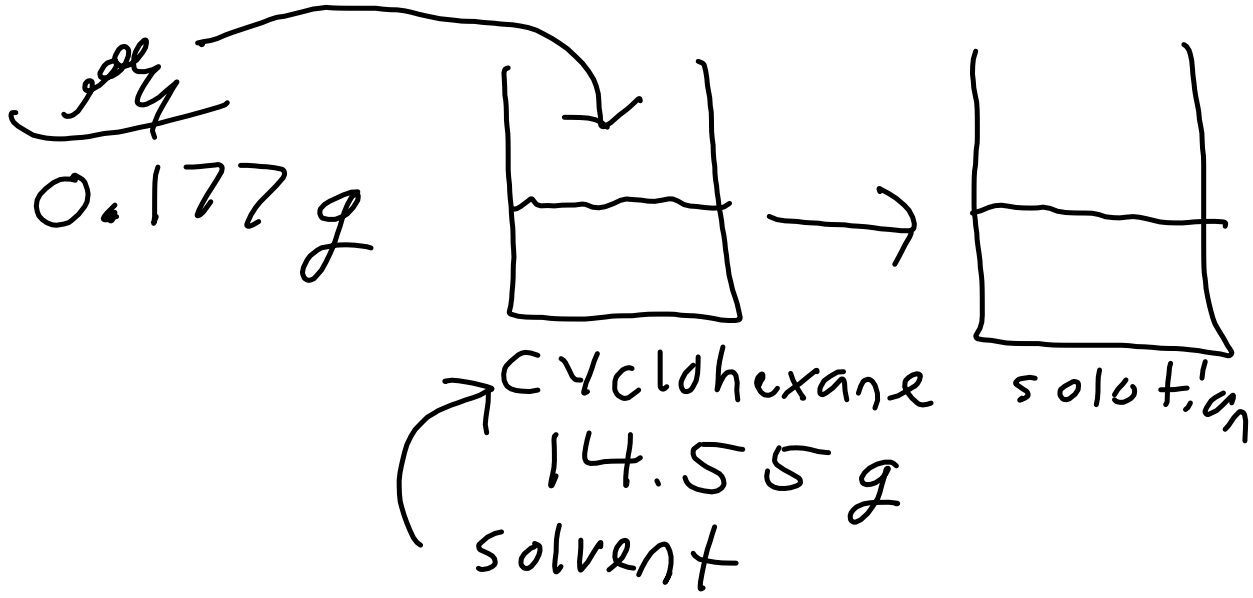
$$\Delta T_b = T_b - T_b^\circ$$

$$|\Delta T_f| = T_f^\circ - T_f$$

$$\Delta T_b = K_b \cdot c_m$$

$$|\Delta T_f| = K_f \cdot c_m$$



A 0.177 g sample of a non-volatile, non-ionizing solute was dissolved in 14.55 g of cyclohexane, producing a solution having a freezing point of 4.22°C. The normal freezing point of cyclohexane is 6.55°C, and its freezing point depression constant is 20.0°C/m. What is the molecular weight of the solute?

$$MWT = \frac{\text{mass in grams}}{\#\text{ of moles}}$$

$$\simeq \frac{0.177\,g}{0.001695\,mol} = 104\,\frac{g}{mol}$$

$$|\Delta T_f| = K_f \cdot C_m$$

$$\downarrow$$

$$C_m = \frac{|\Delta T_f|}{K_f} = \frac{2.33\,^\circ C}{20.0\,\frac{^\circ C}{m}}$$

$$= 0.1165\,m$$

$$0.1165\,\frac{mol}{kg}\left(0.01455\,kg\right) = 0.001695\,mol$$

$$PV = nRT$$

↓ solve for P

$$P = \frac{nRT}{V}$$

This would be equivalent:

$$P = \left(\frac{n}{V}\right)RT$$

$$P = M \cdot RT$$

$$\Pi = M \cdot R \cdot T$$ Morse equation

A solution was prepared at 25°C by dissolving 2.31 g of a protein having a molecular weight of 32850 g/mol in enough water to produce 37.9 mL of solution. What is the osmotic pressure (in torr) of this solution?

$$\Pi = M \cdot R \cdot T$$

$$\Pi = \left(1.855 \times 10^{-3} \frac{mol}{L}\right)\left(0.08206 \frac{L\,atm}{K\,mol}\right)(298.15\,K)$$

$$\rightarrow 1.855 \times 10^{-3} \frac{mol}{L}$$

$$M = \frac{\#\,mol}{\#\,L} = \frac{7.0320 \times 10^{-5}\,mol}{0.0379\,L}$$

$$2.31\,g \left(\frac{1\,mol}{32850\,g}\right) = 7.0320 \times 10^{-5}\,mol$$