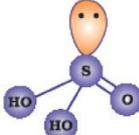
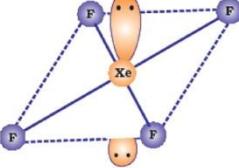




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CHEMISTRY MARKING SCHEME
FOREIGN-2016
SET -56/2/2/F

Q.no.	Answers	Marks
1	Reaction (ii)	1
2	NO ₂ gas	1
3	N,N-dimethylbutanamide	1
4	Like Charged particles cause repulsion/ Brownian motion/ solvation	1
5	Because of some crystallization.	1
6	Henry's law states that the mole fraction of gas in the solution is proportional to the partial pressure of the gas over the solution. Applications: solubility of CO ₂ gas in soft drinks /solubility of air diluted with helium in blood used by sea divers or any other Solubility of gas in liquid decreases with increase in temperature.	1 ½ ½
7	X = CH ₃ -CO-CH ₂ -CH ₃ / Butan-2-one Y = CH ₃ -CH(OH)-CH ₂ -CH ₃ / Butan-2-ol	1 1
8	i)  ii) 	1+1
9	i) [Co(NH ₃) ₄ Cl ₂]Cl ii) Tetraamminedichloridocobalt(III) chloride	1 1
10	When reaction is completed 99.9%, [R] _n = [R] ₀ - 0.999[R] ₀ $k = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$ $= \frac{2.303}{t} \log \frac{[R]_0}{[R]_0 - 0.999[R]_0} = \frac{2.303}{t} \log 10^3$ $t = 6.909/k$ For half-life of the reaction $t_{1/2} = 0.693/k$ $\frac{t}{t_{1/2}} = \frac{6.909}{k} \times \frac{k}{0.693} = 10$	½ ½ 1
OR		



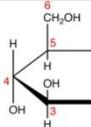
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10	<p>$R \rightarrow P$</p> <p>Rate = $\frac{dR}{dt} = kR$</p> <p>or $\frac{dR}{R} = -kdt$</p> <p>Integrating this equation, we get</p> $\ln [R] = -kt + I \quad (4.8)$ <p>Again, I is the constant of integration and its value can be determined easily.</p> <p>When $t = 0$, $R = [R]_0$, where $[R]_0$ is the initial concentration of the reactant.</p> <p>Therefore, equation (4.8) can be written as</p> $\ln [R]_0 = -k \times 0 + I$ $\ln [R]_0 = I$ <p>Substituting the value of I in equation (4.8)</p> $\ln [R] = -kt + \ln [R]_0 \quad (4.9)$ <p>Rearranging this equation</p> $\ln \frac{R}{R_0} = -kt$ <p>or $k = \frac{1}{t} \ln \frac{[R]_0}{[R]}$</p> $k = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$	<p>1/2</p> <p>1/2</p> <p>1</p>
11	$\Delta T_f = iK_f m$ <p>For complete ionisation of Na_2SO_4 $i=3$</p> $\Delta T_f = T_f^0 - T_f = 3 \times 1.86 \text{ K kg mol}^{-1} \times \frac{2\text{g}}{142\text{g mol}^{-1}} \times \frac{1000 \text{ g kg}^{-1}}{50 \text{ g}}$ $\Delta T_f = 1.57$ <p align="center">So, $T_f = -1.57^\circ\text{C}$ or 271.43K</p>	<p>1/2</p> <p>1/2</p> <p>1</p> <p>1</p>
12	<p>i) Because of higher oxidation state (+5) / high charge to size ratio / high polarizing power.</p> <p>ii) Because of high interelectronic repulsion.</p> <p>iii) Because of its low bond dissociation enthalpy and high hydration enthalpy of F^-.</p>	<p>1x3=3</p>
13	<p>i) A : $C_6H_5CONH_2$ B : $C_6H_5NH_2$ C : $C_6H_5NHCOCH_3$</p> <p>ii) A : $C_6H_5NO_2$ B : $C_6H_5NH_2$ C : C_6H_5-NC</p>	<p>1 1/2</p> <p>1 1/2</p>



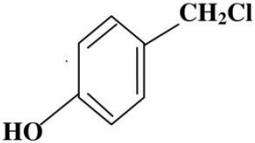
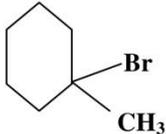


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14	<p>(i) Butadiene and acrylonitrile $\text{CH}_2 = \text{CH} - \text{CH} = \text{CH}_2$ and $\text{CH}_2 = \text{CH} - \text{CN}$</p> <p>(ii) Vinyl chloride $\text{CH}_2 = \text{CH} - \text{Cl}$</p> <p>(iii) Chloroprene</p> $\begin{array}{c} \text{Cl} \\ \\ \text{CH}_2 = \text{C} - \text{CH} = \text{CH}_2 \end{array}$	<p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p>
15	<p>i) </p> <p>ii) Peptide linkage / -CO-NH- linkage</p> <p>iii) Water soluble- Vitamin B / C Fat soluble- Vitamin A / D / E / K</p>	<p>1</p> <p>1</p> <p>$\frac{1}{2} + \frac{1}{2}$</p>
16	<p>i) dsp^3, Diamagnetic, low spin</p> <p>ii) The energy used to split degenerate d-orbitals due to the presence of ligands in a definite geometry is called crystal field splitting energy.</p>	<p>$\frac{1}{2} + \frac{1}{2}$</p> <p>1</p>
17	<p>i) Iodine is heated with Zr or Ti to form a volatile compound which on further heating decompose to give pure Zr or Ti . or</p> $\text{Zr(impure)} + 2\text{I}_2 \longrightarrow \text{ZrI}_4 \text{ (volatile)}$ $\text{ZrI}_4 \xrightarrow{1800\text{K}} \text{Zr(pure)} + 2\text{I}_2$ <p>ii) Cryolite lowers the m.p. of alumina mix / acts as a solvent / brings conductivity.</p>	<p>1</p> <p>1</p>



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	(iii) Role of NaCN in the extraction of Ag is to do the leaching of silver ore in the presence of air. or $4\text{Ag(s)} + 8\text{CN}^{\text{(aq)}} + 2\text{H}_2\text{O} + \text{O}_2\text{(g)} \longrightarrow 4[\text{Ag}(\text{CN})_2]^- + 4\text{OH}^-$	1
18	<p>i)</p>  <p>ii)</p>  <p>iii) $\text{CH}_3\text{CH}_2\text{ONO}$</p>	1 x 3=3
19	$k = \frac{2.303}{t} \log \frac{p_i}{2p_i - p_t}$ $= \frac{2.303}{300} \log \frac{0.3}{2 \times 0.3 - 0.5}$ $= \frac{2.303}{300} \log 3$ $= \frac{2.303 \times 0.4771}{300}$ $= 0.0036 \text{ atm}^{-1} \text{ or } 0.004 \text{ atm}^{-1} \text{ (approx.)}$	1 1 1
20	<p>i) Because of the resonance stabilization of the conjugate base i.e enolate anion or diagrammatic representation.</p> <p>iii) Because the carboxyl group gets bonded to the catalyst anhyd. AlCl_3 (Lewis acid).</p> <p>(note: part ii is deleted because of printing error and mark allotted in part i and part iii)</p>	1½ 1½
20	<p style="text-align: center;">OR</p> <p>i) $\text{C}_6\text{H}_5\text{CH}_3 \xrightarrow{\text{CrO}_3 / (\text{CH}_3\text{CO})_2\text{O}} \text{C}_6\text{H}_5\text{CH}(\text{OCOCH}_3)_2 \xrightarrow{\text{H}_2\text{O}} \text{C}_6\text{H}_5\text{CHO}$</p>	

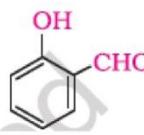
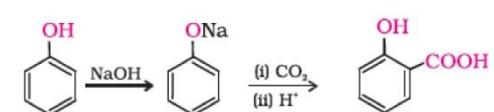
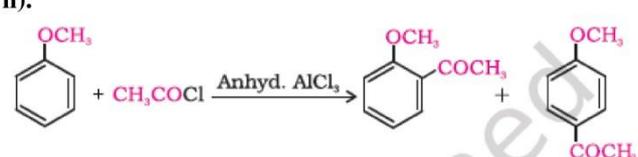


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	ii) $\text{CH}_3\text{COOH} \xrightarrow{\text{Cl}_2/\text{P}} \text{Cl-CH}_2\text{-COOH}$ iii) $\text{CH}_3\text{COCH}_3 \xrightarrow{\text{Zn(Hg)/conc.HCl}} \text{CH}_3\text{CH}_2\text{CH}_3$ (Or by any other correct method)	1x3=3
21	$d = \frac{z \times M}{N_A \times a^3}$ <p align="center">Or</p> $d = \frac{z \times w}{N \times a^3}$ <p align="center">Where w is weight and N is no. of atoms.</p> $d = \frac{4 \times 200 \text{ g}}{2.5 \times 10^{24} \times (400 \times 10^{-10} \text{ cm})^3}$ $d = 5 \text{ g cm}^{-3}$ <p align="center">(or by any other correct method)</p>	1 1 1
22	i) It is a process in which both adsorption and absorption can take place simultaneously. ii) It is the potential difference between the fixed layer and the diffused/ double layer of opposite charges around the colloidal particles. iii) It is the temperature above which the formation of micelles takes place.	1 1 1
23	(i) Caring ,dutiful, Concerned, compassionate (or any other two values) ii) Because higher doses may have harmful effects and act as poison which cause even death. iii) Tranquilizers are a class of chemical compounds used for treatment of stress or even mental diseases. ex. chlordiazepoxide, equanil, veronal, serotonin, valium (or any other two examples)	1/2+1/2 1 1 1/2+1/2
24	a) i) Because of higher oxidation state (+7) of Mn. ii) Because it has one unpaired electron in 3d orbital in its +2 oxidation state / or it has incompletely filled d-orbital in +2 oxidation state. iii) Because of comparable energies of 5f , 6d and 7s orbitals.	1 1 1



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	<p>b)</p> $2\text{MnO}_2 + 4\text{KOH} + \text{O}_2 \longrightarrow 2\text{K}_2\text{MnO}_4 + 2\text{H}_2\text{O}$ $3\text{MnO}_4^{2-} + 4\text{H}^+ \longrightarrow 2\text{MnO}_4^- + \text{MnO}_2 + 2\text{H}_2\text{O}$	1+1
	OR	
24	<p>a)</p> <p>i)Cr, because of maximum no. of unpaired electrons cause strong metallic bonding.</p> <p>ii)Mn, because it attains stable half -filled $3d^5$ configuration in +2 oxidation state.</p> <p>iii)Zn, because of no unpaired electron in d-orbital.</p> <p>b)</p> $2\text{Na}_2\text{CrO}_4 + 2\text{H}^+ \rightarrow \text{Na}_2\text{Cr}_2\text{O}_7 + 2\text{Na}^+ + \text{H}_2\text{O}$ $\text{Na}_2\text{Cr}_2\text{O}_7 + 2\text{KCl} \longrightarrow \text{K}_2\text{Cr}_2\text{O}_7 + 2\text{NaCl}$	<p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p> <p>1+1</p>
25	<p>a)</p> <p>i) $(\text{CH}_3)_3\text{C-I} + \text{CH}_3\text{-OH}$</p> <p>i) $\text{CH}_3\text{-CH}_2\text{-C(=O)-CH}_3$</p> <p>ii)</p>  <p>b).i)</p>  <p>ii).</p> 	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>



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OR		
25	<p>a). (i)</p> <div style="text-align: center;"> <p style="text-align: center;"> <chem>Oc1ccccc1</chem> $\xrightarrow{\text{Br}_2(\text{aq})}$ <chem>Oc1c(Br)cc(Br)cc1Br</chem> </p> </div> <p>(ii) $\text{CH}_3\text{CH}_2\text{OH} + \text{CH}_3\text{COCl} \xrightarrow{\text{pyridine}} \text{CH}_3\text{CH}_2\text{O-COCH}_3 + \text{HCl}$</p> <p>(iii).</p> <div style="text-align: center;"> <p style="text-align: center;"> <chem>COc1ccccc1</chem> $\xrightarrow{\text{HI}}$ <chem>Oc1ccccc1</chem> + <chem>CI</chem> </p> </div> <p>(b)(i) Warm each compound with iodine and sodium hydroxide. Phenol : No yellow ppt formed Ethanol: Yellow ppt of Iodoform are formed.</p> <p>ii) On adding Lucas reagent ($\text{HCl}/\text{anhyd. ZnCl}_2$), Propan-2-ol gives white turbidity after 5 minutes whereas 2-methylpropan-2-ol gives white turbidity immediately.</p> <p style="text-align: right;">(or any other suitable test)</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
26	<p>a) Given $E^\circ_{\text{Cell}} = +0.30\text{V}$; $F = 96500\text{C mol}^{-1}$</p> <p>$n = 6$ (from the given reaction)</p> <p>$\Delta_r G^\circ = -n \times F \times E^\circ_{\text{Cell}}$</p> <p>$\Delta_r G^\circ = -6 \times 96500\text{C mol}^{-1} \times 0.30\text{V}$</p> <p style="text-align: center;">$= -173,700\text{ J / mol}$ or -173.7 kJ / mol</p> <p>$\log K_c = \frac{n E^\circ_{\text{Cell}}}{0.059}$</p> <p>$\log K_c = \frac{6 \times 0.30}{0.059}$</p> <p style="text-align: center;">$\log K_c = 30.5$</p>	<p>$\frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2}$</p> <p>1</p>





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	<p>b)A</p> <p>Because E° value of A shows that on coating ,A acts as anode and Fe acts as a cathode and hence A oxidises in preference to Fe and prevent corrosion / or E°_{cell} is positive and hence A oxidises itself to prevent corrosion of Fe/E° value is more negative.</p> <p align="center">(or any other correct reason)</p>	1 1
	OR	
26	<p>a)</p> $\Lambda_m = \frac{\kappa}{c}$ $= \frac{3.905 \times 10^{-5} \text{ S cm}^{-1}}{0.001 \text{ mol L}^{-1}} \times \frac{1000 \text{ cm}^3}{\text{L}}$ $\Lambda_m = 39.05 \text{ Scm}^2 \text{ mol}^{-1}$ $\Lambda_o = \lambda^\circ(\text{H}^+) + \lambda^\circ(\text{CH}_3\text{COO}^-)$ $= (349.6 + 40.9) \text{ Scm}^2 \text{ mol}^{-1}$ $\Lambda_o = 390.5 \text{ Scm}^2 \text{ mol}^{-1}$ $\alpha = \frac{\Lambda_m}{\Lambda_o}$ $= \frac{39.05 \text{ Scm}^2 \text{ mol}^{-1}}{390.5 \text{ Scm}^2 \text{ mol}^{-1}}$ $\alpha = 0.1$	1/2 1 1/2 1
	<p>b)Secondary battery or rechargeable battery</p> $\text{Pb(s)} + \text{PbO}_2(\text{s}) + 2\text{SO}_4^{2-}(\text{aq}) + 4\text{H}^+(\text{aq}) \longrightarrow 2\text{PbSO}_4(\text{s}) + 2\text{H}_2\text{O}(\text{l})$	1 1