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 \(8.40 \times 10^{-3} \text{ M s}^{-1}\). 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)

\[ 2\text{NOCl}(g) \rightarrow 2\text{NO}(g) + \text{Cl}_2(g) \]

is a second order reaction with a rate constant of 0.0480 M\(^{-1}\) 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 NO₂ according to the reaction,

\[ 2\text{NO}_2(g) \rightarrow 2\text{NO}(g) + \text{O}_2(g) \]

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

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