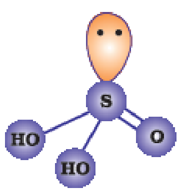
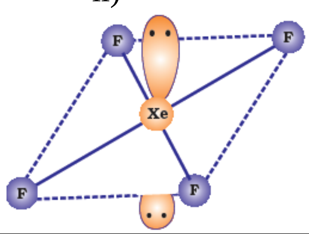
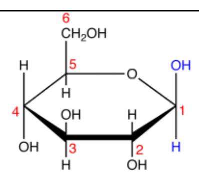
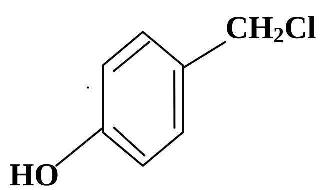
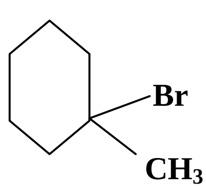
CHEMISTRY MARKING SCHEME
FOREIGN-2016
SET -56/2/1/F

Q.no.	Answers	Marks
1	Like Charged particles cause repulsion/ Brownian motion/ solvation	1
2	Because of some crystallization.	1
3	Reaction (ii)	1
4	NO_2 gas	1
5	N,N-dimethylbutanamide	1
6	i) $[Co(NH_3)_4Cl_2]Cl$ ii) Tetraamminedichloridocobalt(III) chloride	1 1
7	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	
7	$R \rightarrow P$ Rate $= \frac{d\,R}{dt} = k\,R$ or $\frac{d\,R}{R} = -kdt$ Integrating this equation, we get $\ln [R] = -kt + I$ (4.8) Again, I is the constant of integration and its value can be determined easily. When $t = 0$, $R = [R]_0$, where $[R]_0$ is the initial concentration of the reactant. Therefore, equation (4.8) can be written as $\ln [R]_0 = -k \times 0 + I$ $\ln [R]_0 = I$ Substituting the value of I in equation (4.8) $\ln[R] = -kt + \ln[R]_0$ (4.9) Rearranging this equation $\ln\frac{R}{R_0} = kt$ or $k = \frac{1}{t}\ln\frac{[R]_0}{[R]}$	½ ½

	$k = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$	1
8	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
9	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
10	i)  ii) 	1+1
11	$k = \frac{2.303}{t} \log \frac{p_i}{2p_i - p_t}$ $= \frac{2.303}{300} \log \frac{0.3}{2 \times 0.3 - 0.5}$ $= \frac{2.303}{300} \log 3$ $= \frac{2.303 \times 0.4771}{300}$ $= 0.0036\ atm^{-1}$ or $0.004\ atm^{-1}$ (approx.)	1 1 1

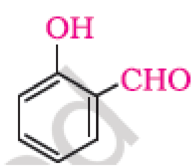
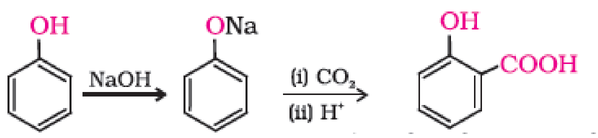
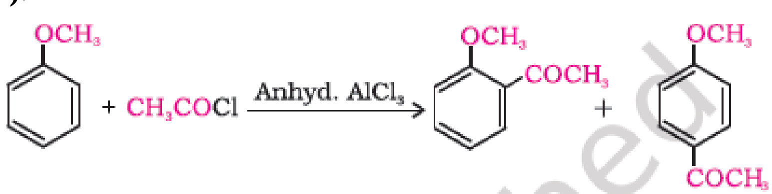
12	i)Because of the resonance stabilization of the conjugate base i.e enolate anion or diagrammatic representation. iii)Because the carboxyl group gets bonded to the catalyst anhyd.$AlCl_3$(lewis acid). **(note: part ii is deleted because of printing error and mark alloted in part i and part iii)**	1½ 1½
	OR	
12	i)$C_6H_5CH_3 \xrightarrow{CrO_3/(CH_3CO)_2O} C_6H_5CH(OCOCH_3)_2 \xrightarrow{H_2O} C_6H_5CHO$ ii)$CH_3COOH \xrightarrow{Cl_2/P} Cl\text{-}CH_2\text{-}COOH$ iii)$CH_3COCH_3 \xrightarrow{Zn(Hg)/conc.HCl} CH_3CH_2CH_3$ (Or by any other correct method)	1x3=3
13	$\mathbf{d = \frac{z \times M}{N_A \times a^3}}$ **Or** $\mathbf{d = \frac{z \times w}{N \times a^3}}$ **Where w is weight and N is no. of atoms.** $\mathbf{d = \frac{4 \times 200\ g}{2.5 \times 10^{24} \times (400 \times 10^{-10} cm)^3}}$ $\mathbf{d = 5\ g\ cm^{-3}}$ **(or by any other correct method)**	 1 1 1
14	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

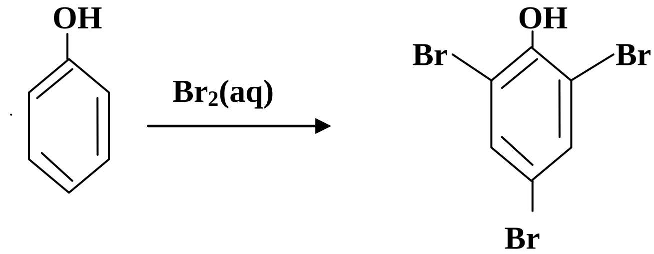
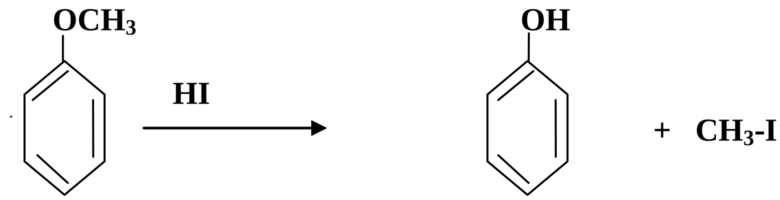
15	$\Delta T_f = iK_f m$ For complete ionisation of Na_2SO_4 i=3 $\Delta T_f = T_f^0 - T_f = 3 \times 1.86 \text{ K kg mol}^{-1} \times \frac{2g}{142g \text{ mol}^{-1}} \times \frac{1000 \text{ g kg}^{-1}}{50 \text{ g}}$ $\Delta T_f = 1.57$ **So, $T_f = -1.57^oC$ or 271.43K**	½ ½ 1 1
16	i)Because of higher oxidation state (+5) / high charge to size ratio / high polarizing power. ii)Because of high interelectronic repulsion. iii)Because of its low bond dissociation enthalpy and high hydration enthalpy of F^- .	1x3=3
17	i)A : $C_6H_5CONH_2$ B : $C_6H_5NH_2$ C : $C_6H_5NHCOCH_3$ ii)A: $C_6H_5NO_2$ B : $C_6H_5NH_2$ C: C_6H_5- NC	1½ 1½
18	(i) **Butadiene and acrylonitrile** **$CH_2 = CH - CH = CH_2$ and CH_2=CH-CN** (ii) Vinyl chloride **CH_2=CH-Cl** (iii) Chloroprene **$CH_2 = C(Cl) - CH = CH_2$**	½+½ ½+½ ½+½
19	i)  ii) Peptide linkage / -CO-NH- linkage iii) Water soluble-Vitamin B / C Fat soluble- Vitamin A /D /E /K	1 1 ½+½

20	i) dsp^3, Diamagnetic, low spin 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.	1 ½+½ 1
21	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 $Zr(impure) + 2I_2 \longrightarrow \underset{(volatile)}{ZrI_4}$ $ZrI_4 \xrightarrow{1800K} Zr(pure) + 2I_2$ **ii)Cryolite lowers the m.p.of alumina mix / acts as a solvent / brings conductivity.** (iii) Role of NaCN in the extraction of Ag is to do the leaching of silver ore in the presence of air. or $4Ag(s) + 8CN^-(aq) + 2H_2O + O_2(g) \longrightarrow 4[Ag(CN)_2]^- + 4OH^-$	1 1 1
22	**i)**  **ii)**  **iii)** CH_3CH_2ONO	1 x 3=3

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)	½+½ 1 1 ½+½
24	a) Given $E^o_{Cell} = + 0.30V$; $F = 96500C\ mol^{-1}$ $n = 6$ (from the given reaction) $\Delta_rG^O = -n \times F \times E^o_{Cell}$ $\Delta_rG^O = -6 \times 96500\ C\ mol^{-1} \times 0.30V$ $= -173{,}700\ J / mol$ or $-173.7\ kJ / mol$ $\log Kc = \frac{n E^o_{Cell}}{0.059}$ $\log Kc = \frac{6 \times 0.30}{0.059}$ $\log Kc = 30.5$ b)A Because E^o value of A shows that on coating ,A acts as anode and Fe acts as a cathode and hence A oxidises in prefence to Fe and prevent corrosion / or E^o_{cell} is positive and hence A oxidises itself to prevent corrosion of Fe/E^o value is more negative. (or any other correct reason) OR	 ½ 1 ½ 1 1 1

24	a) $\Lambda_m = \dfrac{\kappa}{c}$ $= \dfrac{3.905 \times 10^{-5}\ S\ cm^{-1}}{0.001 mol\ L^{-1}} \times \dfrac{1000 cm^3}{L}$ $\mathbf{\Lambda_m = 39.05\ Scm^2mol^{-1}}$ $\Lambda_o = \lambda^o(H^+) + \lambda^o(CH_3COO^-)$ $= (349.6 + 40.9)\ Scm^2mol^{-1}$ $\Lambda_o = 390.5\ Scm^2mol^{-1}$ $\boldsymbol{\alpha} = \dfrac{\Lambda_m}{\Lambda_o}$ $= \dfrac{39.05\ Scm^2mol^{-1}}{390.5\ Scm^2mol^{-1}}$ $\boldsymbol{\alpha = 0.1}$ b)Secondary battery or rechargeable battery $Pb(s) + PbO_2(s) + 2SO_4^{2-}(aq) + 4H^+(aq) \longrightarrow 2PbSO_4(s) + 2H_2O(l)$	½ 1 ½ 1 1 1
25	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. b) $2MnO_2 + 4KOH + O_2 \longrightarrow 2K_2MnO_4 + 2H_2O$ $3MnO_4^{2-} + 4H^+ \longrightarrow 2MnO_4^- + MnO_2 + 2H_2O$	1 1 1 1+1
	OR	

25	a) i)Cr, because of maximum no. of unpaired electrons cause strong metallic bonding. ii)Mn, because it attains stable half -filled $3d^5$ configuration in +2 oxidation state. iii)Zn, because of no unpaired electron in d-orbital. b) $$2Na_2CrO_4 + 2H^+ \rightarrow Na_2Cr_2O_7 + 2Na^+ + H_2O$$ $$Na_2Cr_2O_7 + 2KCl \longrightarrow K_2Cr_2O_7 + 2NaCl$$	½ + ½ ½ + ½ ½ + ½ 1+1
26	a) i) $(CH_3)_3C\text{-}I \quad + \quad CH_3\text{-}OH$ i) $CH_3\text{-}CH_2\text{-}\underset{\underset{O}{\|}}{C}\text{-}CH_3$ ii)  **b) .i)**  **ii).** 	1 1 1 1 1
	OR	

26	a). (i)  	1
	(ii) $CH_3CH_2OH + CH_3COCl \xrightarrow{\text{pyridine}} CH_3CH_2O\text{-}COCH_3 + HCl$	1
	(iii).  	1
	(b)(i) Warm each compound with iodine and sodium hydroxide. Phenol : No yellow ppt formed Ethanol: Yellow ppt of Iodoform are formed.	1
	ii)On adding lucas reagent (HCl/anhyd.$ZnCl_2$) , Propan-2-ol gives white turbidity after 5 minutes whereas 2-methylpropan-2-ol gives white turbidity immediately. (or any other suitable test)	1

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