Chem 12 **Reading and Homework set 10**

(last one!)

Read Ch 15 sections 15.6 - 15.9

Not for credit —

A. Ch 15, problems 48 – 52, 53 (note that "C_4H_9" is almost certainly meant to represent a *tert*-butyl group, $(CH_3)_3C$–; also, suggest a simple way to measure the rate by monitoring the concentration of something vs time. Measuring the concentration of the reactant, *t*BuBr is not easy. Could one perhaps measure the concentration of one of the products? Yes, one could, and one does, in fact, measure rates of such reactions using exactly this very basic technique.)

B. Problems 55, 57, 59, 62 (What is the rate law if the first step is rate-limiting? What if the second is rate-limiting?), **63**.

C. Problems 64, 65, 67, 70 (For a reaction with an activation energy of 85 kJ/mol, what change in rate would result from a 10°C increase in temperature around room temp?), 73 (also determine the Arrhenius *A* value), 99, 100 (these are the best problems in the entire set!!! We must find some way to create an exam problem based on these... something with cockroaches, perhaps...)

To be turned in for credit

25 points; due Wed, April 27 at the beginning of class.

1. Ch 15, problem 54. (a) Assume that the first step is reversible, and apply the steady state approximation to the concentration of $NOCl_2$. Then decide which step must be rate-limiting for the result to be consistent with the experimental rate law of problem 17. (b) Determine the rate law assuming the first step is rate-limiting (so the second step is irrelevant), and (c) Determine the rate law assuming the second step is rate-limiting, which means that the first step is a rapid equilibrium, so we can use the equilibrium approximation. (d) Check that your results from parts b and c are consistent with your result from part a. Should they be? Yes, they should.

2. Problem 58. This is a tough one, but you can do it. Assume that the elementary step given is reversible, and make a reasonable proposal for the second step.

3. (a) Problem 60. Use the equilibrium approximation. (b) Carefully draw the structures of the compounds involved in the first 3 steps, showing the bonding and all lone electrons (count carefully!). Hint: in COCl and $COCl_2$, the *Cls are bonded to the C*, not the O. Hint2: You can draw two resonance structures for CO — draw both, but the reaction is easier to understand if you look at the less important one, i.e. the one with no formal charges)

4. Problems 71 (hey, there's a *t*Bu group again!) and 72. Also determine the Arrhenius *A* value from your plot.

5. Problems 68, 76, 82, 83