Use of osmotic pressure to determine molar mass

A sample of 1.5 mg. of a protein of unknown molar mass is added to an osmometer. The solution volume is 1 mL. The solution height increases by 1 cm. The measurement temperature is 298 K. What is the molar mass of the protein?

A. 37,900

B. 39,700

C. 79,300

D. 97,300

Use of osmotic pressure to determine molar mass

A sample of 1.5 mg. of a protein of unknown molar mass is added to an osmometer. The solution volume is 1 mL. The solution height increases by 1 cm. The measurement temperature is 298 K. What is the molar mass of the protein?

A. 37,900

B. 39,700

C. 79,300

D. 97,300

$$M = \frac{wRT}{\Pi} = \frac{wRT}{\rho gh} = \frac{(1.5\ kg/m^3)(8.31\ J/mol\text{–}K)(298\ K)}{(1000\ kg/m^3)(9.8\ m/s^2)(0.01\ m)}$$

$$= 37.9\ kg\ /\ mol$$

$$= 37{,}900\ g\ /\ mol$$