

## SECTION 'B' (Short-Answer Questions) (30)

ATOMIC MASS: (H = 1 amu, C = 12 amu, Al = 27 amu, O = 16 amu, Cl = 35.5 amu, S = 32 amu, Ag = 108 amu, N = 14 amu)

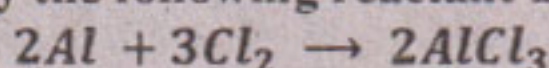
**NOTE:** Answer any NINE part questions.

All questions carry equal marks.

2. i) Define any four of the following:

- \* Molar Volume
- \* Evaporation
- \* Bond Energy
- \* Limiting Reactant
- \* Dipole Moment

ii)  $\text{AlCl}_3$  is produced by the following reactant at  $500^\circ\text{C}$



When 160 gm of Aluminium is reacted with excess of chlorine gas, 650 gm of  $\text{AlCl}_3$  is obtained. Calculate

(a) Theoretical yield (b) % yield

iii) Combustion of Ethene ( $\text{C}_2\text{H}_4$ ) in air to form  $\text{CO}_2$  &  $\text{H}_2\text{O}$  is given in the following equation:



If a mixture containing 2.8 gm  $\text{C}_2\text{H}_4$  & 6.4 gm  $\text{O}_2$  is allowed to ignite, identify the limiting reactant and determine the mass of  $\text{CO}_2$  gas that will be formed.

iv) State Pauli's Exclusion Principle. Write electronic configuration of the following:

- \*  $\text{Cl}^-$  (Z = 17)
- \*  $\text{Ca}^{+2}$  (Z = 20)
- \* Cu (Z = 29)

v) Draw the shape of  $\text{BF}_3$ ,  $\text{NH}_3$ ,  $\text{CH}_4$  and  $\text{H}_2\text{O}$  molecules on the basis of VSEPR theory.

vi) Differentiate between any two of the following:

- \* Crystalline Solid and Amorphous Solid
- \* Isomorphism and Polymorphism
- \* Molarity and Molality

vii)  $\sigma$  bond and  $\pi$  bond

viii) 40 dm<sup>3</sup> of hydrogen gas is collected over water at  $23^\circ\text{C}$  and 831 torr pressure. What would be the volume of dry gas obtained at STP (vapour pressure of water at  $23^\circ\text{C}$  = 21 torr)

ix) Give scientific reasons for the following:

\* At Mount Everest, atmospheric pressure falls down to about one-third, pressure at sea-level.

\* Water droplets quickly deposit at the outer side of a glass of cold water.

\* Mercury in a glass tube does not wet the walls.

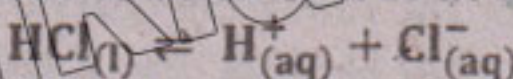
\* While boiling an egg, we often mix a small amount of table salt in water.

x) State Graham's Law of diffusion. The ratio of rates of diffusion of two gases A and B is 1.5:1 respectively. If the relative molecular mass of gas A is 16, find the molecular mass of B gas.

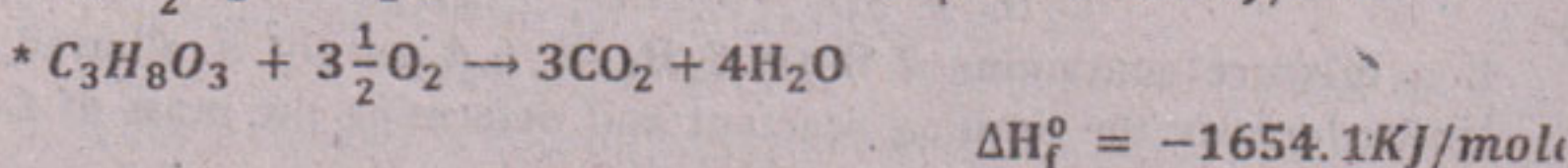
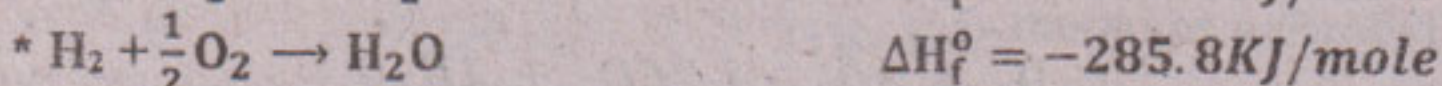
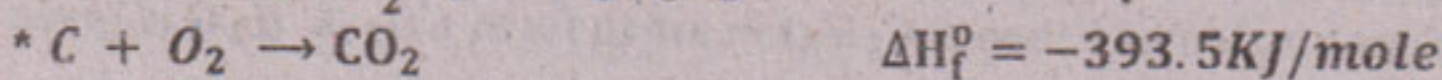
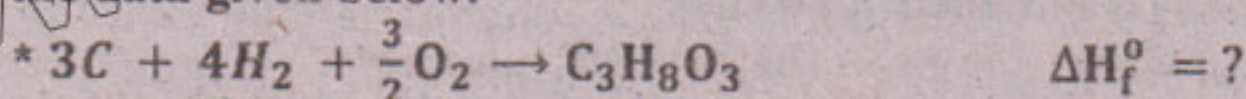
xi) Define Solubility Product. Write the solubility product expression for the following:

- \*  $\text{PbCl}_2$
- \*  $\text{Fe}(\text{OH})_3$
- \*  $\text{Ag}_2\text{SO}_4$

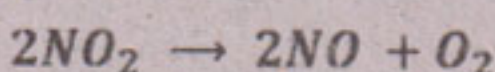
xii) Define pH and pOH. Write its formula. Calculate pOH of 0.0025M aqueous solution of HCl at  $25^\circ\text{C}$ .



xiii) Calculate standard enthalpy of formation  $\Delta H_f^\circ$  of ( $\text{C}_3\text{H}_8\text{O}_3$ ) from the data given below.



xiv) What is order of reaction? Decomposition of  $\text{NO}_2$  into  $\text{NO}$  and  $\text{O}_2$  is 2<sup>nd</sup> order reaction:



If the rate constant at certain temperature is  $3.8 \times 10^{-4} \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$  and initial concentration of  $\text{NO}_2$  is 0.38M, calculate the initial rate of reaction.

xv) State Raoult's Law. Derive this law mathematically in three forms, How this law can be applied on binary solution of miscible liquids?

OR What is the fourth state of matter? State about its occurrence, characteristics and uses.

## SECTION 'C' (Detailed Answer Questions) (32)

**NOTE:** Attempt any Two questions from this section. All questions carry equal marks.

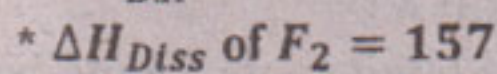
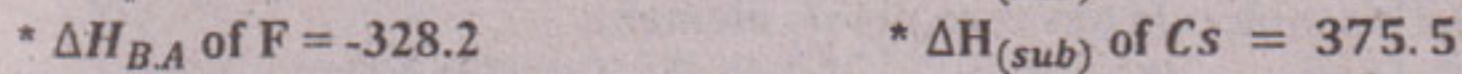
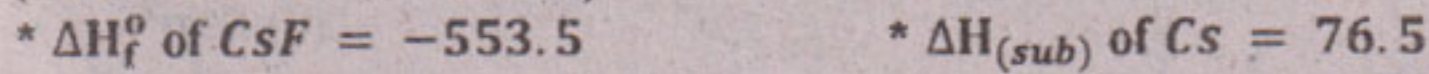
3 a) Write the four main postulates of Bohr's atomic theory. Derive the

relation  $r_n = \frac{a^0 n^2}{z}$  for the radius of n<sup>th</sup> orbit of Hydrogen atom.

b) What is Hybridization? Write its types.  $\text{CH}_4$ ,  $\text{NH}_3$  &  $\text{H}_2\text{O}$  all have same hybridization but their molecular structures are different. Explaining their structures give a reason for this difference.

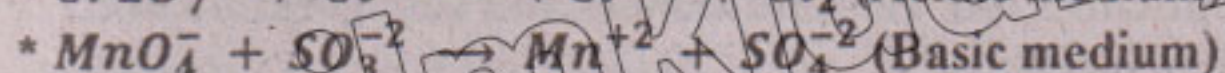
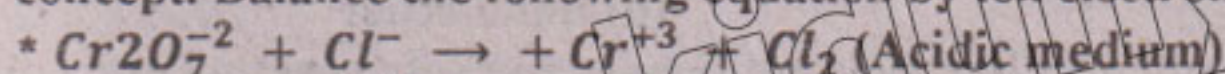
4 a) State Hess's Law? What is meant by Born-Haber's Cycle? Determine the lattice energy for  $\text{CsF}_5$  writing all the involved thermochemical equations stepwise, using following data:

(all values are in KJ/mole)



4 b) Give the statement and mathematical derivation of First Law of Thermodynamics and derive  $q_v = \Delta E$  and  $q_p = \Delta H$

5 a) Define Oxidation and Reduction according to modern electronic concept. Balance the following equation by ion electron method:



5 b) Define Cell-Potential, Standard Electrode Potential. Explain the determination of standard electrode Zinc with diagram and potential of cell reactions.