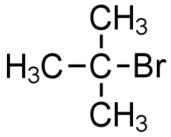
MARKING SCHEME CHEMISYRY-2015

(CODE NO. : 56/1/C)

<table>
<tr><th>Questions</th><th>Value points</th><th>Mark</th></tr>
<tr><td>1</td><td>(i)Electrophoresis (ii) by mixing two oppositely charged sols (iii) by boiling (iv) by persistent dialysis (v) by addition of electrolyte (any one)</td><td>1</td></tr>
<tr><td>2</td><td>X_4Y_3</td><td>1</td></tr>
<tr><td>3</td><td>White phosphorous, because of angular strain in P_4 molecule/ discrete tetrahedral unit.</td><td>½ , ½</td></tr>
<tr><td>4</td><td>2-Methylpropane-1,3-diol</td><td>1</td></tr>
<tr><td>5</td><td> 
Because carbocation intermediate derived from $(CH_3)_3CBr$ is more stable than carbocation from CH_3CH_2Br.</td><td>½
½</td></tr>
<tr><td>6

6</td><td>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.
<table>
<tr><th>Ideal Solution</th><th>Non Ideal</th></tr>
<tr><td>1. It obeys Raoult’s Law over entire range of concentration of solution.</td><td>It does not obey Raoult’s Law.</td></tr>
<tr><td>2.Solute – Solvent interaction is nearly same as in pure solvent.</td><td>Solute – Solvent interaction is not same as solute-solute or solvent –solvent interactions.</td></tr>
</table>
(or any other correct difference)</td><td>1

1

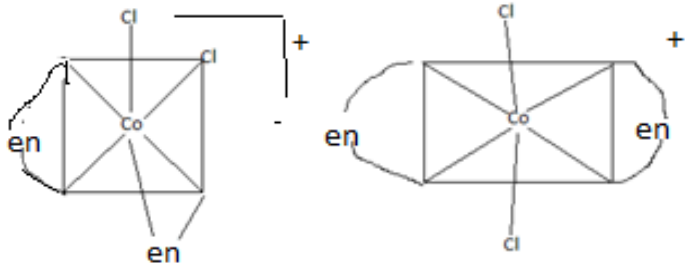
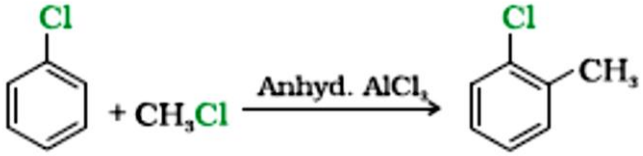
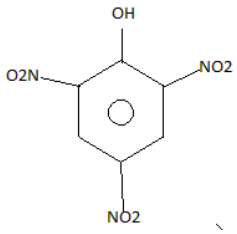
1

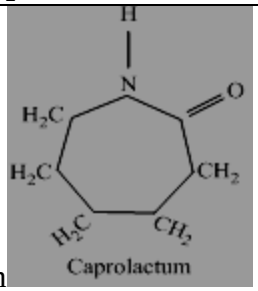
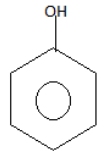
½ + ½</td></tr>
<tr><td>7</td><td>(a) H^+ (aq) + e- → 1/2H_2 (g)
E° = 0.00V is feasible at cathode because its reduction potential is higher than the other reaction.

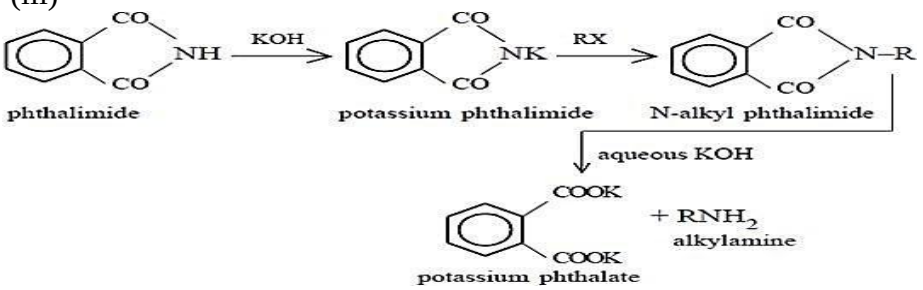
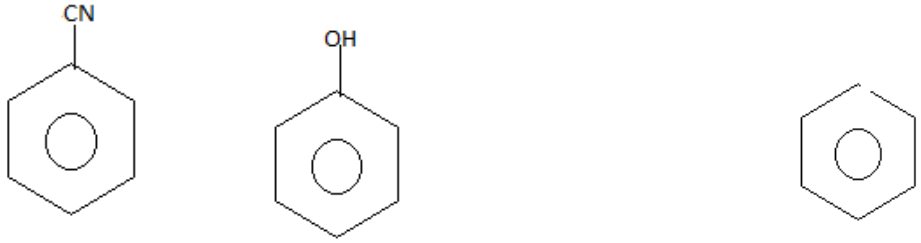
b. Because the overall reaction doesn’t involve any ion in the solution whose</td><td>½ , ½

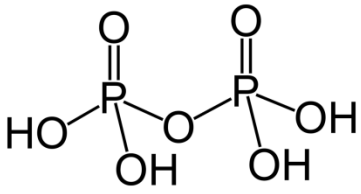
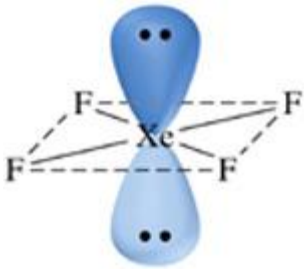
1</td></tr>
</table>

	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 min = $\frac{0.693}{k}$ k = 0.03 min^{-1} k = $\frac{2.303}{t}$ log $\frac{[A_0]}{[A]}$ t = $\frac{2.303}{0.03}$ log $\frac{100}{25}$ t = $\frac{2.303}{0.03}$ x 0.6021 min t = 46.22 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