

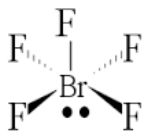
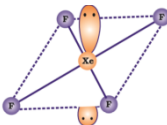
Chemistry Marking scheme

Delhi - 2016

Set – 56/1/1/D

Q.No	VALUE POINTS	MARKS
1	$\text{CH}_3\text{CH}_2\text{CH}(\text{Cl})\text{CH}_3$; secondary halide/ 2° carbocation is more stable	$\frac{1}{2}$, $\frac{1}{2}$
2	NH_3	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	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
7	A- Na_2CrO_4 B- $\text{Na}_2\text{Cr}_2\text{O}_7$ C- $\text{K}_2\text{Cr}_2\text{O}_7$ Use- strong oxidising agent / as a primary standard in volumetric analysis	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
	OR	
7	$8\text{MnO}_4^- + 3\text{S}_2\text{O}_3^{2-} + \text{H}_2\text{O} \longrightarrow 8\text{MnO}_2 + 6\text{SO}_4^{2-} + 2\text{OH}^-$	1
	$\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 3\text{Sn}^{2+} \rightarrow 2\text{Cr}^{3+} + 3\text{Sn}^{4+} + 7\text{H}_2\text{O}$	1
8	(i) $[\text{Cr}(\text{H}_2\text{O})_5\text{Cl}]\text{Cl}_2 \cdot \text{H}_2\text{O}$ (ii) pentaquachloridoChromium(III) chloride monohydrate (or chloride hydrate) (no deduction for not writing hydrate)	1 1
9.	(i) zero order , bimolecular/ unimolecular (ii) $\text{mol L}^{-1} \text{s}^{-1}$	$\frac{1}{2}$, $\frac{1}{2}$ 1
10.	(i) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH} + \text{H}^+ \rightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{OH}_2^+$ (ii) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}_2^+ + \text{CH}_3\text{CH}_2\text{CH}_2\text{OH} \rightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{O}^+\text{CH}_2\text{CH}_3 + \text{H}_2\text{O}$ (iii) $\text{CH}_3\text{CH}_2\text{CH}_2\text{O}^+\text{CH}_2\text{CH}_3 \rightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3 + \text{H}^+$	$\frac{1}{2}$ 1 $\frac{1}{2}$
11.	(i) In chlorobenzene, each carbon atom is sp^2 hybridised / resonating structures / partial double bond character. (ii) Due to +R effect in chlorobenzene/ difference in hybridization i.e. sp^2 and sp^3 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^2 hybridised.	1 1 1
12.	2×10^{24} atoms weigh = 300g	

	6.022×10^{23} atoms weigh = $(300 \times 6.022 \times 10^{23}) / 2 \times 10^{24}$ = 90.3 g $d = \frac{z \times M}{a^3 N_A}$ = $4 \times 90.3 / (250 \times 10^{-10})^3 \times N_0$ = 38.4 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 J/mol $t_{1/2} = 0.693 / k$ $k = 0.693 / 200 \text{ min}$ = 0.0034 min^{-1}	$\frac{1}{2}$ 1 $\frac{1}{2}$ 1						
14.	(i) <table border="1"><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) 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) $E^0_{\text{cell}} = E^0_c - E^0_a$ = $(-0.44) - (-0.74) \text{ V}$ = 0.30V $E_{\text{cell}} = E^0_{\text{cell}} - \frac{0.059}{n} \log \frac{[\text{Cr}^{3+}]^2}{[\text{Fe}^{2+}]^3}$ $E_{\text{cell}} = E^0_{\text{cell}} - \frac{0.059}{6} \log \frac{[0.01]^2}{[0.1]^3}$ = $0.30 - (-0.059/6)$ = 0.3098V	$\frac{1}{2}$ $\frac{1}{2}$ 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						

	b) i)  ii) 	1,1
	<u>OR</u>	
24	(i) F ₂ is the stronger oxidising agent than chlorine (a) low enthalpy of dissociation of F-F bond (b) less negative electron gain enthalpy of F (c) high hydration enthalpy of F ⁻ ion ii) low temperature, high pressure and presence of catalyst iii) a) H ₃ PO ₄ < H ₃ PO ₃ < H ₃ PO ₂ b) BiH ₃ < SbH ₃ < AsH ₃ < PH ₃ < NH ₃	1/2 × 4 = 2 1 1 1
25.	A -C ₆ H ₅ COCH ₃ B -C ₆ H ₅ CH ₂ CH ₃ C -C ₆ H ₅ COOH D, E -C ₆ H ₅ COONa, CH ₃ I	1 1 1 1+1
	<u>OR</u>	
25	a) $\text{HCHO} + \text{HCHO} \xrightarrow[\text{conc}]{\text{NaOH}} \text{HCOONa} + \text{CH}_3\text{OH}$ (or any other example) b) CH ₃ CH=N-NHCONH ₂ c) Stronger -I effect of fluorine, stronger acid less pK _a / strong electron withdrawing power of fluorine. d) CH ₃ CH=CHCH ₂ CHO e) Silver mirror formed on adding ammonical silver nitrate to propanal and not with propanone (or any other correct test)	1 1 1 1 1
26.	a) $\Delta T_f = i \frac{K_f w_b \times 1000}{M_b \times w_a}$ $\Delta T_f = 3 \times (1.86 \times 1.9/95 \times 50) \times 1000$ $= 2.23\text{K}$ $T_f - \Delta T_f = 273.15 - 2.23 = 273 - 2.23$ $T_f = 270.92\text{ K or } 270.77\text{K}$ b) i) 2M glucose ; More Number of particles / less vapour pressure ii) Reverse Osmosis	1 1 1 1/2 + 1/2 1
	<u>OR</u>	
26	a)	

	$\Delta T_f = \frac{K_f w_b \times 1000}{M_b \times w_a}$	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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