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Solution

Sheet - II

1. If N_2 gas is bubbled through water at 293 K, how many millimoles of N_2 gas would dissolve in 1 litre of water? Assume that N_2 exerts a partial pressure of 0.987 bar. Given that Henry's law constant for N_2 at 293 K is 76.48 K bar.

2. Vapour pressure of chloroform ($CHCl_3$) and dichloromethane (CH_2Cl_2) at 298 K are 200 mm Hg and 415 mm Hg resp. Calculate:
   (i) the vapour pressure of the solution prepared by mixing 25.5 g of $CHCl_3$ and 40 g CH_2Cl_2 at 298 K and
   (ii) mole fractions of each component in vapour phase.

3. The vapour pressure of pure benzene at a certain temp. is 0.85 bar. When a non-volatile, non-electrolyte solid weighing 0.5 g is added to 39 g benzene (molar mass 78 g/mol) then vapour pressure of the solution becomes 0.845 bar. What is the molar mass of the solid substance?

4. Henry's Law constant for CO_2 in water is 1.67×10^8 Pa at 298 K. Calculate the quantity of CO_2 in 500 mL soda water when packed under 2.5 atm CO_2 pressure at 298 K.

5. The vapour pressure of pure liquids A and B are 450 and 700 mm Hg resp. at 350 K. Find out the composition of the liquid mixture if total vapour pressure is 600 mm Hg. Also find the composition of the vapour phase.