

## Solutions - 12      Osmotic Pressure - Molar Mass

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

$$\underline{\underline{\Pi}} = \underline{\underline{M}} \frac{RT}{V} - \frac{5.20 \text{ mm Hg} \times 1 \text{ atm}}{760 \text{ mm Hg}} = 0.00684 \text{ atm}$$
$$25 + 273 = 298 \text{ K}$$

$$M = \frac{\underline{\underline{\Pi}}}{R T} = \frac{0.00684 \text{ atm}}{0.0821 \frac{\text{atm}}{\text{mol K}} \times 298 \text{ K}}$$
$$= 0.0002797 \text{ mol/L}$$

Molarity = mol/L ?

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

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

$$\underline{\underline{MW}} = \frac{0.8330 \text{ g}}{4.76 \times 10^{-5} \text{ mol}} = \boxed{1.75 \times 10^7 \text{ g/mol}}$$