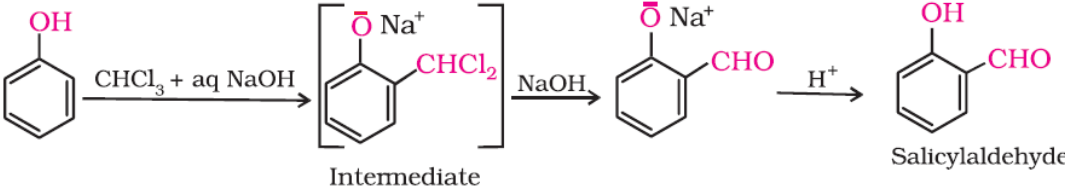
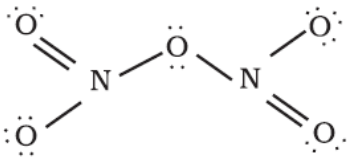
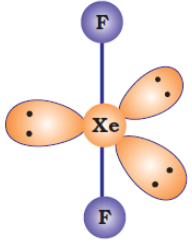


**CHEMISTRY MARKING SCHEME**  
**OUTSIDE DELHI -2013**  
**SET -56/3**

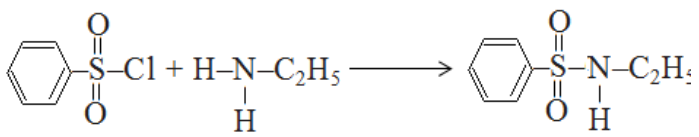
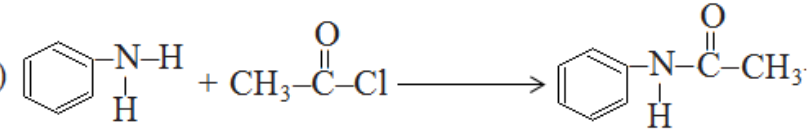
1	Tyndall effect / Illumination of path of light.	1
2	Basicity = 2 As two P-OH bonds are present.	½ ½
3	1,4 - Dichloro-o-2- methylbenzene./ 2,5- Dichlorotoluene	1
4	Electrolytic refining	1
5	Glucose & Galactose	1
6	Homopolymer	1
7	$\text{CH}_3\text{CH}_2\text{CH}_3 < \text{CH}_3\text{CHO} < \text{CH}_3\text{CH}_2\text{OH}$	1
8	$\text{CH}_2=\text{CH}-\text{CH}_2-\text{NH}_2$	1
9.	<p> <math display="block">\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}-\text{C}-\ddot{\text{O}}-\text{H} + \text{H}^+ \xrightleftharpoons{\text{Fast}} \text{H}-\text{C}-\text{C}-\overset{\text{H}}{\text{O}^+}-\text{H} \\   \quad   \\ \text{H} \quad \text{H} \end{array}</math>   <math display="block">\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\   \quad   \quad   \\ \text{H}-\text{C}-\text{C}-\overset{\text{H}}{\text{O}^+}-\text{H} \xrightleftharpoons{\text{Slow}} \text{H}-\text{C}-\text{C}^+ + \text{H}_2\text{O} \\   \quad   \\ \text{H} \quad \text{H} \end{array}</math>   <math display="block">\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}-\text{C}^+ \\   \quad   \\ \text{H} \quad \text{H} \end{array} \rightleftharpoons \begin{array}{c} \text{H} \quad \text{H} \\ \backslash \quad / \\ \text{C} = \text{C} \\ / \quad \backslash \\ \text{H} \quad \text{H} \end{array} + \text{H}^+</math> <p style="text-align: center;">Ethene</p> </p>	½ ½ 1
10	The interhalogen compounds can be prepared by the direct combination or by the action of halogen on lower interhalogen compounds.  General composition $\text{XX}'_n$ (where $n = 1, 3, 5, 7$ & $\text{X}'$ is more electronegative)	1  1
11	(a) Reimer-Tiemann reaction	

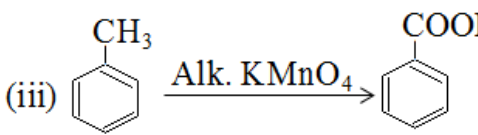
	 <p>(b) Williamson synthesis</p> $R-X + R'-\ddot{O}Na \longrightarrow R-\ddot{O}-R' + NaX$	1+1
12	<p>(i)</p>  <p>(ii)</p> 	1  1
13	<p>(i) Cationic vacancy is generated</p> <p>(ii) p - type</p>	1 1
14	<p>For f.c.c unit cell <math>r = \frac{a}{2\sqrt{2}}</math></p> $a = 2r \times \sqrt{2}$ $= 2 \times 125 \text{ pm} \times 1.414$ $= 353.5 \text{ pm}$	$\frac{1}{2}$  1  $\frac{1}{2}$
15	$\Delta G = -nFE^\circ_{\text{cell}}$ $= -2 \times 96500 \text{ C mol}^{-1} \times 1.1 \text{ V}$ $= -212300 \text{ J mol}^{-1} \text{ or } -212.3 \text{ kJ mol}^{-1}$	$\frac{1}{2}$ $\frac{1}{2}$ 1
16	<p>(a) order = <math>2 + \frac{1}{2} = \frac{5}{2}</math></p> <p>(b) <math>t_{\frac{1}{2}} = \frac{0.693}{k}</math></p>	$\frac{1}{2}$ $\frac{1}{2}$

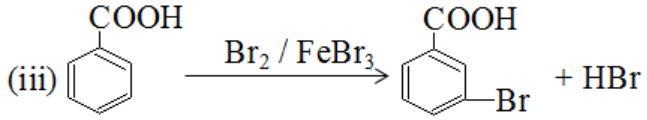
	$= \frac{0.693 \text{ s}}{5.5 \times 10^{14}}$ $= 1.26 \times 10^{13} \text{ s}$	1
17	<p><b>Thermoplastics.</b> These polymers are easily softened on heating moulded and then hardened on cooling</p> <p><b>Examples:</b> polythene, polypropylene, polystyrene, polyvinyl chloride, teflon, polyvinyl acetate, etc. (any one)</p> <p><b>Thermosetting polymers</b> These polymers on heating become infusible and form an insoluble hard mass thus, cannot be remoulded</p> <p><b>Examples:</b> Bakelite, urea-formaldehyde resins, etc. (any one)</p>	1/2+ 1/2
17	<p style="text-align: center;">OR</p> <p>The polymers which can be degraded by the microorganism</p> <p><b>Example:</b> PHBV (or any other correct one example)</p>	1 1
18	<p>Bauxite (<math>\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}</math>)</p> <p>The significance of leaching is to prepare pure Alumina from the Bauxite ore./ reactions involved</p>	1 1
19	<p><b>(i) Macromolecular colloids:</b> Macromolecules in suitable solvents for solutions in which the size of the macromolecules may be in the colloidal range.</p> <p><b>Examples:</b> starch, cellulose, proteins and enzymes; and those of man-made macromolecules are polythene, nylon, polystyrene, synthetic rubber, etc. (any one)</p> <p><b>(ii) Peptization:</b> the process of converting a precipitate into colloidal sol by shaking it with dispersion medium in the presence of a small amount of electrolyte.</p> <p><b>Example:</b> Freshly formed precipitate of ferric hydroxide, <math>\text{Fe}(\text{OH})_3</math>, is peptized by ferric chloride, <math>\text{FeCl}_3</math>, solution. Similarly, a sol of aluminium hydroxide (<math>\text{Al}(\text{OH})_3</math>) is obtained by adding</p>	1/2+ 1/2 1/2+ 1/2

	<p>insufficient quantity of very dilute HCl solution to freshly precipitated aluminium hydroxide.</p> <p>(any one)</p> <p><b>(iii) Emulsion:</b> Those colloids in which dispersed phase &amp; dispersion medium both are liquid</p> <p><b>Example:</b> milk is an emulsion of fat in water, cod liver oil is an emulsion of water in oil.</p> <p>(any one)</p>	1/2+ 1/2
20	<p>(i) tetrachloridonickelate(II) ion</p> <p>(ii) <math>sp^3</math></p> <p>(iii) Tetrahedral.</p> <p style="text-align: center;">OR</p>	1x3=3
20	<p>The energy involved in splitting the degenerate d-orbitals into two sets <math>t_{2g}</math> and <math>e_g</math> is called crystal field splitting energy.</p> <p>(i) <math>t_{2g}^4 e_g^0</math></p> <p>(ii) <math>t_{2g}^3 e_g^1</math></p>	1 1+1
21	<p>(i) Its covalency cannot exceed 4/ Due to non-availability of d-orbitals in its valence shell.</p> <p>(ii) Because of small size of F atom the inter electronic repulsion is large in F atom</p> <p>(iii) Due to resonance. / Resonance structures.</p>	1x3=3
22	<p>Given if rate at 293K is R thus at 313K rate becomes 4R</p> $\log \frac{k_2}{k_1} = \frac{E_a}{2.303R} \left[ \frac{T_2 - T_1}{T_1 \times T_2} \right]$ $\log \frac{4R}{R} = \frac{E_a}{2.303 \times 8.314} \left[ \frac{313 - 293}{293 \times 313} \right]$ $\log 4 = \frac{E_a}{19.1471} \left[ \frac{20}{91709} \right]$ $0.6021 = \frac{E_a}{19.1471} \left[ \frac{20}{91709} \right]$ $\frac{0.6021 \times 19.1471 \times 91709}{20} = E_a$ <p><math>E_a = 52863.2177J</math> or <math>52.863 KJ</math></p>	1  1  1

23	<p>(i) Ms. Anuradha has shown generosity / caring / helping / kindness attitude towards poor</p> <p>(ii) Vit. B<sub>2</sub>.</p> <p>(iii) Vitamin B/ C</p>	1x3=3
24	<p><b>Given cell notation is incorrect</b></p> <p><b>Correct cell formula is</b></p> $\text{Cu}^{2+} (10^{-1} \text{ M} \mid \text{Cu}_{(s)} \mid \mid \text{Ag}^{+} (10^{-3} \text{ M} \mid \text{Ag}_{(s)})$ <p><b>Given E<sup>0</sup> cell = 0.46 V</b></p> $E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{0.0591}{n} \log \frac{[\text{Cu}^{2+}]}{[\text{Ag}^{+}]^2}$ $E_{\text{cell}} = 0.46 - \frac{0.0591}{2} \log \frac{[0.1]}{[10^{-3}]^2}$ $E_{\text{cell}} = 0.46 - 0.02955 \log \frac{[0.1]}{[10^{-6}]}$ $E_{\text{cell}} = 0.46 - 0.02955 \log 10^5$ $E_{\text{cell}} = 0.46 - 0.02955 \times 5$ $E_{\text{cell}} = 0.46 - 0.146$ $E_{\text{cell}} = 0.314 \text{ V}$ <p style="text-align: center;"><b>or</b></p> $E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{0.0591}{2} \log \frac{[\text{Ag}^{+}]^2}{[\text{Cu}^{2+}]}$ $= 0.46 \text{ V} - \frac{0.0591}{2} \log \frac{[10^{-3}]^2}{[0.1]}$ $= 0.46 \text{ V} - \frac{0.0591}{2} \log [10^{-3}]^2$	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>

	$= 0.46V + 0.0295 \times 5$ $= 0.6075V$	1
25	<p>(i) I, is better leaving group / C-I bond is weaker than C-Br bond.</p> <p>(ii) Because it is a racemic mixture / equal &amp; opposite rotation of two enantiomers cancel each other.</p> <p>(iii) Due to resonance in halobenzene / <math>sp^2</math> hybridization of C-atom in halobenzene &amp; <math>sp^3</math> hybridization of C-atom in <math>CH_3X</math></p>	1x3=3
26	<p>(i) Antacid / Antihistamine</p> <p>(ii) Synthetic detergents</p> <p>(iii) 0.2% Phenol</p>	1x3=3
27	<p>(i) <math>CH_3CH_2NH_2 \xrightarrow{HNO_2 / 0^\circ C} CH_3CH_2OH</math></p> <p>(ii) </p> <p>(iii) </p>	1x3=3
28	<p>(a) (i) <math>M^{3+} (3d^4)</math> good electron acceptor as resulting species is more stable (<math>3d^5</math>)</p> <p>(ii) The <math>E^\circ (M^{2+}/M)</math> values are not regular which can be explained from the irregular variation of ionisation enthalpies (<math>\Delta H_i + \Delta i H_2</math>) sublimation enthalpies and hydration enthalpies.</p> <p>(iii) Due to multiple bond formation ability of oxygen with Mn in <math>Mn_2O_7</math>.</p> <p>(b) (i) <math>2CrO_4^{2-} + 2H^+ \longrightarrow Cr_2O_7^{2-} + H_2O</math></p>	1x3=3

28	<p>(ii) <math>2\text{KMnO}_4 \xrightarrow{\text{Heat}} \text{K}_2\text{MnO}_4 + \text{MnO}_2 + \text{O}_2</math></p> <p style="text-align: center;">OR</p> <p>(a) Because of incomplete filling of d-orbitals</p> <p>(i) Mn</p> <p>(ii) Scandium (Sc)</p> <p>(b) There is a steady decrease in the size of atoms/ions with increase in atomic number in lanthanoid</p> <p style="text-align: center;">Misch metal</p>	<p>1+1</p> <p>1x3=3</p> <p>1+1</p>
29	<p>(a)</p> <p>(i) <math>\text{CH}_3\text{-}\overset{\text{O}}{\parallel}\text{C}\text{-CH}_3 \xrightarrow[\text{NaBH}_4]{\text{LiAlH}_4 \text{ or}} \text{CH}_3\overset{\text{OH}}{\text{C}}\text{HCH}_3</math></p> <p>(ii) <math>\text{CH}_3\text{-}\overset{\text{O}}{\parallel}\text{C}\text{-H} + \text{HCN} \longrightarrow \text{CH}_3\overset{\text{H}}{\underset{\text{CN}}{\text{C}}}\text{-OH} \xrightarrow{\text{H}_2\text{O}/\text{H}^+} \text{CH}_3\overset{\text{H}}{\underset{\text{COOH}}{\text{C}}}\text{-OH}</math></p> <p>(iii) </p> <p>(b) (i) Add I<sub>2</sub> &amp; NaOH in both the solutions pentan-2-one gives yellow coloured precipitate, but pentan-3-one does not.</p> <p>(ii) Add I<sub>2</sub> &amp; NaOH in both the solutions ethanal gives yellow coloured precipitate, but propanal does not. (or any other correct suitable test)</p> <p style="text-align: center;">OR</p>	<p>1x3=3</p> <p>1+1</p>

	<p>(a)</p> <p>(i) <math>\text{CH}_3\text{-}\overset{\text{O}}{\parallel}\text{C}\text{-CH}_3 \xrightarrow[\text{conc. HCl}]{\text{Zn - Hg}} \text{CH}_3\text{-CH}_2\text{-CH}_3 + \text{H}_2\text{O}</math></p> <p>(ii) <math>\text{CH}_3\text{-}\overset{\text{O}}{\parallel}\text{C}\text{-Cl} + \text{H}_2 \xrightarrow{\text{Pd-BaSO}_4} \text{CH}_3\text{-}\overset{\text{O}}{\parallel}\text{C}\text{-H} + \text{HCl}</math></p> <p>(iii) </p> <p>(b) (i) <math>\text{F-CH}_2\text{-COOH}</math></p> <p>(ii) <math>\text{CH}_3\text{COOH}</math></p>	<p>1x3=3</p> <p>1+1</p>
30	<p>(a) Partial vapour pressure of a liquid component is directly proportional to its mole fraction in its solution.</p> <p>The partial pressure of the volatile component or gas is directly proportional to its mole fraction in solution. Only the proportionality constant <math>K_H</math> differs from <math>P^0_A</math>. Thus, Raoult's law becomes a special case of Henry's law in which <math>K_H</math> becomes equal to <math>P^0_A</math>.</p> <p>(b) Given <math>W_B = 1.00\text{g}</math>      <math>W_A = 50\text{g}</math>      <math>K_f = 5.12\text{K kg/ mol}^{-1}</math>;      <math>\Delta T_f = 0.40\text{K}</math></p> $\Delta T_f = K_f \frac{W_B \times 1000}{M_B \times W_A \text{ (in grams)}}$ $M_B = K_f \frac{W_B \times 1000}{\Delta T_f \times W_A}$ $M_B = \frac{5.12 \times 1 \times 1000}{0.40 \times 50}$ $= 256\text{g mol}^{-1}$ <p style="text-align: center;">OR</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
30		



(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

$$m = \frac{1000 \times \text{wt \%}}{(100 - \text{wt \%}) \times \text{mol. wt. of solute}} \quad \alpha \quad m = \frac{w \times 1000}{M \times W}$$

$$m = \frac{1000 \times 10}{(100 - 10) \times 180}$$

$$m = \frac{10000}{90 \times 180}$$

$$m = 0.617 \text{ m}$$

1x3=3

1/2+ 1/2

1

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