

FRANKLIN-SIMPSON HIGH SCHOOL

Course Name: AP Chemistry

Unit Name: Kinetics

Days: 15

AP Chemistry Objectives:

III. Reactions (35–40%)

B. Stoichiometry

1. Ionic and molecular species present in chemical systems: net ionic equations
2. Balancing of equations, including those for redox reactions
3. Mass and volume relations with emphasis on the mole concept, including empirical formulas and limiting reactants

C. Equilibrium

1. Concept of dynamic equilibrium, physical and chemical; Le Chatelier's principle; equilibrium constants
2. Quantitative treatment
 - a. Equilibrium constants for gaseous reactions: K_p , K_c
 - b. Equilibrium constants for reactions in solution

D. Kinetics

1. Concept of rate of reaction
2. Use of experimental data and graphical analysis to determine reactant order, rate constants, and reaction rate laws
3. Effect of temperature change on rates
4. Energy of activation; the role of catalysts
5. The relationship between the rate-determining step and a mechanism

V. Laboratory (5–10%)

The differences between college chemistry and the usual secondary school chemistry course are especially evident in the laboratory work.

The AP Chemistry Exam includes some questions based on experiences and skills students acquire in the laboratory:

- making observations of chemical reactions and substances
- recording data
- calculating and interpreting results based on the quantitative data obtained
- communicating effectively the results of experimental work

Purpose of the Unit:

While thermo chemistry looks at IF a reaction will occur, kinetics looks at how fast a reaction will occur. It revolves around the concept of rate which is one that students are usually comfortable with thanks in part to their mathematics classes! Students have some knowledge of enzymes as catalysts thanks to their biology classes and have seen how adding a catalyst lowers the activation energy on a reaction coordinate diagram. Students will be able to estimate and calculate the amount of time required for a reaction to reach completion and also determine the factors that will affect the rate of the reaction by determining the order of the reaction, mathematically and graphically.

Prerequisites:

Students will need an understanding of:

- thermodynamics
- manipulating graphs
- Equilibrium constants

Daily Lesson Guide

Day	Lesson Content and Objectives	Focus Questions	Critical Thinking (High Yield / Literacy /LTF/etc.)	Engagement	Assessment and/or Accommodations
1-3	Instantaneous & Relative Rates + Intro to Differential Rate Law III.B.1, 2, 3 III.C.1, 2 III.D.1, 2	* How do you determine the rate of a chemical reaction? * What are the units associated with rates?	* Summarizing and note taking * I Do – We Do – You Do * Analysis/ Application * Learning with others	* ACT bell ringer * Take notes on modeled notes * Solve problems within notes solo and in small groups (formative)	* Evaluate student sample problems for understanding

4-5	Integrated Rate Law & Mechanisms III.B.1, 2, 3 III.C.1, 2 III.D.2, 4, 5	* How can you use integration to graphically determine the rate of a reaction? * How to reactions occur on a step-by-step basis and what effects do these steps have in finding the rate?	* Summarizing and note taking * I Do – We Do – You Do * Analysis/ Application * Learning with others	* ACT bell ringer * Take notes on modeled notes * Solve problems within notes solo and in small groups (formative)	* Evaluate student sample problems for understanding
6-8	Laboratory: AP Chemistry required lab 12 Determination of the Rate of a Reaction, Its Order, and Ea III.B.1, 2, 3 III.C.1, 2 III.D.1, 2, 3, 4, 5 V.	* How can the rate and order of a reaction be determined experimentally?	* Learning with Others * Generating and testing Hypotheses * Authenticity * Novelty and Variety * Analysis/ Applications/ Synthesis	* ACT bell ringer * Work in small lab groups to solve a lab problem * Use data collected to determine rate, order, and Ea of a reaction (summative)	* Evaluate lab reports * Students can check themselves by verifying their results among other lab groups
9-10	The Arrhenius Equation & Activation Energy III.B.1, 2, 3 III.C.1, 2 III.D.3, 4, 5	* How does activation energy play a role in kinetics? * What role does the Arrhenius equation play in determining the rate law?	* Summarizing and note taking * I Do – We Do – You Do * Analysis/ Application * Learning with others	* ACT bell ringer * Take notes on modeled notes * Solve problems within notes solo and in small groups (formative)	* Evaluate student sample problems for understanding

11-13	AP Kinetics FRQs and MC questions III.B.1, 2, 3 III.C.1, 2 III.D.1-5 V.	How will I be tested over kinetics on the AP Chemistry Exam? How does everything I just learned fit together with what I already know?	<ul style="list-style-type: none"> * Learning with others * Choice * Clickers 	<ul style="list-style-type: none"> * ACT bell ringer * Work independently, then in small groups, then as whole class to solve and grade FRQ's with AP rubrics * Use clickers and Turning Point to answers MC Questions from retired AP exams (summative) 	* Evaluate student responses and provide immediate feedback on FRQ's and MC's with rubrics and keys
14-15	Unit Exam III.B, C, D, E V.	* Can I use my knowledge to take an AP-like exam covering kinetics?	<ul style="list-style-type: none"> * Evaluation * Analysis * Application * Synthesis * Authenticity 	<ul style="list-style-type: none"> * ACT bell ringer * Solve retired AP Chemistry MC and FR Questions * Graded by AP standards and rubrics (summative) 	* Evaluate exam