

CHEM 1252**Problem of the Day 14**

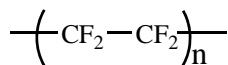
1. A solution is prepared by dissolving 35.0 g of hemoglobin (Hb) in enough water to have 1.00 L solution. If the osmotic pressure of the solution is found to be 10.0 mm Hg at 25°C, calculate the molar mass of hemoglobin. (Note: $i = 1$ for Hb)

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2. A cucumber placed in a concentrated brine (salt water) shrivels into a pickle because of osmotic pressure. Explain.

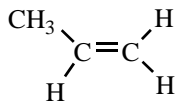
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3. There is a whole branch of chemistry devoted to molecules called polymers. Polymer literally means "many parts." These molecules consist of linking individual units called monomers into long chains. For example, the polymer commonly known as Teflon consists of tetrafluoroethylene monomers, $\text{CF}_2=\text{CF}_2$. The formula for the polymer consisting of "n" such units is shown below.

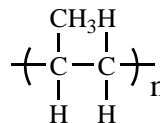


You are going to figure out how many monomers there are in the polymer called polypropylene. The formulas for the monomer, propylene, and its polymer are shown below.

Molecular Formula:



Polymer Formula:



When 85.9 g of polypropylene are dissolved in 150.0 g of benzene, the boiling point of the solution is measured to be 80.31°C . The boiling point of pure benzene is 80.10°C .

(a) What is the increase in the boiling point?

$\Delta T_b =$ $^\circ\text{C}$

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(b) Given that $K_b = 2.53^\circ\text{C}/m$ for benzene, calculate the molar mass for polypropylene based on these data. ($\Delta T_b = i K_b m$, $i=1$) **You must show work to receive partial credit!**

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(c) What is the molar mass of propylene monomer?

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(d) Using your answers from part (b) and part (c) how many propylene monomers are there in a chain of polypropylene? **You must justify your answer.**

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