

1. A solution is prepared by dissolving 396 g of sucrose in 624 g of water. What is the vapor pressure of this solution at 30°C? (VP of H₂O at 30°C = 31.8 mmHg) (ans: 30.8mmHg)

2. Calculate the freezing point and boiling point of water when 100 g of ethylene glycol (CH₂OHCH₂OH; MW = 62.07 g/mol) is added to 1450 g of water. (K_b = 0.52°C/m ; K_f = 1.86 °C/m) (ans: 100.58°C; -2.069°C)

3. Use Raoult's law to predict the vapor pressure of a solution, at 0°C, made from two volatile liquids: 35.6 g dibromomethane (CH₂Br₂; MW = 183.8g/mol; VP = 0.015 atm) and 35.6 g dichloromethane (CH₂Cl₂; MW = 84.93 g/mol; VP = 0.175 atm) (ans: 0.124 atm)

4. Calculate the molar mass of naphthalene, the organic compound in “mothballs” if a solution prepared by dissolving 5.00 g of naphthalene in exactly 100 g of benzene has a freezing point 2.0°C below that of pure benzene. (K_f benzene = 5.12 °C/m) (ans: 128 g/mol)
5. A solution made by dissolving 25 mg of insulin in 5.0 mL of water has an osmotic pressure of 15.5 mmHg at 25°C. Calculate the molar mass of insulin. (Assume that there is no change in volume when the insulin is added to the water) (ans: 5.99×10^3 g/mol)
6. Arrange the following aqueous solutions in order decreasing freezing point, and state your reason: 0.15 *m* CH₃COOH, 0.15 *m* CO(NH₂)₂ (urea), 0.10 *m* H₂SO₄, 0.10 *m* Mg(NO₃)₂ and 0.10 *m* NaBr.