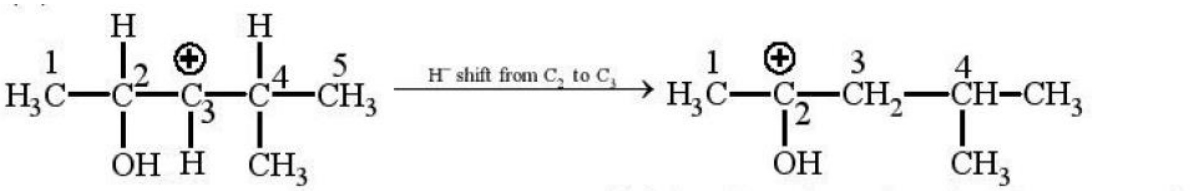
IIT-JEE-2009

PAPER – II

CHEMISTRY

SECTION – I

1. Answer: (D)



(driving force is conjugation from oxygen)

2. Answer: (B)

On the basis of stability of resonating structures.

3. Answer: (A)

$\mathrm{Cr(CO)_6}$

$\mathrm{Cr(24) = [Ar]3d^5 4s^1}$

Since (CO) is strong ligand, in $\mathrm{Cr(CO)_6}$ no unpaired election is present So 'spin only' magnetic moment is zero.

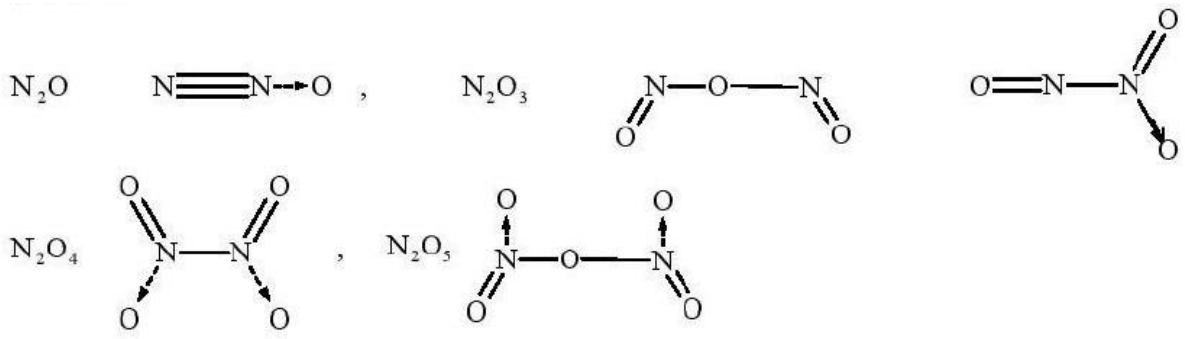
4. Answer: (D)

Given, $\log K = 6 - \dfrac{2000}{T}$

Since, $\log K = \log A - \dfrac{Ea}{2.303RT}$ So, $A = 10^6\ \mathrm{sec}^{-1}$ and $Ea = 38.3\ \mathrm{kJ/mole}$

SECTION-II

5. Answer: (A, B, C)



6. Answer: (A, B, C)

Due to bulkiness of trimethylamine, it does not react.

7. Answer: (B, C)

8. Answer: (A, D)

9. Answer: (A, B, D)

SECTION – III

10. Answer: ((A-p,q,t)(B-p,s,t)(C -r,s)(D-p))

11. Answer: ((A - p, s) (B - q, s) (C - r, t) (D - q, t))

$$3Cu + dil.8HNO_3 \rightarrow 3Cu\left(NO_3\right)_2 + 4H_2O + 2NO$$

$$Cu + conc.4HNO_3 \rightarrow Cu\left(NO_3\right)_2 + 2H_2O + 2NO_2$$

$$4Zn + dil.10HNO_3 \rightarrow 4Zn\left(NO_3\right)_2 + 5H_2O + N_2O$$

$$Zn + conc.4HNO_3 \rightarrow Zn\left(NO_3\right)_2 + 2H_2O + 2NO_2$$

SECTION-IV

12. Answer: (6)

$$2MnO_2 + 4KOH + O_2 \rightarrow \underset{\text{(Potassium manganate)}}{2K_2MnO_4} + 2H_2O \quad O.S \text{ of } Mn = +6 \text{ in } K_2MnO_4$$

13. Correct Answer: (4)

$$CuSO_4 \cdot 5H_2O \rightarrow \left[Cu\left(H_2O\right)_4\right]SO_4 \cdot H_2O$$

So, water molecules directly attached to Cu are 4.

14. Answer: (6)

Coordination number of Al is 6. It exists in ccp lattice with 6 coordinate layer structure.

15. Answer: (9)

Energy release at constant volume due to combustion of $3.5\,\text{gm}$ of a gas Hence energy released due to the combustion of $28\,\text{gm}$ (i.e., $1\,\text{mole}$) of a gas

$$= 2.5 \times 0.45 \times \frac{28}{3.5} = 9\,\text{kJmol}^{-1}$$

16. Answer: (8)

$$K_a\left(C_6H_5COOH\right) = 1\times10^{-4}$$

pH of $0.01\,\text{M}\ C_6H_5COONa$

$$\underset{0.01(1-h)}{C_6H_5COO^-} + H_2O\ f\quad \underset{0.01h}{C_6H_5COOH} + \underset{0.01h}{OH^{-1}}$$

$$K_h = \frac{K_w}{K_a} = \frac{0.01h^2}{1-h}$$

$$\frac{10^{-14}}{10^{-4}} = \frac{10^{-2}h^2}{1-h}\left(1-h\ ;\ 1\right)$$

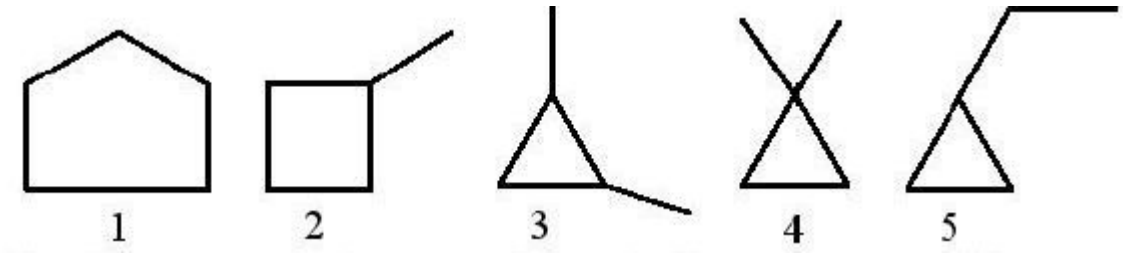
$$\left[OH^-\right] = 0.01h = 0.01\times10^{-4} = 10^{-6}$$

$$\left[H^+\right] = 10^{-8}$$

$$pH = 8$$

17. Answer: (8)

Cyclic C_5H_{10}



For 3^{rd} structure 2 cis-trans and 1 optical isomer are possible.

Total 7 isomers.

18. Answer: (8)

$$_{92}U^{238} \xrightarrow{-6\alpha} {}_{80}X^{214} \xrightarrow{-2\beta} {}_{82}Pb^{214} \quad (6\alpha, 2\beta), \text{total 8 paritcles.}$$

19. Answer: (4)

$$V_{rms_{(Xgas)(400\,K)}} = V_{mp_{(Ygas)(60\,K)}}$$

$$M.W.(X\,gas) = 40; M.W.(Y\,gas) = x$$

$$\sqrt{\frac{3RT_1}{M_1}} = \sqrt{\frac{2RT_2}{M_2}}$$

$$\sqrt{\frac{400\times 3}{40}} = \sqrt{\frac{2\times 60}{x}}$$

$$30 = \frac{120}{x}$$

$$x = 4$$