INTEGRATED RATE LAW PART II

NAME _____ SECTION _____

1. The reaction:

$$B(g) \rightarrow \text{products}$$

follows simple second order kinetics. When the initial concentration of B is 0.500 M, the initial rate of the reaction is determined to be 8.40×10^{-3} M s^{-1}. When the initial concentration of B is tripled, what change would you expect to observe in the initial rate of the reaction?

2. Write the integrated rate law for a reaction that follows simple second order kinetics.

3. a. The decomposition of NOCl*(g)*

$$2NOCl(g) \rightarrow 2NO(g) + Cl_2(g)$$

is a second order reaction with a rate constant of 0.0480 $M^{-1} \cdot sec^{-1}$ at 200 °C. In an experiment at 200 °C, the initial concentration of NOCl was 0.400 M. What is the concentration of NOCl after 15.0 minutes have elapsed?

b. How many minutes will it take for the concentration of NOCl*(g)* to drop to 0.150 M?

4. Derive a mathematical equation for the half-life for a reaction which follows simple second order kinetics.

5. The initial concentration of NOCl, described in 3a. above, is 0.400 M. Calculate the half-life for the decomposition reaction.

6. Describe how a plot of *ln* [concentration] versus time can provide the rate constant for a reaction which follows simple second order kinetics.

7. Using the following data, establish that the decomposition of NO_2 according to the reaction,

$$2NO_2(g) \rightarrow 2NO(g) + O_2(g)$$

follows second order kinetics. Determine the rate constant for the reaction.

Time (sec)	$[NO_2]$ (M)
0	0.0100
25	0.0088
50	0.0079
75	0.0071
100	0.0065
150	0.0055
175	0.0051
200	0.0048
250	0.0042
300	0.0038