

Homework No. 3

1. Determine the vapor pressure of a solution of 92.1 g of glycerin, $C_3H_5(OH)_3$, in 184.4 g of ethanol at $40\text{ }^\circ\text{C}$. The vapor pressure of pure ethanol is 0.178 atm at $40\text{ }^\circ\text{C}$, and glycerin is essentially nonvolatile.
2. Find the boiling point of a solution of 92.1 g of iodine in 800.0 g of chloroform.
3. Calculate the freezing point of a solution of 0.724 g of calcium chloride in 175 g of water, assuming complete dissociation by the solute.
4. Determine the osmotic pressure of a solution with a volume of 0.750 L that contains 5.0 g of methanol ($i=1$) in water at $37\text{ }^\circ\text{C}$.
5. List the following aqueous solutions in order of their expected freezing points: 0.050 m CaCl_2 , 0.15 m NaCl , 0.10 m HCl , 0.050 m $\text{HC}_2\text{H}_3\text{O}_2$, and 0.10 m $\text{C}_{12}\text{H}_{22}\text{O}_{11}$.
6. A solution of 4.00 g of a nonelectrolyte dissolved in 55.0 g of benzene is found to freeze at $2.32\text{ }^\circ\text{C}$. What is the molar mass of this compound?
7. A solution of 35.7 g of a nonelectrolyte in 220.0 g of chloroform has a boiling point of $64.5\text{ }^\circ\text{C}$. What is the molar mass of this compound?