

# AP Chemistry (*Distant Learning*)      Unit 5 Outline: Chemical Kinetics and Equilibria

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## Chapter 13: Chemical Kinetics

Wk/Class	Topics	Suggested Reading	✓	Assignments	✓
Jan 25 / Day 1	Chemical Kinetics, Reaction Rate $\left( Rate = \frac{\Delta[A]}{\Delta t} \right)$ , Average Rate and Instantaneous Rate, Determining Rates Using Pressure, Rate Constant ( $k$ ), Relationship Between Molar Quantities and Reaction Rates, Rate Law, Differential Rate Law ( $Rate = k[A]^n$ ), Integrated Rate Law, Order ( $n$ ), Overall Reaction Order, Initial Rates, Methods of Initial Rates	13.1: The Rate of a Reaction (pg. 546 to 553)  13.2: The Rate Law (pg. 553 - 557)		pg. 589 #1 to 3, 5 to 8  pg. 589–590 #9 to 22; pg. 593–594 #72 and 87	
Jan 25 / Day 2	Integrated Rate Laws, (1 <sup>st</sup> , 2 <sup>nd</sup> , and zero orders), First-Order Rate Laws $\left( \ln [A] = -kt + \ln [A]_0 \text{ or } \ln \left( \frac{[A]_0}{[A]} \right) = kt \right)$ , Half Life of First Order Reaction $\left( t_{1/2} = \frac{\ln(2)}{k} \right)$ , Second-Order Rate Laws $\left( \frac{1}{[A]} = kt + \frac{1}{[A]_0} \right)$ , Half Life of Second Order Reaction $\left( t_{1/2} = \frac{1}{k[A]_0} \right)$ , Zero Order Rate Laws ( $[A] = -kt + [A]_0$ ), Half Life of Zero Rate Laws $\left( t_{1/2} = \frac{[A]_0}{2k} \right)$ , Pseudo-First-Order Rate Law	13.3: The Relation Between Reactant Concentration and Time (Integrated Rate Law) (pg. 557 to 567)		pg. 590–591 #23 to 30; pg. 594–595 #88 and 94	
Feb 8 / Day 1	Collision Model, Activation Energy, Activated Complex (Transition State), Temperature and Collision Frequency, Molecular Orientations and Steric Factor, Arrhenius Equation	13.4: Activation Energy and Temperature Dependence of Rate Constants (pg. 568-575)		pg. 590–591 #31 to 42; pg. 596 #109, 110, 112	
Feb 8 / Day 2	<b>Lab #6: Kinetics of Crystal Violet Fading (February 10, Wednesday)</b>	<b>Lab #6 Handout</b> <b>Lab #6 Video</b>		<b>Lab Report #6 Due: Feb 25, Thursday</b>	
Feb 22/ Day 1	Reaction Mechanism, Intermediate, Elementary Step, Molecularity, Unimolecular, Bimolecular, Termolecular Steps, Rate-Determining Step, Deduction and Conditions of Possible Reaction Mechanisms, Catalyst, Homogeneous Catalyst, Heterogeneous Catalyst, Adsorption, Desorption, Enzymes	13.5: Reaction Mechanisms (pg. 575 to 581) 13.6: Catalysis (pg. 581 to 588)		pg. 591–595 #43 to 49, 51 to 54, 68, 70, 73, 99 pg. 592–595 #55 to 58, 62, 64, 65, 80, 84, 92	
	<b>Chapter 13 Quiz (Assign February 25, Thursday)</b>	<b>Chapter 13 HW Due (March 1, Monday)</b>		<b>Ch 13 Take-Home Quiz (Due: March 1, Monday)</b>	

## Chapter 14: Chemical Equilibrium

Wk/Class	Topics	Suggested Reading	✓	Assignments	✓
Feb 22 / Day 2	Chemical Equilibrium, Properties of Chemical Equilibrium, Law of Mass Action, Equilibrium Expression, Equilibrium Constant ( $K$ ), Homogeneous Equilibria, Equilibrium Expressions of Partial Pressures ( $K_P$ ), Equilibrium Position, Heterogeneous Equilibria, Multiple Equilibria, Reverse Equilibrium Reactions and Multiplying Equilibrium Reactions	14.1: The Concept of Equilibrium and the Equilibrium Constant (pg. 602 to 604)  14.2: Writing Equilibrium Constant Expressions (pg. 604 to 615)		pg. 633 #1 to 4  pg. 633–635 #5 to 11, 13, 14, 16, 18, 20, 22 to 24, 26 to 28, 30 to 32; pg. 639 #92	
Mar 1 / Day 1	Relationship Between Rate Constants and Equilibrium Constants and Expressions, Applications of Equilibrium (The Extent of a Reaction, Reaction Quotient, $Q$ , Calculating Equilibrium Pressures and Concentrations – ICE Box)	14.3: The Relationship Between Chemical Kinetics and Chemical Equilibrium (pg. 616 to 617)  14.4: What Does the Equilibrium Constant Tell Us? (pg. 617 to 623)		pg. 635 #33 and 34  pg. 635–636 #37 to 48; pg. 637–641 #64, 70 to 78 (even), 82, 84, 108	
Mar 1 / Day 2	Le Châtelier's Principle (Effects of a Change in Concentration, Pressure, and Temperature) Free Energy and Pressures and Equilibrium ( $\Delta G = \Delta G^\circ + RT \ln(Q)$ and $\Delta G^\circ = -RT \ln(K)$ ), $w_{\max} = \Delta G$ , Reversible and Irreversible Processes	14.5: Factors That Affect Chemical Equilibrium (pg. 623 to 630)  18.6: The Dependence of Free Energy on Pressure (pg. 803 to 807)		pg. 636–640 #49 to 52, 56 to 62 (even), 65 to 69, 90, 98, 106 pg. 811–814 #21, 22, 24, 26 to 32, 49, 64, 66, 76, 80	
Mar 15 / Day 1 & 2	<b>Unit 5 Test</b> <b>(covers Chapter 13, 14, Section 18.6)</b>  <b>Multiple Choice: (March 15, Monday)</b> <b>Extended Response (March 18, Thursday)</b>			<b>Chapter 14 HW Due</b> <b>(March 15, Monday)</b>	