

CHM 152 Group Work 1 Summer 2009

1. What is the rate law for this reaction? $\text{H}_3\text{BO}_3 + 3 \text{HCl} \rightarrow \text{BCl}_3 + 3 \text{H}_2\text{O}$ _____
2. If the concentration of a reactant is doubled and the corresponding rate quadruples, what is the order with respect to that reactant? _____
3. To graphically find the rate constant for a first order reaction you should plot _____ versus time.
4. What is the half-life for a first order reaction if the initial concentration of reactant is 1.25M and after 69.2 seconds the concentration has dropped to 0.955M?

5. What percentage of a sample remains after 5 half lives? _____
6. What is the rate law for a zero order overall reaction? _____
7. If an elementary step has two reactants, what is its molecularity? _____
8. The slow step in a mechanism is also called the _____ step.
9. According to the following balanced equation, if the rate of appearance of oxygen gas is $4.00 \times 10^{-2} \text{ M/s}$, what is the rate of disappearance of $\text{KClO}_3(\text{s})$?
 $2 \text{KClO}_3(\text{s}) \rightarrow 2 \text{KCl}(\text{s}) + 3 \text{O}_2(\text{g})$
 - a. $2.67 \times 10^{-2} \text{ M/s}$
 - b. $6.00 \times 10^{-2} \text{ M/s}$
 - c. $2.00 \times 10^{-2} \text{ M/s}$
 - d. $3.00 \times 10^{-2} \text{ M/s}$
 - e. $5.33 \times 10^{-2} \text{ M/s}$

10. For this reaction: $2\text{NO}(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{NOCl}(\text{g})$ the **real** rate law is $\text{rate} = k [\text{NO}] [\text{Cl}_2]$
If the following steps are the mechanism, which one must be the rate determining step? _____
What is the intermediate in this mechanism? _____ What is the overall order? _____

$\text{NO}(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow \text{NOCl}_2(\text{g})$	elementary step one
$\text{NO}(\text{g}) + \text{NOCl}_2(\text{g}) \rightarrow 2\text{NOCl}(\text{g})$	elementary step two

11. Name one factor that can increase the success of reactant collisions. Explain **how** it increases the reaction rate.

12. What is the reactant concentration after 78.9 seconds for a second order reaction with a half-life of 3.10 minutes if the initial concentration was 0.555M?