

1. a) Define osmotic pressure.
b) Give mathematical expression for Raoult's law for a non-volatile solute. (1)
2. Why is boiling point of water increased when NaCl is added to it. Show with the help of a graph also that the boiling point gets elevated on adding a solute. (1)
3. Find Henry's law constant if the partial pressure of ethane over a saturated solution containing 0.56 g of ethane is 1bar. (1)
4. Define Kohlraush's law of independent migration. (1)
5. a) Explain electrochemical theory of rust formation, with the help of reactions only.
b) How much charge is required for the reduction of 1 mole of Al^{3+} to Al? (2)
6. The osmotic pressure of a 0.0103 M solution of an electrolyte is found to be 0.70 atm. at 300 K. Calculate the Van't Hoff factor. What conclusion do you draw about the molecular state of the solute in the solution. ($R = 0.082 \text{ L atm./mol./K}$) (2)
7. a) Differentiate between Schottky defect and Frenkel defect. (Two points only)
b) X ray diffraction studies show that Cu crystallizes in an fcc. structure with cell edge of $3.608 \times 10^{-8} \text{ cm}$. In another experiment Cu is found to have a density of 8.92 g/cm^3 . Calculate the atomic mass of Cu . (3)
8. Heptane and octane form an ideal solution. At 373 K the vapour pressure of the components is 105.2 K Pa, and 46.8 K Pa respectively. What will be the total vapour pressure of the mixture of 0.26 moles of heptanes and 0.31 moles of octane ? (3)
9. Calculate the emf of the cell at 298 K in which following reaction takes place : -
 $\text{Ni(s)} + 2 \text{Ag (0.002 M)} \rightarrow \text{Ni}^{2+} (0.160 \text{ M}) + 2 \text{Ag(s)}$
(Given that $E^0 = 1.05 \text{ V}$). Also calculate the standard free energy value. (3)
($F = 96500 \text{ C}$)
10. Answer the following questions : - (3)
 - a) What is galvanisation?
 - b) What is a secondary cell?
 - c) Which non stoichiometric defect responsible for the colour of alkali metal halides?
 - d) Give one use of fuel cells.
 - e) Solid A a very hard, electrical insulator in solid as well as liquid state and melts at very high temperature. What type of solid is it?
 - f) Define ferromagnetism.