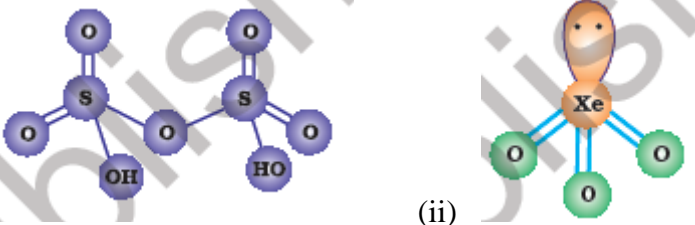


## Chemistry-Marking Scheme 2015

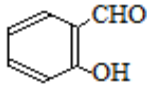
Chennai- 56/1/MT

Q.No	Value points	Marks
1	Dispersed phase – Solid , Dispersion medium – Liquid.	1
2	Due to incompletely filled d-orbitals in +2 oxidation state (i.e., in $\text{Cu}^{2+}$ state. )	1
3	$\text{CH}_3\text{-CH}_2\text{-Br}$ .	1
4	3 Faraday / 3F	1
5	1-methoxypropan-2-ol.	1
6	 <p>i) (ii)</p>	1,1
7	Pentaamminecarbonatocobalt(III) chloride. Ionization isomerism	1 1
7	OR (i) $[\text{CuCl}_4]^{2-}$ (ii) $\text{K}_2[\text{Zn}(\text{OH})_4]$	1,1
8	As per Raoult's law $p_A = x_A p_A^\circ$ $P_A = p_A^\circ(1 - x_B) = p_A^\circ - p_A^\circ x_B$ $(p_A^\circ - p_A) / p_A^\circ = x_B$ $\Delta p / p_A^\circ = x_B = \frac{w_B M_A}{w_B M_A + w_A M_B}$ $M_B = \frac{(\Delta p / p_A^\circ) w_A}{w_B}$	2
9	(i) $\text{C}_6\text{H}_5\text{-NH}_2 < \text{C}_6\text{H}_5\text{-NH-CH}_3 < \text{CH}_3\text{-CH}_2\text{-NH}_2$ . (ii) $\text{CH}_3\text{-NH-CH}_3 < \text{CH}_3\text{-CH}_2\text{-NH}_2 < \text{C}_2\text{H}_5\text{-OH}$ .	1 1
10	Rate constant is the proportionality constant that relates rate of reaction with concentration of reactants / Rate of the reaction when molar concentration of the reactant becomes unity.  (i) Unit : $\text{time}^{-1}$ or $\text{s}^{-1}$ . (ii) Unit : $\text{L mol}^{-1} \text{time}^{-1}$ or $\text{M}^{-1} \text{s}^{-1}$ .	1  $\frac{1}{2}$ $\frac{1}{2}$
11	(i) Anion vacancies occupied by free electrons in alkali metal halides, (when they have metal excess defects) are called F-centre.  (ii) When Si or Ge is doped with a trivalent impurity then electron vacancies are created called positive holes which impart electrical conduction. They are called p-type semiconductors.  (iii) Ferrimagnetism is observed when the magnetic moments are aligned in parallel and antiparallel way in unequal numbers in a	1  1  1

	substance leading to small net permanent magnetic moment.	
12	$\log (k_2 / k_1) = (E_a / 2.303R) (T_2 - T_1) / T_1 T_2$ $\log [(8 \times 10^{-2}) / (2 \times 10^{-2})] = 20 E_a / 2.303 \times 8.314 \times 300 \times 320$ $E_a = [\log(4) \times 2.303 \times 8.314 \times 300 \times 320] / 20$ $E_a = 55336.8 \text{ J mol}^{-1} = 55.34 \text{ kJ mol}^{-1}$	1 1 1
13	<p>(i) In a catalysis process when the reactants and catalyst occur in same phase, the process is called homogeneous catalysis.</p> <p>(ii) The process of settling of colloidal particles forming precipitate is called coagulation.</p> <p>(iii) Polymeric substances or macromolecules when added to suitable solvents form solutions in which the size of the macromolecules may be in colloidal range. Such colloids are known as macromolecular colloids.</p>	1 1 1
14	<p>(i) The impurities are more soluble in the melt of metal than in solid state of the metal.</p> <p>(ii) As leaching agent, thereby oxidizing the metal into soluble cyanocomplex / <math>[\text{Au}(\text{CN})_2]^-</math>.</p> <p>(iii) Wrought iron</p>	1 1 1
15	$\Delta T_b = K_b m$ $\Delta T_b = K_b (W_B \times 1000 / M_B \times W_A)$ $353.93 - 353.23 = 2.52 \times 1.5 \times 1000 / M_B \times 90$ $M_B = (2.52 \times 1.5 \times 1000) / (0.7 \times 90)$ $= 60.0 \text{ g mol}^{-1}$	1 1 1
16	<p>(i) Because of <math>p\pi-p\pi</math> multiple bonding in nitrogen (diatomic) which is absent in phosphorus (polymeric / polyatomic).</p> <p>(ii) Because of decrease in tendency of <math>sp^3</math> hybridisation from <math>\text{H}_2\text{O}</math> to <math>\text{H}_2\text{Te}</math>.</p> <p>(iii) Due to their smallest atomic sizes in respective periods, / or due to the fact that they have only one electron less than the next noble gas configuration.</p>	1 1 1
17	<p>(i) <math>\text{CH}_3-\text{CH}(\text{OH})-\text{CH}_3</math></p> <p>(ii) <math>\text{CH}_3-\text{CH}=\text{CH}-\text{CH}_3</math></p> <p>(iii) <math>p\text{-Br-C}_6\text{H}_4\text{-CO-CH}_3</math></p>	1 1 1
18	<p>(i) Due to intramolecular H-bonding in o-nitrophenol / p-nitrophenoxide is more stabilized than o-nitrophenoxide due to more delocalization of the negative charge.</p> <p>(ii) The mutual repulsion between bulky alkyl groups is stronger than</p>	1

	the l.p-l.p electronic repulsions. (iii) $\text{CH}_3\text{ONa}$ is not only nucleophile but also stronger base, thereby leads to elimination reaction of the alkyl halide.	1 1												
19	(i) $\text{C}_6\text{H}_5\text{NH}_2 \xrightarrow{\text{NaNO}_2 + \text{HCl} / 278\text{K}} \text{C}_6\text{H}_5\text{N}_2\text{Cl} \xrightarrow{\text{H}_3\text{PO}_2 + \text{H}_2\text{O}} \text{C}_6\text{H}_6$ (ii) $\text{CH}_3\text{-CONH}_2 \xrightarrow{\text{KOH} + \text{Br}_2} \text{CH}_3\text{NH}_2$ (iii) $\text{C}_6\text{H}_5\text{NO}_2 \xrightarrow{\text{Sn} + \text{HCl} \text{ or } \text{Fe} + \text{HCl}} \text{C}_6\text{H}_5\text{NH}_2$ <b>OR</b>	1 1 1												
19	(i) $\text{C}_2\text{H}_5\text{NH}_2 + \text{CH}_3\text{COCl} \xrightarrow{\text{pyridine}} \text{C}_2\text{H}_5\text{-NHCOCH}_3 + \text{HCl}$ (ii) $\text{C}_2\text{H}_5\text{NH}_2 + \text{C}_6\text{H}_5\text{SO}_2\text{Cl} \longrightarrow \text{C}_2\text{H}_5\text{NH-O}_2\text{SC}_6\text{H}_5 + \text{HCl}$ (iii) $\text{C}_2\text{H}_5\text{NH}_2 + \text{CHCl}_3 + \text{KOH} \longrightarrow \text{C}_2\text{H}_5\text{NC} + \text{KCl} + \text{H}_2\text{O}$	1 1 1												
20	(i) But-1,3-diene, Acrylonitrile; $\text{CH}_2=\text{CH}-\text{CH}=\text{CH}_2$ , $\text{CH}_2=\text{CH}-\text{CN}$ (ii) Phenol, Formaldehyde; $\text{C}_6\text{H}_5\text{OH}$ , $\text{HCHO}$ (iii) Tetrafluoroethylene; $\text{CF}_2=\text{CF}_2$ (Note: half mark for name/s and half mark for structure/s)	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$												
21	(i) Gluconic acid / $\text{COOH}-(\text{CHOH})_4-\text{CH}_2\text{OH}$ (ii) Peptide linkage / $-\text{NH}-\text{CO}-$ links (iii) <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">s.no</th> <th style="width: 40%;">DNA</th> <th style="width: 50%;">RNA</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Sugar is 2-deoxy ribose</td> <td>Sugar is ribose</td> </tr> <tr> <td>2</td> <td>Double helical structure</td> <td>Single stranded structure</td> </tr> <tr> <td></td> <td colspan="2">(or any other one correct difference)</td> </tr> </tbody> </table>	s.no	DNA	RNA	1	Sugar is 2-deoxy ribose	Sugar is ribose	2	Double helical structure	Single stranded structure		(or any other one correct difference)		1 1 1
s.no	DNA	RNA												
1	Sugar is 2-deoxy ribose	Sugar is ribose												
2	Double helical structure	Single stranded structure												
	(or any other one correct difference)													
22	(a)(i) $d^2sp^3$ ; Octahedral (ii) $sp^3$ ; Tetrahedral (b) 'en' , forms chelate .	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$												
23	(i) Social awareness ,Health conscious, Caring , empathy, concern .(or any other two values) (ii) (ii) Cartoon display / street play/poster making (or any other correct answer) (iii) Wrong choice and over dose may be harmful. (iv) Saccharin , Aspartame (or any other example)	$\frac{1}{2} + \frac{1}{2}$ 1 1 $\frac{1}{2} + \frac{1}{2}$												

24	$E_{\text{Cell}} = (E^{\circ}_{\text{Ag}} - E^{\circ}_{\text{Ni}}) - (0.0591/n) \log[ \text{Ni}^{2+}/(\text{Ag}^+)^2 ]$ $= (0.80 + 0.25) - 0.02955 \log(10^{-2}/10^{-6})$ $= 1.05 - 0.0178 = 1.0322 \text{ V}$ $\Delta G = - n F E_{\text{cell}}$ $= - 2 \times 96500 \times 1.0322$ $= - 199214 \text{ J mol}^{-1} = - 199.2 \text{ kJ mol}^{-1}$ <p style="text-align: center;"><b>OR</b></p>	1 1 1 1/2 1/2 1
24	<p>(a) Molar Conductivity (<math>\Lambda_m</math>) = 1000 K / C</p> $= (1000 \times 1.06 \times 10^{-2}) / 0.1$ $= 106 \text{ S cm}^{-2} \text{ mol}^{-1}.$ <p>Deg. of dissociation (<math>\alpha</math>) = <math>\Lambda_m / \Lambda_m^0</math></p> $= 106 / (50.1 + 76.5)$ $= 0.8373$ <p>(b) Primary battery- non rechargeable whereas secondary battery is chargeable. Eg: primary battery-dry cell, mercury cell(any one) , secondary battery- lead storage battery, Ni-Cd battery(any one) (or any other correct example)</p>	1/2 1/2 1 1/2 1/2, 1/2 1/2, 1/2
25	<p>(a)</p> <p>(i) <math>\text{Ce}^{4+}</math> gets reverted to 3+ oxidation state in aqueous medium hence is a good oxidizing agent/ <math>\text{Ce}</math> is more stable in +3 oxidation state.</p> <p>(ii) Due to very strong metal-metal bonding ( involving large no. of electrons of the d-orbitals)</p> <p>(iii) Mn has maximum no. of unpaired electrons in 3d-orbitals.</p> <p>(b)(i) <math>2\text{MnO}_4^- + 6\text{H}^+ + 5\text{NO}_2^- \longrightarrow 2\text{Mn}^{2+} + 5\text{NO}_3^- + 3\text{H}_2\text{O}</math></p> <p>(ii) <math>\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{Fe}^{2+} \longrightarrow 2\text{Cr}^{3+} + 6\text{Fe}^{3+} + 7\text{H}_2\text{O}</math></p> <p style="text-align: center;"><b>OR</b></p>	1 1 1 1 1
25	<p>(a) (i) Due to d-d transitions (involving absorption of energy in visible range ) / unpaired electrons in d- orbitals.</p> <p>(ii) Because Cr is more stable in +3 oxidation state.</p> <p>(iii) Due to stability of <math>5f^0</math>, <math>5f^7</math>, <math>5f^{14}</math> / very small energy difference / comparable energy among 5f, 6d, and 7s orbitals.</p> <p>(b) The overall decrease in atomic and ionic radii from La to Lu (due to poor shielding effect of 4f electrons) is called Lanthanoid contraction. Common oxidation state of Lanthanoids is +3.</p>	1 1 1 1+1

26	<p>(a) A is <math>C_6H_5CHO</math>; B &amp; C / C &amp; B are <math>C_6H_5CH_2OH</math> &amp; <math>C_6H_5COONa</math> D is <math>C_6H_5CH(OH)CH_3</math></p> <p>(b) (i) <math>C_6H_5-CO-CH_3</math> forms yellow coloured <math>CHI_3</math> on heating with <math>I_2+KOH</math> / <math>NaOH</math> but <math>C_6H_5-CO-CH_2-CH_3</math> does not / equation form.</p> <p>(ii) With neutral <math>FeCl_3</math>, phenol gives violet coloration but benzoic acid does not. (any other suitable test).</p> <p>(c) </p>	<p><math>\frac{1}{2} \times 4</math></p> <p>1</p> <p>1</p> <p>1</p>
<b>OR</b>		
26	<p>(a) (i) <math>CH_3CH(OH)CN</math></p> <p>(ii) <math>CH_3CH=N-NH_2</math></p> <p>(iii) <math>CH_3CH_2OH</math></p> <p>(b) <math>C_6H_5-CO-CH_3 &lt; CH_3-CO-CH_3 &lt; CH_3-CHO</math></p> <p>(c) <math>CH_3CHO</math> gives yellow precipitate of <math>CHI_3</math> with <math>I_2 + KOH</math> but <math>CH_3CH_2CHO</math> does not/ equation form</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>