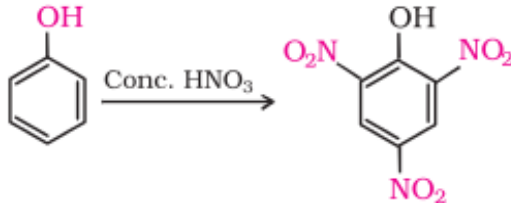


Delhi-1 2013

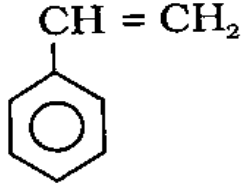
CHEMISTRY MARKING SCHEME
DELHI -2013
SET 56/1/1

Q no.	Answers	Marks
1	4	1
2	Mond Process/ Vapour phase refining method	1
3	4	1
4	4-chloropent-1-ene	1
5	CH ₃ CN is for n ^o d or ethanenitrile is for n ^o d.	1
6	H ₃ C-CH(CH ₃)-CH ₂ -CHO	1
7	(CH ₃) ₃ N < CH ₃ NH ₂ < (CH ₃) ₂ NH	1
8	mRNA, rRNA, tRNA	1
9	$\Delta T_b = K_b \cdot m$ $T_b - T_b^0 = 0.52 \text{ K kg mol}^{-1} \times \frac{18 \text{ g}}{180 \text{ g mol}^{-1}} \times \frac{1}{1 \text{ kg}}$ $T_b - 373.15 \text{ K} = 0.052 \text{ K}$ $T_b = 373.202 \text{ K}$	½ ½ ½ ½
10	$\Lambda_m = \kappa / C$ $\Lambda_m = \frac{0.025 \text{ S cm}^{-1}}{0.20 \text{ mol L}^{-1}}$ $\Lambda_m = 125 \text{ S cm}^2 \text{ mol}^{-1}$ <p style="text-align: right;">(deduct ½ mark for wrong or no unit)</p>	½ ½ 1

11	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;"></td> <td style="text-align: center;">Dispersed phase</td> <td style="text-align: center;">Dispersion Medium</td> <td></td> </tr> <tr> <td style="vertical-align: top;">(i) Smoke</td> <td style="text-align: center;">Solid</td> <td style="text-align: center;">Gas</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="vertical-align: top;">(ii) Milk</td> <td style="text-align: center;">Liquid</td> <td style="text-align: center;">Liquid</td> <td style="text-align: center;">1</td> </tr> </table>		Dispersed phase	Dispersion Medium		(i) Smoke	Solid	Gas	1	(ii) Milk	Liquid	Liquid	1	
	Dispersed phase	Dispersion Medium												
(i) Smoke	Solid	Gas	1											
(ii) Milk	Liquid	Liquid	1											
11	<p>OR</p> <p>Lyophilic sds are solvent attracting sds whereas Lyophobic sds are Solvent repelling sds</p> <p>Lyophobic sds can be easily coagulated</p>	<p>$\frac{1}{2} + \frac{1}{2}$</p> <p>1</p>												
12	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Physisorption</th> <th style="text-align: center;">Chemisorption</th> </tr> </thead> <tbody> <tr> <td>It is not very specific.</td> <td>It is highly specific.</td> </tr> <tr> <td>It usually takes place at low temperature and decreases with increasing temperature.</td> <td>It takes place at high temperature.</td> </tr> <tr> <td>It is reversible.</td> <td>It is irreversible.</td> </tr> <tr> <td>Low enthalpy of adsorption.</td> <td>High enthalpy of adsorption.</td> </tr> </tbody> </table>	Physisorption	Chemisorption	It is not very specific.	It is highly specific.	It usually takes place at low temperature and decreases with increasing temperature.	It takes place at high temperature .	It is reversible.	It is irreversible.	Low enthalpy of adsorption.	High enthalpy of adsorption.	$\frac{1}{2} \times 4 = 2$		
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Low enthalpy of adsorption.	High enthalpy of adsorption.													
13	<p>(a) NaCN solution</p> <p>(b) CO</p>	1+1												
14	<p>(i)</p> $\text{PCl}_5 \xrightarrow{\text{heat}} \text{PCl}_3 + \text{Cl}_2$ <p>(ii)</p> $4\text{H}_3\text{PO}_3 \xrightarrow{\text{heat}} 3\text{H}_3\text{PO}_4 + \text{PH}_3$ <p style="text-align: center;">(Full marks may be given if equation is not balanced)</p>	<p>1</p> <p>1</p>												

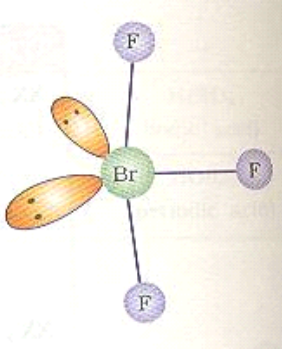
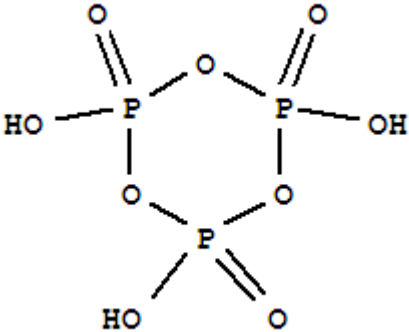
15	<p>(a) Cu, because in +1 oxidation state it has stable $3d^{10}$ configuration.</p> <p>(b) Mn^{2+}, V^{3+}: because of the presence of unpaired electrons.</p> <p>(if only one ion is mentioned deduct $\frac{1}{2}$ mark)</p>	<p>$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$</p>
16	<p>(i) Due to resonance / diagrammatic representation, C-Cl bond acquires a partial double bond character which is difficult to cleave.</p> <p>(ii) Due to sp^2 hybridisation of 'C' of C-Cl bond.</p> <p>(iii) Due to unstable phenyl cation.</p> <p>(iv) Due to repulsion between nucleophile and electron rich arenes.</p> <p>(any two)</p>	1+1
17	<p>(i) $CH_3-CH_2-\ddot{O}-H + H^+ \rightarrow CH_3-CH_2-\overset{+}{O}-H$</p> <p>(ii) $CH_3CH_2-\ddot{O}: + CH_3-CH_2-\overset{+}{O}-H \rightarrow CH_3CH_2-\overset{+}{O}-CH_2CH_3 + H_2O$</p> <p>(iii) $CH_3CH_2-\overset{+}{O}-CH_2CH_3 \rightarrow CH_3CH_2-O-CH_2CH_3 + H^+$</p>	<p>$\frac{1}{2}$ $\frac{1}{2}$ 1</p>
18	<p>(i)</p> $CH_3-CH=CH_2 \xrightarrow{H_2O/H^+} \begin{array}{c} CH_3-CH-CH_3 \\ \\ OH \end{array}$ <p>(ii)</p>  <p>(or by any other correct suitable method)</p>	1+1

19	<p>(a) p-type semiconductor (b) Ferromagnetism (c) Impurity defect / Cation vacancy defect</p>	1x3=3
20	<p>When K_2SO_4 is dissolved in water, ions are produced Total number of ions produced = 3</p> $i = 3$ $\pi = i CRT = i \times n \times R \times T$ $\pi = 3 \times \frac{2.5 \times 10^2 \text{ g}}{174 \text{ g mol}^{-1}} \times \frac{1}{2L} \times 0.0821 \text{ Lat mK}^{-1} \text{ mol}^{-1} \times 298 \text{ K}$ $\pi = 5.27 \times 10^3 \text{ atm}$ <p style="text-align: right;">(deduct 1/2 mark for wrong or no unit)</p>	<p>1/2 1/2 1 1</p>
21	<p>The cell reaction: $Fe(s) + 2H^+(aq) \rightarrow Fe^{2+}(aq) + H_2(g)$</p> $E_{cell}^{\circ} = 0.44 \text{ V}$ <p>Nernst equation</p> $E_{cell} = E_{cell}^{\circ} - \frac{0.059}{2} \log \frac{[Fe^{2+}]}{[H^+]^2}$ $E_{cell} = 0.44 \text{ V} - \frac{0.059}{2} \log \frac{(0.001 \text{ M})}{(1 \text{ M})^2}$ $= 0.44 \text{ V} - \frac{0.059}{2} \log (10^{-3})$ $= 0.44 \text{ V} + 0.0885 \text{ V}$ $= 0.5285 \text{ V}$ <p style="text-align: right;">(deduct 1/2 mark for wrong or no unit)</p>	<p>1 1/2 1/2 1</p>

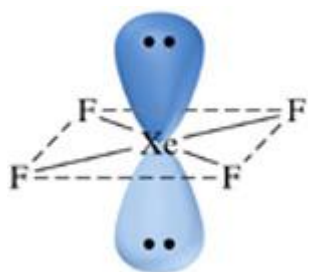
22	(i) Due to incomplete filling of d-orbitals, transition metals show variable oxidation states. (ii) Because of Lanthanoid Contraction. (iii) Because of their ability to show multiple / variable oxidation states.	1 x 3=3
	OR	
22	(i) $\text{Cr}_2\text{O}_7^{2-} + 6\text{Fe}^{2+} + 14\text{H}^+ \rightarrow 2\text{Cr}^{3+} + 6\text{Fe}^{3+} + 7\text{H}_2\text{O}$ (ii) $2\text{CrO}_4^{2-} + 2\text{H}^+ \rightarrow \text{Cr}_2\text{O}_7^{2-} + \text{H}_2\text{O}$ (iii) $2\text{MnO}_4^- + 5\text{C}_2\text{O}_4^{2-} + 16\text{H}^+ \rightarrow 2\text{Mn}^{2+} + 10\text{CO}_2 + 8\text{H}_2\text{O}$	1 x 3=3
	(Accept only balanced equation)	
23	(i) Triamminetri chloridochromium(III) (ii) Potassium hexacyanoferrate(III) (iii) Dibromidobis-(ethane-1,2-diamine)cobalt(III) / Dibromidobis-(ethylenediamine)cobalt(III)	1 1 1
24	(i) A=C ₆ H ₅ CN B=C ₆ H ₅ COOH C=C ₆ H ₅ CONH ₂ (ii) A=C ₆ H ₅ NH ₂ B=C ₆ H ₅ N ₂ ⁺ Cl ⁻ C=C ₆ H ₅ -OH	$\frac{1}{2} \times 3 = 1 \frac{1}{2}$ $\frac{1}{2} \times 3 = 1 \frac{1}{2}$
25	(i) Buna-S: 1,3- Butadiene and Styrene $\text{CH}_2 = \text{CH} - \text{CH} = \text{CH}_2$ and 	$\frac{1}{2} + \frac{1}{2}$
	(ii) Neoprene: Chloroprene $\text{CH}_2 = \overset{\text{Cl}}{\underset{ }{\text{C}}} - \text{CH} = \text{CH}_2$	$\frac{1}{2} + \frac{1}{2}$

	<p>(iii) Nylon-66 Hexamethylene diamine and Adipic acid $\text{H}_2\text{N}(\text{CH}_2)_6\text{NH}_2$ $\text{HOOC}(\text{CH}_2)_4\text{COOH}$</p>	$\frac{1}{2} + \frac{1}{2}$
26	<p>(i) Sonali: Concerned for the society, socially active and helpful to others. Principal: Caring, commanding and serious about the welfare of students. (or any other suitable values)</p> <p>(ii) Vitamins B and C</p>	<p>1 1 $\frac{1}{2} + \frac{1}{2}$</p>
27.	<p>(a) Sodium Benzoate (b) To impart antiseptic properties (c) Tranquilizers</p>	1 x 3=3

28	<p>(a)</p> <p>(i) rate = $k[A]^2[B]$</p> <p>(ii) Rate will increase 9 times of the actual rate of reaction</p> <p>(iii) Rate will increase 8 times of the actual rate of reaction</p> <p>(b)</p> $k = \frac{2.303}{t} \log \frac{[A]_0}{[A]}$ $k = \frac{2.303}{40 \text{ min}} \log \frac{100}{70}$ $k = \frac{2.303}{40} \times 0.155 = 0.00892 \text{ min}^{-1}$ $t_{1/2} = \frac{0.693}{k}$ $t_{1/2} = \frac{0.693 \text{ min}}{0.00892}$ $t_{1/2} = 77.7 \text{ min}$	<p>$1 \times 3 = 3$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>
28	<p style="text-align: center;">OR</p> <p>(a)</p> $t_{99\%} = \frac{2.303}{k} \log \frac{100}{1}$ $t_{90\%} = \frac{2.303}{k} \log \frac{100}{10}$ <p>on comparison</p> $\frac{t_{99\%}}{t_{90\%}} = \frac{\log 100}{\log 10}$ <p>Hence $t_{99\%} = 2 t_{90\%}$</p> <p style="text-align: center;">(or solved by any other correct suitable method)</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>

	<p>(b)</p> $\text{Slope} = \frac{-E_a}{2303R}$ $-4250 \text{ K} = -\frac{E_a}{2303 \times 8.314 \text{ J K}^{-1} \text{ mol}^{-1}}$ $E_a = 81375 \text{ J mol}^{-1} \text{ or } 81.375 \text{ kJ mol}^{-1}$	<p>1</p> <p>1</p> <p>1</p>
29.	<p>(i) Because of smaller size of F-atom/ shorter bond length, the electron-electron repulsion among the lone pairs is greater in F_2 than Cl_2</p> <p>(ii) Due to hydrogen bonding in NH_3.</p> <p>(b)</p> <p>(i)</p>  <p>(ii)</p> 	<p>1+1</p>

(iii)



1x3=3

OR

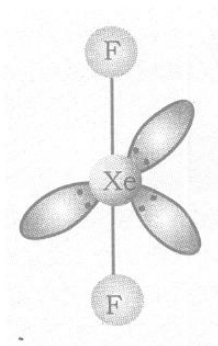
- (a) (i) Because of its low solubility in blood.
 (ii) Because of its highest electronegativity.
 (iii) Because O-O single bond is weaker than S-S single bond.

1x3=3

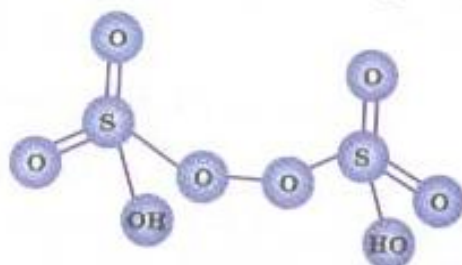
29

(b)

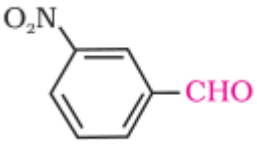
(i)



(ii)



1+1

	<p>(iii)</p>  <p>(b)</p> <p>(i) Ethanal and Propanal : Ethanal gives yellow ppt of Iodoform (CHI_3) on addition of NaOH/I_2 whereas Propanal does not give this test. (or any other suitable test)</p> <p>(ii) Benzoic acid and Phenol : Add neutral FeCl_3 to both, phenol gives purple / violet colouration whereas Benzoic acid does not give this test or / Add NaHCO_3 to both, Benzoic acid will give brisk effervescence whereas phenol does not give this test. (or any other suitable test)</p> <p>Sh. S K Murja Pr of. R D Shukla Dr. K N Uppadhya Mr. Rakesh Dhawan Ms. Neeru Sofat Mr. Vrendra Singh</p> <p>D (Ms.) Sangeeta Bhatia M. K M Abdul Raheem M. D A Mishra M. Deshbir Singh M. Akhileshwar Mishra</p>	<p>1 x3=3</p> <p>1+1</p>
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