

Handin Homework 6 CH341

1. How ideal is water vapor? To answer this question, try the following problem: Assume a volume for a closed flask of 10.000 L, a temperature of 298.15K, and 0.01280 moles of gas. Calculate the pressure of water vapor in the flask using the ideal gas law and the Van der Waals equation of state and compare. (For your information for comparison, the vapor pressure of water at 298K is $P_{\text{vap}} = 23.8$ torr.)

2. If the isothermal compressibility of acetone is $111 \times 10^{-6} \text{ atm}^{-1}$ at 14.2°C , what is the change in volume if the pressure is increased from 10.0 atm to 35.0 atm? Assume an initial volume of 1.00 L.

3. Find the formula for the work done in the reversible isothermal expansion of a Van der Waals gas. (i.e. derive the corresponding equation to the ideal gas result: $w = -nRT \ln \frac{V_2}{V_1}$)