Chemical Kinetics

1. Distinguish between average and instantaneous rate and graphical methods to determine them.
2. Distinguish between component (reactant or product) rate and the *reaction rate*.
3. Know the difference between "forward reaction rate" and "reverse reaction rate".
4. What is a *rate law (a differential equation)* and how can we find the reaction rate from a rate law?
5. Distinguish between overall reaction order and order with respect to a component.
6. Use the graphical method to find the reaction and component rates and how we can use this data to find the amount reacted or produced after a given period of time.
7. Identify the integrated form of the rate law for the *overall* zero, first and second order reactions.
8. Use the integrated equation forms and the equations for the half-life for each order in problem solving.
9. Review the reaction mechanism concept and terminology such as; intermediate, molecularity, unimolecular, bimolecular and termolecular.
10. How do we prove if a reaction mechanism is plausible?
11. Review the "collision" aspect for chemical kinetics and the meaning of activation energy as well as activated complex and transition state). Also recall the impact of variables such as frequency factor, orientation factor, collision frequency, activated complex and the transition state.
12. Review (*which* and *how*) important factors that influence the reaction rate such as temperature and molecular orientation and how these factors impact the reaction rate and the rate law (Arrhenius equation).
13. Work with the "two-point" form of Arrhenius equation to solve for an unknown variable.
14. Distinguish between homogeneous and heterogeneous catalysis.
15. Define catalyst processes of adsorption, diffusion, reaction and desorption) and how they improve reaction rates.
16. Find the rate law given a multi-step reaction mechanism involving fast and slow steps. A fast step could involve equilibrium. There will be 1 rate limiting (determining) step in these mechanisms.
17. Review the definitions of intermediate product(s) and catalysts in a mechanism.
18. Review applications involving enzyme action, atmospheric ozone depletion and catalytic converters as discussed in lecture. Read your textbook for more details on these topics and follow chapter examples.