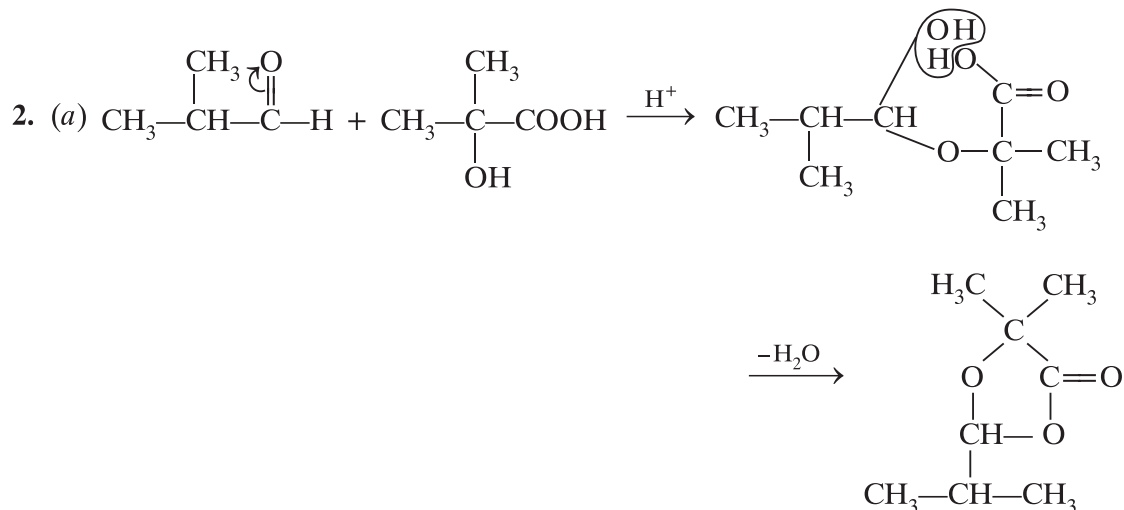
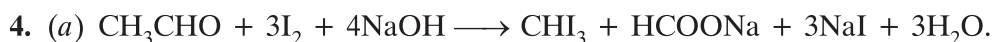


Answers to RCH-DS2/Set-1

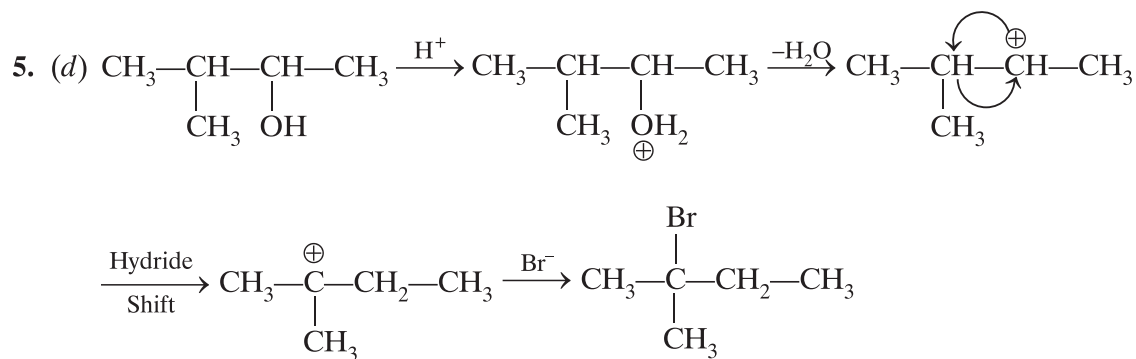
1. (d) All of these



3. (d) P, Q, R, S



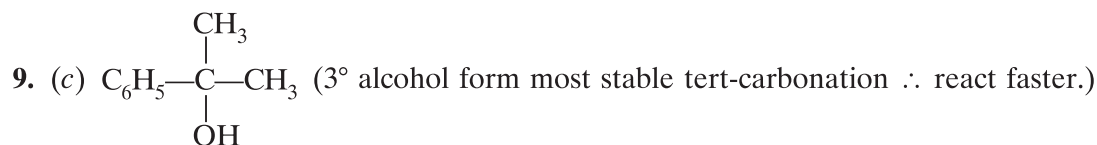
It has aldehyde group so forms silver mirror with Tollen's reagent.



Tertiary carbonation is more stable.

6. (c) Eu ($4f^7 6s^2$) and Yb ($4f^{14} 6s^2$), Eu^{2+} has half filled f -orbitals, Yb^{2+} has fully filled f -orbitals $\therefore 3^{\text{rd}}$ I.E. is exceptionally high.

7. (b) $\kappa = \frac{1}{R} \times \frac{l}{a} \Rightarrow \frac{l}{a} = \kappa \times R = 0.0210 \times 60 = 1.26 \text{ cm}^{-1}$



10. (d) $\Lambda_{\text{Na}_3\text{PO}_4}^\circ = 3\Lambda_{\text{NaCl}}^\circ + \Lambda_{\text{K}_3\text{PO}_4}^\circ - 3\Lambda_{\text{KCl}}^\circ = 3 \times 110.2 + 98.8 - 3 \times 134.6$
 $\Lambda_{\text{Na}_3\text{PO}_4}^\circ = 330.6 + 98.8 - 403.8 = 25.6 \text{ S cm}^2 \text{ mol}^{-1}$

11. (d) Both (a) and (b)

12. (c) p - IV, q - I, r - II, s - III

13. (b) Both A and R are true but R is not the correct explanation of A.

14. (b) Both A and R are true but R is not the correct explanation of A.

15. (d) A is false but R is true.

16. (c) A is true but R is false.

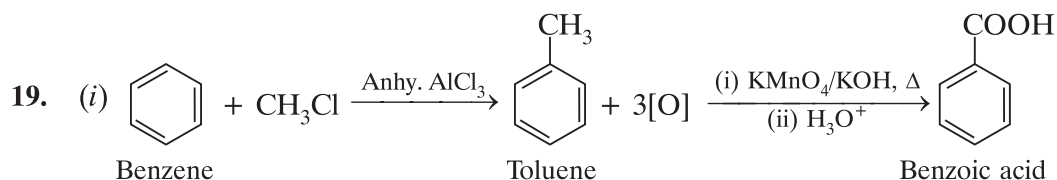
17. $(\Delta T_b)_A = (\Delta T_b)_B$

$$K_b \times \frac{2}{M_A} \times \frac{1000}{98} = K_b \times \frac{8}{M_B} \times \frac{1000}{92} \Rightarrow \frac{M_A}{M_B} = \frac{2}{8} \times \frac{92}{58} \approx \frac{1}{4}$$

$$\frac{M_A}{M_B} = \frac{1}{4}$$

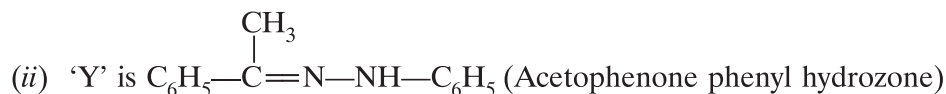
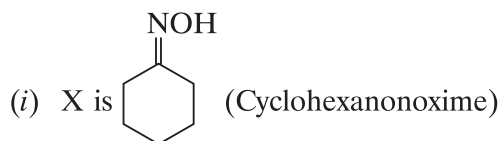
18. (a) *p*-dichlorobenzene < *m*-dichlorobenzene < *o*-dichlorobenzene.

(b) It is due to lower bond dissociation enthalpy due to longer bond length.





Or

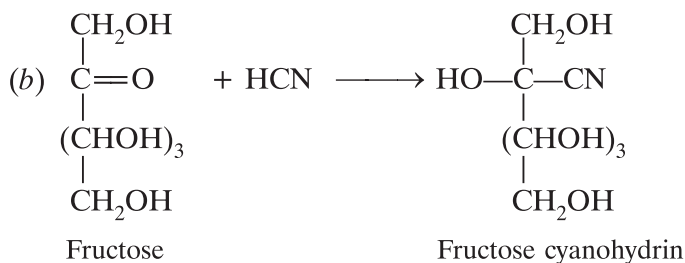


20. (a) $\Delta_r G^\circ = -2.303 RT \log K_c$

(b) $m = Z \times Q \Rightarrow 40 = \frac{27}{3} \times Q$

$\Rightarrow Q = \frac{40}{9} = 4.44 \text{ Faraday}$

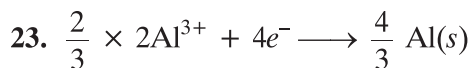
21. (a) It is because globular proteins can form H-bonds with water whereas fibrous proteins cannot form H-bonds with water.



22. (a) • $[\text{Ag}(\text{CN})_2]^-$ is used in silver plating and for extraction of Ag.

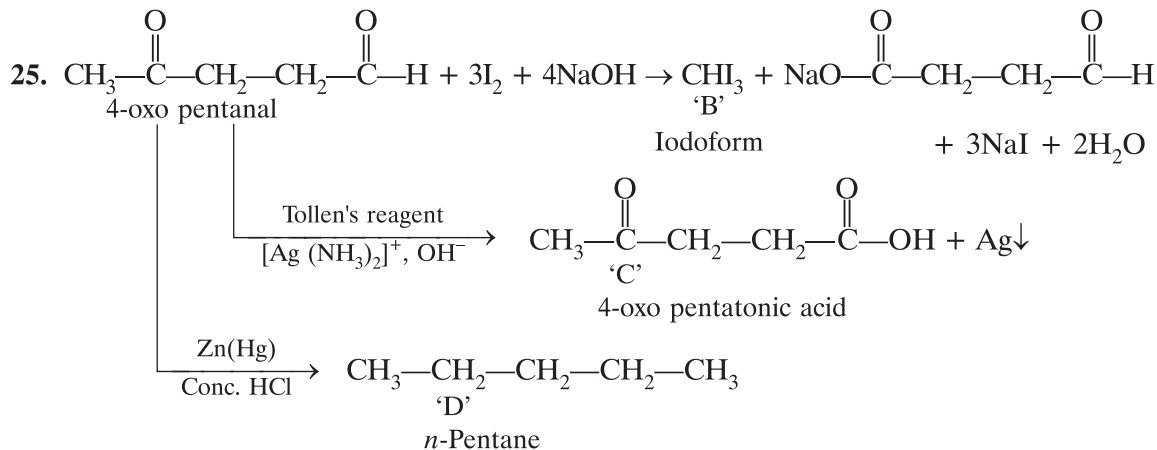
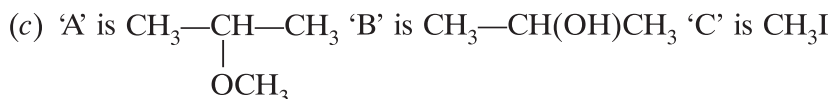
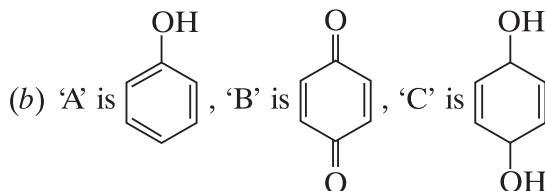
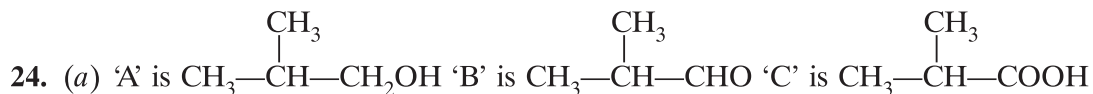
- EDTA is used to remove hardness of water and for treatment of lead poisoning.
- Wilkinson's catalyst is used as catalyst in hydrogenation of alkenes.
- Chlorophyll is used in photosynthesis.

(b) Aqua cyanido bis (ethane 1, 2-diamine) cobalt (III) ion.



$$\Delta G^{\circ} = -nE^{\circ}F \Rightarrow 960 \times 1000 \text{ J} = -4 \times E^{\circ} \times 96500$$

$$E^{\circ} = -\frac{9600}{965 \times 4} = -2.48 \text{ V}$$



26. From Expt. (1) and (2)

$$\text{rate} = k [H_2]^x [NO]^y$$

$$\frac{0.135}{0.033} = \frac{k[65.6]^x [40.0]^y}{k[65.6]^x [20.0]^y} \Rightarrow 4 = 2^y \Rightarrow 2^z = 2^y \Rightarrow y = 2$$

From expt. 3 and 4

$$\frac{0.214}{0.106} = \frac{k[38.4]^x [65.6]^y}{k[19.2]^x [65.6]^y}$$

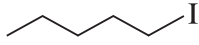
$$2^1 = 2^x \Rightarrow x = 1$$

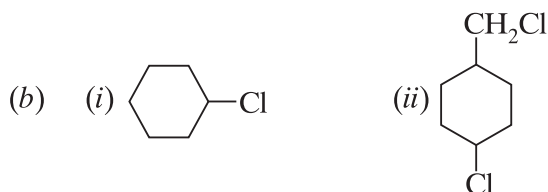
$$\text{rate} = k[\text{NO}]^2 [\text{H}_2]^1 \Rightarrow 0.135 = k [40.0]^2 [65.6]^1$$

$$k = \frac{0.135}{1600 \times 65.6} = \frac{135 \times 10^{-5}}{16 \times 65.6} = \frac{135 \times 10^{-5}}{1049.6} = \frac{1350 \times 10^{-6}}{1049.6}$$

$$= 1.286 \times 10^{-6} \text{ s}^{-1}$$

27. (a) (i)  \therefore it is primary halide.

(ii)  because C—I bond is weaker, has lower bond dissociation enthalpy.



28. $\log k(\text{s}^{-1}) = 14.34 - \frac{1.25 \times 10^4 k}{T} \quad \dots(i)$

$\log k(\text{s}^{-1}) = \log A - \frac{E_a}{2.303 RT} \quad \dots(ii)$

Comparing (i) and (ii)

$$\frac{-1.25 \times 10^4}{T} = -\frac{E_a}{2.303 RT}$$

$$E_a = \frac{1.25 \times 10^4 \times 2.303 \times 8.314}{1000} = 239.34 \text{ kJ mol}^{-1}$$

29. (a) E_a does not depend on ΔH of the reaction.

(b) Slope = $-E_a/R$

(c) $t = \frac{2.303}{k} \log \frac{[R]_0}{[R]} = \frac{2.303}{1.15 \times 10^{-3}} \log \frac{5}{0.05} = \frac{2303 \times 10^{-3}}{1.15 \times 10^{-3}} \times 2 = 4000 \text{ s}$

Or

$$\log \frac{k_2}{k_1} = \frac{Ea}{2.303 R} \left(\frac{1}{T_1} - \frac{1}{T_2} \right)$$

$$\log 4 = \frac{Ea}{2.303 \times 8.314} \left(\frac{1}{300} - \frac{1}{320} \right)$$

$$Ea = \frac{19.147 \times 4800 \times 0.6021}{1000} = 55.336 \text{ kJ mol}^{-1}$$

30. (a) Tris-(ethane 1, 2-diamine) cobalt(III)

(b) $\mu_B = \sqrt{n(n+2)} = \sqrt{4 \times 6} = \sqrt{24} = 4.90 \text{ BM}$

(c) (i) sp^3d^2 , octahedral

(ii) It is paramagnetic

Or

(c) (i) The coordination number of Cr is 6 $\therefore C_2O_4^{2-}$ is didentate ligand

(ii) $x + 0 = -1 \Rightarrow x = -1$

31. (a) $(n-2)f^{1 \text{ to } 14} (n-1)d^{0-1} ns^2$

(b) Eu^{2+} loses one electron to form Eu^{3+} which is more stable due to higher hydration enthalpy.

(c) Fe^{2+} loses electron to form $Fe^{3+}(3d^5)$ which is more stable due to half filled d -orbitals.

(d) CrO_3 is covalent as Cr is in +6 oxidation state \therefore it is acidic, CrO is ionic \therefore basic in nature.

(e) AgF is more ionic, therefore, soluble in water. $AgCl$ is less ionic, therefore, insoluble in water.

(f) Cu^{2+} has higher hydration enthalpy than Cu^+ , \therefore more stable.

(g) Chromite ore ($FeCr_2O_4$)

32. (a) Osmosis: When a solvent is separated from the solution by a semi-permeable membrane which allows the passage of solvent molecules but does not allow solute particles to pass through it, there is net flow of solvent molecules from the solvent to the solution which is called *osmosis*.

Osmotic pressure. It is extra pressure to be applied on solution side to stop osmosis is known as osmotic pressure when both solvent and solution are separated by semipermeable membrane.

$$(b) \frac{\pi_1}{\pi_2} = \frac{C_1}{C_2} \Rightarrow \frac{4.98}{1.52} = \frac{36/180}{C_2} \quad [\because \pi = CRT]$$

$$\Rightarrow C_2 = \frac{36}{180} \times \frac{1.52}{4.98} = 0.061 \text{ mol L}^{-1}$$

Or

(a) It is due to formation of H-bonding due to which escaping tendency of molecules and vapour pressure of the solution decrease, therefore, boiling point of the solution increases. Hence, such solution shows negative deviation from Raoult's law.

$\Delta H = -ve, \Delta V = -ve$

(b) We know that
$$\frac{p_A^{\circ} - p_A}{p_A^{\circ}} = x_B = \frac{\frac{W_B}{M_B}}{\frac{W_A}{M_A} + \frac{W_B}{M_B}}$$

Molecular weight of urea = 60.05 g mol^{-1}

$$\therefore \frac{3.165 \text{ kPa} - p_A}{3.165 \text{ kPa}} = \frac{\frac{W_B}{M_B}}{\frac{W_A}{M_A}} \left[\because \frac{W_B}{M_B} \ll \ll \frac{W_A}{M_A} \right]$$

$$\Rightarrow 1 - \frac{p_A}{3.165} = \frac{\frac{5}{60.05}}{\frac{95}{18}}$$

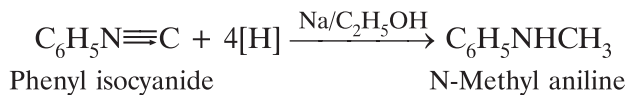
$$\Rightarrow 1 - \frac{p_A}{3.165} = \frac{5}{60.05} \times \frac{18}{95} = \frac{18}{1140.95}$$

$$\Rightarrow \frac{p_A}{3.165} = 1 - \frac{18}{1140.95}$$

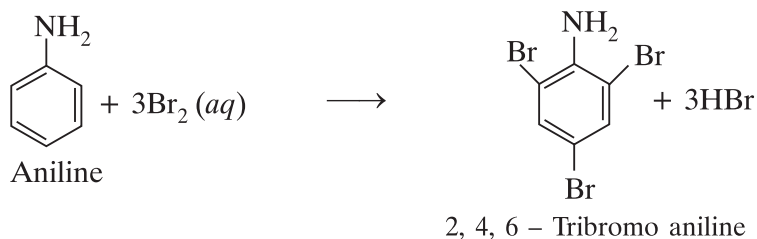
$$= \frac{1140.95 - 18.00}{1140.95} = \frac{1122.95}{1140.95}$$

$$\Rightarrow p_A = \frac{3.165 \times 1122.95}{1140.95} \Rightarrow p_A = 3.115 \text{ kPa} = 3.12 \text{ kPa}$$

33. (a) sp^3 , pyramidal due to presence of lone pair of electron.
- (b) It is because they can form H-bonds with water
- (c) Add CHCl_3 and $\text{KOH}(\text{alc})$. Aniline will form offensive smelling compound where as N-methyl aniline will not react.
- (d) (i) N-Methyl aniline will be formed.



- (ii) 2, 4, 6 – Tribromo aniline will be formed.



Or

