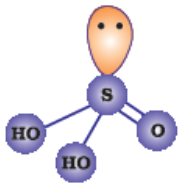
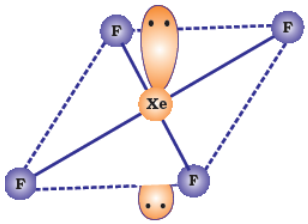
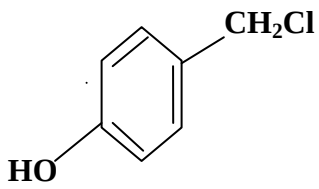
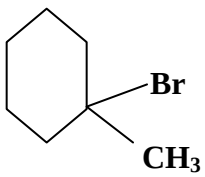
CHEMISTRY MARKING SCHEME
FOREIGN-2016
SET -56/2/1/F

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 $= \frac{dR}{dt} = kR$ or $\frac{dR}{R} = -kdt$ 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

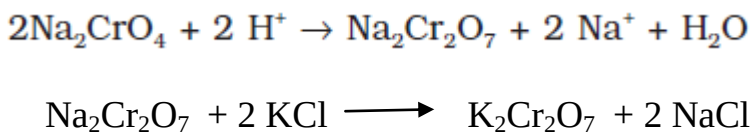
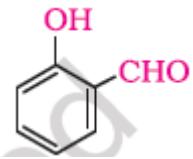
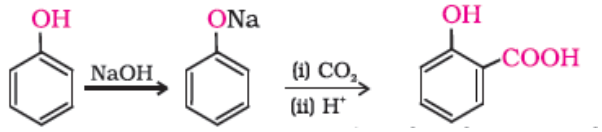
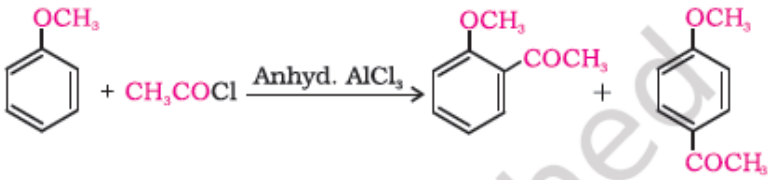
12	i)Because of the resonance stabilization of the conjugate base i.e enolate anion or diagrammatic representation. iii)Because the carboxyl group gets bonded to the catalyst anhyd.$AlCl_3$(lewis acid). **(note: part ii is deleted because of printing error and mark alloted in part i and part iii)**	1½ 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

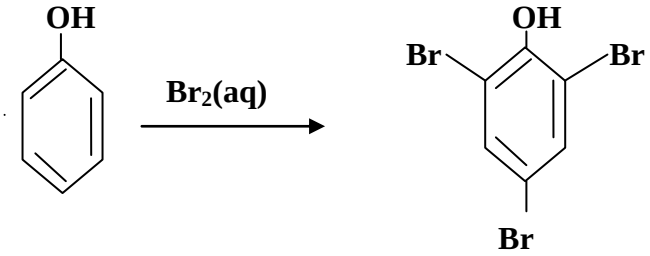
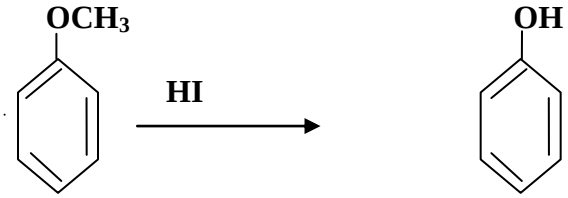
15	$\Delta T_f = iK_f m$ For complete ionisation of Na_2SO_4 i=3 $\Delta T_f = T_f^0 - T_f = 3 \times 1.86\ K\ kg\ mol^{-1} \times \frac{2g}{142g\ mol^{-1}} \times \frac{1000\ g\ kg^{-1}}{50\ g}$ $\Delta T_f = 1.57$ **So, $T_f = -1.57^oC$ or 271.43K**	½ ½ 1 1
16	i)Because of higher oxidation state (+5) / 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 Cl | **$CH_2 = C - CH = CH_2$**	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 $Zr(impure) + 2I_2 \longrightarrow ZrI_4$ (volatile) $ZrI_4 \xrightarrow{1800K} Zr(pure) + 2I_2$ **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)	½+½
	ii)Because higher doses may have harmful effects and act as poison which cause even death.	1
	iii)Tranquilizers are a class of chemical compounds used for treatment of stress or even mental diseases.	1
	ex. chlordiazepoxide, equanil,veronal, serotonin,valium (or any other two examples)	½+½
24	a)	
	Given $E^o_{Cell} = + 0.30V$; $F = 96500C\ mol^{-1}$	
	n = 6 (from the given reaction)	
	$\Delta_rG^O = - n \times F \times E^o_{Cell}$	½
	$\Delta_rG^O = - 6 \times 96500\ C\ mol^{-1} \times 0.30V$	
	= - 173,700 J / mol or - 173.7 kJ / mol	1
	$\log Kc = \frac{n\ E^o_{Cell}}{0.059}$	½
	$\log Kc = \frac{6 \times 0.30}{0.059}$	
	log Kc = 30.5	1
	b)A	1
	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)	1
	OR	

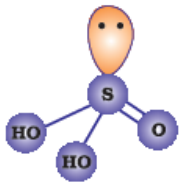
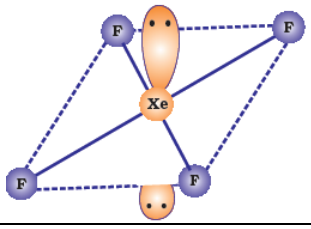
24	a) $\Lambda_m = \frac{\kappa}{c}$ $= \frac{3.905 \times 10^{-5}\ S\ cm^{-1}}{0.001 mol\ L^{-1}} \times \frac{1000 cm^3}{L}$ **$\Lambda_m = 39.05\ Scm^2mol^{-1}$** $\Lambda_o = \lambda^o(H^+) + \lambda^o(CH_3COO^-)$ $= (349.6 + 40.9)\ Scm^2mol^{-1}$ $\Lambda_o = 390.5\ Scm^2mol^{-1}$ **$\alpha = \frac{\Lambda_m}{\Lambda_o}$** $= \frac{39.05\ Scm^2mol^{-1}}{390.5\ Scm^2mol^{-1}}$ **$\alpha = 0.1$** 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)  	½ + ½ ½ + ½ ½ + ½ 1+1
26	a) i) $(CH_3)_3$ C-I + CH_3-OH i) CH_3-CH_2-C(=O)-CH_3 ii)  **b) .i)**  **ii).** 	1 1 1 1 1
	OR	

26	a). (i)  **(ii)** $CH_3CH_2OH + CH_3COCl \xrightarrow{\text{pyridine}} CH_3CH_2O\text{-}COCH_3 + HCl$ **(iii).**  (b)(i) Warm each compound with iodine and sodium hydroxide. Phenol : No yellow ppt formed Ethanol: Yellow ppt of Iodoform are formed. 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 1 1 1 1

Name	**Signature**	**Name**	**Signature**
Dr. (Mrs.) Sangeeta Bhatia		Sh. S.K. Munjal	
Dr. K.N. Uppadhya		Sh. D.A. Mishra	
Prof. R.D. Shukla		Sh. Rakesh Dhawan	
Dr. (Mrs.) Sunita Ramrakhiani		Ms. Nirmala Venkateswaran	
Sh. S. Vallabhan, Principal		Mrs. Deepika Arora	
Mr. K.M. Abdul Raheem		Ms. Minakshi Gupta	
Mrs. Sushma Sachdeva		Sh. Mukesh Kaushik	
Ms. Seema Bhatnagar		Mr. Roop Narayan	
Sh. Pawan Singh Meena		Ms. Garima Bhutani	
Sh. Praveen Kumar Agrawal			

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
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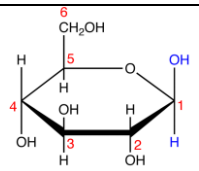
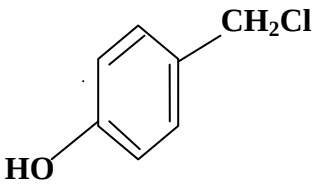
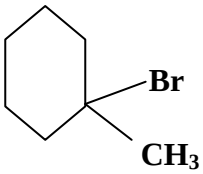
10	When reaction is completed 99.9%, $[R]_n = [R]_0 - 0.999[R]_0$ $k = \frac{2.303}{t}\log\frac{[R]_0}{[R]}$ $= \frac{2.303}{t}\log\frac{[R]_0}{[R]_0 - 0.999[R]_0} = \frac{2.303}{t}\log 10^3$ $t = 6.909/k$ For half-life of the reaction $t_{1/2} = 0.693/k$ $\frac{t}{t_{1/2}} = \frac{6.909}{k} \times \frac{k}{0.693} = 10$	½ ½ 1
	OR	

10	$R \rightarrow P$ Rate $= \frac{d\,R}{dt} = k\,R$ or $\frac{d\,R}{R} = -k dt$ 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 $k = \frac{1}{t} \ln \frac{[R]_0}{[R]}$ $k = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$	½ ½ 1
11	$\Delta T_f = iK_f\, m$ For complete ionisation of Na_2SO_4 i=3 $\Delta T_f = T_f^0 - T_f = 3 \times 1.86\ K\ kg\ mol^{-1} \times \frac{2g}{142g\ mol^{-1}} \times \frac{1000\ g\ kg^{-1}}{50\ g}$ $\Delta T_f = 1.57$ **So, $T_f = -1.57^oC$ or 271.43K**	½ ½ 1 1
12	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
13	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

14	(i) **Butadiene and acrylonitrile** **$CH_2 = CH – CH = CH_2$ and CH_2=CH-CN** (ii) Vinyl chloride **CH_2=CH-Cl** (iii) Chloroprene Cl | **$CH_2 = C – CH = CH_2$**	½+½ ½+½ ½+½
15	 i) ii) Peptide linkage / -CO-NH- linkage iii) Water soluble-Vitamin B / C Fat soluble- Vitamin A /D /E /K	1 1 ½+½
16	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
17	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 $Zr(impure) + 2I_2 \longrightarrow ZrI_4$ (volatile) $ZrI_4 \xrightarrow{1800K} Zr(pure) + 2I_2$ **ii)Cryolite lowers the m.p.of alumina mix / acts as a solvent / brings conductivity.**	1 1

	(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
18	**i)**  **ii)**  **iii)** **CH_3CH_2ONO**	1 x 3=3
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20	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	
20	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
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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
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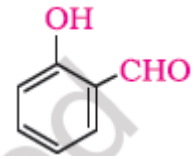
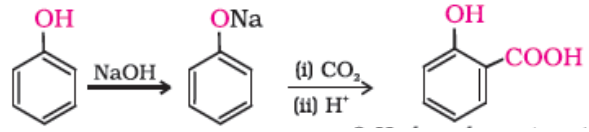
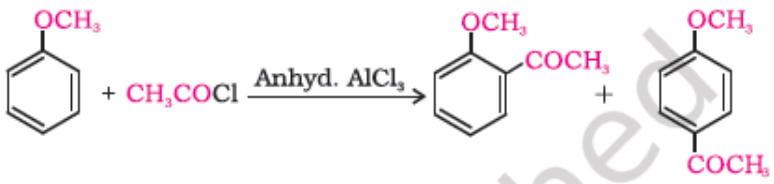
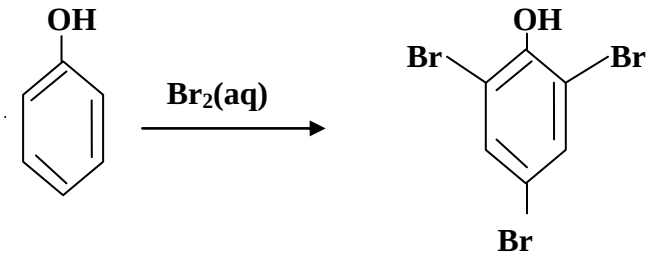
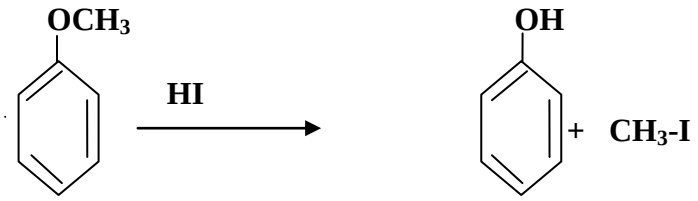
24	a) i)Because of higher oxidation state (+7) of Mn. ii)Because it has one unpaired electron in 3d orbital in its +2 oxidation state / or it has incompletely filled d-orbital in +2 oxidation state. iii)Because of comparable energies of 5f , 6d and 7s orbitals.	1 1 1

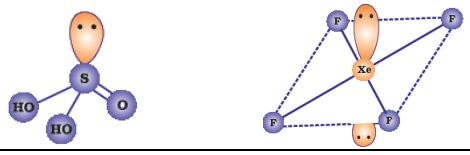
	b) $2MnO_2 + 4KOH + O_2 \longrightarrow 2K_2MnO_4 + 2H_2O$ $3MnO_4^{2-} + 4\,H^+ \longrightarrow 2MnO_4^- + MnO_2 + 2H_2O$	1+1
	OR	
24	a) i)Cr, because of maximum no. of unpaired electrons cause strong metallic bonding. ii)Mn, because it attains stable half -filled $3d^5$ configuration in +2 oxidation state. iii)Zn, because of no unpaired electron in d-orbital. b) $2Na_2CrO_4 + 2\,H^+ \rightarrow Na_2Cr_2O_7 + 2\,Na^+ + H_2O$ $Na_2Cr_2O_7 + 2\,KCl \longrightarrow K_2Cr_2O_7 + 2\,NaCl$	½ + ½ ½ + ½ ½ + ½ 1+1

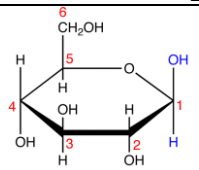
25	a) i) $(CH_3)_3\,C\text{-}I + CH_3\text{-}OH$ i) $CH_3\text{-}CH_2\text{-}\underset{\underset{O}{\|}}{C}\text{-}CH_3$ ii)  **b) .i)**  **ii).** 	1 1 1 1 1

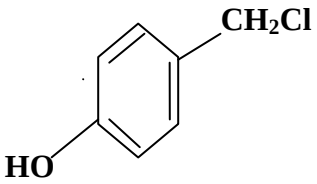
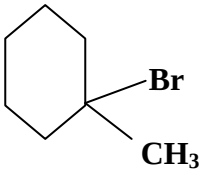
	OR	
25	a). (i)  **(ii)** $CH_3CH_2OH + CH_3COCl \xrightarrow{\text{pyridine}} CH_3CH_2O\text{-}COCH_3 + HCl$ **(iii).**  (b)(i) Warm each compound with iodine and sodium hydroxide. Phenol : No yellow ppt formed Ethanol: Yellow ppt of Iodoform are formed. ii)On adding lucas reagent (HCl/anhyd.$ZnCl_2$) , Propan-2-ol gives white turbidity after 5 minutes whereas 2-methylpropan-2-ol gives white turbidity immediately. (or any other suitable test)	1 1 1 1 1
26	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	 ½ 1 ½ 1

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

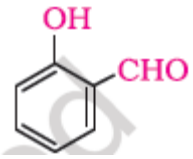
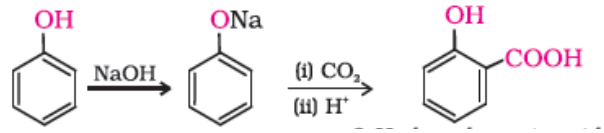
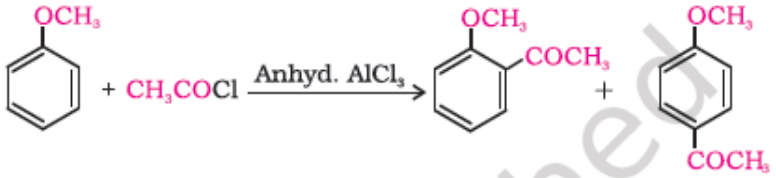
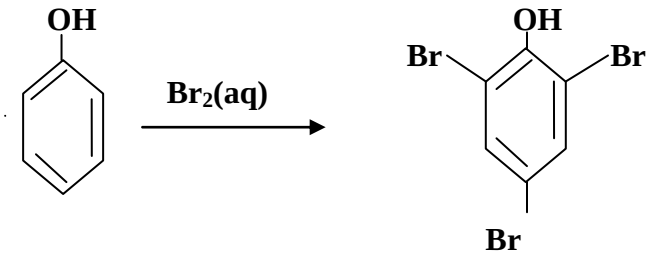
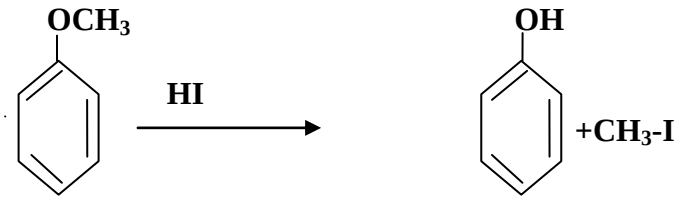
CHEMISTRY MARKING SCHEME
FOREIGN-2016
SET -56/2/3/F

Q.no.	Answers	Marks
1	NO_2 gas	1
2	N,N-dimethylbutanamide	1
3	Like Charged particles cause repulsion/ Brownian motion/ solvation	1
4	Because of some crystallization.	1
5	Reaction (ii)	1
6	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
7	i) ii)  	1+1
8	i) $[Co(NH_3)_4Cl_2]Cl$ ii) Tetraamminedichloridocobalt(III) chloride	1 1
9	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	
9	$R \rightarrow P$ Rate = $\frac{dR}{dt} = kR$ or $\frac{dR}{R} = -kdt$ 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 $k = \frac{1}{t}\ln\frac{[R]_0}{[R]}$ $k = \frac{2.303}{t}\log\frac{[R]_0}{[R]}$,	½ ½ 1

10	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
11	(i) **Butadiene and acrylonitrile** **$CH_2 = CH – CH = CH_2$ and CH_2=CH-CN** (ii) Vinyl chloride **CH_2=CH-Cl** (iii) Chloroprene Cl | **$CH_2 = C – CH = CH_2$**	½+½ ½+½ ½+½
12	 i) ii) Peptide linkage / -CO-NH- linkage iii) Water soluble-Vitamin B / C Fat soluble- Vitamin A /D /E /K	1 1 ½+½
13	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
14	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 $Zr(impure) + 2I_2 \longrightarrow ZrI_4$ (volatile) $ZrI_4 \xrightarrow{1800K} Zr(pure) + 2I_2$ **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

15	**i)**  **ii)**  **iii)** **CH_3CH_2ONO**	1 x 3=3
16	$k = \frac{2.303}{t} \log \frac{p_i}{2p_i - p_t}$ $= \frac{2.303}{300} \log \frac{0.3}{2 \times 0.3 - 0.5}$ $= \frac{2.303}{300} \log 3$ $= \frac{2.303 \times 0.4771}{300}$ $= 0.0036\ atm^{-1}$ or $0.004\ atm^{-1}$ (approx.)	1 1 1
17	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	
17	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

18	$d = \frac{z \times M}{N_A \times a^3}$ Or $d = \frac{z \times w}{N \times a^3}$ Where w is weight and N is no. of atoms. $d = \frac{4 \times 200\ g}{2.5 \times 10^{24} \times (400 \times 10^{-10}\ cm)^3}$ $d = 5\ g\ cm^{-3}$ (or by any other correct method)	1 1 1
19	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
20	$\Delta T_f = iK_f m$ For complete ionisation of Na_2SO_4 i=3 $\Delta T_f = T_f^0 - T_f = 3 \times 1.86\ K\ kg\ mol^{-1} \times \frac{2g}{142g\ mol^{-1}} \times \frac{1000\ g\ kg^{-1}}{50\ g}$ $\Delta T_f = 1.57$ **So, $T_f = -1.57^oC$ or 271.43K**	½ ½ 1 1
21	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
22	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
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) i) $(CH_3)_3$ C-I + CH_3-OH ii) CH_3-CH_2-C(=O)-CH_3 iii)  **b) .i)**  **ii).** 	1 1 1 1 1
	OR	
24	a). (i)  (ii) CH_3CH_2OH + CH_3COCl $\xrightarrow{\text{pyridine}}$ CH_3CH_2O-$COCH_3$ + HCl **(iii).** 	1 1 1

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	b)Secondary battery or rechargeable battery	1
	$Pb(s) + PbO_2(s) + 2SO_4^{2-}(aq) + 4H^+(aq) \longrightarrow 2PbSO_4(s) + 2H_2O(l)$	1

26	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	
26	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