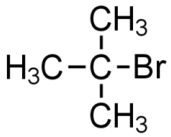
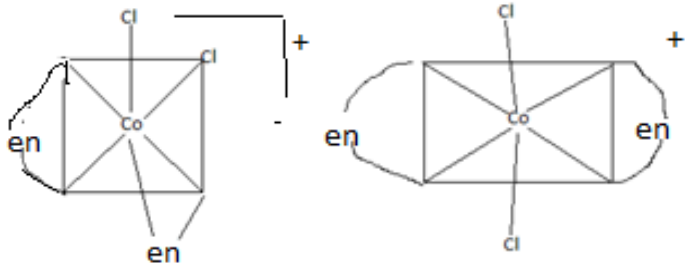
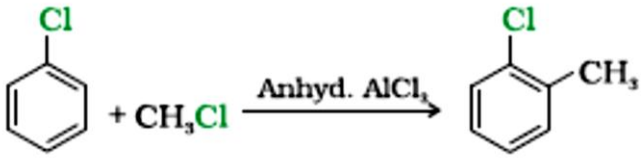
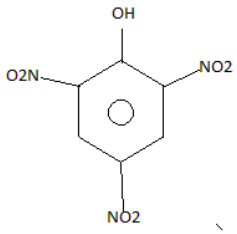
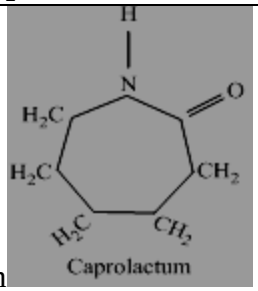
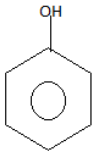
MARKING SCHEME CHEMISYRY-2015

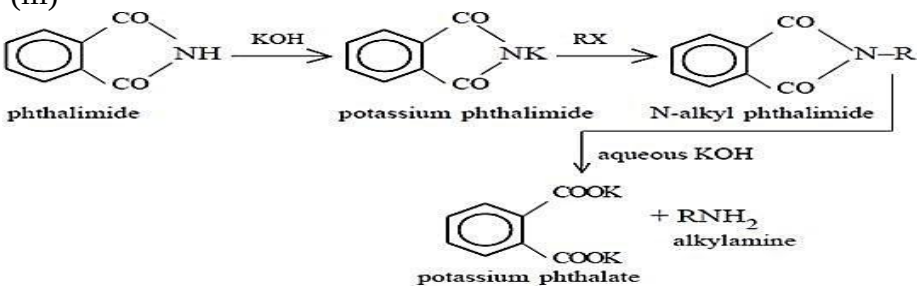
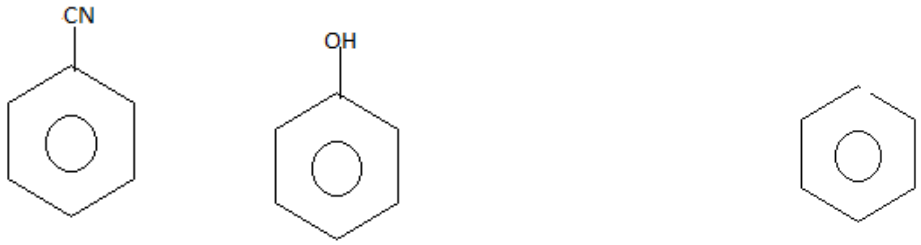
(CODE NO. : 56/1/C)

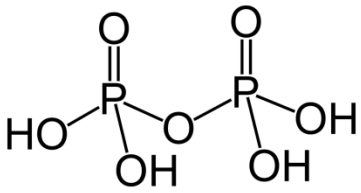
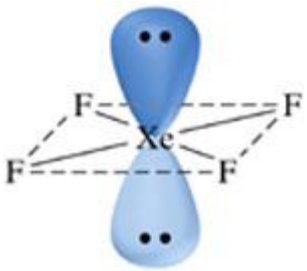
Questions	Value points	Mark
1	(i)Electrophoresis (ii) by mixing two oppositely charged sols (iii) by boiling (iv) by persistent dialysis (v) by addition of electrolyte (any one)	1
2	X_4Y_3	1
3	White phosphorous, because of angular strain in P_4 molecule/ discrete tetrahedral unit.	½ , ½
4	2-Methylpropane-1,3-diol	1
5	 Because carbocation intermediate derived from $(CH_3)_3CBr$ is more stable than carbocation from CH_3CH_2Br.	½ ½
6 6	It states that solubility of gas in liquid is directly proportional to partial pressure of the gas in equilibrium with the solution. With increase in temperature K_H value increases but solubility of gas in liquid decreases. / $K_H \alpha$ 1/solubility OR It states for solution containing volatile components the partial vapor pressure of each component of the solution is directly proportional to its mole fraction present in the solution. Ideal Solution / Non Ideal 1. It obeys Raoult's Law over entire range of concentration of solution. / It does not obey Raoult's Law. 2.Solute – Solvent interaction is nearly same as in pure solvent. / Solute – Solvent interaction is not same as solute-solute or solvent –solvent interactions. (or any other correct difference)	1 1 1 ½ + ½
7	(a) H^+ (aq) + e- → 1/2H_2 (g) E° = 0.00V is feasible at cathode because its reduction potential is higher than the other reaction. b. Because the overall reaction doesn't involve any ion in the solution whose	½ , ½ 1

	concentration changes during its lifetime.	
8	Greater number of unpaired electrons, greater would be the interatomic interactions and thus strong metallic bonding. Zn , no unpaired electrons hence weak metallic bonding.	1 ½ ,½
9	(i) pentaamminenitrito-N-cobalt(III) nitrate (ii) $K_2[Ni(CN)_4]$	1 1
10	(i) CH_3MgBr, H_3O^+ (ii) Cl_2 , P	1 1
11	$\Delta T_f = i \times K_f \times m$ For $CaCl_2$ i = 3 $\Delta T_f = (i \times K_f \times W_B \times 1000)/ (M_B \times W_A)$ $2 = 3 \times 1.86 \times W_B \times 1000/ 111 \times 500$ $W_B = 19.89$ g	½ ½ 1 1
12	$d = Z \times M / a^3 \times N_o$ $10\ g/cm^3 = Z \times 81\ g/mol /(3 \times 10^{-8}\ cm)^3 \times (6.023 \times 10^{23}\ /mol)$ $Z = 2.007$ Nature of cubic unit cell = bcc	½ ½ 1 1
13	$E°_{cell} = E_R^0 - E_L^0$ $= 0.00 - (-0.14)$ $E°_{cell} = + 0.14V$ $E_{cell} = E°_{cell} - \frac{0.059\ V}{n} \log \frac{[Sn^{2+}]}{[H^+]^2}$ $E_{cell} = E°_{cell} - \frac{0.059\ V}{2} \log \frac{[0.001]}{[0.01]^2}$ $= +0.14 - 0.0295\ V \log 10$ $E_{cell} = 0.1105$ V	 1 1 1
14	(i)Because physisorption is exothermic process, so it decreases with increase in temperature. (ii)Because alum coagulates the impurities present in water. (iii) Due to continuous unbalanced bombardment / zig-zag motion of particles by the molecules of dispersion medium / it does not allow the paticles to settle down.	1 1 1
15	(i)van Arkel method (ii) CO acts as reducing agent (iii) Because ΔS becomes more positive , and ΔG becomes negative.	1 1 1

16	. (a)(i) Because actinoids are radioactive and show wide range of oxidation states. (ii) Transition metals form complex compounds due to small size, high ionic charge, availability of d orbitals b. $2MnO_4^- + 6H^+ + 5\ SO_3^{2-} \rightarrow 5SO_4^{2-} + 3H_2O + 2\ Mn^{2+}$	1 1 1
17	 (i) cis trans (ii) t_2g^4 / diagram (iii) $[NiCl_4]^{2-}$ -Chloride ion being weak field ligand does not pair d electrons while in $[Ni(CO)_4]$, CO being strong field ligand pairs up the d electrons.	1 1 1
18	. (i) $CH_3\text{-}CH{=}CH_2$ ---HBr, peroxide---> $CH_3\text{-}CH_2\text{-}CH_2\text{-}Br$ ---AgF---> $CH_3CH_2CH_2F$ (ii)  (iii) C_2H_5OH ---PCl_3/PCl_5---> C_2H_5Cl ---KCN---> C_2H_5CN **OR** (i)$CH_3CH_2\ CH{=}CH_2$ (ii)  (iii) CH_3NC	1 1 1 1,1,1
19	(i) Because $-NO_2$ is an electron withdrawing group (ii) Due to H-Bonding	1 1

	(iii) Reaction occurs by S_N1 mechanism , 3^0-carbocation $(CH_3)_3C^+$ is more stable than CH_3^+	1
20	(i) $CH_3 - CH(OH) - CN$ (ii) C_6H_5COOH (iii) CH_3CONH_2	1 1 1
21	(i) Caprolactum  Caprolactum (ii) Phenol + Formaldehyde  + HCHO (iii) 1,3-Butadiene + Acrylonitrile CH_2=CH-CH=CH_2 + CH_2=CH-CN (Note: half mark for structure/s and half mark for name/s)	1 1 1
22	(i) Starch (ii) Native Protein found in a biological system with a unique 3-D structure and biological activity is called a native protein. Denatured protein is the protein with no biological activity. (iii) Vitamin-K	1 1 1
23	(i) Concern, Compassion, caring, empathy (any two) (ii) By organizing rallies , street play, posters, public speech(any other relevant answer) (iii) Anti depressant drugs are those which inhibit depression E.g. Iproniazide , Phenelzine (or any other) (iv) Saccharine / Sucralose/Alitame/Aspartame (any one)	½ , ½ 1 ½ , ½ 1
24	(i) $CH_3CONH_2 + Br_2 + 4KOH \rightarrow CH_3NH_2 + K_2CO_3 + 2\,KBr + 2\,H_2O$ (ii) $C_6H_5NH_2 + NaNO_2 + 2HCl \xrightarrow{273\text{-}278K} C_6H_5N_2^+Cl^- + NaCl + 2H_2O$	1 1

	(iii)  b.(i)Add $CHCl_3$ and alc KOH , aniline gives foul smell of isocyanide whereas N-methyaniline does not. (ii)When $(CH_3)_2NH$ reacts with Benzene SulphonylChloride(Hinsberg Reagent) gives ppt which is insoluble in alkali whereas $(CH_3)_3N$ does not reacts with Hinsberg's Reagent. (Or any other correct test) **OR**	1 1 1
24	a. (i) (ii) (iii)  b. (i) $(CH_3)_3N$ < C_2H_5NH2 < C_2H_5OH (ii) p-nitoaniline < aniline < p-methylaniline	1,1,1 1 1
25	a. Rate of reaction is defined as change in concentration of reactants or products per unit time. Factors: concentration of reactant , temperature , pressure , surface area (any two) b. $\log(k_2/k_1) = Ea/2.303R\ [1/T_1 - 1/T_2]$ $\log(8 \times 10^{-2}/ 4\times 10^{-2}) = E_a/2.303 \times 8.314\ [1/300 - 1/310]$ $\log 2 = Ea/2.303 \times 8.314\ [1/300 - 1/310]$ $Ea = 53598.59$ J/mol or 53.6 kJ/mol **OR**	1 ½ , ½ 1 1 1
25	(a)(i) Rate becomes 4 times (ii) 2^{nd} order	1 1

	b) $t_{1/2} = \frac{0.693}{k}$ $23.1 \text{ min} = \frac{0.693}{k}$ $k = 0.03 \text{ min}^{-1}$ $k = \frac{2.303}{t} \log \frac{[A_0]}{[A]}$ $t = \frac{2.303}{0.03} \log \frac{100}{25}$ $t = \frac{2.303}{0.03} \times 0.6021 \text{ min}$ $t = 46.22 \text{ min}$	1 ½ ½ 1
26	(i) X-X' bond in inter halogens is weaker than X-X in halogens. (ii) High bond dissociation energy/ due to the presence of triple bond. (iii)Because bond dissociation enthalpy decreases from NH_3 to BiH_3. b. (i) (ii)   **OR**	1 1 1 1,1
26	a) PH_3 $P_4 + 3NaOH + 3H_2O \rightarrow 3NaH_2PO_2 + PH_3$ b)Helium c) Because bond dissociation energy of F-F bond is lower than that of Cl-Cl. d) $4H_3PO_3 \xrightarrow{HEAT} 3H_3PO_4 + PH_3$ e) $PbS + 4O_3 \longrightarrow PbSO_4 + 4O_2$	½ , ½ 1 1 1 1