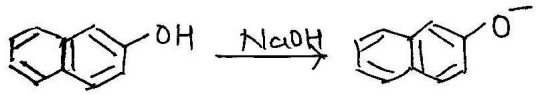
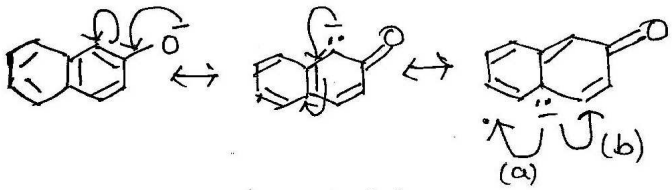
JEE (ADVANCE) SOLUTIONS – 2015 – CODE '8'
CHEMISTRY
PAPER-1

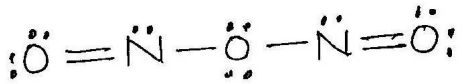
21. [9]

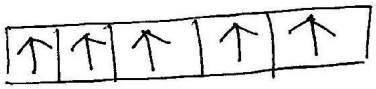




Through path (a) ⇒ 5
Through path (b) ⇒ 2

Total contributing structures $= 5+2+2 = 9$

22. [8] 

23. [4] Fe^{+++} = 

Since SCN^- is a Weak Field Ligand, ΔO pairing does not take place while CN^- is a Strong Field Ligand, ΔO pairing will take place.

SCN^-, $\mu_{s_1} = \sqrt{5(5+2)} = 5.92$ BM

CN^-, $\mu_{s_2} = \sqrt{1(1+2)} = 1.73$ BM

$\therefore |\mu_{s_1} - \mu_{s_2}| = 5.92 - 1.73$

$= 4.19 \sim 4.$

24. [4]

$BeCl_2 \Rightarrow SP$ $\quad N_2O \Rightarrow SP$

$N_3^- \Rightarrow SP$ $\quad NO_2^+ \Rightarrow SP$ } Linear

$O_3 \Rightarrow$ Bent

$SCl_2 \Rightarrow$ Bent

ICl_2^-, I_3^-, XeF_2 are also Linear but there is the involvement of d-orbital(s) in hybridization.

25. [3]

For single electronic system, the order of energy levels $\Rightarrow 1S < 2S = 2P < 3S = 3P = 3d < \cdots$

$\therefore$ H atom 2nd excited state $\Rightarrow n = 3$.

Degeneracy $= 1 + 3 + 5 = 9$

for multielectronic system, the order of energy levels $= 1S < 2S < 2P < 3S < \cdots$

H^- at $\Rightarrow 2P \Rightarrow$ Degeneracy $= 3$

26. [4]

Let x mols are oxidised

$$\Delta G^\circ = -nFE^\circ_{cell}$$

$$-193 \times 1000 = -x \times 2 \times 96500 \times 0.25$$

$$x = \frac{193 \times 1000 \times 100}{2 \times 96500 \times 25}$$

$$x = 4$$

27. [1].

$\Delta T_f = i \times K_f \times m$

$0.0558 = i \times 1.86 \times 0.01$

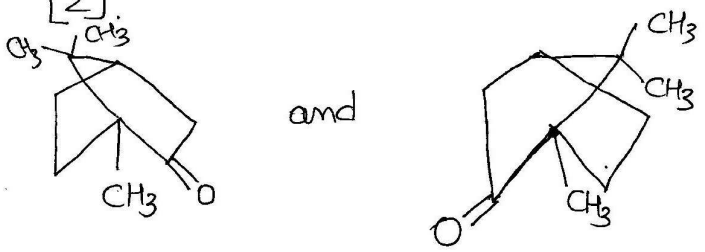
$i = 3$

∴ No. of mols after dissociation = 3

(Assuming $\alpha = 100\%$)

∴ Complex is $[Co(NH_3)_5Cl]Cl_2$

28. [2]



29. A, B, C.

$Cr^{++} \longrightarrow Cr^{+++} + e^-$

$d^4 \qquad d^3$

$Mn^{+++} + e^- \longrightarrow Mn^{++}$

$d^4 \qquad d^5$

For chromium d^3 is more stable due to exactly half filled $t_{2g}^3 e_g^0$ while for Manganese d^5 is more stable due to exactly filled d^5 configuration.

30. B, C, D

Impure Cu-strip ⇒ Anode

Pure Cu-strip ⇒ Cathode

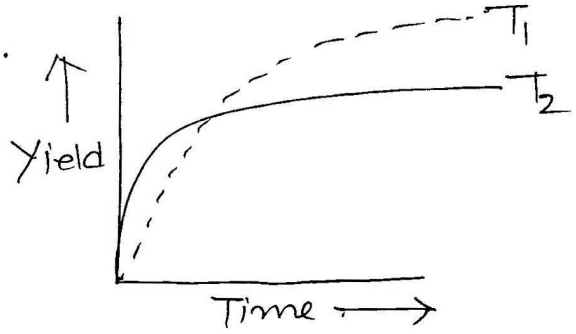
31. A, B.

H_2O_2 in Alkaline medium is a good reducing agent.

$H_2O_2/NaOH$ and $Na_2O_2 + 2H_2O \longrightarrow 2NaOH + H_2O_2$

H_2O_2 in Acidic medium is a good Oxidising agent

32. B.



$\because \Delta H < 0$, The progress of the reaction will decrease with increase in temp. but initially it increases due to increase in kinetic energy of reacting molecules.

33. A.

For ccp structure,

No. of atoms per unit cell = 4.

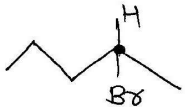
$\therefore$ According to charge balance.

$$3m \times 4x + 2n \times 8x = 2 \times 4x$$

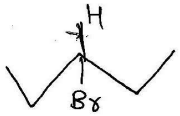
$$3m + 4n = 2$$

$$\Rightarrow m = \frac{1}{2},\ n = \frac{1}{8}$$

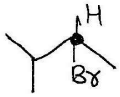
34. B, D.



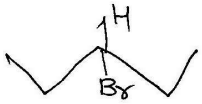
(A) → Optically Active



(B) → Optically Inactive.



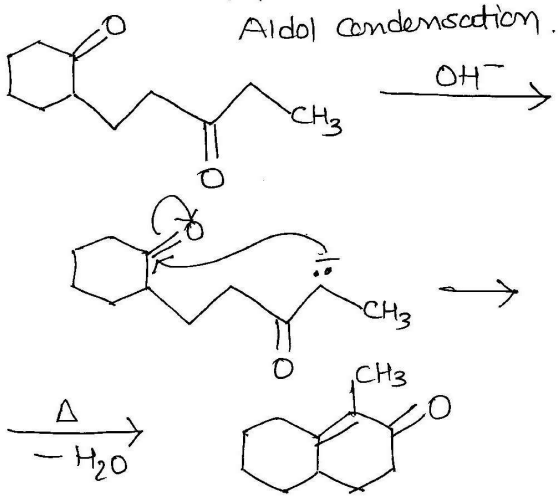
(C) - Optically Active.



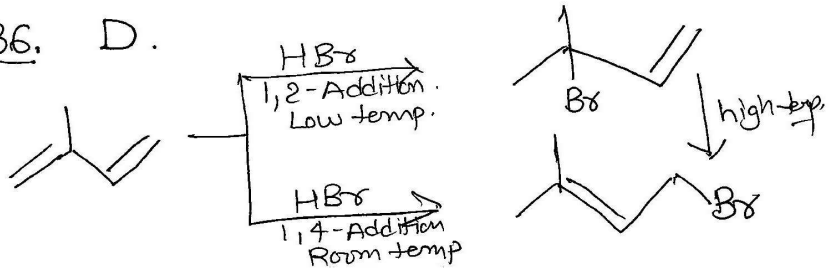
(D) - Optically Inactive.

35. A.

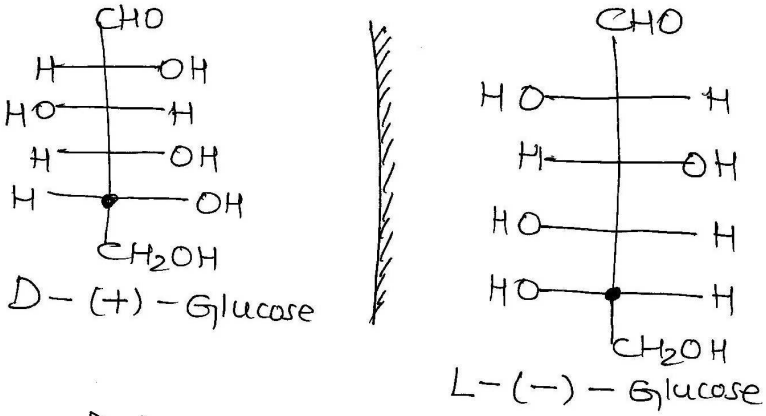
Intramolecular Aldol condensation.



36. D.

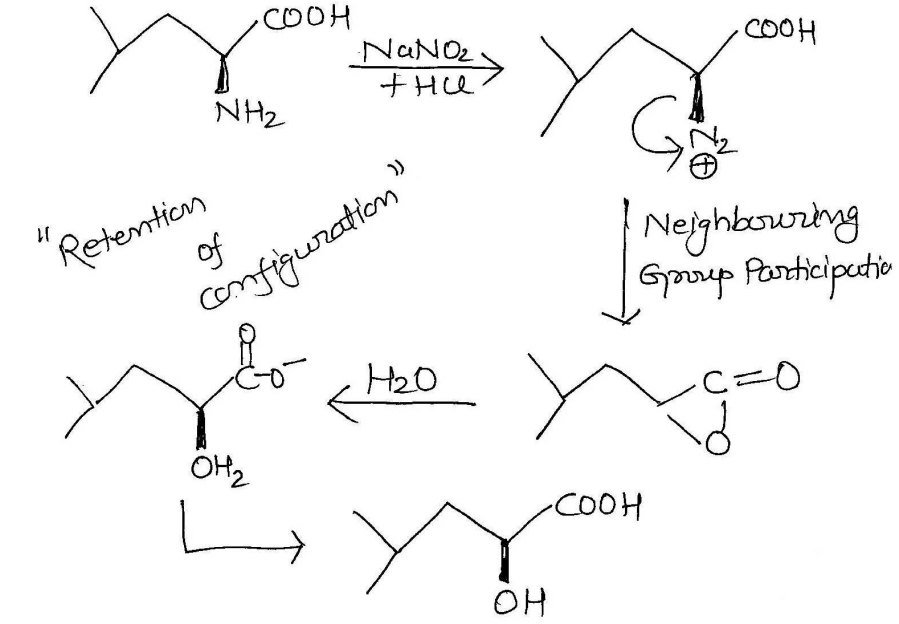


37. A



D, L are Relative Configurations differs only at Lowest Asymmetric Carbon atom. (Anomeric Carbon).

38. C.



39. (A) → PQS (C) → QR
(B) → T (D) → R

Siderite → $FeCO_3$
Malachite → $CuCO_3 \cdot Cu(OH)_2$
Bauxite → $Al_2O_3 \cdot xH_2O$
Calamine → $ZnCO_3$
Argentite → Ag_2S

40. (A) → RT (B) → PQS
(C) → PQS (D) → PQST

(A) → $H_2O(l) \rightleftharpoons H_2O(s)$
(273K, 1atm)
$\Delta S < 0$, $\Delta G = 0$

(B) → Container is isolated, so.
$q = 0$, $w = 0 \Rightarrow \Delta U = q + w = 0$

(C) → Again container is isolated, so
$q = 0$, $w = 0 \Rightarrow \Delta U = q + w = 0$
(Yet the process is spontaneous due to $\Delta S > 0$)

(D) $H_2(g)$ (300K, 1atm) ⟶ ⟵ $H_2(g)$ (600K, 1atm) (Reversible)

$\therefore q = 0$, $w = 0$, $\Delta U = 0$
$\Delta G = 0$