PROBLEM SET 4

CHM 3400, Dr. Chatfield, Fall 2011
Due Thursday, Oct. 13

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1. Atkins, exercise 5.3 (5.7 in 4th ed)

2 Atkins, exercise 5.5 (5.9 in 4th ed)

3. Atkins, exercise 5.7 (5.12 in 4th ed)

4. Atkins, exercise 5.10 (5.15 in 4th ed)

5. Atkins, exercise 5.11 (5.16 in 4th ed)

6. Atkins, exercise 5.14 (5.20 in 4th ed)

7. Atkins, exercise 5.16 (5.22 in 4th ed)

8. Atkins, exercise 5.22 (5.26 in 4th ed)

9. (a) Beginning with the Clapeyron equation, derive the equation below for fusion (i.e., for a solid→liquid phase transition). Use the same general procedure used to derive the Clausius-Clapeyron equation (which is for vaporization or sublimation), but you will need to make different approximations. (One is to treeat $\Delta_{fus}H$ and $\Delta_{fus}V$ as independent of temperature).

$$p_f = p_i + \frac{\Delta_{fus}H}{\Delta_{fus}V}\ln\frac{T_f}{T_i}$$

(b) Use this equation to determine the melting point of ice at a pressure of 1000 bar. You will need to find a value for $\Delta_{fus}H$, for ice, which is given in the text and has been used in previous homework assignments. You can determine $\Delta_{fus}V$ from the densities of liquid water and ice, which you can find in a variety of places including online.