

Solution's -12 Osmotic Pressure - Molar Mass

* A solution has 0.8330g polymer of unknown str. in 170.0 mL organic solution and was found to have an osmotic pressure of 5.20 mmHg at 25°C. What is the molar mass of the polymer?

$$\Pi = \frac{MRT}{V} \quad - \quad \frac{5.20 \text{ mmHg} \times \frac{1 \text{ atm}}{760 \text{ mmHg}}}{25 + 273} = 0.00684 \text{ atm}$$

$$M = \frac{\Pi}{RT} = \frac{0.00684 \text{ atm}}{0.0821 \frac{\text{atm} \cdot \text{L}}{\text{mol} \cdot \text{K}} \times 298 \text{ K}} = 0.0002797 \text{ mol/L}$$

$$\text{Molarity} = \frac{\text{mol}}{\text{L}} = ?$$

$$L = 170.0 \text{ mL} / 1000 =$$

$$\text{mol} = M \times L = 0.0002797 \frac{\text{mol}}{\text{L}} \times 0.170 \text{ L} = 4.76 \times 10^{-5} \text{ mol}$$

$$\underline{\underline{MW}} = \frac{\text{g}}{\text{mol}} = \frac{0.8330 \text{ g}}{4.76 \times 10^{-5} \text{ mol}} = 1.75 \times 10^4 \frac{\text{g}}{\text{mol}}$$