Biophysical Chemistry – CH 4404 01
Assignment 2

Due Friday, September 6 (by 5:00 pm)

Please complete the answers to this assignment on separate pages and return it at the beginning of class on Friday, September 6. Please show your work and sources (if you referred elsewhere for constants, enthalpies, etc.). Note that enthalpies of formation (ΔH^0) are given in Appendices A.5-7.

1. Tinoco Chapter 2, Question 8 (10 points)

2. (a) Explain in plain English why an isothermal expansion of an ideal gas does not affect the energy of the system. (3 points)

   (b) The internal energy (E) of one mole of an ideal gas is approximately 3.7 kJ at 300K. Where does the energy come from to do work on the surroundings in question 1, part (a)? *Hint:* The first sentence of this question may or may not be relevant. (2 points)

3. An ideal gas undergoes a small transition from P_1, V_1, to a new pressure and volume, P_2, V_2.

   (a) Write expressions for the *average* volume and pressure during the transition, P_{avg} and V_{avg}. Don't overthink this question. (2 points)

   (b) Show that the following equation is true: (3 points)

   $$\Delta(PV) = P_{avg}\Delta V + V_{avg}\Delta P$$

   Note that $\Delta(PV) = P_2V_2 - P_1V_1$.

4. Tinoco chapter 2, question 1 (6 points)

5. Tinoco chapter 2, question 14 (8 points)

6. Tinoco chapter 2, question 16 (6 points)

7. Tinoco chapter 2, question 23 (5 points)

8. Tinoco chapter 2, question 30 (5 points)