CHEM 482, sec 0102. Homework #3

Due date: Mon, April 12, 2004, 10am

A printed or hand-written homework (no electronic versions please) is due no later than 10am Mon, Apr 12, 2004. It can be handed in during the class (after the lecture). If you unable to come to the class, please bring it to my office at any other time before the deadline.

1. (7 points)

You measured rate constants for two unspecified reactions, A and B, as a function of temperature (see Table). From these data determine the activation energies and the frequency factors for these reactions. Which reaction has higher activation barrier?

Temperature, ^{o}C	Reaction A k, in M^{-1} s^{-1}	Reaction B k, in 10^3 M^{-1} s^{-1}
5	63.1	2.3
10	71.9	2.8
15	81.5	3.5
20	92.1	4.4
25	103.5	5.4
30	116.0	6.6
35	129.4	8.0
40	143.9	9.7

2. (6 points) At what wavelength would you expect the maximum intensity of radiation of a human body (temperature 37^{o}C)? Assume that the blackbody radiation law applies.

3. (7 points) What should be the speed of a baseball (mass = 100 g) such that its wavelength becomes equal to the wavelength of an electron on the first orbit of Bohr's atom model? Can such a speed be achieved?