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Boiling Point Elevation Prelab

1. Explain what the van't Hoff factor is.

Van't Hoff factor is denoted by 'i'. It tells us about the numbers of ions/particles a solute dissociates into when it is dissolved in solvent. It is directly proportional to the boiling point elevation.

2. The boiling point of a solution containing 5.35 g of a nonvolatile hydrocarbon in 102.2 g of acetone is 56.60°C. What is the molecular weight of the hydrocarbon? For acetone, T_b = 55.95°C and K_b = 1.71 °C/m

Given:-

$T_{b(solution)} = 56.60°C$

$= 55.95°C$

$i = 1$, because of hydrocarbon

$T_{b(solvent)}$

$\Delta T_b = 56.60 - 55.95 = 0.65°C$

$K_b = 1.71°C/m$

$\Delta T_b = iK_b m$

$0.65 = 1 \times 1.71\, m$

$m = \frac{0.65}{1.71} = 0.38$ mol/kg

moles of hydrocarbon $= m \times$ kg of solvent

$= 0.38 \times 0.1022$

$= 0.039$

molar mass $= \frac{\text{mass of solute}}{\text{moles of solutes}} = \frac{5.35\,g}{0.039\,mol} = 137.2$ g/mol