

Solutions - 9 Raoult's law - 2 Bpt - Elevation

Q Calculate the bpt elevation of a solution of 685g ethylene glycol ($\text{C}_2\text{H}_4\text{O}_2$; MW 62.07 g/mol) in 2075g H_2O . ($K_b \text{H}_2\text{O} = 0.52^\circ\text{C}/m$)

$$\Delta T_b = K_b m$$

$$m = \frac{\text{mol solute}}{\text{kg solvent}} = \frac{685 \text{ g} / 62.07 \text{ g/mol}}{2075 \text{ g} / 1000} = \frac{11.04 \text{ mol}}{2.075 \text{ kg}}$$

$$11.04 \text{ mol} / 2.075 \text{ kg} = 5.32 m$$

$$\Delta T_b = 0.52^\circ\text{C}/m \times 5.32 m$$

$$\text{change in } T = 2.8^\circ\text{C}$$

$$\text{new Bpt} = 100 + 2.8^\circ\text{C} = \boxed{102.8^\circ\text{C}}$$