Questions from an old Test (Spring 2001)

1. (14 pts.) 0.4326 g of an unidentified nonpolar solid was dissolved in 11.4315 g of the nonpolar solvent benzene. The freezing point of the benzene solution was 4.14 °C. Determine the molar mass of the unknown.

2. (14 pts.) The density of a 1.0 M solution of HCl dissolved in ether ($CH_3CH_2OCH_2CH_3$) is 0.731 g/cm². Determine the mole fraction of the HCl in the solution.

5. (6 pts.) The vant Hoff number of a solute can be predicted from the stoichiometry of the dissolution reaction. Will the predicted vant Hoff number be closer to the actual vant Hoff number at high or low solute concentrations?

7. (7 pts.) When comparing two substances, which one will have the lower normal boiling point, the substance with the higher vapor pressure, or the substance with the lower vapor pressure?