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**Chemistry Marking scheme  
Delhi - 2016  
Set – 56/1/1/D**

Q.No	VALUE POINTS	MARKS
1	CH <sub>3</sub> CH <sub>2</sub> CH(Cl)CH <sub>3</sub> ; secondary halide/ 2 <sup>o</sup> carbocation is more stable	½, ½
2	NH <sub>3</sub>	1
3	Ferromagnetism	1
4	2,4,6-Tribromoaniline / 2,4,6-Tribromobenzenamine	1
5	Like Charged particles cause repulsion/ Brownian motion/ solvation	1
6	(i) Mercury cell (ii) Fuel cell (iii) Lead storage battery (iv) Dry cell	½ ½ ½ ½
7	A-Na <sub>2</sub> CrO <sub>4</sub> B-Na <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> C-K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> Use- strong oxidising agent / as a primary standard in volumetric analysis	½ ½ ½ ½
OR		
7	8MnO <sub>4</sub> <sup>-</sup> + 3S <sub>2</sub> O <sub>3</sub> <sup>2-</sup> + H <sub>2</sub> O → 8MnO <sub>2</sub> + 6SO <sub>4</sub> <sup>2-</sup> + 2OH <sup>-</sup>	1
	Cr <sub>2</sub> O <sub>7</sub> <sup>2-</sup> + 14 H <sup>+</sup> + 3 Sn <sup>2+</sup> → 2 Cr <sup>3+</sup> + 3 Sn <sup>4+</sup> + 7 H <sub>2</sub> O	1
8	(i) [Cr(H <sub>2</sub> O) <sub>5</sub> Cl]Cl <sub>2</sub> .H <sub>2</sub> O (ii) pentaquaachloridoChromium(III) chloride monohydrate (or chloride hydrate) (no deduction for not writing hydrate)	1 1
9.	(i) zero order , bimolecular/ unimolecular (ii) mol L <sup>-1</sup> s <sup>-1</sup>	½, ½ 1
10.	(i) CH <sub>3</sub> -CH <sub>2</sub> -O-H + H <sup>+</sup> → CH <sub>3</sub> -CH <sub>2</sub> -O <sup>+</sup> H <sub>2</sub> (ii) CH <sub>3</sub> CH <sub>2</sub> -O <sup>-</sup> + CH <sub>3</sub> -CH <sub>2</sub> -O <sup>+</sup> H <sub>2</sub> → CH <sub>3</sub> CH <sub>2</sub> -O-CH <sub>2</sub> CH <sub>3</sub> + H <sub>2</sub> O (iii) CH <sub>3</sub> CH <sub>2</sub> -O-CH <sub>2</sub> CH <sub>3</sub> → CH <sub>3</sub> CH <sub>2</sub> -O-CH <sub>2</sub> CH <sub>3</sub> + H <sup>+</sup>	½ 1 ½
11.	(i) In chlorobenzene, each carbon atom is sp <sup>2</sup> hybridised / resonating structures / partial double bond character. (ii) Due to +R effect in chlorobenzene/ difference in hybridization i.e. sp <sup>2</sup> and sp <sup>3</sup> respectively/ -I and +R effect oppose each other while -I effect is the only contributing factor in cyclohexane. (iii) Due to formation of planar carbocation/ Carbon in carbocation formed is sp <sup>2</sup> hybridised.	1 1 1
12.	2 x 10 <sup>24</sup> atoms weigh = 300g	

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	$6.022 \times 10^{23}$ atoms weigh = $(300 \times 6.022 \times 10^{23}) / 2 \times 10^{24}$ = 90.3 g  $d = \frac{z \times M}{a^3 N_A}$ $= \frac{4 \times 90.3}{(250 \times 10^{-10})^3 \times N_0}$ $= 38.4 \text{ g cm}^{-3}$  (or any other correct method)	1  $\frac{1}{2} + \frac{1}{2}$  1						
13	$\log k = \log A - E_a / 2.303 RT$ $E_a / 2.303 RT = 1.0 \times 10^4 \text{ K} / T$ $E_a = 1.0 \times 10^4 \times 2.303 \times 8.314$ $= 191471.4 \text{ J/mol}$  $t_{1/2} = 0.693 / k$ $k = 0.693 / 200 \text{ min}$ $= 0.0034 \text{ min}^{-1}$	$\frac{1}{2}$  1  $\frac{1}{2}$  1						
14.	(i) <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Adsorption</th> <th>Absorption</th> </tr> </thead> <tbody> <tr> <td>Surface phenomena</td> <td>Bulk phenomena</td> </tr> <tr> <td>The accumulation of molecular species at the surface rather than in the bulk of a solid or liquid is termed adsorption.</td> <td>The substance is uniformly distributed throughout the bulk of the solid essentially a bulk phenomenon. (any one difference)</td> </tr> </tbody> </table> (ii) $\text{AlCl}_3$ , more positive charge/Hardy-Schulze rule  (iii) Sulphur	Adsorption	Absorption	Surface phenomena	Bulk phenomena	The accumulation of molecular species at the surface rather than in the bulk of a solid or liquid is termed adsorption.	The substance is uniformly distributed throughout the bulk of the solid essentially a bulk phenomenon. (any one difference)	1  $\frac{1}{2} + \frac{1}{2}$  1
Adsorption	Absorption							
Surface phenomena	Bulk phenomena							
The accumulation of molecular species at the surface rather than in the bulk of a solid or liquid is termed adsorption.	The substance is uniformly distributed throughout the bulk of the solid essentially a bulk phenomenon. (any one difference)							
15.	(i) Zone refining (ii) Leaching / Bayer's process (iii) Reducing agent / to form CO which acts as a reducing agent.	1 1 1						
16.	(i) $E_{\text{cell}}^0 = E_c^0 - E_a^0$ $= (-0.44) - (-0.74) \text{ V}$ $= 0.30 \text{ V}$  $E_{\text{cell}} = E_{\text{cell}}^0 - \frac{0.059}{n} \log \frac{[\text{Cr}^{3+}]^2}{[\text{Fe}^{2+}]^3}$  $E_{\text{cell}} = E_{\text{cell}}^0 - \frac{0.059}{6} \log \frac{[0.01]^2}{[0.1]^3}$ $= 0.30 - (-0.059/6)$ $= 0.3098 \text{ V}$	$\frac{1}{2}$  $\frac{1}{2}$  1  1						
17.	(i) ability of oxygen to form multiple bond/ $\pi\pi$ - $d\pi$ bond. (ii) Partially filled d orbitals / due to comparable energies of ns and (n-1) d orbitals (iii) due to relative stabilities of the $f^0$ , $f^7$ and $f^{14}$ occupancies of the 5f orbitals/ Comparable energies of 7s, 6d, 5f orbitals.	1 1 1						

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
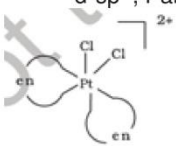
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18.	(i) $\text{CH}_3\text{OH}$ , $(\text{CH}_3)_3\text{C-I}$ (ii) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ (iii) 	1 1 1
19.	(i) $\text{C}_6\text{H}_5\text{NH}_2$ , $\text{C}_6\text{H}_5\text{N}_2^+\text{Cl}^-$ , $\text{C}_6\text{H}_5\text{I}$ (ii) $\text{CH}_3\text{CN}$ , $\text{CH}_3\text{CH}_2\text{NH}_2$ , $\text{CH}_3\text{CH}_2\text{NC}$	$\frac{1}{2} + \frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2} + \frac{1}{2}$
20.	a. Catalyst / initiator of free radical b. Hexamethylene diamine and adipic acid / structure / IUPAC name c. Buna-S < polystyrene < Terylene	1 $\frac{1}{2}$ , $\frac{1}{2}$ 1
OR		
20	<p><i>Chain initiation steps</i></p> $\text{C}_6\text{H}_5-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}-\overset{\text{O}}{\parallel}{\text{C}}-\text{C}_6\text{H}_5 \longrightarrow 2\text{C}_6\text{H}_5-\overset{\text{O}}{\parallel}{\text{C}}-\dot{\text{O}} \longrightarrow 2\dot{\text{C}}_6\text{H}_5$ <p align="center">Benzoyl peroxide <span style="margin-left: 150px;"></span> Phenyl radical</p> $\dot{\text{C}}_6\text{H}_5 + \text{CH}_2 = \text{CH} \longrightarrow \text{C}_6\text{H}_5-\text{CH}_2-\dot{\text{C}}\text{H}$ <p><i>Chain propagating step</i></p> $\text{C}_6\text{H}_5-\text{CH}_2-\dot{\text{C}}\text{H} + \text{CH}_2 = \text{CH} \longrightarrow \text{C}_6\text{H}_5-\text{CH}_2-\text{CH}_2-\dot{\text{C}}\text{H}$ $\text{C}_6\text{H}_5-\text{CH}_2-\text{CH}_2-\dot{\text{C}}\text{H} + \text{CH}_2 = \text{CH} \longrightarrow \text{C}_6\text{H}_5-\text{CH}_2-\text{CH}_2-\text{CH}_2-\dot{\text{C}}\text{H}$ <p align="center"><math>\downarrow</math></p> $\text{C}_6\text{H}_5-\text{CH}_2-\text{CH}_2-\text{CH}_2-\dot{\text{C}}\text{H}$ <p><i>Chain terminating step</i></p> <p>For termination of the long chain, these free radicals can combine in different ways to form polythene. One mode of termination of chain is shown as under:</p> $\text{C}_6\text{H}_5-\text{CH}_2-\text{CH}_2-\dot{\text{C}}\text{H} + \text{C}_6\text{H}_5-\text{CH}_2-\text{CH}_2-\dot{\text{C}}\text{H} \longrightarrow \text{C}_6\text{H}_5-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{C}_6\text{H}_5$	1  1  1
21.	(i) $\beta$ -D glucose and $\beta$ -D-galactose / glucose and galactose (ii) water soluble, excreted out of the body (iii) In nucleotide, phosphoric acid/phosphate group attached to the nucleoside / structures of both nucleotide and nucleoside / nucleotide = base + sugar + phosphate group, nucleoside = base + sugar.	$\frac{1}{2}$ , $\frac{1}{2}$ 1 1
22.	$d^2sp^3$ , Paramagnetic, low spin 	1, $\frac{1}{2}$ , $\frac{1}{2}$ 1
23.	(i) Aware, concerned or any other correct two values. (ii) Side effects, unknown health problems (iii) Neurologically active drugs/ stress relievers Example- valium, equanil (or any other correct two example)	$\frac{1}{2} + \frac{1}{2}$ 1 1 $\frac{1}{2} + \frac{1}{2}$
24	a) i. Endothermic compound / decomposition of ozone is exothermic in nature and $\Delta G$ is negative / decomposition of ozone is spontaneous. ii. Exists as $[\text{PCl}_4]^+[\text{PCl}_6]^-$ iii. Shows only -1 oxidation state / most electronegative element/ absence of d-orbitals	1 1 1

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$\Delta T_f = \frac{K_f w_b \times 1000}{M_b \times w_a}$	1
$0.383 = (3.83 \times 2.56 / M \times 100) \times 1000$	1
$M = 256$	
$S \times x = 256$	
$32 \times x = 256$	1
$x = 8$	
b)	
i) Shrinks	1
ii) swells	1

Name	Signature	Name	Signature
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