

**General Chemistry II**  
**Topic: Chemical Kinetics**

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The student should be able to:

1. Explain the relationship between thermochemistry, equilibrium, and kinetics vis a vis chemical reactions.
2. Explain how the following factors can affect reaction rates:
  - a) the nature of the reactants (e.g. state of matter)
  - b) the concentration of reactants
  - c) changes in temperature
  - d) changes in volume
  - e) catalysis
3. Define and relate the following terms to one another: reaction rate, order of reaction, molecularity, rate law, and specific rate constant.
4. Write the rate expression for a chemical reaction, calculate the specific rate constant, calculate the rate of reaction, and determine the concentrations of reactants and/or products at different stages of the reaction given the appropriate data.
5. Discuss and relate Collision theory and Transition State theory to one another.
6. Draw and interpret potential energy (reaction coordinate) diagrams.
7. Define reaction mechanism and rate determining step.
8. Identify the rate determining step of an overall reaction given the appropriate mechanistic data.
9. Propose a mechanism for a reaction given the rate law and the equation for the overall reaction.
10. Determine the energy of activation for a chemical reaction given the appropriate data concerning specific rate constants and temperature.
11. Identify the chain initiating, chain propagating, chain terminating, and inhibiting steps of a chain reaction given the overall chemical equation and the jumbled sequence of steps of the chain reaction mechanism.
12. Identify reagents acting as catalytic agents in a chemical reaction given a detailed mechanism for the reaction of interest.