

Unit 6 – Chapter 11: Solutions & IMFs

Name _____

Assignment #3: Pressure of Solution & Raoult's Law

Period _____

- 1) Glycerin, $C_3H_8O_3$, is a nonvolatile liquid. What is the vapor pressure of a solution made by adding 164 g of glycerin to 338 mL of H_2O at $39.8^\circ C$? The vapor pressure of pure water at $39.8^\circ C$ is 54.75 torr and its density is 0.992 g/cm^3 .

- 2) A solution of sodium chloride in water has a vapor pressure of 19.6 torr at $25^\circ C$. What is the mole fraction of NaCl solute particles in this solution? What would be the vapor pressure of this solution at $45^\circ C$? The vapor pressure of pure water is 23.8 torr at $25^\circ C$ and 71.9 torr at $45^\circ C$ and assume sodium chloride exists as Na^+ and Cl^- ions in solution.

- 3) A solution is prepared by mixing 0.0300 mol CH_2Cl_2 and 0.0500 mol CH_2Br_2 at $25^\circ C$. Assuming the solution is ideal, calculate the composition of the vapor (in terms of mole fractions) at $25^\circ C$. At $25^\circ C$, the vapor pressures of pure CH_2Cl_2 and pure CH_2Br_2 are 133 and 11.4 torr, respectively.

- 4) A solution is made by mixing 50.0 g acetone (CH_3COCH_3) and 50.0 g methanol (CH_3OH). What is the vapor pressure of this solution at $25^\circ C$? What is the composition of the vapor expressed as a mole fraction? Assume ideal solution and gas behavior. (At $25^\circ C$ the vapor pressures of pure acetone and pure methanol are 271 and 143 torr, respectively.) The actual vapor pressure of this solution is 161 torr. Explain any discrepancies.