

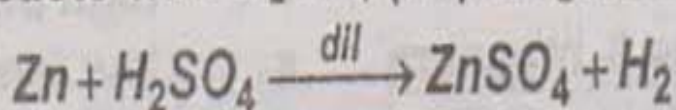
## SECTION 'B' (SHORT-ANSWER QUESTIONS)

**NOTE: Answer any Ten part questions. (40)**

2.(i) Define the following:

- \* Random error                      \* Exponential notation
- \* Heat of formation                \* Rate expression

(ii) Zinc reacts with  $H_2SO_4$  (dil) as given below:



Calculate the mass of  $ZnSO_4$ , the volume of  $H_2$  gas at S.T.P. and the number of molecules of  $H_2$  gas which will be produced by reacting 163.5g of Zn with  $H_2SO_4$ .

(iii) An organic compound contains 40% carbon, 6.67% hydrogen and 53.33% oxygen by mass. The molecular mass of the compound is 180. Find its empirical and molecular formulae.

(iv) A  $500\text{ cm}^3$  vessel contains  $H_2$  gas at 400 torr pressure and another  $1\text{ dm}^3$  vessel contains  $O_2$  gas at 600 torr pressure. If these gases are transferred to  $2\text{ dm}^3$  empty vessel, calculate the pressure of the mixture of gases.

(v) What is Ideal gas. Derive the ideal gas equation.

(vi) Give any four scientific reasons of the following:

- \* Evaporation is a cooling process.
- \* Water has higher B.P. than Hydrogen fluoride although fluorine is more electronegative than Oxygen.
- \* The order of reaction is zero of photochemical reactions.
- \*  $Na^+$  is smaller in size than Na atom.
- \* Milk sours more rapidly in summer than in winter.

(vii) State  $(n + l)$  rule. Write the electronic configuration of the following:

- \*  $Cu(Z = 29)$                       \*  $Sr^{++}(Z = 38)$                       \*  $S^{-(Z = 16)}$

(viii) What is Covalent bond? Explain the ionic character of Covalent bond.

(ix) Calculate the Heat of formation of  $Fe_2O_3$  at  $25^\circ C$ :

- \*  $2Fe + \frac{3}{2} O_2 \rightarrow Fe_2O_3$                        $\Delta H_f = ?$
- \*  $H_2 + \frac{1}{2} O_2 \rightarrow H_2O$                        $\Delta H = -286\text{ KJ / mole}$
- \*  $Fe_2O_3 + 3H_2O \rightarrow 2Fe(OH)_3$                        $\Delta H = +289\text{ KJ / mole}$
- \*  $Fe + 3H_2O \rightarrow Fe(OH)_3 + \frac{3}{2} H_2$                        $\Delta H = +161\text{ KJ / mole}$

(x) State and explain Hess's Law of Constant heat summation with its applications

(xi) State Le-Chatelier's Principle. Give its applications in the manufacture of  $SO_3$  by Contact process.

(xii) The  $K_c$  for the reaction  $2HI \rightleftharpoons H_2 + I_2$  is  $1.3 \times 10^{-2}$ . If there are  $0.5\text{ mole / dm}^3$  of  $H_2$ ,  $1.5\text{ mole / dm}^3$  of  $I_2$  and  $5\text{ mole / dm}^3$   $HI$ , predict the direction in which the reaction moves to as to achieve the equilibrium.

(xiii) What are the main postulates of Arrhenius theory of ionization?

(xiv) Define Activation energy. Give its relationship with the speed of reaction.

(xv) Determine the order of reaction for:

$A + B \rightarrow \text{Products}$  from the following data:

S.No	A Moles / $\text{dm}^3$	B Moles / $\text{dm}^3$	Rate $\text{MS}^{-1}$
1	0.1	0.1	$1 \times 10^{-3}$
2	0.2	0.1	$4 \times 10^{-3}$
3	0.1	0.3	$3 \times 10^{-3}$

## SECTION 'C' (DETAILED- ANSWER QUESTIONS)(28)

**NOTE: Answer 2 questions from this section.**

3.(a) Starting from  $\Delta E = E_2 - E_1$  derive the expression for the wave number for hydrogen atom.

(b) Define Radioactivity. Describe the characteristic of Alpha and Beta rays.

(c) What is Unit cell? Sketch a unit cell and label the dimensions  $a$ ,  $b$ ,  $c$  and angles  $\alpha$ ,  $\beta$ ,  $\gamma$ . How do cubic and tetragonal systems differ?

4.(a) Define Orbital Hybridization. Explain the shape of Ethene,  $C_2H_4$  on the basis of hybridization.

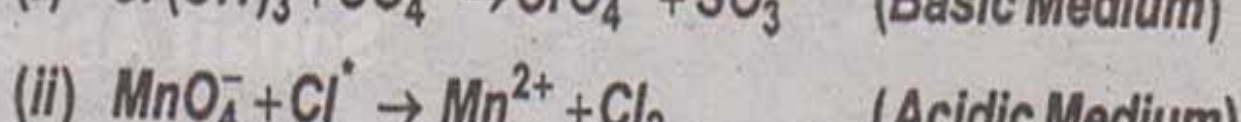
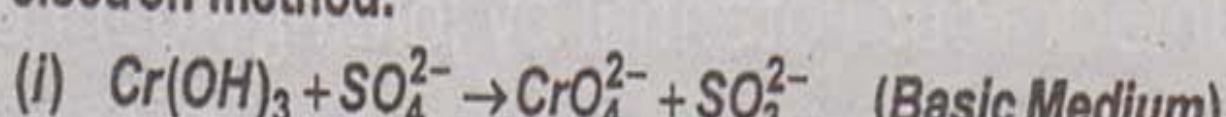
(b) Explain the structure of  $BeCl_2$  and  $NH_3$  on the basis of Electron pair repulsion model and Hybrid orbital model.

(c) Differentiate any two of the following:

- (i) Sigma bond and Pi - bond
- (ii) Hydration and Hydrolysis
- (iii) Line spectrum & Continuous spectrum

5.(a) What is Standard Electrode potential? How is the electrode potential of Copper determined? Explain.

(b) Balance any one of the following equations by Ion - electron method:



(c) Will Cadmium hydroxide precipitate from  $0.02\text{M}$  solution of  $CdCl_2$  at  $pH = 10$ ?

$$K_{sp} \text{ of } Cd(OH)_2 = 2.5 \times 10^{-14} \text{ mole}^2 / \text{dm}^6$$