Terms to know and understand:

Arrhenius equation
Bimolecular
Elementary step
Instantaneous rate
Intermediate
Kinetics
Microscopic reversibility
Osmotic pressure
Rate constant
Termolecular
Mechanism
Initial rate
Catalyst
Equilibrium
Rate law (rate equation)
Half-life
Molecularity
Unimolecular
Activation energy
Rate determining (limiting) step
Equilibrium constant
Collision theory

Trends to know:

- How does reaction rate respond to an increase/decrease in temperature, specificity of orientation, activation energy, and the number of collisions
- Be able to interpret the three kinds of concentration vs. time graphs ([A] vs. time; ln[A] vs. time; 1/[A] vs. time
- What happens to the rate constant when you reverse a reaction, multiply a reaction by a constant, or add two reactions together
- The rules for writing equilibrium expressions

Calculations/Problem Types to be able to solve:

- Determine the molar mass when given osmotic pressure, mass, and volume
- Determine a rate law using the initial rate method
- Determine a rate law using the graphical method
- Identify the overall order of a reaction
- Identify the order of a reaction with respect to a particular reactant
- Derive a complete rate law (including the value of k), for a reaction when given the concentration dependences of each reactant
- Determine the value of the rate constant k for a reaction
- Given the half-life for a first-order reaction A → products along with the initial value of $[A]_o$, find $[A]_t$ at a subsequent time an integral number of half-lifes later.
- Calculate the number of half-lives that have passed in a first order process (i.e., radioactive decay)
- Use the Arrhenius equation to determine activation energy E_a using both the graphical and the 2-point form.
- Write an overall reaction given a series of elementary steps
- Determine the molecularity for each step in a proposed mechanism
- Identify the intermediate(s) and/or catalyst(s) involved in a reaction
- Determine which of two possible mechanisms is more “reasonable”
- Determine the rate laws of elementary steps and overall reaction
- Provided a rate law, write the reaction
- Write rate laws for forward and reverse reactions
- Given an elementary reaction, write its rate law
- Write an equilibrium expression for a reaction