar concentration)</p> $\frac{W_{\text{cane sugar}}}{M_{\text{cane sugar}}} = \frac{W_X}{M_X}$ $\frac{5 \text{ g}}{342 \text{ g mol}^{-1}} = \frac{0.877}{M_X}$ $M_X = \frac{0.877 \times 342}{5} \text{ gmol}^{-1}$ $M_X = 59.9 \text{ or } 60 \text{ gmol}^{-1}$	1 1 1
21	$k = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$ $60 \text{ s}^{-1} = \frac{2.303}{t} \log \frac{[R]_0}{\frac{[R]_0}{10}}$ $t = \frac{2.303}{60 \text{ s}^{-1}} \log 10$ $t = \frac{2.303}{60} \text{ s}$ $t = 0.0384 \text{ s}$	1 1 1
22	<ul style="list-style-type: none"> 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. iii) Colloidal particles scatter light in all directions in space. This scattering of light illuminates the path of beam in the colloidal dispersion. 	1 1 1
23	<ul style="list-style-type: none"> i) Aspartame, Saccharin (any one) ii) No iii) Social concern, empathy, concern, social awareness (any 2) 	1 1 2
24	<ul style="list-style-type: none"> a) Due to relatively stable half - filled p-orbitals of group 15 elements b) i) $\text{CaF}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{CaSO}_4 + 2\text{HF}$ ii) $\text{SO}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow \text{SO}_2\text{Cl}_2(\text{l})$ iii) $2\text{NH}_4\text{Cl} + \text{Ca}(\text{OH})_2 \rightarrow 2\text{NH}_3 + 2\text{H}_2\text{O} + \text{CaCl}_2$ <p style="text-align: center;">OR</p>	2 1 1 1

24	<p>a) i)</p>  <p>ii)</p>  <p>b) i) Due to small size of nitrogen, the lone pair of electron on nitrogen is localized/ easily available for donation. ii) Because they need only one electron to attain stable/noble gas configuration.</p>  <p>iii)</p>	1 1 1 1 1
25	<p>a) i)</p>  <p>ii)</p> <p>$(\text{CH}_3)_2\text{C}=\text{CHCOCH}_3$</p> <p>b) i) Add NaHCO_3, benzoic acid will give brisk effervescence of CO_2 whereas ethylbenzoate will not. ii) Add NaOH and I_2, acetophenone 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.</p>	1 1 1 1



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	OR	(or any other correct test)	1
25	<p>a) i)</p> $\begin{array}{c} \text{CH}_3 \\ \diagdown \\ \text{C}=\text{N}-\text{OH} \\ \diagup \\ \text{CH}_3 \end{array}$ <p>ii)</p> $\begin{array}{c} \text{CH}_3 \\ \diagdown \\ \text{C}=\text{N}-\text{NH}-\text{C}(=\text{O})-\text{NH}_2 \\ \diagup \\ \text{H} \end{array}$		1
	<p>b) i)</p> $\text{CH}_3\text{CHO} \xrightarrow[\text{conc HCl}]{\text{Zn-Hg}} \text{CH}_3-\text{CH}_3$		1
	<p>ii)</p> $2 \text{CH}_3-\text{CHO} \xrightleftharpoons{\text{dil. NaOH}} \text{CH}_3-\underset{\text{OH}}{\text{CH}}-\text{CH}_2-\text{CHO}$		1
	<p>iii)</p> $\text{CH}_3\text{CHO} \xrightarrow{\text{LiAlH}_4} \text{CH}_3\text{CH}_2\text{OH}$		1
26	$E^0_{\text{cell}} = E^0_{\text{Sn}^{2+}/\text{Sn}} - E^0_{\text{Zn}^{2+}/\text{Zn}}$ $= -0.14\text{V} - (-0.76\text{V})$ $= 0.62\text{V}$ $\Delta_r G^0 = -n F E^0_{\text{cell}}$ $= -2 \times 96500 \text{ C mol}^{-1} \times 0.62 \text{ V}$ $= -119660 \text{ J mol}^{-1}$ $E_{\text{cell}} = E^0_{\text{cell}} - \frac{0.059}{n} \log \frac{[\text{Zn}^{2+}]}{[\text{Sn}^{2+}]}$ $E_{\text{cell}} = 0.62 - \frac{0.059}{2} \log \frac{[\text{Zn}^{2+}]}{[\text{Sn}^{2+}]}$		1 1 1 1
	OR		
26	<p>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.</p> <p>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.</p> <p>Molar conductivity increases with decrease in concentration.</p>		½ ½ 1





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$\begin{aligned} \text{b) } E^{\circ}_{\text{cell}} &= E^{\circ}_{\text{C}} - E^{\circ}_{\text{A}} \\ &= 0.80\text{V} - 0.77\text{V} \\ &= 0.03\text{V} \end{aligned}$	$\frac{1}{2}$
$\begin{aligned} \Delta_r G^{\circ} &= -n F E^{\circ}_{\text{cell}} \\ &= -1 \times 96500 \text{ C mol}^{-1} \times 0.03 \text{ V} \\ &= -2895 \text{ J mol}^{-1} \end{aligned}$	1
$\text{Log } K_c = \frac{n E^{\circ}_{\text{cell}}}{0.059}$	$\frac{1}{2}$
$\text{Log } K_c = \frac{1 \times 0.03}{0.059}$	$\frac{1}{2}$
$\text{Log } K_c = 0.508$	