

	$a^3 = \frac{4 \times 58.5}{2.165 \times 6.02 \times 10^{23}} \times \frac{10}{10} = \frac{2340 \times 10^{-24}}{2.165 \times 6.02}$ $a = \left(\frac{2340}{2.165 \times 6.02} \right)^{1/3} \times 10^{-8}$ $\text{let } x = \left(\frac{2340}{2.165 \times 6.02} \right)^{1/3}$ $\lg x = \lg \left(\frac{2340}{2.165 \times 6.02} \right)^{1/3}$ $= 1/3 (\lg 2340 = \lg 2.165 - \lg 6.02)$ $= 1/3 (3.3692 - 0.3355 - 0.7796)$ $= 1/3 [2.2541]$ $\lg x = 0.7514$ $x = \text{Antilog}(0.7514) = 5.641$ $a = 5.641 \times 10^{-8} \text{ cm} = 564.1 \times 10^{-10} \text{ cm}$ $= 564.1 \text{ pm}$ $a = 2(r_c + r_a)$ $r_c + r_a = a/2$ $r_{\text{Na}} + r_{\text{Cl}} = \frac{564.1}{2} = 282.05 \text{ pm.}$
	SECTION- C (3 Marks each)
Q11.	<p>Let the number of oxide ions (O^{2-}) in close packing be x.</p> <p>No of octahedral voids = x</p> <p>As 2/3 rd of the octahedral voids are occupied by ferric ions, number of ferric ions present = $2/3 \times x = 2x/3$</p> <p>Ratio of $\text{Fe}^{3+} : \text{O}^{2-} = 2x/3 : x = 2:3$</p> <p>Formula = Fe_2O_3.</p>
Q12	<p>Ferromagnetic substances make better permanent magnets because the metal ions of a ferromagnetic substance are grouped into small regions called domain. Each domain act as a tiny magnet. These domains are randomly oriented. When a ferromagnetic substance is placed in a magnetic field all the domains are randomly oriented. When a ferromagnetic substance is placed in a magnetic field, all the domains get oriented in the direction of the magnetic field and a strong magnetic field is produced. Such order of domains persists even when the external magnetic field is removed.</p>
	SECTION- D (4 Mark)
Q13	<p>As NaCl is doped with 10^{-3} mol % SrCl_2.</p> <p>100 mol of NaCl are doped with 10^{-3} mol of SrCl_2</p> $1 \text{ mol of NaCl is doped with } \text{SrCl}_2 = \frac{10^{-3}}{100} \text{ mol}$ $= 10^{-5} \text{ mol}$ <p>As each Sr^{2+} ion introduces one cation vacancy conc. of cation vacancies = $10^{-5} \times 6.02 \times 10^{23} \text{ mol}^{-1}$</p> $= 6.02 \times 10^{18} \text{ mol}^{-1}.$
	SECTION – E (5 Mark)
14	<p>a) Packing Efficiency = $\frac{\text{volume occupied by atom in unit cell}}{\text{Total volume of unit cell}} \times 100$</p> <p>= 74 %</p> <p>b) i) Na_2O</p> <p>$\text{Na}^+ = 4, \text{O}^{2-} = 8$</p> <p>ii) $\text{Ca}^{2+} = 8, \text{F}^- = 4$</p> <p>c) i) A void surrounded by four spheres occupying the corners of tetrahedron called tetrahedral void. It is much smaller than the size of sphere in the close packing. A void surrounded by six sphere along the corners of an octahedral voids is smaller than that of the spheres in the close packing but large than the tetrahedral void.</p> <p>ii) The regular three dimensional arrangement of identical points in the space which represent how the constituent particles are arranged in a crystal. A unit cell is the smallest portion of a crystal lattice, which when repeated over and again in different directions produce the complete crystal lattice.</p>

Chapter- 2 (Solution)

Ans 1	Molal depression constant may be defined as the depression in freezing point when the molality of the solution is unity ie one mole of the solute is dissolved in 1000 g of the solvent.	
Ans 2	$2A \rightarrow A_2$ 1 mole of A after association $i = \frac{1}{2} = 0.5$ gives $\frac{1}{2}$ mole of A_2	
Ans3	On adding cyclohexane to ethanol, its molecules get in between the molecules of ethanol thus breaking the hydrogen bonds and reducing ethanol- ethanol interactions. This will increase the vapour pressure of the solution and result in positive deviation from Raoult's law.	
Ans 4	$\Delta T_f = 0.201^\circ\text{C}$ Observed $\Delta T_f = K_f \times m$ Calculated $\Delta T_f = 1.86 \times 0.1$ $= .186^\circ\text{C}$ $i = \frac{0.201}{0.186}$ $= 1.0806$ $\text{HF} = \text{H}^+ + \text{F}^-$ 1 mol 0 0 $1-\alpha$ α α Total = $1 + \alpha$ $i = 1 + \alpha$ $\alpha = i - 1 = 0.0806$ or 8.06%	
Ans 5	$\Delta T_f = K_f m$ $\therefore K_f = \frac{\Delta T_f}{m} = \frac{273.15 - 271}{0.1539}$ $= 13.97\text{k/m}$ $\Delta T_f = \frac{1000 k_f w_2}{w_1 M_2}$ $= \frac{1000 \times 13.97 \times 15}{100 \times 180} = 3.88$ \therefore Freezing point of the solution = $273.15 - 3.88\text{k}$ $= 269.27\text{K}$	
Ans 6	$M_2 = \frac{1000 K_b W_2}{W_1 \Delta T_b}$ $K_b = \frac{M_2 W_1 \Delta T_b}{1000 W_2}$ $= \frac{103 \times 87.90 \times 0.25}{1000 \times 0.90}$ $K_b = 2.515 \text{ K kg mol}^{-1}$	
Ans 7.	$\pi = CRT$ $C = \frac{\pi}{RT} = \frac{8.21}{.0821 \times 310}$ $= 0.323\text{M}$ $= 0.323 \times 180\text{g/L} = 58.14\text{g/L}$	
Ans 8	$w_2 = 10\text{g}$ $w_1 = 90\text{g}$ $n_2 = \frac{10}{60} = \frac{1}{6}$ $n_1 = \frac{90}{18} = 5$ $P^0 - p = \frac{P^0 P}{P^0} = \frac{n_2}{n_2}$ $\frac{P^0 - P}{P^0} = \frac{1/6}{5}$ $1 - \frac{P}{P^0} = \frac{1}{30}$ $\frac{-P}{P^0} = \frac{1}{30} - 1$ $\frac{P}{P^0} = \frac{29}{30}$ $P = \frac{29}{30} \times 55.3$ $= 53.45 \text{ mm}$	

Ans 9.	<p>a) For a solution of volatile liquids, Raoult's law states that the partial pressure of each component of the solution is directly proportional to its mole fraction present in solution</p> $P_A \propto x_A$ $P_A = P_A^0 x_A$ <p>Henry's law – The partial pressure of a gas in vapour phase 'p' is directly proportional to mole fraction 'n' of the gas is directly proportional to mole fraction 'x' of the gas in the solution.</p> $P = K_b \cdot x$ <p>∴ Partial pressure of the volatile component or gas is directly proportional to its mole fraction $p \propto x$. Only the proportionality constant K_H differs from P_A^0.</p> <p>∴ It becomes a special case of Henry's law $K_H = P_A^0$</p> <p>b) i) They will shrink due to plasmolysis. ii) They will swell and may even burst. RBCs are isotonic with 0.9% NaCl solution.</p>	
Ans 10.	$\Delta T_f = \frac{1000 K_f \cdot w_2}{W_1 M_2}$ $= \frac{1000 \times 5.12 \times 0.3}{30 \times 60}$ $= 0.853 \text{K}$ $i = \frac{\Delta T_f \text{ observed}}{\Delta T_f \text{ calculated}}$ $= \frac{0.45}{0.853} = 0.527$ <p>b) NaCl dissociates to give two ions ($\text{Na}^+ + \text{Cl}^-$) Na_2SO_4 dissolves to give three ions ($2\text{Na}^+, \text{SO}_4^{2-}$) Thus their equimolar solutions have different concentration of ions As osmotic pressure depends upon concentration of particles, they have different osmotic pressure.</p>	

Chapter- 3 (Electro Chemistry)

Ans 1	Molar conductivity of weak electrolytes keep on increasing with dilution and does not become constant even at very large dilution.
Ans 2	At anode $\text{Pb (s)} + \text{SO}_4^{2-} (\text{aq}) \rightarrow \text{PbSO}_4 + 2\text{e}^-$ At cathode $\text{PbO}_2 (\text{s}) + \text{SO}_4^{2-} (\text{aq}) + 4\text{H}^+ (\text{aq}) + 2\text{e}^- \rightarrow \text{PbSO}_4 (\text{s}) + 2\text{H}_2\text{O}$ $\text{Pb (s)} + \text{PbO}_2 (\text{s}) + 4\text{H}^+ (\text{aq}) + 2\text{SO}_4^{2-} (\text{aq}) \rightarrow 2\text{PbSO}_4 (\text{s}) + 2\text{H}_2\text{O}$
Ans3	$\Lambda^0 \text{m} [\text{Ba(OH)}_2] = \Lambda^0 \text{m} (\text{BaCl}_2) + 2 \Lambda^0 \text{m} (\text{NaOH}) - 2 \Lambda^0 \text{m} \text{NaCl}$ $= 2.800 \times 10^{-2} + 2 [2.481 \times 10^{-2}] - 2 \times 1.265 \times 10^{-2}$ $= 5.232 \times 10^{-2} \text{ Sm}^2 \text{ mol}^{-1}$.
Ans 4	$\text{Ni} + 2\text{Ag}^+ \rightarrow \text{Ni}^{2+} + 2\text{Ag}$ $E^0_{\text{cell}} = E_{\text{cathode}} - E_{\text{anode}}$ $= .80 - (-0.25) = 1.05\text{V}$ As EMF is positive, reaction is spontaneous.
Ans 5	$\text{Fe} + 2\text{H}^+ \rightarrow \text{Fe}^{2+} + \text{H}_2$ $E_{\text{cell}} = E^0_{\text{cell}} - \frac{0.0591}{2} \log \frac{[\text{Fe}^{2+}]}{(\text{H}^+)^2}$ $= 0.44 - \frac{0.0591}{2} \log \frac{0.001}{1^2}$ $E_{\text{cell}} = 0.53\text{V}$
Ans6	Equivalent conductivity of a solution V is defined as the conductance of all the ions produced from 1gm equivalent of the electrolyte dissolved in V cm^3 of the solution when the distance between the electrodes is 1 cm and area is large to contain whole of the solution $\Lambda_{\text{eq}} = \text{Kc} \times \frac{1000}{\text{Normality}}$ $= \text{ohm} \cdot \text{cm}^{-1} \frac{\text{cm}^3}{\text{gmeq}}$ $= \text{ohm}^{-1} \text{cm}^2 \text{eg}^{-1}$. or $\text{Sm}^2 \text{eg}^{-1}$ SI unit.
Ans 7	Anode reaction : $\text{Cu (s)} \rightarrow \text{Cu}^{2+} (\text{aq}) + 2\text{e}^-$ Cathode reaction $\text{Cl}_2 (\text{g}) + 2\text{e}^- \rightarrow 2\text{Cl}^- (\text{aq})$ Net reaction $\text{Cu (s)} + \text{Cl}_2 (\text{g}) \rightarrow \text{CuCl}_2 (\text{aq})$ $E^0_{\text{cell}} = E^0_{\text{c}} - E_{\text{a}}^0$ $= 1.36 - 0.34$ $= 1.02\text{V}$ $E^0_{\text{cell}} = \frac{0.591}{2} \log \text{kc}$ $\log \text{kc} = 34.5178$ $\text{Kc} = \text{antilog } 34.5178$ $\text{Kc} = 3.29 \times 10^{34}$
Ans 8.	Specific conductance $\text{K} = 1/\text{R} \times \text{cell constant}$ $= \frac{1}{1005} \times 1.25$ $= 0.001244 \text{ ohm}^{-1} \text{cm}^{-1}$ Molar conductance $\Lambda^0 \text{m} = \frac{\text{K} \times 1000}{\text{M}} = \frac{.001244 \times 1000}{7.5 \times 10^{-3}}$ $= 165.87 \pi^{-1} \text{cm}^2 \text{mol}^{-1}$
Ans 9	a) Rusting of iron takes place in presence of H^+ ions. Alkaline medium neutralises the H^+ ions and thereby inhibits rusting. b) This is because acidic NH_4Cl corrodes the zinc container. c) As on dilution, number of ions per unit volume decreases.
Ans10	a) Its pollution free device since no harmful products are formed. b) Efficiency is 75% higher than conventional cells.
Ans 11	Iron surface is covered with more electropositive metal like in which gets oxidised in preference to iron \therefore the metal is sacrificed at the cost of iron, zinc is coated under process galvanisation.

Chapter- 4

Ans 1	<p>Acid catalysed hydrolysis of ethyl acetate</p> $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O} \xrightarrow{\text{H}^+} \text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH}$ <p>Rate = $K [\text{CH}_3\text{COOC}_2\text{H}_5]$</p>	
Ans 2	<p>Order of reaction = $\frac{1}{2} + 2 = \frac{5}{2}$</p>	
Ans3	<p>The half life($t_{1/2}$) of a reaction is the time in which the concentration of a reactant is reduced to one half of its initial concentration.</p> <p>a) $t_{1/2}$ for a zero order reaction = $\frac{[R]_0}{2k}$ $[R]_0$ = initial concentration . K = rate constant</p> <p>b) $t_{1/2}$ for a first order reaction = $\frac{0.693}{K}$</p>	
Ans 4	<p>Rate law : it is an experimentally determined expression which relates the rate of reaction with concentration of reactions :</p> <p>$\text{A} + \text{B} \longrightarrow \text{Products}$</p> <p>$R \propto [\text{A}]^m [\text{B}]^n$</p> <p>$R = K [\text{A}]^m [\text{B}]^n$</p> <p>Where 'K' is constant</p> <p>$[\text{A}] = [\text{B}] = 1 \text{ mol l}^{-1}$</p> <p>Rate = K.</p> <p>Rate constant as the rate of reaction when the concentration of each reactant in the reaction is unity.</p> <p>i) general units of rate constant</p> <p>$K = (\text{mol l}^{-1})^{1-n} \text{ s}^{-1}$</p> <p>$\text{L}^{-1} \text{ mol s}^{-1} = (\text{mol l}^{-1})^{1-n} \text{ s}^{-1}$</p> <p>$-1 = -1+n \longrightarrow n = 0$ reaction order = 0</p> <p>ii) $\text{L mol}^{-1} \text{ s}^{-1} = (\text{mol l}^{-1})^{1-n} \text{ s}^{-1}$</p> <p>$1 = -1 + n \longrightarrow n = 2$ or $-1 = 1-n$</p> <p>Reaction order = 2.</p>	
Ans 5.	<p>Order of reaction</p> <p>(i) it is the sum of the powers of the conc of the reaction in the rate law expression :</p> <p>ii) It is determined experimentally</p> <p>iii) It can be or a fraction.</p> <p>iv) order is applicable to elementary as well as complex reaction.</p> <p>Molecularity :</p> <p>i) It is number of reacting species taking part in an elementary reaction, which must collide simultaneously so as to result into a chemical reaction.</p> <p>ii) It is a theoretical concept.</p> <p>iii) It cannot be zero or a fraction.</p> <p>iv) Molecularity is applicable only for elementary reactions for complex reaction it has no meaning.</p>	
Ans 6.	<p>For a first order reaction take 40 min for 30% decomposition.</p> $K = \frac{2.303}{t} \lg \frac{[R]^0}{[R]} = \frac{100}{100-30} = \frac{10}{7}$ $K = \frac{2.303}{40} \log \frac{10}{7}$ $K = \frac{2.303}{40} \log 1.428 = \frac{2.303}{40} \times 0.1548$ $K = 8.91 \times 10^{-3} \text{ min}^{-1}$ $T_{1/2} = \frac{0.693}{8.91 \times 10^{-3}} = 77.78 \text{ min.}$	

Ans7.	$t = \frac{2.303}{K} \lg \frac{[R]_0}{[R]} \text{ as } [R] = \frac{[R]_0}{16}$ $t = \frac{2.303}{K} \lg \frac{[R]_0}{\frac{[R]_0}{16}} = \frac{2.303}{60} \times 4 \lg 2$ $= \frac{2.303}{60} \times 40 \times 0.3010 = 4.62 \times 10^{-2} \text{s}$	
Ans 8.	$t = 100 \text{ min}$ $K = \frac{2.303}{100} \lg \frac{a}{a-x}$ <p>For 60% completion of the reaction If $a = 100\%$ $a - x = 100 - 60 = 40\%$</p> $k = \frac{2.303}{100} \lg \frac{100}{40} \quad (\text{i})$ <p>for 90% completion of the reaction $a = 100\%$ $a - x = 100 - 90 = 10\%$</p> $k = \frac{2.303}{t} \lg \frac{100}{10} \quad (\text{ii})$ <p>Substituting the value of k in eq (ii)</p> $\frac{2.303}{100} \lg \frac{100}{40} = \frac{2.303}{t} \lg 10 \quad (\because \lg 10 = 1)$ $\frac{1}{t} = \frac{1}{100} \lg \frac{100}{40}$ $\frac{1}{t} = \frac{0.3979}{100} \rightarrow t = \frac{100}{0.3979} = 251.2 \text{ min.}$	
Ans 9.	$T_1 = 300 \text{ K}, T_2 = 320 \text{ K} \quad K_2/K_1 = 4$ $R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$ $\lg \frac{K_2}{K_1} = \frac{E_a}{2.303R} \left[\frac{T_2 - T_1}{T_1 T_2} \right]$ $\lg 4 = \frac{E_a}{2.303 \times 8.314} \times \frac{20}{96000}$ $E_a = \frac{.602 \times 2.303 \times 8.314 \times 96000}{20} = 55327.58 \text{ J mol}^{-1}$	
Ans 10	$K_1 = 0.25, K_2 = 0.07 \text{ S}^{-1}$ $T_1 = 500 \text{ K}, T_2 = 700 \text{ K}$ $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$ $\lg \frac{K_2}{K_1} = \frac{E_a}{2.303 \times 8.314} \left[\frac{700 - 500}{500 \times 700} \right]$ $E_a = 18230.35 \text{ J mol}^{-1}$	
Ans11	$(\text{CH}_3)_2 \text{CHN} = \text{NCH}(\text{CH}_3)_2 (\text{g}) \rightarrow \text{N}_2(\text{g}) + \text{C}_6\text{H}_{14}(\text{g})$ <p>Initial Pressure : P_0 0 0</p> <p>After time t : $P_0 - P$ P P</p> <p>Total pressure after time (t) (P_t) = $(P_0 - P) + P + P = P_0 + P$</p> <p>$P = P_t - P_0$</p> <p>$a \propto P_0$ and $(a - x) \propto P_0 - P$ substituting the value of 'P' $a - x \propto P_0 - (P_t - P_0)$ i.e. $(a - x) \propto 2P_0 - P_t$ for first order reaction.</p> $K = \frac{2.303}{t} \lg \frac{a}{a-x}$ $= \frac{2.303}{t} \lg \frac{P_0}{2P_0 - P_t}$ $t = 360 \text{ s} \quad K = \frac{2.303}{360} \lg \frac{35}{2 \times 35 - 54} = \frac{2.303}{360} \lg \frac{35}{16}$ $= \frac{2.303}{360} \times .3400 = 2.175 \times 10^{-3} \text{ S}^{-1}$	

	$t = 720s \quad K = \frac{2.303}{720} \lg \frac{35}{2 \times 35 - 63} = \frac{2.303}{720} \lg 5$ $= \frac{2.303}{720} \times .6990 = \frac{2.235 \times 10^{-3} s^{-1}}{2}$ $\text{Avg value of } K = \frac{2.175 + 2.235 \times 10^{-3} s^{-1}}{2}$ $= 2.20 \times 10^{-3} s^{-1}$	
Ans12	$t_1 = \frac{2.303}{t_1} \lg \frac{[R]_0}{[R]_0 - 0.10[R]_0} = \frac{2.303}{t_1} \lg \frac{100}{90}$ $= \frac{2.303}{t_1} (0.0458) = \frac{0.1055}{t_1} \text{ or } t_1 = \frac{0.1055}{K_{298K}}$ $K_2 = \frac{2.303}{t_2} \lg \frac{[R]_0}{[R]_0 - 0.25[R]_0} = \frac{2.303}{t_2} \lg \frac{100}{75}$ $= \frac{2.303}{t_2} (0.125) = \frac{.2879}{t_2} \text{ or } t_2 = \frac{.2879}{K_{308K}}$ $t_1 = t_2$ $\frac{0.1055}{K_1} = \frac{0.2879}{K_2} \text{ or } \frac{K_2}{K_1} = 2.7289$ <p>Now from Arrhenius eq. $\lg \frac{K_2}{K_1} = \frac{E_a}{2.303R} \left[\frac{T_2 - T_1}{T_1 - T_1} \right]$</p> $\lg (2.7289) = \frac{E_a}{2.303 \times 8.314} \times \frac{10}{298 - 308}$ $.4360 = \frac{E_a}{2.303 \times 8.314} \times \frac{10}{-10}$ $E_a = 76.623 \text{ KJ mol}^{-1}$ <p>Calculation of 'K' at 318 K.</p> $\lg K = \lg A - \frac{E_a}{2.303RT}$ $= \lg (4 \times 10^{10}) - \frac{76623 \text{ J mol}^{-1}}{2.303 \times 8.314 \times 318}$ $= 10.6021 - 12.5843 = -1.9822$ $K = \text{Antilog} (-1.9822) = \text{Anti log } (2.0178)$ $= 1.042 \times 10^{-2} s^{-1}$	
Ans13	$\text{Rate} = K[A]^m [B]^n$ $\text{RExp I} = 6.0 \times 10^{-3} = K (0.1)^m (0.1)^n$ $\text{Rate Exp II} = 7.2 \times 10^{-2} = K (0.3)^m (0.2)^n$ $\text{Rate Exp III} = 2.88 \times 10^{-1} = K (0.3)^m (0.4)^n$ $\text{Rate Exp IV} = 2.4 \times 10^{-2} = K (0.4)^m (0.1)^n$ $\frac{\text{RateExp II}}{\text{RateExp IV}} = \frac{6 \times 10^{-3}}{2.4 \times 10^{-2}} = \frac{K(0.1)^m (0.1)^n}{K(0.4)^m (0.1)^n}$ $\frac{1}{4} = \frac{(0.1)^m}{(0.4)^m} = \left(\frac{1}{4}\right)^m \quad m = 1$ $\frac{\text{RateExp II}}{\text{RateExp III}} = \frac{7.2 \times 10^{-2}}{2.88 \times 10^{-1}} = \frac{K(0.3)^m (0.2)^n}{K(0.3)^m (0.4)^n}$ $\frac{1}{4} = \frac{(0.2)^n}{(0.4)^n} = \left[\frac{1}{2}\right]^n$ $\left[\frac{1}{2}\right]^2 = \left[\frac{1}{2}\right]^n \text{ or } n = 2$ <p>Rate law expression $\text{Rate} = K[A] [B]^2$</p> <p>Order of reaction w.r.t A = 1. Order of reaction w.r.t B = 2. Overall order of reaction = 1 + 2 = 3</p> $K = \frac{\text{Rate}}{[A][B]^2} = \frac{6.0 \times 10^{-3} \text{ mol L}^{-1} \text{ min}^{-1}}{0.1 \text{ mol L}^{-1} (0.1 \text{ mol L}^{-1})^2}$ $= 6.0 \text{ mol}^{-2} \text{ L}^2 \text{ min}^{-1}$	

Chapter-5

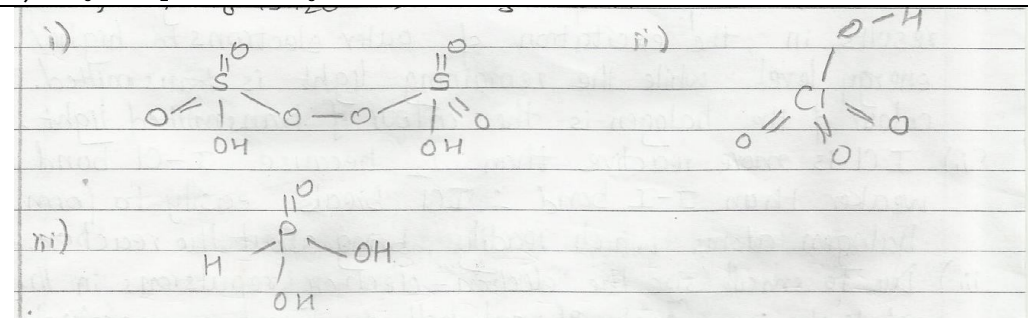
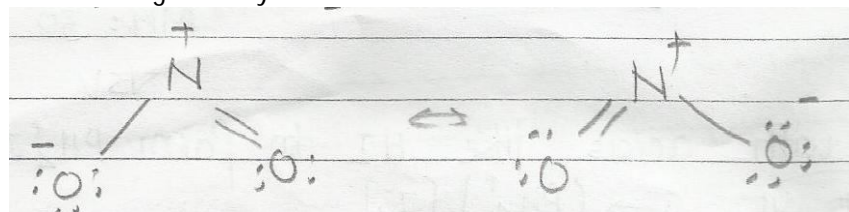
Ans 1	The adsorption of gases on the surface of metals is called occlusion.	
Ans 2	Sol : Paints, cell fluids Gel : Butter, Cheese	
Ans3	Fe ³⁺ ion has greater coagulating power than K ⁺ ion as ferric ion has higher charge.	
Ans 4 i)	The effective ions of the electrolyte in bringing about coagulation are those which carry charge opposite to that of the colloidal particles. These ions are called coagulating ions/ flocculating ions. ii) Greater the valency of the coagulating or flocculating ion greater is its power to bring about coagulation. -vely charged arsenious sulphide Al ³⁺ > Ba ²⁺ > Na ⁺ .	
Ans 5	Dialysis : It's a process of removing a dissolved substance from a colloidal solution by means of diffusion through a suitable membrane. It is a method of purification of colloidal solution. Electrophoresis : The movement of colloidal particles towards oppositely charged electrode in an electric field is called electrophoresis. Tyndalla Effect : The scattering of light by the colloidal particles present in a colloidal sol. Is called Tyndall effect.	
Ans 6	It's a chemical reaction in which the rate depends on the pore size of the catalyst and also on the shape and size of the reactant and product molecules. Zeolites acts as a shape –selective catalyst, with pore size usually varies from 260 to 740 pm. ZSM-5	
Ans 7	The process of physisorption for example that of H ₂ on finely divided nickel involves weak vander Waals forces. With increase in temperature, hydrogen molecules dissociate into hydrogen atoms which are held on the surface by chemisorption.	
Ans 8	Yes, clouds are colloidal in nature and carry charge spray of silver iodide an electrolyte results in coagulation leading to rain.	
Ans 9	i) As physisorption is an exothermic process solid + Gas \longrightarrow Gas / Solid and Δ \therefore Le chateliers principle if we increase the temperature, equilibrium will shift in the backward direction, gas is released from the adsorbed surface . ii) Ice-creams are emulsions which get stabilised by emulsifying agents like gelatin. iii) The cleansing action of soap such as sodium stearate is due to the fact that soap molecules form micelle around the oil droplet in such a way that hydrophobic part of the stearate ions is in the oil droplet and hydrophilic part projects out of the grease droplet like bristles. Polar groups interact with water, the oil droplet surrounded by stearate ions is now pulled in water and removed from the dirty surface.	
Ans 10	a) $\frac{x}{m} = K p^{1/n}$ $\log \frac{x}{m} = \log K + \frac{1}{n} \log P$. b) i) they are reversible in nature once the dispersed phase is separated from dispersion medium the sol can be made again by simply remising with dispersion medium. ii) Associated collord – soaps and detergents multimolecular colloid sulphur sol, gold sol.	

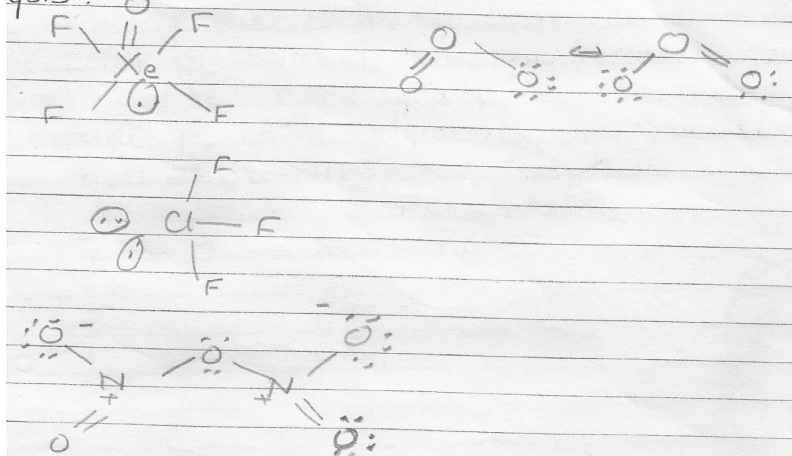
Chapter-6 (General Principles and Processes of Isolation of Elements) Marking Scheme

Ans 1	At high temperature carbon and hydrogen react with metals to form carbides and by hydrides.	
Ans 2	Van ARkel method.	
Ans 3	NaCN (Sodium cyanide), used as a depressant.	
Ans 4	i) Silica ii) Lime	
Ans 5	<p>i) Electrolytic refining of a metal : In this method impure metal is made to act as anode. A strip of same metal in pure form is used as cathode. They are put in electrolytic bath containing soluble salt of same metal on passing electric current, metal ions from the electrolyte solution are deposited at the cathode in the form of pure metal while an equivalent amount of metal dissolves from the anode and goes into the electrolyte solution as metal ions.</p> <p>ii) During leaching Ag is oxidised to Ag⁺ which then combines with CN ions to form soluble complex. [Ag(CN)₂]⁻ silver is then recovered from this complex by displacement method using more electro-positive Zn metal.</p> $2[\text{Ag}(\text{CN})_2]^{-}(\text{aq}) + \text{Zn}(\text{s}) \longrightarrow 2\text{Ag}(\text{s}) + [\text{Zn}(\text{CN})_4]^{2-}(\text{aq})$	
Ans 6	<p>i) Zone refining method based on the principle that impurities are more soluble in the melt than in the solid state of the metal.</p> <p>ii) Chromatographic method : based on the principle that different components of a mixture are absorbed to different extent on an adsorbent. The adsorbed components are removed by using suitable solvents.</p>	
Ans 7	$3\text{Fe}_2\text{O}_3 + \text{Co} \longrightarrow 2\text{Fe}_3\text{O}_4 + \text{CO}_2$ $\text{Fe}_2\text{O}_3 + \text{Co} \longrightarrow 2\text{FeO} + \text{CO}_2$ $\text{Fe}_3\text{O}_4 + 4\text{CO} \longrightarrow 3\text{Fe} + 4\text{CO}_2$	
Ans 8	The free energy of formation ($\Delta_f G^\circ$) of Co from C becomes lower at temp above 1120 K whereas that of CO ₂ from C becomes lower above 1323 K than $\Delta_f G^\circ$ of ZnO. However $\Delta_f G^\circ$ of CO ₂ from CO is always higher than that of ZnO. Therefore 'C' can reduce ZnO to Zn but not Co. Therefore out of C and Co, C is a better reducing agent than CO or ZnO.	
Ans 9	<p>$\Delta_f G^\circ$ of Cu₂S is more -ve than those of CS₂ and H₂S.</p> <p>So, neither carbon or Hydrogen can reduce Cu₂S to Cu metal.</p> $\text{Cu}_2\text{S} + \text{H}_2 \longrightarrow 2\text{Cu} + \text{H}_2\text{S}$ $2\text{Cu}_2\text{S} + \text{C} \longrightarrow 4\text{Cu} + \text{CS}_2$ <p>$\Delta_f G^\circ$ of Cu₂O is much less -ve than that of CO and hence carbon can easily reduce Cu₂O to Cu.</p> $\text{Cu}_2\text{O}(\text{s}) + \text{C}(\text{s}) \longrightarrow 2\text{Cu}(\text{s}) + \text{CO}(\text{g})$ <p>Thus the extraction of copper from pyrite is more difficult than from its oxide ore through reduction.</p>	
Ans 10	<p>i) $\frac{4}{3}\text{Al}(\text{s}) + \text{O}_2(\text{g}) \longrightarrow \frac{2}{3}\text{Al}_2\text{O}_3(\text{s})$ $\Delta_f G^\circ = -827\text{KJ/mol}$</p> <p>ii) $\frac{4}{3}\text{Cr}(\text{s}) + \text{O}_2(\text{g}) \longrightarrow \frac{2}{3}\text{Cr}_2\text{O}_3(\text{s})$; $\Delta_f G^\circ = -540\text{KJ/mol}^{-1}$</p> <p>Subtract eq (ii) from (i)</p> $\frac{4}{3}\text{Al}(\text{s}) + \frac{2}{3}\text{Cr}_2\text{O}_3(\text{s}) \longrightarrow \frac{2}{3}\text{Al}_2\text{O}_3(\text{s}) + \frac{4}{3}\text{Cr}(\text{s}); \Delta_r G^\circ = -287\text{KJ/mol}$ <p>As $\Delta_r G^\circ$ of the combined redox reaction is -ve therefore reduction of Cr₂O₃ by 'Al' is possible.</p>	
Ans 11.	<p>(i) Leaching of bauxite ore to prepare pure alumina :</p> $\text{Al}_2\text{O}_3(\text{s}) + 2\text{NaOH}(\text{aq}) + 3\text{H}_2\text{O}(\text{l}) \longrightarrow 2\text{Na}[\text{Al}(\text{OH})_4](\text{aq})$ $2\text{Na}[\text{Al}(\text{OH})_4](\text{aq}) + 2\text{CO}_2(\text{g}) \longrightarrow \text{Al}_2\text{O}_3 \cdot x\text{H}_2\text{O}(\text{s}) + 2\text{NaHCO}_3(\text{aq})$ $\text{Al}_2\text{O}_3 \cdot x\text{H}_2\text{O}(\text{s}) \xrightarrow{1470\text{K}} \text{Al}_2\text{O}_3(\text{s}) + x\text{H}_2\text{O}(\text{g})$ <p>iii) $\text{Zr}(\text{s}) + 2\text{I}_2(\text{g}) \xrightarrow{870\text{K}} \text{ZrI}_4(\text{g})$</p> $\text{ZrI}_4(\text{g}) \xrightarrow[2075\text{K}]{\text{Tungsten Filament}} \text{Zr}(\text{s}) + 2\text{I}_2(\text{g})$ <p style="text-align: center;">Pure</p> <p>iii) $4\text{Au}(\text{s}) + 8\text{CN}^{-}(\text{aq}) + 2\text{H}_2\text{O}(\text{l}) + \text{O}_2(\text{g})$</p> \downarrow $4[\text{Au}(\text{CN})_2]^{-}(\text{aq}) + 4\text{OH}^{-}(\text{aq})$ <p>Gold is recovered from [Au(CN)₂]⁻ complex by displacement method using a more active metal zinc</p> $2[\text{Au}(\text{CN})_2]^{-}(\text{aq}) + \text{Zn}(\text{s}) \longrightarrow 2\text{Au}(\text{s}) + [\text{Zn}(\text{CN})_4]^{2-}(\text{aq})$	

<p>Ans 12</p>	<p>i) Pig iron into steel : By heating in a converter. A blast of oxygen disluted with CO₂ is blown through converter. Oxygen reacts with impurities and raises the temperature to 2173 K. Carbon gets oxidised to Co which burns off at the mouth of the converter. Oxides of silicon and Mg from slag. When the flame is stopped, slag is tapped off and other metals like Mn, Cr, Ni, W may be added in the end.</p> <p>ii) Impure titanium is heated with iodine to form volatile TiI₄, which decomposes on tungsten filament at high temp. to give pure titanium.</p> $\text{Ti (s)} + 2\text{I}_2(\text{g}) \xrightarrow{523\text{K}} \text{TiI}_4(\text{g}) \xrightarrow{1700\text{K}} \text{Ti(s)} + 2\text{I}_2(\text{g}) \text{ pure impure.}$ <p>iii) Zinc oxide into metallic zinc : reduction of ZnO is done using coke, as a reducing agent.</p> $\text{ZnO} + \text{C} \xrightarrow[1673\text{K}]{\text{coke}} \text{Zn} + \text{CO}$ <p>The metal is distilled off and collected by rapid chilling.</p>	
<p>Ans 13</p>	<p>Carried out with acids in the presence of air when copper goes into solution as Cu²⁺ ions.</p> $2\text{Cu (s)} + 2\text{H}_2\text{SO}_4(\text{aq}) + \text{O}_2(\text{g}) \longrightarrow 2\text{CuSO}_4(\text{aq}) + 2\text{H}_2\text{O(l)}$	
<p>Ans14</p>	<p>Copper matte consists of Cu₂S and FeS. When a blast of hot air is passed through molten matter taken in a silica lined converted FeS present in matte is oxidised to FeO which combines with silica (SiO₂) to form FeSiO₃, Slag.</p> $2\text{FeS} + 3\text{O}_2 \longrightarrow 2\text{FeO} + 2\text{SO}_2$ $\text{FeO} + \text{SiO}_2 \longrightarrow \text{FeSiO}_3$ $\text{Silica} \longrightarrow \text{Slag}$ <p>When whole of iron has been removed as slag, some of the Cu₂S undergoes oxidation to form Cu₂O which then reacts with more Cu₂S to form copper metal.</p> $2\text{Cu}_2\text{S} + 3\text{O}_2 \longrightarrow 2\text{Cu}_2\text{O} + 2\text{SO}_2$ $2\text{Cu}_2\text{O} + \text{Cu}_2\text{S} \longrightarrow 6\text{Cu} + \text{SO}_2$ <p>Thus copper matte is heated in silica lined converted to remove FeS present in matte as FeSiO₃ slag.</p>	
<p>Ans 15</p>	<p>Many reaction which are non spontaneous (ΔG is the) can be made to occur spontaneously if these are coupled with reaction having larger -ve free energy. By coupling means carrying out simultaneously both non spontaneous and spontaneous reaction eg decomposition of Fe₂O₃ into iron is non spontaneous (ΔG⁰ = + 1487kj/mol. However this decomposition can take place spontaneously if CO is simultaneously burn in oxygen (ΔG = -514.4kj/mol)</p> $2\text{Fe}_2\text{O}_3(\text{s}) \longrightarrow 4\text{Fe}(\text{s}) + 3\text{O}_2(\text{g}) \quad \text{i) } \Delta G^0 = + 1487\text{Kj/mol}$ $2\text{CO}(\text{g}) + \text{O}_2(\text{g}) \longrightarrow 2\text{CO}_2(\text{g}) \quad \text{ii) } \Delta G^0 = -514.4\text{kj/mol}$ <p>Multiplying eq ii) by 3 and then adding to eq (i)</p> $6\text{CO}(\text{g}) + 3\text{O}_2(\text{g}) \longrightarrow 6\text{CO}_2(\text{g}) \quad \Delta G^0 = - 1543.2\text{kj/mol}$ $2\text{Fe}_2\text{O}_3(\text{s}) \longrightarrow 4\text{Fe}(\text{s}) + 3\text{O}_2 \quad \Delta G^0 = + 1487 \text{Kj/mol}$ <hr/> $2\text{Fe}_2\text{O}_3(\text{s}) \longrightarrow 4\text{Fe}(\text{s}) + 3\text{O}_2 \quad \Delta G^0 = + 1487 \text{kj/mol}$ $\Delta G^0 = -56.2\text{kj/mol}$ <p>Since ΔG⁰ in the reduction of Fe₂O₃ with CO is -ve therefore reaction is feasible and spontaneous.</p>	

Chapter-7

Ans1	<p>PH₃ reacts with acids like HI to form PH₄⁺I⁻.</p> $\text{H}_3\text{P:} + \text{H}^+\text{I}^- \longrightarrow [\text{PH}_4^+][\text{I}^-]$ <p>∴ due to presence of lone pair of electrons on P. PH₃ acts as a lewis base.</p>	
Ans 2	<p>As the size of the element increases down the group the E-H bond dissociation energy decreases and hence E-H bond breaks more easily ∴ thermal stability of the hydride of gp 16 elements decreases down the group H₂O > H₂S > H₂Se > H₂Te > H₂Po</p>	
Ans 3	<p>i) P₄ + 10SO₂Cl₂ → 4PCl₅ + 10SO₂ ii) XeF₆ + 3H₂O → XeO₃ + 6HF</p>	
Ans 4		
Ans 5	<p>N due to absence of d orbitals cannot form pπ-dπ multiple bonds As a result N cannot expand its covalency beyond four but in R₃H=O N has a covalency of 5. P due to presence of d orbitals form pπ-dπ multiple bonds and hence can expand its covalency beyond 4. ∴ P forms R₃P=O in which covalency of P is 5.</p> <p>ii) This is due to polymeric structure of red phosphorus or angular strain in P₄ molecule of white phosphorus where the angle is only 60°.</p> <p>iii)</p> 	
Ans 6.	<p>i) In vapour form sulphur partly exists as S₂ molecules which have two unpaired electrons in the antibonding π*. Molecular orbitals like O₂ molecule and hence exhibits paramagnetism.</p> <p>ii) Because +3 oxidation state of Bi is more stable than Sb due to inert pair effect.</p> <p>iii) Solid PCl₅ behaves as an ionic compound because it is a salt containing the tetrahedral cation [PCl₄⁺] and octahedral anion [PCl₆⁻]</p>	
Ans 7	<p>i) Due to absorption of radiation in visible region which results in the excitation of outer electrons to higher energy level while the remaining light is transmitted. The colour of the halogen is the colour of transmitted light.</p> <p>ii) ICl is more reactive than I₂ because I-Cl bond is weaker than I-I bond. ICl breaks easily to form halogen atoms which readily bring about the reaction.</p> <p>iii) Do to small size the electron- electron repulsions in the relatively compact 2p subshell of F are comparatively large ∴ incoming electron is not accepted with the same ease as in large 3p subshell of Cl atom. ∴ Energy released during formation of F⁻ from F is less than that of Cl⁻.</p>	
Ans8	<p>i) As the electronegativity of the halogen decreases the electron density in the O-H bond increases. As a result cleavage of O-H bond to liberate H⁺ ions becomes little difficult ∴ acidic character decreases. HO - Cl > H-O-Br > H-O-I.</p> <p>ii) NO₂ dimerises to get paired up and hence become paramagnetic.</p> <p>iii) SF₆ is sterically protected by six F atoms and hence does not allow H₂O molecules to attack the S atom. F does not have d orbitals to accept the electrons donated by H₂O molecules. ∴ SF₆ does not undergo hydrolysis.</p>	

<p>Ans 9</p>	 <p>The image shows four handwritten chemical structures on lined paper. The first is XeF6, a six-coordinate complex with a lone pair on Xe. The second is O3, showing resonance structures with a central oxygen atom bonded to two terminal oxygen atoms, one with a positive charge and one with a negative charge. The third is ClF3, a T-shaped molecule with two lone pairs on Cl. The fourth is a resonance structure of N2O, showing a central nitrogen atom bonded to two oxygen atoms, one with a positive charge and one with a negative charge.</p>	
<p>Ans 10</p>	<p>i) $P_4 + 3NaOH + 3H_2O \longrightarrow PH_3 + 3NaH_2PO_2$ ii) $2I^- + H_2O + O_3 \longrightarrow 2OH^- + I_2 + O_2$ iii) $PF_6 + Xe \longrightarrow [Pt F_5^+][XeF]^-$</p> <p style="text-align: center;">OR</p> <p>$4H_3PO_3 \xrightarrow{\Delta} 3H_3PO_4 + PH_3$ $3Cl_2 + 6NaOH \xrightarrow{\text{Hot conc}} 5NaCl + NaClO_3 + 3H_2O$</p>	

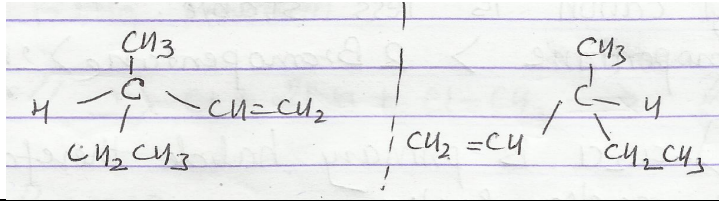

Ans1	It is due to regular increase in Ionisation enthalpy.	
Ans2	Mn (Z = 25), as its atom has the max number of unpaired electrons. Thus it shows oxidation states from +2 to +7 (+2, +3, +4, +5, +6, +7) which is the maximum number.	
Ans3	Interstitial compounds are those in which small atoms occupy the interstitial sites in the crystal Lattice. Interstitial compounds are well known for transition metals because small sized atom of H, B, C, N can easily occupy position in the voids present in the crystal lattices of transition metals.	
Ans4	$4\text{FeO} \cdot \text{Cr}_2\text{O}_3 + 8\text{Na}_2\text{CO}_3 + 7\text{O}_2 \xrightarrow{\text{Roasted}} 8\text{Na}_2\text{CrO}_4 + 2\text{Fe}_2\text{O}_3 + 8\text{CO}_2$ Chromite ore $2\text{Na}_2\text{CrO}_4 + \text{H}_2\text{SO}_4 \longrightarrow \text{Na}_2\text{Cr}_2\text{O}_7 + \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$ $\text{Na}_2\text{Cr}_2\text{O}_7 + 2\text{KCl} \longrightarrow \text{K}_2\text{Cr}_2\text{O}_7 + 2\text{NaCl}$ K ₂ Cr ₂ O ₇ is separated by Fractional crystallisation. In aqueous solution, dichromate and chromate ions exist in equilibrium. On increasing the PH i.e. on making the solution alkaline, dichromate ions (orange coloured) are converted into chromate ions and thus, the solution turns yellow.	
Ans5	The same substance undergoes oxidation as well as reduction. In disproportionation reaction, oxidation number of an element increases as well as decreases to form two different products. $3\text{Mn}^{+6}\text{O}_4^{2-} + 4\text{H}^+ \longrightarrow 2\text{Mn}^{+7}\text{O}_4^- + \text{Mn}^{+4}\text{O}_2 + 2\text{H}_2\text{O}$ $3\text{Cr}^{+5}\text{O}_4^{3-} + 8\text{H}^+ \longrightarrow 2\text{Cr}^{+6}\text{O}_4^{2-} + \text{Cr}^{3+} + 4\text{H}_2\text{O}$	
Ans6	In lanthanoids with increasing atomic no, the atomic and ionic radii decrease from one element to the other, but the decrease is very small. It is because, for every additional proton in the nucleus, the corresponding electron goes into a 4f subshell, which is too diffused to screen the nucleus as effectively as the more localised inner shell. Hence the attraction the nucleus for the outermost electron increases steadily with the atomic number. Consequences : <ol style="list-style-type: none"> The properties of second and third transition series are similar. Basic strength decreases from La(OH)₃ to Lu(OH)₃. Lanthanide contraction makes separation of lanthanoid possible. 	
Ans7	i) $[\text{MnO}_4^- + 8\text{H}^+ + 5\text{e}^- \longrightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O}] \times 2$ $\text{S}^{2-} \longrightarrow \text{S} + 2\text{e}^-] \times 5$ $2\text{MnO}_4^- + 5\text{S}^{2-} + 16\text{H}^+ \longrightarrow 2\text{Mn}^{2+} + 5\text{S} + 8\text{H}_2\text{O}$ ii) $\text{Cr}_2\text{O}_7^{2-} + 2\text{OH}^- \longrightarrow 2\text{CrO}_4^{2-} + \text{H}_2\text{O}$	
Ans8	i) $\text{Mn}^{3+} = 3d^4 = 4 \text{ unpaired } e^-$ ii) $\text{Cr}^{3+} = 3d^3 = 3e^-$ iii) $\text{V}^{3+} = 3d^2 = 2e^-$ iv) $\text{Ti}^{3+} = 3d^1 = 1e^-$	
Ans9	i) This is due to the presence of voids of appropriate sizes in their crystal lattices. ii) Zn ²⁺ ion has its orbitals completely filled whereas in Cu ²⁺ ion there is one half-filled 3-d orbital. Therefore, due to d-d transition Cu ²⁺ has a tendency to form coloured salts whereas Zn ²⁺ has no such tendency. iii) In these oxoanions the oxygen atoms are directly bonded to the transition metal. Since oxygen is highly electronegative, the oxoanions bring out the highest oxidation state of the metal. iv) It is because after losing one more electron it acquires stable 4f ⁷ electronic configuration.	
Ans10	a) Negative E ⁰ values for Mn ²⁺ and Zn ²⁺ are related to stabilities of half-filled and fully filled configuration. But for Ni ²⁺ , E ⁰ value is related to the highest negative enthalpy of hydration. b) This is due to d-d transition of electron in [Ti(H ₂ O) ₆] ³⁺ complex Ti ³⁺ has one e ⁻ in d-orbital (3d) which absorbs energy corresponding to blue-green region and jumps from t _{2g} to e _g set of d-orbital (t _{2g} ¹ e _g ⁰ → t _{2g} ⁰ e _g ¹), but Sc ³⁺ has no e ⁻ in the d-orbital.	
Ans11	a) Ag ⁺ - 4d ¹⁰ , Cu ²⁺ - 3d ⁹ , Mg ²⁺ - 2s ² 2p ⁶ , Cu ⁺ - 3d ¹⁰ CuF ₂ is coloured due to unpaired e ⁻ b) Mn ⁶⁺ - 3s ² 3p ⁶ 4s ¹ can lose e ⁻ to attain stable configuration. Whereas Cr ⁶⁺ - 3s ² 3p ⁶ 4s ⁰	

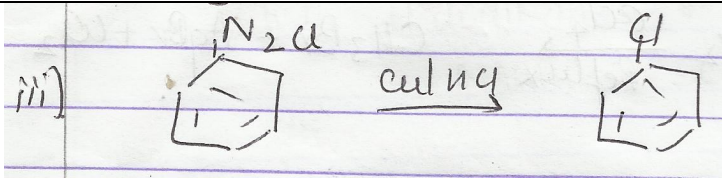
	<p>c) This is due to filling of $4f$ orbitals which have poor shielding effect (lanthanoid contraction).</p> <p>d) The lowest oxide of transition metal is basic because the metal atom has low oxidation state it can donate valence electrons which are not involved in bonding to act like a base. While highest is acidic due to highest oxidation state as the valence electrons are involved in bonding and are unavailable (MnO basic whereas Mn_2O_7 is acidic)</p> <p>e) Mn^{2+} - d^5 configuration.</p>	
Ans12	<p>a) There is a gradual decrease in the atomic sizes of transition elements in a series with increasing atomic numbers due to poor shielding effect of d- electrons, the net electrostatic attraction between the nucleus and the outer most electrons increases.</p> <p>b) This is due to filling of $4f$ orbitals which have poor shielding effect.</p> <p>c) The E^0 value for Mn^{3+} / Mn^{2+} couple is much more positive than Cr^{3+} / Cr^{2+} couple or Fe^{3+} / Fe^{2+} couple because Mn^{3+} ion receiving an electron gets d- subshell half filled which is highly stable, while in case of Fe^{3+}, d - subshell is already half- filled, so it does not receive electron easily.</p> <p>d) The transition elements have great tendency for complex formation due to presence of vacant d- orbitals of suitable energy, small size of cation and higher nuclear charge.</p> <p>e) Due to lanthanoid contraction, they have almost same size ($Zr = 160pm$) and ($Hf = 159 pm$)</p>	
Ans 13	<p>a) As the size decreases covalent character increases. Therefore La_2O_3 is more ionic and Lu_2O_3 is more covalent.</p> <p>b) As the size decrease from La to Lu, stability of oxosalts also decrease.</p> <p>c) Stability of the complexes increases as the size of Lanthanoids decreases.</p> <p>d) Radii of $4d$ and $5d$ block elements will be almost same.</p> <p>e) Acidic character of oxides increases from La to Lu.</p>	

Chapter-9 Co-ordination Compounds (Marking scheme)

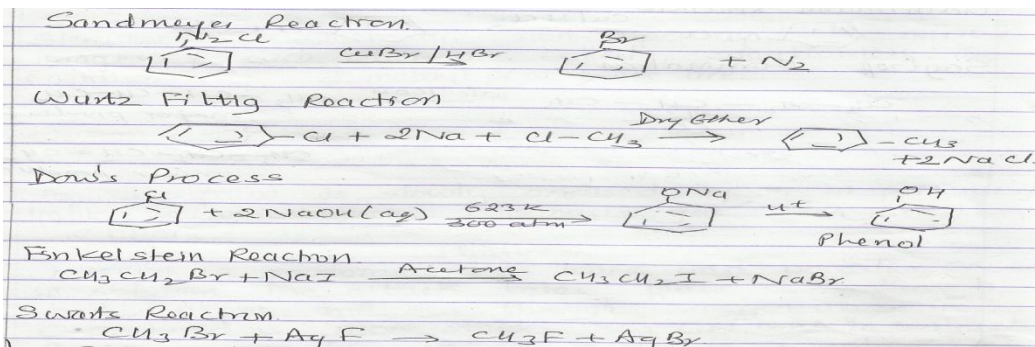
Ans1	$[\text{Co}(\text{NH}_3)_6] \text{Cl}_2 \xrightarrow{\text{aq}} [\text{Co}(\text{NH}_3)_6]^{2+} + 2\text{Cl}^-$ Three ions are produced.	
Ans 2	When a bidentate or a polydentate ligand contains donor atoms positioned in such a way that when they coordinate with the central metal ion, a five or six membered ring is formed eg $[\text{Pt} \text{Cl}_2 (\text{en})]$	
Ans 3	There will be three isomers : cis and trans- isomers. Cis will also show optical isomerism.	
Ans4	Because CO forms π bonds.	
Ans5	i) $3(+1) + x + 6(-1) = 0$ $\text{K}_3[\text{Fe}(\text{CN})_6]$ $x = +3$ ii) $x - 4 = -2$ $[\text{Pt} \text{Cl}_4]^{2-}$ $x = +2$	
Ans 6	It is due to the presence of weak and strong ligands in complexes, if CFSE is high the complex will show low value of magnetic moment eg $[\text{CoF}_6]^{3-}$ and $[\text{Co}(\text{NH}_3)_6]^{3+}$, the former is paramagnetic and the latter is diamagnetic.	
Ans 7	i) Linkage isomerism : The isomers which have same molecular formula but differ in the linkage of ligand atom.	

Chapter-10 Haloalkanes and Haloarenes (Marking Scheme)

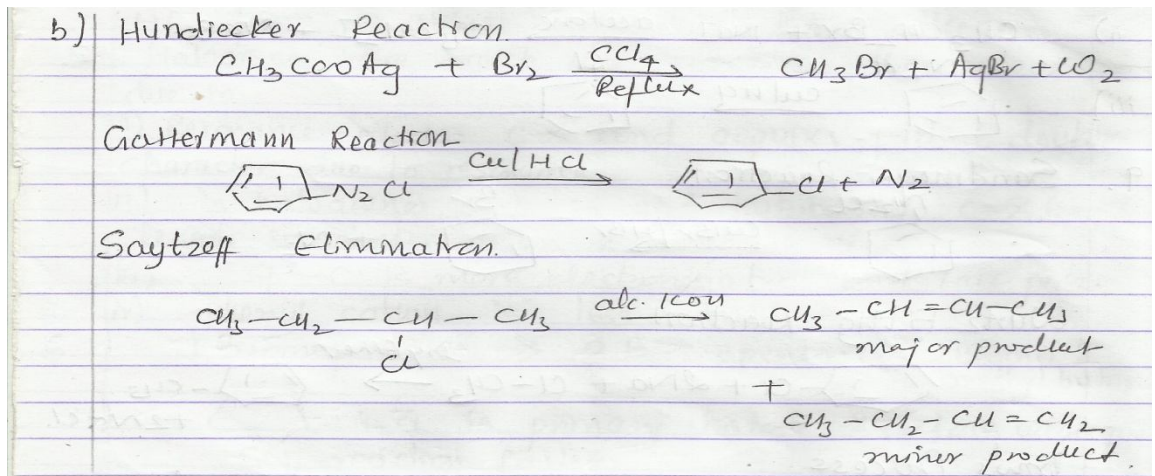
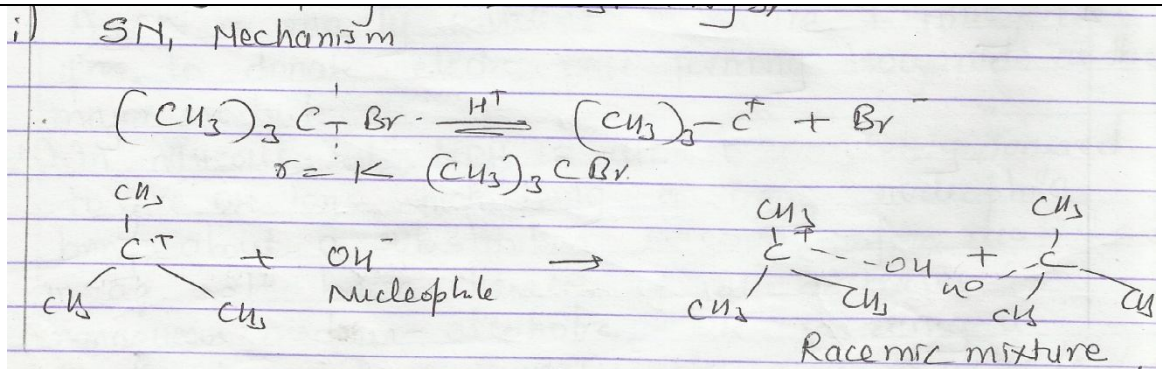
Ans1	$\text{CH}_3 - \overset{\text{CH}_3}{\underset{\text{CH}_3}{\text{C}}} - \text{C}^1\text{H}_2 \text{ Br}$ <p>1 bromo – 2,2 dimethyl propane</p>	
Ans2	<p>Stereoisomers which are non-superimposable mirror images of each other are called enantiomers. The enantiomers of 3 methyl pent – 1- ene are.</p> 	
Ans 3	<p>As chloroform is slowly oxidised by air in presence of light to an extremely poisonous gas phosgene.</p> $2\text{CHCl}_3 + \text{O}_2 \xrightarrow{\text{Light}} 2\text{COCl}_2 + 2\text{HCl}$ <p>Phosgene</p>	
Ans 4	<p>i) KCN is predominantly ionic and provides CN⁻ ion in solution. The attack takes place mainly through carbon atom and not through nitrogen atom as C-C bond is more stable than C-N bond. In contrast AgCN is mainly covalent in nature and nitrogen is free to donate electron pair forming isocyanide as the major product.</p> <p>ii) In aqueous solⁿ, KOH is almost completely ionised to give OH⁻ ions which being a strong nucleophile brings about a substitution reaction to form alcohol. Or in aq. solⁿ basic character of OH⁻ decreases/ In nonaqueous medium- alcoholic OR⁻ ion being a much stronger base than OH⁻ eliminates a molecule of HCl from an alkyl chloride to form alkene.</p>	
Ans 5	<p>Haloarenes are much less reactive than haloalkanes due to :</p> <p>i) Resonance effect – C-X bond acquires partial double character due to resonance.</p> <p>ii) In haloarenes C is sp² hybridised C-X bond length is shorter than in haloalkane.</p> <p>iii) Sp² - C is more electronegative and less polar.</p> <p>iv) phenyl cation is less stable.</p>	
Ans 6	<p>i) 1 Bromopentane > 2 Bromopentane > 2 Bromo 2 methyl butane.</p> <p>ii)  -CH₂Cl is primary halide therefore undergoes SN₂ reaction faster.</p>	
Ans 7	<p>Freon – 12-</p> <p>i) Used as propellants.</p> <p>ii) For aerosol and foams to spray out deodorants.</p> <p>iii) As a refrigerant.</p> <p>CCl₄</p> <p>i) As feedstock for synthesis of chlorofluorocarbons</p> <p>ii) As a solvent</p> <p>iii) As refrigerant and propellant.</p> <p>Iodoform</p> <p>i) As an antiseptic for dressing wounds.</p> <p>ii) As iodoform test to differentiate methyl ketones and methyl carbinols from other ketones and alcohols.</p>	
Ans 8	$2 \text{CH}_3 - \overset{\text{CH}_3}{\underset{\text{H}}{\text{C}}} - \text{Cl} + 2\text{Na} \xrightarrow{\text{Dryther}} \text{CH}_3 - \overset{\text{CH}_3}{\underset{\text{H}}{\text{C}}} - \text{C} - \overset{\text{CH}_3}{\underset{\text{H}}{\text{C}}} - \text{CH}_3$ <p>2, 3, dimethyl butane.</p> <p>ii) $\text{CH}_3\text{CH}_2\text{Br} + \text{NaI} \xrightarrow{\text{acetone}} \text{CH}_3\text{CH}_2\text{I} + \text{NaBr}$</p>	



Ans 9



Ans 10

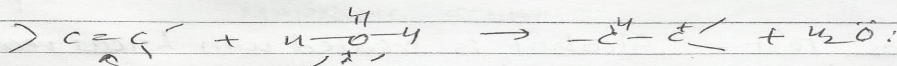
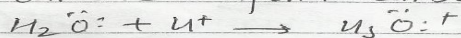


Chapter-11 Alcohols, Phenols and Ethers (Marking Scheme)

Ans 1	PCC	
Ans 2	Ethers are insoluble in water because due to the bigger size of the alkyl group, the oxygen atom in ethers fails to form intermolecular H ⁺ bonds with water.	
Ans 3	<p>a) Phenol and Benzyl alcohol. Phenol gives a violet colouration with FeCl₃ solution while benzyl alcohol does not. $6 \text{C}_6\text{H}_5\text{OH} + \text{FeCl}_3 \rightarrow [(\text{C}_6\text{H}_5\text{O})_6\text{Fe}]^{3-} + 3\text{HCl} + 3\text{H}^+$ Violet colouration.</p> <p>b) Butan-2-ol when warmed with NaOI (I₂/ NaOH) gives yellow ppt of iodoform while 2 methyl propan-2-ol does not give this test.</p> $\text{CH}_3-\text{CH}_2-\text{CHOHCH}_3 + 4\text{I}_2 + 6\text{NaOH} \xrightarrow{\Delta} \text{CHI}_3 \downarrow + \text{CH}_3\text{CH}_2\text{COO}^-\text{Na}^+ + 5\text{NaI} + 5\text{H}_2\text{O}$ <p style="text-align: center;">Yellow + 5NaI + 5H₂O</p> <p>(CH₃)₃C-OH + I₂ + NaOH → No reaction.</p>	
Ans 4	<p> <chem>Oc1ccccc1</chem> $\xrightarrow{\text{Na}_2\text{CO}_3/\text{H}_2\text{SO}_4}$ <chem>O=C(O)c1ccccc1</chem> <chem>CC(=O)C</chem> + <chem>CH3MgBr</chem> $\xrightarrow{\text{Dilute H}^+}$ <chem>CC(C)(C)O</chem> <chem>CC=C</chem> + <chem>H2O</chem> $\xrightarrow{\text{H}^+ \text{ or } \text{H}^+\text{Acid}^+}$ <chem>CC(O)C</chem> </p>	
Ans 5	<p> <chem>Oc1ccccc1</chem> $\xrightarrow{\text{H}_2\text{SO}_4 \text{ conc.}}$ <chem>Oc1ccccc1S(=O)(=O)O</chem> $\xrightarrow{\text{conc. HNO}_3}$ <chem>Oc1c([N+](=O)[O-])cc([N+](=O)[O-])cc1[N+](=O)[O-]</chem> Picric acid. <chem>CC(C)CO</chem> $\xrightarrow{\text{SOCl}_2}$ <chem>CC(C)Cl</chem> $\xrightarrow{\text{conc. H}^+}$ <chem>CC(C)=C</chem> <chem>COc1ccccc1</chem> + <chem>HI</chem> $\xrightarrow{\text{373K}}$ <chem>Oc1ccccc1</chem> + <chem>CI</chem> </p>	
Ans 6	<p>All cresols are weaker acids than phenols, Methyl gp (+) effect as well as hyperconjugation effect. Both effects increase the electron density in the O-H bond hence all the cresols are weaker acid, than phenols. ocresol < p cresol < m - cresol < phenol- at meta position no hyperconjugation effect.</p>	
Ans7a)	$\text{CH}_3-\text{CH}_2-\underset{\text{CH}_3}{\text{CH}}-\text{CH}_2-\text{OH} + \text{CH}_3\text{CH}_2\text{I}$	
b)	$\text{CH}_3\text{CH}_2\text{CH}_2\text{OH} + \text{CH}_3\text{CH}_2-\underset{\text{CH}_3}{\text{C}}-\text{I}$	
c)	<p> <chem>c1ccccc1CI</chem> + <chem>Oc1ccccc1</chem> </p>	

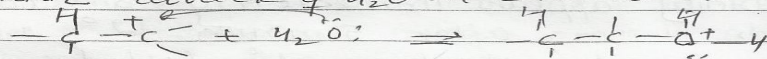
Ans 8 I

Protonation of alkene to form carbocation.



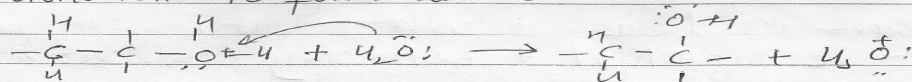
II

Nucleophilic attack of H_2O on carbocation



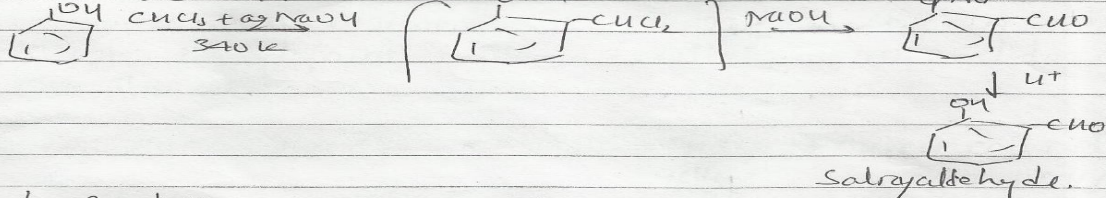
III

Deprotonation to form alcohol.

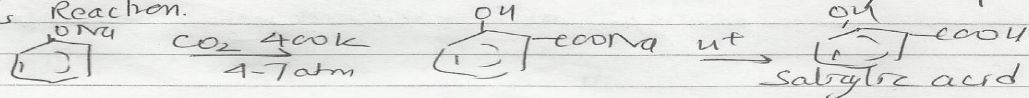


Ans 9

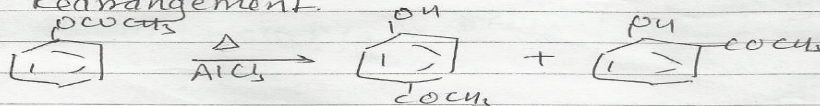
Reimer-Tiemann Reaction



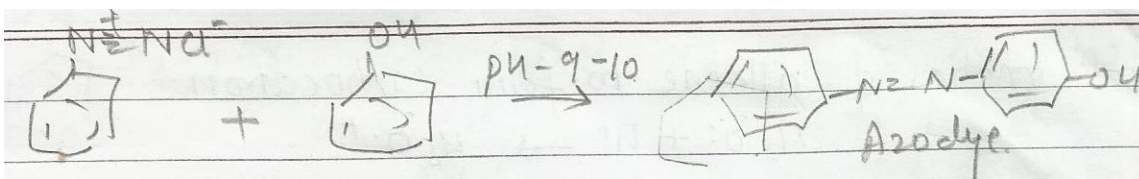
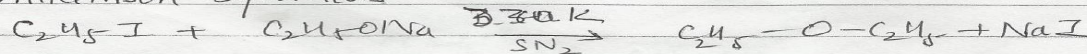
Kolbe's Reaction.



Fries Rearrangement.



Williamson Synthesis



Ans 10

a) Lucas Test - Alcohol is treated with Lucas reagent equimolar mixture of HCl and $ZnCl_2$.

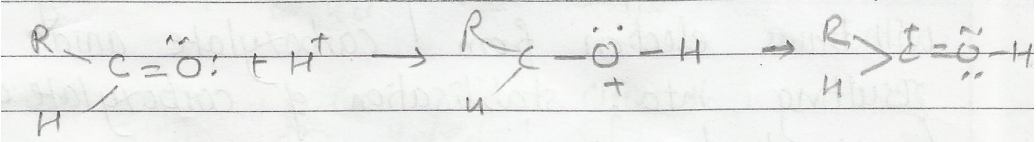
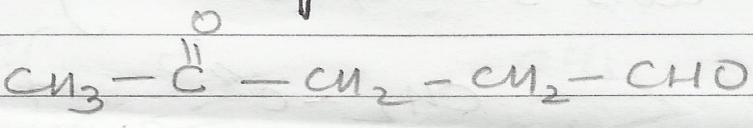
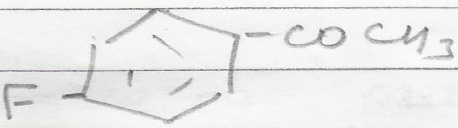
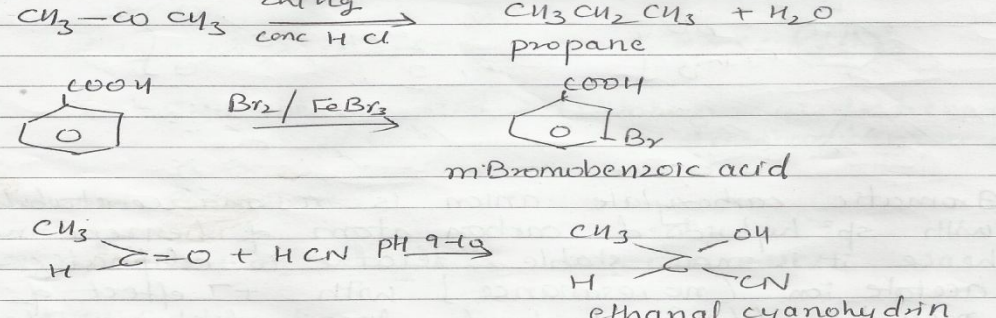
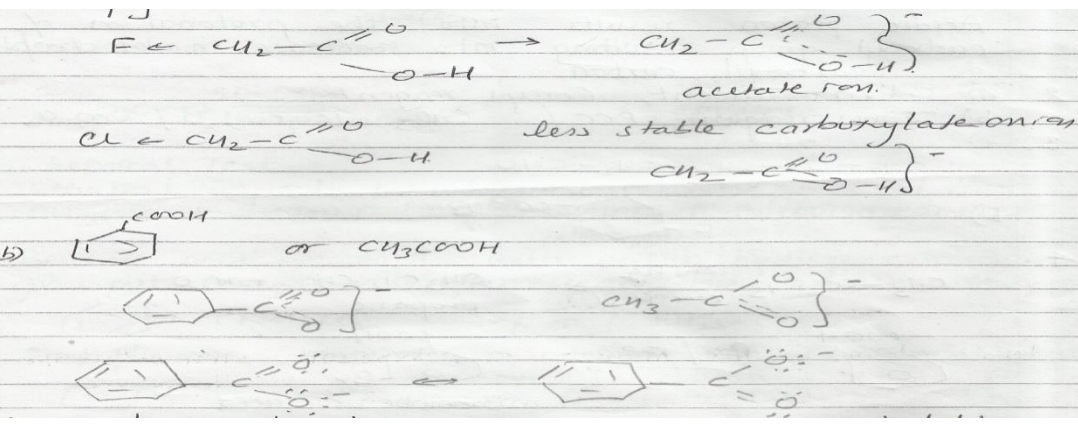
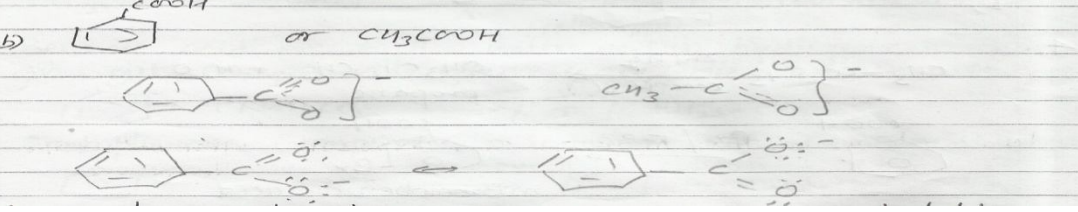
If turbidity appears immediately 3° alcohol is indicated.

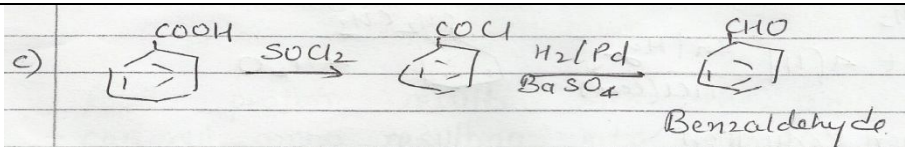
If turbidity appears after 5 minutes 2° alcohol is indicated.

b) Ether- used as a solvent at low temperature.

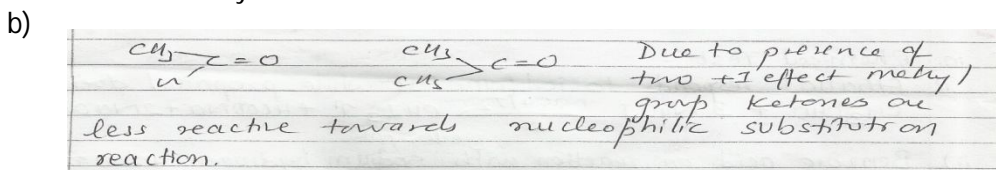
As industrial and extracting solvent.

Chapter-12

<p>Ans1</p>	 <p>Acidic proton results into the protonation of carbonyl group resulting into increase in electrophilicity of carbonyl carbon.</p>	
<p>Ans2</p>	<p>a) Tollin's reagent, Corey's reagent b) Jones reagent, PCC/ CrO₃ in (CH₃CO)₂O/ CrO₂ Cl₂ 2H₂O.</p>	
<p>Ans3</p>	<p>a)</p>  <p>b)</p> 	
<p>Ans4</p>		
<p>Ans5</p>	<p>a) FCH₂COOH or ClCH₂COOH F with -I effect stronger than Chlorogroup withdraws electron from carboxylate anion resultin into stabilisation of carboxylate anion. (conjugate base).</p>  <p>b)</p>  <p>Aromatic carboxylate anion is resonance stabilised with sp² hybridised carbon atom of benzene ring hence it is more stable relative to aliphatic acetate ion (no resonance) with +I effect of methyl gp (sp³ hybridised less electronegative, less electron withdrawing).</p>	
<p>Ans6</p>	<p>a) $2\text{CH}_3\text{CHO} \xrightarrow{\text{dil NaOH}} \text{CH}_3 - \overset{\text{OH}}{\text{CH}} - \text{CH}_2 - \text{CHO}$</p> <p>b) $\text{CH}_3 - \text{COCH}_3 \xrightarrow[\text{concHCl}]{2\text{n/Hg}} \text{CH}_3 \text{CH}_2 \text{CH}_3$</p>	

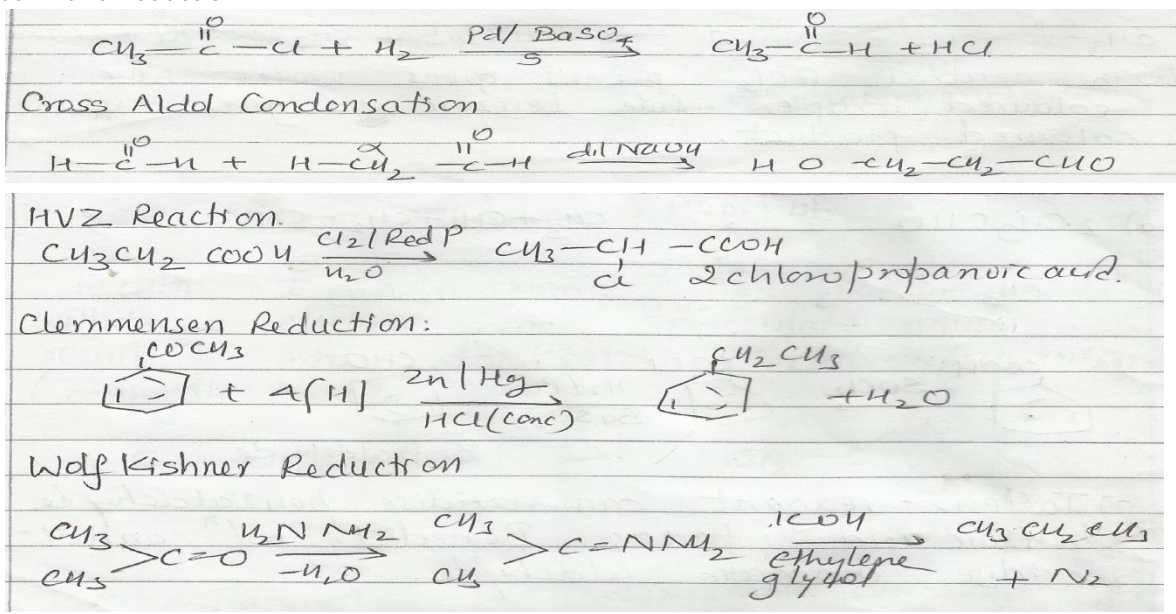


Ans7 a) Tollen's reagent can oxidise benzaldehyde to benzoic acid whereas Benedict solⁿ cannot oxidise aromatic aldehyde.



Ans8 a) $\text{CH}_3\text{CHO} > \text{CH}_3\text{COCH}_3 > \text{C}_6\text{H}_5\text{COC}_6\text{H}_5$
 b) 3,4 dinitrobenzoic acid > 4 nitrobenzoic acid > benzoic acid > 4 methoxybenzoic acid

Ans9 Resenmund Reduction :

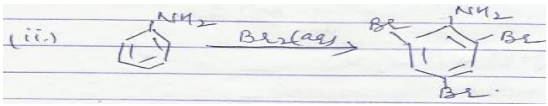


Ans10

10. Chemical Test.
- i) Ethanal responds to iodoform test while propanal does not.
 $\text{CH}_3\text{CHO} + 3\text{NaOI} \xrightarrow{\Delta} \text{CHI}_3 \downarrow + \text{HCOONa} + 2\text{NaOH}$
 yellow ppt
 - ii) Benzoic acid on reaction with sodium hydrogen carbonate gives out CO_2 gas with effervescence while ethyl benzoate does not.
 - iii) Acetophenone responds to iodoform test but not benzaldehyde.
 - iv) Iodoform test given by propanone but not propanal.
 $\text{CH}_3\text{COCH}_3 + 3\text{NaOI} \rightarrow \text{CHI}_3 \downarrow + \text{CH}_3\text{COONa} + 2\text{NaOH}$

With neutral FeCl_3 phenol gives violet, blue coloured complex while benzoic acid gives buff coloured product.

Chapter-13 Organic

Ans 1	<p>Al. $\text{H}_3\text{N}^+ \text{---} \text{SO}_3^-$, Sulphanilic acid.</p>
Ans 2	<p>i) In primary amines, two hydrogen atom are present on N-atom and they undergo extensive intermolecular hydrogen bonding which results in association of molecules while in tertiary amines, no hydrogen atom is present on N-atom. Hence there is no hydrogen bonding in tertiary amines. ii) Aliphatic amines are stronger bases than aromatic amines because : a) Due to resonance in aromatic amines, the lone pair of electrons on the nitrogen atom gets delocalized over the benzene ring and thus is less easily available for protonation. b) The aryl amine ions have lower stability than corresponding alkyl amines ie. Protonation of aromatic amines is not favoured.</p>
Ans 3	<p>A3-(i) $\text{CH}_3\text{---CH}_2\text{---NH}_2 + \text{CH}_3\text{---C(=O)---Cl} \rightarrow \text{CH}_3\text{---C(=O)---NH---CH}_2\text{---CH}_3 + \text{HCl}$ Ethanoyl chloride $\text{CH}_3\text{---C(=O)---NH---CH}_2\text{---CH}_3$ N-Ethyl ethanamide (ii) $\text{CH}_3\text{---CH}_2\text{---Cl} \xrightarrow{\text{alc KCN}} \text{CH}_3\text{---CH}_2\text{---CN}$ or $\text{Na/C}_2\text{H}_5\text{---OH}$ \downarrow LiAlH_4 $\text{CH}_3\text{---CH}_2\text{---CH}_2\text{---NH}_2$ Propan-1-amine</p>
Ans 4	<p>$\text{C}_6\text{H}_5\text{CH}_2\text{NH}_2$ reacts with HNO_2 at 273-278 K to give diazonium salt, which being unstable, decomposes with brisk evolution of N_2 gas. $\text{C}_6\text{H}_5\text{CH}_2\text{NH}_2 \xrightarrow[273.278\text{K}]{\text{HNO}_2/\text{HCl}} [\text{C}_6\text{H}_5\text{CH}_2\text{---N}^+ \equiv \text{N}]\text{Cl}^-$ $\downarrow \text{H}_2\text{O}$ $\text{C}_6\text{H}_5\text{---CH}_2\text{OH} + \text{N}_2 \uparrow + \text{HCl}$ Whereas $\text{C}_6\text{H}_5\text{NH}_2$ reacts with HNO_2 at 273-278K to form stable benzenediazonium chloride which upon treatment with an alkaline solution of B-naphthol, gives an orange dye. $\text{C}_6\text{H}_5\text{NH}_2 \xrightarrow[273-278\text{K}]{\text{HNO}_2/\text{HCl}} \text{C}_6\text{H}_5\text{---N}^+ \equiv \text{N} \text{Cl}^- \xrightarrow[\text{NaOH}]{\text{B-naphthol}} \text{1-phenyl-2-naphthol (orange dye)}$</p>
Ans 5	<p>i) Aniline to fluoro benzene $\text{C}_6\text{H}_5\text{NH}_2 \xrightarrow[0-5^\circ\text{C}]{\text{NaNO}_2/\text{HCl}} \text{C}_6\text{H}_5\text{---N}^+ \equiv \text{N} \text{Cl}^- \xrightarrow[\Delta]{\text{HBF}_4} \text{C}_6\text{H}_5\text{---F} + \text{BF}_3 + \text{NaCl} + \text{N}_2$ (ii) Benzene diazonium chloride to benzene $\text{C}_6\text{H}_5\text{---N}_2^+ \text{Cl}^- + \text{H}_3\text{PO}_2 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_6 + \text{N}_2 + \text{H}_3\text{PO}_3 + \text{HCl}$ Benzene diazonium chloride \rightarrow Benzene (iii) Methyl chloride to ethyl amine $\text{CH}_3\text{Cl} \xrightarrow{\text{alc KCN}} \text{CH}_3\text{---CN} \xrightarrow{\text{LiAlH}_4} \text{CH}_3\text{---CH}_2\text{---NH}_2$</p>
Ans 6	<p>i) $\text{C}_6\text{H}_5\text{N}_2^+\text{Cl}^- \xrightarrow[\text{H}_3\text{PO}_3]{\text{H}_3\text{PO}_2} \text{C}_6\text{H}_6 + \text{N}_2 + \text{H}_3\text{PO}_3 + \text{HCl}$ (ii) </p>
Ans 7	<p>P-nitroaniline < aniline < P-toluidine < N,N-dimethyl-P-toluidine</p>

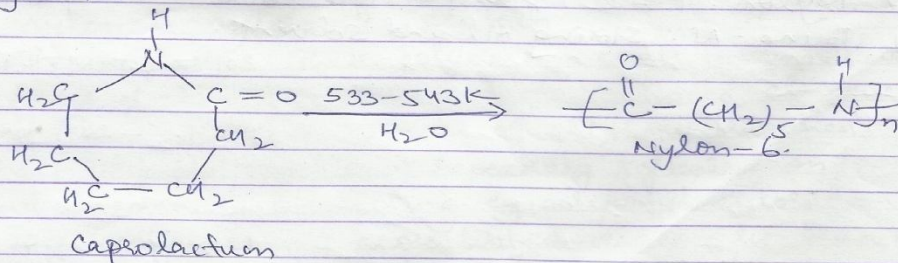
Chapter- 14 Biomolecules

Ans 1	Anomers are stereoisomers which differ in orientation of OH only around C-1. Eg α glucose and β glucose.																																	
Ans 2	Nucleoside consists of a base joined to sugar molecule e.g adenosine, contains adenine and ribose. Guanosine contains guanine and ribose, cytosine contains cytosine and ribose.																																	
Ans 3	Tertiary structure of protein includes folding and twisting of secondary structure of proteins. It has compact and folded structure. It involves H-bonding, disulphide linkage, ionic bridges and hydrophobic interactions, giving fibrous and globular structure.																																	
Ans 4	<table border="1"> <thead> <tr> <th colspan="2">a) Fibrous</th> <th colspan="2">Globular Protein</th> </tr> </thead> <tbody> <tr> <td>i)</td> <td>Long linear thread like polymeric chains</td> <td>i)</td> <td>Spheroidal, globular mass.</td> </tr> <tr> <td>ii)</td> <td>Insoluble in water</td> <td>ii)</td> <td>Soluble in water</td> </tr> <tr> <td>iii)</td> <td>Not affected by change of temp and pressure</td> <td>iii)</td> <td>Highly sensitive to moderate change in temp and pressure</td> </tr> <tr> <td>iv)</td> <td>Keratin, Myosin</td> <td>iv)</td> <td>Hormones, Insulin</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">b) Oligopeptide</th> <th colspan="2">Polypeptide</th> </tr> </thead> <tbody> <tr> <td>i)</td> <td>A few amino acid upto 10</td> <td>i)</td> <td>Larg no of α amino acids 50 and above.</td> </tr> <tr> <td>ii)</td> <td>Found in tissues as hormones vasopresim, oxytocin</td> <td>ii)</td> <td>Complete Protein Albumin, Haemoglobin</td> </tr> </tbody> </table>	a) Fibrous		Globular Protein		i)	Long linear thread like polymeric chains	i)	Spheroidal, globular mass.	ii)	Insoluble in water	ii)	Soluble in water	iii)	Not affected by change of temp and pressure	iii)	Highly sensitive to moderate change in temp and pressure	iv)	Keratin, Myosin	iv)	Hormones, Insulin	b) Oligopeptide		Polypeptide		i)	A few amino acid upto 10	i)	Larg no of α amino acids 50 and above.	ii)	Found in tissues as hormones vasopresim, oxytocin	ii)	Complete Protein Albumin, Haemoglobin	
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Ans 5	<p>α Helix secondary structure</p> <p>Intramolecular Hydrogen bonding α 3.6 helix.</p>	<p>β pleated sheet structure</p> <p>Intermolecular H-bonding zig-zag chain.</p>																																
	b) Pernicious Anaemia																																	
Ans 6	<p>β D(+)-Glucose.</p>																																	
Ans 7	<p>a) Amino acids contain basic amino group and acidic carboxylic group therefore they amphoteric in nature.</p> <p>b)</p> <p>At isoelectric point there is no net migration of amino acid under the influence of applied electric field for Glycine – 6.1. It exists as zwitter ion dipolar internal salt.</p>																																	
Ans 8	DNA	RNA																																
	a) The sugar present is 2-deoxy-D(1_ ribose	a) It is D(-) ribose																																
	b) It contains cytosine and thymine	b) Contains cytosine and uracil as pyrimidine bases.																																
	c) It has double stranded α helix structure	c) Single stranded α helix structure.																																
	d) Undergoes replication	d) Does not replicate																																
	e) Control the transmission of hereditary effects	e) Controls the synthesis of proteins.																																

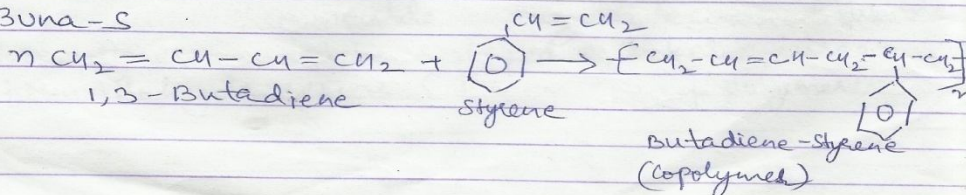
Ans9	The process by which a DNA molecule produces two identical copies of itself is called duplication. It is semiconservative. In the DNA double helix, the sequence of bases in one chain is complementary to the sequence of other A = T, C = G. It takes place only in 5 ¹ – 3 ¹ direction.	
Ans10	<p>a) Glycosidic Linkage : The linkage between two monosaccharides through oxygen atom in an oligosaccharide or polysaccharide is known as Glycosidic linkage (1,2, or 1,4)</p> <p>b) Zwitter Ion-</p> $\begin{array}{ccc} \text{NH}_2 & & \text{NH}_3^+ \\ & & \\ \text{R-CH} - \text{COOH} & = & \text{R-CH} - \text{COO}^- \end{array}$ <p style="text-align: center;">Zwitter Ion/ Dipolar Salt</p> <p>c) Denaturation of Protein : When a native protein is subjected to a change in temp or pH, hydrogen bonds get disturbed. Globules unfold and helix gets uncolled and protein loses its biological activity. Primary structure remains intact.</p> <p>d) DNA as each DNA sequence of bases is unique to an individual therefore DNA from hairstrand, fingertips are matched to find out forgery, pattern of evolution to determine paternity and in criminal investigation. It's an important tool in forensic investigation.</p> <p>e) Reducing Sugar : Those carbohydrates which contain free aldehydic or ketonic group and reduces Fehling's solution and Tollen's reagent are called reducing sugars. All monosaccharides maltose and lactose.</p>	

Ans 1	Buna- S, neoprene													
Ans2	Vulcanisation is a process of heating natural rubber with sulphur. This is done to make rubber more elastic, hard, more adoration resistant by sulphur cross linking.													
Ans3	a) Buna-S ÷ 1,3- Butadiene and styrene used fomr Automobile, tyres. b) Buna -N ÷ Butadiene and acrylonitrile used for storing oil and solveats.													
Ans4	Polymers which disintegrate by themselves over a period of time either by bacterial degradation or by enzymatic hydrolysis or by oxidation in environment are called biodegradable polymers eg : nylon -2-nylon-6, protein.													
Ans5	a) Thermoplastics : These polymers possess intermolecular forces of attraction intermediate between elastomers and fibres. These are linear or slightly branched chain polymers capable of repeatedly softening on heating and hardening on cooling eg : polyvinyl chloride. b) These polymers are cross- linked : Orheavily branched molecules which on heating undergo extensive cross-linking in moulds and again become infusible. These polymers cannot be resphaped eg: Bakelite, urea- formaldehyde resins (Thermosetting polymers)													
Ans6	a) Addition polyers formed by the repeated addition of some or different monomer molecules. The monomers used are unsaturated compounds eg polythene $n\text{CH}_2 = \text{CH}_2 \xrightarrow[\text{Ziegler - Natta-catalyst}]{333-343} \text{-(CH}_2 - \text{CH}_2\text{)}_n\text{-}$ Ethene Highdensity Polythene b) Condensation polymers : formed by the repeated condensation reaction between different bifunctional or trifunctional monomer units usually with elimination of small molecules such as water, alcohol and HCl leg Nylon – 6, nylon -6,6 and terylene. c) Biopolymer : Polymer which disintegrate by themselves over a period of time either by bacterial degradation or by enzymatic hydrolysis or by oxidation in environment eg synthetic polymers such as PHBV.													
Ans7	a) Neoprene : Chloroprene $\text{CH}_2 = \overset{\text{Cl}}{\text{C}} - \text{CH} = \text{CH}_2$ b) Dacron : Ethylene glycol $\text{HOCH}_2 - \text{CH}_2\text{OH}$ c) Nylon – 6,6 : Hexamethylene diamine : $\text{NH}_2\text{-(CH}_2\text{)}_6\text{-NH}_2$ Adipic acid $\text{COOH- (CH}_2\text{)}_4\text{-COOH}$													
Ans8	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">a) Navolac</th> <th style="width: 50%; text-align: center;">Bakelite</th> </tr> </thead> <tbody> <tr> <td>1. Linear product</td> <td>1. Cross link product</td> </tr> <tr> <td>2. Used in paints</td> <td>2. Used for making combs, electrical switches.</td> </tr> <tr> <th style="text-align: center;">b) Neoprene</th> <th style="text-align: center;">Polyisoprene</th> </tr> <tr> <td>1. Artificial rubber</td> <td>1. Natural rubber</td> </tr> <tr> <td>2. Co polynnner</td> <td>2. Linear polymer</td> </tr> </tbody> </table> c) i) Chaingrowth polymer : Iddition polymerisation eg polysthene ii) Stepgrowth polymer : With elimination of simple molecule such as water , alcohol eg : Nylon – 6,6.	a) Navolac	Bakelite	1. Linear product	1. Cross link product	2. Used in paints	2. Used for making combs, electrical switches.	b) Neoprene	Polyisoprene	1. Artificial rubber	1. Natural rubber	2. Co polynnner	2. Linear polymer	
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b) Neoprene	Polyisoprene													
1. Artificial rubber	1. Natural rubber													
2. Co polynnner	2. Linear polymer													
Ans9	a) LDPE : $n\text{CH}_2 = \text{CH}_2 \xrightarrow[\text{1,000-2000atm LDPE}]{350-570\text{K}} \text{-(CH}_2\text{- CH}_2\text{)}_n\text{-}$ b) Teflon : $n\text{f}_2 = \text{CF}_2 \xrightarrow[\text{High prwessure}]{(\text{NH}_4)_2\text{S}_2\text{O}_8} \text{-(CF}_2 - \text{CF}_2\text{)}_n\text{-}$ Tetrafluoroethene Teflon													

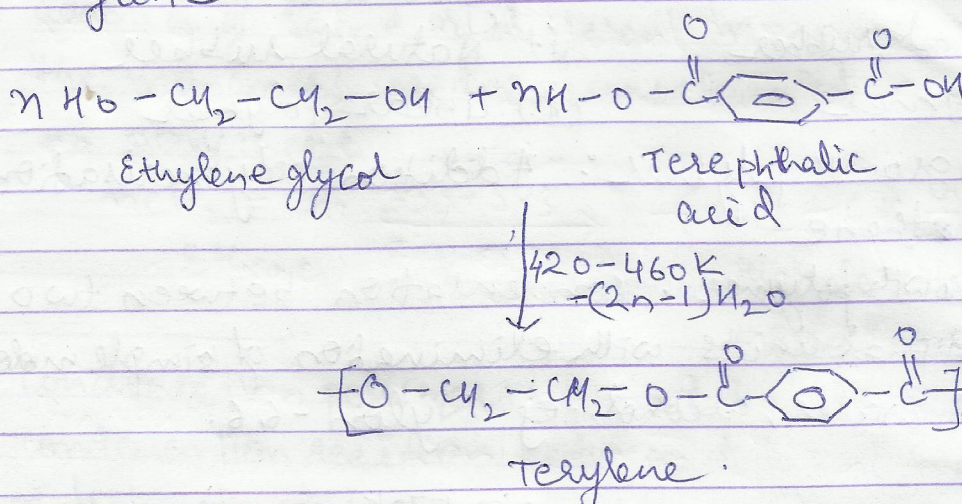
c. Nylon 6



d. Buna-S



e. Terylene :-



Ans10

- a) PHBV : speciality packaging , orthopaedic devices and controlled release of drugs.
- b) Teflon : Making oil seals and gaskets, coating utensils to make them non - sticky.
- c) PVC : Manufacture of rain coats, waterpipes, electrical insulation
- d) Nylon : Fibre, plastic, tyre cords and ropes.
- e) Buna - N : Storing oil and solvents.

Chapter-16 Chemistry in Everyday Life

Ans 1	Drugs which produce a therapeutic and useful biological response.	
Ans2	Unlike soaps, detergents can be used in hard water because like sodium salts, calcium and magnesium salts of sulphonic acids are soluble in water.	
Ans3	<p>a) Antiseptics : Are the chemical substances which prevent the growth of microorganism or even kill them but are not harmful to living human tissues eg: dettol, soframycin, boric acid, hydrogen peroxide.</p> <p>b) Disinfectants : These are the chemical substances which kill microorganisms or stop their growth but are harmful to human tissues eg : Phenol (1%), Chlorine in Concentration of 0.2 to 0.4 ppm in aqueous solution, SO₂.</p>	
Ans4	These are the chemical compounds which are non- nutritive in nature and are used as substitutes for sugar in foods and beverages especially soft drinks eg : Saccharin, Aspartame, Alitame, Sucrolose.	
Ans5	<p>a) Antacids : Chemical substances which remove the excess acid in the stomach and raise the pH to appropriate level eg : NaHCO₃, ranitidine.</p> <p>b) Antihistamines : are the drugs which interfere with the natural action of histamines by competing with histamine for binding sites of receptor where histamine exerts its effects. Eg : Brompheniramine, terfenadine.</p> <p>c) Antimicrobial tenols to destroy or inhibit the pathogenic action of microbes such as bacteria, fungi, or other parasites, selectively. Antiseptics, disinfectants and antibiotics are antimicrobial drugs.</p>	
Ans6	<p>a) Transquilisers : are a class of chemical compounds used for the treatment of stress, fatigue and mild or even severe mental diseases. These r elative anxiety, stress, irritability or excitement by inducing a sense of well being eg : chlordiaze- proxide, lproniazid and phenelzine.</p> <p>b) Narcotic Analgesics : These are the drugs which when administered in small doses relieve pain and produce sleep. Alkaloids like morphine, codeine and heroin belong to the class of narcotic analgesics. These are chiefly used for the relief of postoperative pain, cardiac pain and pains of terminal cancer, and in child birth.</p> <p>c) Food preservatives : These are the chemical substances which are added to the food materials to prevent their spoilage due to microbial growth. The most commonly used preservative include table salt vegetable, oil, sugar, potassium metabisulphite and sodium benzoate.</p>	
Ans7	Broad spectrum antibiotics are effective against several different types of harmful bacteria. Eg : are tetracycline, ofloxacin, chloramphenical chloram phemiccol can be used in case of typhoid, ocute fever, dysentery, urinary infections, meningitis and pneumonia.	
Ans8	Drugs can block the binding site of the enzyme and prevent the binding substrate or can inhibit the catalytic activity of the enzyme.	
Ans9	<p>a) Large part of their molecules are cations and it is the cationic part of the molecule which is involved in the cleansing action. Cationic detergents are quaternary ammonium salts of amines with acetates, chloride or bromides as anions. Cetyltrimethyl ammonium bromide is a cationic detergent and used in hair conditioners. Cationic detergents have germicidal properties and are expensive. Therefore these are limited use.</p> <p>b) Because large part of their molecules are anions and it is the anionic part of the molecule which is involved in the cleansing action. These are sodium salt of sulphonated long chain alcohols or hydrocarbons. Eg : sodium laurye sulphate. Anionic detergents are used in household work and in toothpastes.</p>	
Ans10	Sodium Sterate from micelle around the oil droplet in such a way that hydrophobic part of the separate ions is in the oil droplet and hydrophilic part projects out of the oil droplet like the bristles. Since the polar groups can interact with water, the oil droplet surrounded by separate ions is now pulled in water and removed from the dirty surface. Soap helps in emulsification and washing away of oils and fats. The negatively charged sheath around the globules prevents them from coming together and forming aggregates. Saponification is a process by which triglyccrides are reacted with sodium or potassium hydroxide to produce glycerol and a fatty acid salt.	