

AP Chemistry builds students' understanding of the nature and reactivity of matter. After studying chemical reactions and electrochemistry, students move on to understand how the chemical and physical properties of materials can be explained by the structure and arrangements of the molecules and the forces between those molecules. Students will examine the laws of thermodynamics, molecular collisions, and the reorganization of matter in order to understand how changes in matter take place. Finally, students will explore chemical equilibria, including acid-base equilibria. The equivalent of an introductory college-level chemistry course, AP Chemistry prepares students for the AP exam and for further study in science, health sciences, or engineering.

The AP Chemistry course provides a learning experience focused on allowing students to develop their critical thinking skills and cognitive strategies. Frequent no- and low-stakes assessments allow students to measure their comprehension and improve their performance as they progress through each activity. Students regularly engage with primary source materials, allowing them to practice the critical reading and analysis skills that they will need in order to pass the AP exam and succeed in a college chemistry course. Students perform hands-on labs that give them insight into the nature of science and help them understand chemical concepts, as well as how evidence can be obtained to support those concepts. Students also complete several virtual lab studies in which they form hypotheses; collect, analyze, and manipulate data; and report their findings and conclusions. During both virtual and traditional lab investigations and research opportunities, students summarize their findings and analyze others' findings in summaries, using statistical and mathematical calculations when appropriate. Summative tests are offered at the end of each unit as well as at the end of each semester, and contain objective and constructed response items. Robust scaffolding, rigorous instruction, relevant material, and regular active learning opportunities ensure that students can achieve mastery of the skills necessary to excel on the AP exam.

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Length: Two semesters

UNIT 1: CHEMISTRY FOUNDATIONS

LESSON 1: CHEMICAL REACTIONS AND THE MOLE

Read: Chemical Reactions and the Mole

Read about how changes in matter are represented by chemical equations.

Duration: 3 hrs 30 mins Scoring: 0 points

Quiz: Chemical Reactions and the Mole

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

Study: Qualitative and Quantitative Analysis of Chemical Equations

Learn how to describe the changes that rearrange atoms and form the diversity of matter.

Duration: 1 hr Scoring: 0 points

Quiz: Qualitative and Quantitative Analysis of Chemical Equations

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Study: Mass Data Analysis

Use chemical analysis to identify substances.

Duration: 1 hr Scoring: 0 points

Quiz: Mass Data Analysis

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Practice: Chemical Reactions and the Mole

Express the law of conservation of mass quantitatively and qualitatively by using symbolic representations and particulate drawings.

Duration: 1 hr Scoring: 25 points

Lab: Gravimetric Analysis

Interpret data from an experiment that uses gravimetric analysis to determine the concentration of an analyte in a solution.

Duration: 2 hrs 45 mins Scoring: 50 points

Discuss: Gravimetric Analysis

Analyze and evaluate scientific evidence, and communicate and apply the findings.

Duration: 1 hr Scoring: 15 points

LESSON 2: STOICHIOMETRY

Read: Stoichiometry

Read about how the conservation of atoms makes it possible to identify stoichiometric relationships in a chemical reaction.

Duration: 3 hrs 30 mins Scoring: 0 points

Quiz: Stoichiometry

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

Study: Stoichiometry Calculations

Relate quantities to identify stoichiometric relationships for a reaction, including situations involving limiting reactants and situations in which the reaction has not gone to completion.

Duration: 1 hr Scoring: 0 points

Quiz: Stoichiometry Calculations

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Study: Analyzing Chemical Reactions

Compare quantities to identify stoichiometric relationships for a reaction, including situations involving limiting reactants.

Duration: 1 hr Scoring: 0 points

Quiz: Analyzing Chemical Reactions

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Practice: Stoichiometry

Compare moles and measured masses of substances to identify stoichiometric relationships for a reaction, including situations involving limiting reactants and situations in which the reaction has not gone to completion

Duration: 1 hr Scoring: 25 points

Lab: Mole Ratios

Design a plan to collect data on the synthesis or decomposition of a compound, in order to confirm the conservation of matter and the law of definite proportions.

Duration: 2 hrs 45 mins Scoring: 50 points

Discuss: Mole Ratios

Analyze and evaluate scientific evidence, and communicate and apply the findings.

Duration: 1 hr Scoring: 15 points

Explore: Isotopes and Mass Spectrometry

Analyze, evaluate, and critique scientific explanations by examining scientific evidence

Duration: 1 hr 30 mins Scoring: 25 points

LESSON 3: CHEMISTRY FOUNDATIONS WRAP-UP**Test (CS): Chemistry Foundations Wrap-Up**

Take a computer-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

Test (TS): Chemistry Foundations Wrap-Up

Take a teacher-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

UNIT 2: CHEMICAL REACTIONS AND ELECTROCHEMISTRY**LESSON 1: CHEMISTRY REACTIONS****Read: Chemical Reactions**

Read about the changes matter undergoes during chemical reactions.

Duration: 3 hrs 30 mins Scoring: 0 points

Quiz: Chemical Reactions

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

Study: Types of Chemical Reactions and Solution Stoichiometry

Translate an observed chemical change into a balanced chemical equation, and justify your choice of equation type (molecular, ionic, or net ionic).

Duration: 1 hr Scoring: 0 points

Quiz: Types of Chemical Reactions and Solution Stoichiometry

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Study: Metals in Aqueous Solutions

Translate observed chemical changes involving metals in aqueous solution into balanced chemical equations.

Duration: 1 hr Scoring: 0 points

Quiz: Metals in Aqueous Solutions

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Practice: Chemical Reactions

Identify redox reactions and explain your identification in terms of electron transfer.

Duration: 1 hr Scoring: 25 points

Lab: Redox Titration

Perform a redox titration to determine the concentration of a solution.

Duration: 2 hrs 45 mins Scoring: 50 points

Discuss: Redox Titration

Analyze and evaluate scientific evidence, and communicate and apply the findings.

Duration: 1 hr Scoring: 15 points

LESSON 2: ELECTROCHEMISTRY

Read: Electrochemistry

Read about how electrochemistry shows the interconversion between chemical and electrical energy in galvanic and electrolytic cells.

Duration: 3 hrs 30 mins Scoring: 0 points

Quiz: Electrochemistry

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

Study: Evidence of a Chemical Reaction

Evaluate the classification of a process as a physical change, a chemical change, or an ambiguous change, based on macroscopic observation.

Duration: 1 hr Scoring: 0 points

Quiz: Evidence of a Chemical Reaction

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Study: Electrochemistry and Technology

Use concepts of electrochemistry to identify the underlying problems that are preventing a battery from working properly.

Duration: 1 hr Scoring: 0 points

Quiz: Electrochemistry and Technology

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Practice: Electrochemistry

Analyze data regarding galvanic or electrolytic cells to identify properties of the underlying redox reactions.

Duration: 1 hr Scoring: 25 points

Lab: Electrochemistry: Galvanic Cells

Analyze data regarding galvanic or electrolytic cells to identify properties of the underlying redox reactions.

Duration: 2 hrs 45 mins Scoring: 50 points

Explore: Redox Reactions and the Body

Analyze, evaluate, and critique scientific explanations by examining scientific evidence.

Duration: 1 hr 30 mins Scoring: 25 points

Discuss: Electrochemistry: Galvanic Cells

Analyze and evaluate scientific evidence, and communicate and apply the findings.

Duration: 1 hr Scoring: 15 points

LESSON 3: CHEMICAL REACTIONS AND ELECTROCHEMISTRY WRAP-UP

Test (CS): Chemical Reactions and Electrochemistry

Take a computer-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

Test (TS): Chemical Reactions and Electrochemistry

Take a teacher-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

UNIT 3: THERMODYNAMICS

LESSON 1: ENERGY CHANGES IN MATTER

Read: Energy Changes in Matter

Read about the energy changes that take place during physical and chemical processes.

Duration: 3 hrs 30 mins Scoring: 0 points

Quiz: Energy Changes in Matter

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

Study: Maxwell-Boltzmann Distribution

Generate explanations or make predictions about the transfer of thermal energy between systems that occurs due to kinetic energy from molecular collisions.

Duration: 1 hr Scoring: 0 points

Quiz: Maxwell-Boltzmann Distribution

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Study: Calculating Energy Changes in Chemical and Physical Processes

Use the law of conservation of energy to compare the magnitudes of energy changes occurring in different systems as well as to identify the systems, the types of energy changes, and the directions of energy flow.

Duration: 1 hr Scoring: 0 points

Quiz: Calculating Energy Changes in Chemical and Physical Processes

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Practice: Energy Changes in Matter

Use the law of conservation of energy to compare the magnitudes of energy changes occurring in different systems, as well as to identify the systems, the types of energy changes, and the directions of energy flow.

Duration: 1 hr Scoring: 25 points

Lab: Enthalpy of Fusion of Ice

Design and interpret the results of an experiment in which calorimetry is used to determine the change in enthalpy of a chemical process at constant pressure.

Duration: 2 hrs 45 mins Scoring: 50 points

Lab: Enthalpy of Reaction

Design and interpret the results of an experiment in which calorimetry is used to determine the change in enthalpy of a chemical process at constant pressure.

Duration: 2 hrs 45 mins Scoring: 50 points

Discuss: Enthalpy of Fusion of Ice

Analyze and evaluate scientific evidence, and communicate and apply the findings.

Duration: 1 hr Scoring: 15 points

Discuss: Enthalpy of Reaction

Analyze and evaluate scientific evidence, and communicate and apply the findings.

Duration: 1 hr Scoring: 15 points

LESSON 2: THERMODYNAMICS

Read: Thermodynamics

Read about how the laws of thermodynamics describe the essential role of energy and explain and predict the direction of changes in matter.

Duration: 3 hrs 30 mins Scoring: 0 points

Quiz: Thermodynamics

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

Study: Understanding Thermodynamics

Determine whether a chemical or physical process is thermodynamically favorable by calculating the change in standard Gibbs free energy.

Duration: 1 hr Scoring: 0 points

Quiz: Understanding Thermodynamics

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Study: Applying Principles of Thermodynamics

Use tables of standard enthalpies of formation to calculate the standard enthalpy of reactions involving the extraction of elemental metals from metal oxides.

Duration: 1 hr Scoring: 0 points

Quiz: Sources of Energy

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Practice: Thermodynamics

Determine whether a chemical or physical process is thermodynamically favorable by calculating the change in standard Gibbs free energy.

Duration: 1 hr Scoring: 25 points

Explore: Endothermic and Exothermic Processes in Nature

Analyze, evaluate, and critique scientific explanations by examining scientific evidence.

Duration: 1 hr 30 mins Scoring: 25 points

LESSON 3: THERMODYNAMICS WRAP-UP**Test (CS): Thermodynamics**

Take a computer-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

Test (TS): Thermodynamics Wrap-up

Take a teacher-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

UNIT 4: ATOMIC STRUCTURE AND BONDING**LESSON 1: ATOMIC STRUCTURE AND PERIODICITY****Read: Atomic Structure and Periodicity**

Read about the relationship between atomic structure and periodicity.

Duration: 3 hrs 30 mins Scoring: 0 points

Quiz: Atomic Structure and Periodicity

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

Study: The Structure of the Atom

Analyze data relating to electron energies for patterns and relationships.

Duration: 1 hr Scoring: 0 points

Quiz: The Structure of the Atom

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Study: Atomic Models

Given information about a particular model of the atom, determine if the model is consistent with specified evidence.

Duration: 1 hr Scoring: 0 points

Quiz: Atomic Models

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Practice: Atomic Structure and Periodicity

Predict and justify trends in atomic properties based on location on the periodic table and the shell model.

Duration: 1 hr Scoring: 25 points

Lab: Spectroscopy

Justify the selection of a particular type of spectroscopy to measure properties associated with vibrational or electronic motions of molecules. Interpret the results of an experiment regarding the absorption of light to determine the concentration of an absorbing species in a solution.

Duration: 2 hrs 45 mins Scoring: 50 points

Discuss: Spectroscopy

Analyze and evaluate scientific evidence, and communicate and apply the findings.

Duration: 1 hr Scoring: 15 points

Explore: Materials and the Periodicity of Elements

Analyze, evaluate, and critique scientific explanations by examining scientific evidence.

Duration: 1 hr 30 mins Scoring: 25 points

LESSON 2: BONDING**Read: Bonding**

Read about the forces of attraction that hold atoms together.

Duration: 3 hrs 30 mins Scoring: 0 points

Quiz: Bonding

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

Study: Models of Bonding

Predict the type of bonding present between two atoms in a binary compound, based on location in the periodic table and the electronegativity of the elements.

Duration: 1 hr Scoring: 0 points

Quiz: Models of Bonding

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Study: Examining the Composition of Materials

Analyze data relating to electron energies in order to identify patterns and relationships.

Duration: 1 hr Scoring: 0 points

Quiz: Examining the Composition of Materials

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Practice: Bonding

Use Lewis diagrams and VSEPR to predict the geometry of molecules, identify hybridization, and make predictions about polarity.

Duration: 1 hr Scoring: 25 points

Lab: Types of Compounds

Design a plan to collect and interpret data needed to deduce the type of bonding in a sample of a solid.

Duration: 2 hrs 45 mins Scoring: 50 points

Discuss: Types of Compounds

Analyze and evaluate scientific evidence, and communicate and apply the findings.

Duration: 1 hr Scoring: 15 points

LESSON 3: ATOMIC STRUCTURE AND BONDING WRAP-UP**Test (CS): Atomic Structures and Bonding**

Take a computer-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

Test (TS): Atomic Structures and Bonding

Take a teacher-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

UNIT 5: AP CHEMISTRY SEMESTER 1 EXAM**LESSON 1: AP CHEMISTRY SEMESTER 1 EXAM****Exam: AP Chemistry Semester 1 Exam**

Take a computer-scored exam to demonstrate your mastery of concepts and skills covered this semester.

Duration: 1 hr Scoring: 100 points

Final Exam: AP Chemistry Semester 1 Exam

Take a teacher-scored exam to demonstrate your mastery of concepts and skills covered this semester.

Duration: 1 hr Scoring: 100 points

UNIT 6: INTERMOLECULAR FORCES**LESSON 1: INTERMOLECULAR FORCES AND THE PROPERTIES OF SOLIDS AND LIQUIDS****Read: Intermolecular Forces and the Properties of Solids and Liquids**

Read about how the properties of solids and liquids are the result of intermolecular forces.

Duration: 3 hrs 30 mins Scoring: 0 points

Quiz: Intermolecular Forces and the Properties of Solids and Liquids

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

Study: Intramolecular Forces versus Intermolecular Forces

Evaluate the classification of a process as a physical change, chemical change, or ambiguous change, based on the distinction between rearrangements of covalent interactions and noncovalent interactions.

Duration: 1 hr Scoring: 0 points

Quiz: Intramolecular Forces versus Intermolecular Forces

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Study: Solubility of Ionic Compounds

Create and interpret representations that link the concept of molarity with particle views of solutions.

Duration: 1 hr Scoring: 0 points

Quiz: Solubility of Ionic Compounds

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Practice: Intermolecular Forces and the Properties of Solids and Liquids

Predict properties of substances based on their chemical formulas, and provide explanations of their properties based on particle views.

Duration: 1 hr Scoring: 25 points

Lab: Paper Chromatography

Design and interpret the results of a separation experiment (filtration, paper chromatography, column chromatography, or distillation) in terms of the relative strengths of interactions among the components.

Duration: 2 hrs 45 mins Scoring: 50 points

Explore: Intermolecular Forces and the Properties of Biological Molecules

Analyze, evaluate, and critique scientific explanations by examining scientific evidence.

Duration: 1 hr 30 mins Scoring: 25 points

Discuss: Paper Chromatography

Discussion, Chromatography

Duration: 1 hr Scoring: 15 points

LESSON 2: INTERMOLECULAR FORCES AND THE PROPERTIES OF GASES

Read: Intermolecular Forces and the Properties of Gases

Read about how the properties of gases are the result of intermolecular forces.

Duration: 3 hrs 30 mins Scoring: 0 points

Quiz: Intermolecular Forces and the Properties of Gases

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

Study: Solving Equations Involving Gases

Apply mathematical relationships or estimation to determine macroscopic variables for ideal gases.

Duration: 1 hr Scoring: 0 points

Quiz: Solving Equations Involving Gases

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Study: Gas Behavior

Use the law of conservation of energy to compare the magnitudes of the energy changes occurring in two or more interacting systems.

Duration: 1 hr Scoring: 0 points

Quiz: Gas Behavior

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Practice: Intermolecular Forces and the Properties of Gases

Refine multiple representations of a sample of matter in the gas phase to accurately portray the effects of changes in their macroscopic properties.

Duration: 1 hr Scoring: 25 points

Lab: Types of Chemical Reactions

Evaluate the classification of a process as a physical change, chemical change, or ambiguous change, based on both macroscopic observations and the distinction between rearrangements of covalent interactions and noncovalent interactions.

Duration: 2 hrs 45 mins Scoring: 50 points

Discuss: Types of Chemical Reactions

Analyze and evaluate scientific evidence, and communicate and apply the findings.

Duration: 1 hr Scoring: 15 points

LESSON 3: INTERMOLECULAR FORCES WRAP-UP**Test (CS): Intermolecular Forces Wrap-Up**

Take a computer-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

Test (TS): Intermolecular Forces Wrap-Up

Take a teacher-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

UNIT 7: KINETICS**LESSON 1: REACTION RATES****Read: Reaction Rates**

Read about the rate law and its dependence on reactant concentration.

Duration: 3 hrs 30 mins Scoring: 0 points

Quiz: Reaction Rates

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

Study: Rate Laws

Use representations of the energy profile for an elementary reaction to make qualitative predictions regarding the relative temperature dependence of the reaction rate.

Duration: 1 hr Scoring: 0 points

Quiz: Rate Laws

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Study: Reactions and Collisions

Analyze concentration-versus-time data to determine the rate law for a zeroth-, first-, or second-order reaction.

Duration: 1 hr Scoring: 0 points

Quiz: Reactions and Collisions

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Practice: Reaction Rates

Connect the half-life of a reaction to the rate constant of a first-order reaction, and justify this connection.

Duration: 1 hr Scoring: 25 points

Lab: The Effects of Temperature and Particle Size

Design and interpret the results of an experiment regarding the factors (i.e., temperature, concentration, surface area) that may influence the rate of a reaction.

Duration: 2 hrs 45 mins Scoring: 50 points

Discuss: The Effects of Temperature and Particle Size

Analyze and evaluate scientific evidence, and communicate and apply the findings.

Duration: 1 hr Scoring: 15 points

LESSON 2: REACTION MECHANISMS AND CATALYSIS

Read: Reaction Mechanisms and Catalysis

Read about how rates of chemical reactions are determined by details of the molecular collisions.

Duration: 3 hrs 30 mins Scoring: 0 points

Quiz: Reaction Mechanisms and Catalysis

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

Study: Reaction Rates and Mechanisms

Translate among reaction energy profile representations, particulate representations, and symbolic representations (chemical equations) of a chemical reaction occurring in the presence and absence of a catalyst.

Duration: 1 hr Scoring: 0 points

Quiz: Reaction Rates and Mechanisms

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Study: Reaction Kinetics

Explain the role of enzymes in biochemical reactions.

Duration: 1 hr Scoring: 0 points

Quiz: Reaction Kinetics

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Practice: Reaction Mechanisms and Catalysis

Explain changes in reaction rates arising from the use of acid-base catalysts, surface catalysts, or enzyme catalysts, including selecting appropriate mechanisms with or without the catalyst present.

Duration: 1 hr Scoring: 25 points

Lab: Analyzing Concentration-versus-Time Data

Analyze concentration-versus-time data to determine the rate law for a zeroth-, first-, or second-order reaction.

Duration: 2 hrs 45 mins Scoring: 50 points

Explore: Enzymes as Biological Catalysts

Analyze, evaluate, and critique scientific explanations by examining scientific evidence.

Duration: 1 hr 30 mins Scoring: 25 points

LESSON 3: KINETICS WRAP-UP

Test (CS): Kinetics Wrap-Up

Take a computer-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

Test (TS): Kinetics Wrap-Up

Take a teacher-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

UNIT 8: CHEMICAL EQUILIBRIUM

LESSON 1: GENERAL EQUILIBRIUM

Read: General Equilibrium

Read about the details of reactions in equilibrium.

Duration: 3 hrs 30 mins Scoring: 0 points

Quiz: General Equilibrium

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

Study: Systems at Equilibrium

Given a set of experimental observations regarding physical, chemical, biological, or environmental processes that are reversible, construct an explanation that connects the observations to the reversibility of the underlying chemical reactions or processes.

Duration: 1 hr Scoring: 0 points

Quiz: Systems at Equilibrium

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Study: Solving Equilibrium Problems

Given a manipulation of a chemical reaction or set of reactions (e.g., reversal of reaction or addition of two reactions), determine the effects of that manipulation on Q or K .

Duration: 1 hr Scoring: 0 points

Quiz: Solving Equilibrium Problems

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Practice: General Equilibrium

Use Le Chatelier's principle to make qualitative predictions for systems in which coupled reactions that share a common intermediate drive the formation of a product.

Duration: 1 hr Scoring: 25 points

Lab: Reversible Reactions

Use Le Chatelier's principle to design a set of conditions that will optimize a desired outcome, such as product yield.

Duration: 2 hrs 45 mins Scoring: 50 points

Explore: Reversible Reactions in Nature

Analyze, evaluate, and critique scientific explanations by examining scientific evidence.

Duration: 1 hr 30 mins Scoring: 25 points

LESSON 2: SOLUBILITY EQUILIBRIUM**Read: Solubility Equilibrium**

Read about the role of chemical equilibrium in the solubility of compounds in aqueous solutions.

Duration: 3 hrs 30 mins Scoring: 0 points

Quiz: Solubility Equilibrium

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

Study: Salts and Solubility

Characterize changes in matter using visual clues, and then create representations or written descriptions.

Duration: 1 hr Scoring: 0 points

Quiz: Salts and Solubility

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Study: Principles of Equilibrium

Interpret data regarding the relative solubility of salts in terms of factors (e.g., common ions, pH) that influence the solubility.

Duration: 1 hr Scoring: 0 points

Quiz: Principles of Equilibrium

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Practice: Solubility Equilibrium

Predict the solubility of a salt, or rank the solubility of salts, given the relevant K_{sp} values.

Duration: 1 hr Scoring: 25 points

Lab: Solubility Equilibrium

Analyze the enthalpic and entropic changes associated with the dissolution of a salt, using particulate level interactions and representations.

Duration: 2 hrs 45 mins Scoring: 50 points

Discuss: Solubility Equilibrium

Analyze and evaluate scientific evidence, and communicate and apply the findings.

Duration: 1 hr Scoring: 15 points

LESSON 3: CHEMICAL EQUILIBRIUM WRAP-UP

Test (CS): Chemical Equilibrium

Take a computer-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

Test (TS): Chemical Equilibrium

Take a teacher-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

UNIT 9: ACID-BASE EQUILIBRIA

LESSON 1: ACID-BASE EQUILIBRIA

Read: Acid-Base Equilibria

Read about the role of equilibrium in acid-base chemistry.

Duration: 3 hrs 30 mins Scoring: 0 points

Quiz: Acid-Base Equilibria

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

Study: Solving Acid-Base Equilibrium Problems

Identify a given solution as being the solution of a monoprotic weak acid or base (including salts in which one ion is a weak acid or base), calculate the pH and concentration of all species in the solution, and infer the relative strengths of the weak acids or bases from given equilibrium concentrations.

Duration: 1 hr Scoring: 0 points

Quiz: Solving Acid-Base Equilibrium Problems

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Study: Acids and the Body

Based on the dependence of K_w on temperature, reason that neutrality requires that $[H^+] = [OH^-]$ as opposed to requiring that

pH = 7, and also consider the applications to biological systems.

Duration: 1 hr Scoring: 0 points

Quiz: Acids and the Body

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Practice: Acid-Base Equilibria

Generate or use a particulate representation of an acid (strong, weak, or polyprotic) and a strong base to explain the species that will have large versus small concentrations at equilibrium.

Duration: 1 hr Scoring: 25 points

Lab: Acid-Base Titration

Interpret data from an experiment that uses titration to determine the concentration of an analyte in a solution.

Duration: 2 hrs 45 mins Scoring: 50 points

Discuss: Acid-Base Titration

Analyze and evaluate scientific evidence, and communicate and apply the findings.

Duration: 1 hr Scoring: 15 points

LESSON 2: BUFFERS

Read: Buffers

Read about the components and resulting properties of buffer solutions.

Duration: 3 hrs 30 mins Scoring: 0 points

Quiz: Buffers

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 25 mins Scoring: 30 points

Study: Acids and Bases

Relate the predominant form of a chemical species involving a labile proton (i.e. the protonated/deprotonated form of a weak acid) to the pH of a solution and the pK_a associated with the labile proton.

Duration: 1 hr Scoring: 0 points

Quiz: Acids and Bases

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Study: The Nature of Acids and Bases

Identify a solution as being a buffer solution, and explain the buffer mechanism in terms of the reactions that would occur upon addition of acid or base.

Duration: 1 hr Scoring: 0 points

Quiz: The Nature of Acids and Bases

Take a quiz to assess your understanding of the material.

Duration: 0 hrs 20 mins Scoring: 20 points

Practice: Buffers

Identify a solution as being a buffer solution, and explain the buffer mechanism in terms of the reactions that would occur upon addition of acid or base.

Duration: 1 hr Scoring: 25 points

Lab: Buffers

Design a buffer solution with a target pH and buffer capacity by selecting an appropriate conjugate acid-base pair and estimating the concentrations needed to achieve the desired capacity.

Duration: 2 hrs 45 mins Scoring: 50 points

Explore: The Importance of Buffers in the Body

Analyze, evaluate, and critique scientific explanations by examining scientific evidence.

Duration: 1 hr 30 mins Scoring: 25 points

LESSON 3: ACID-BASE EQUILIBRIA WRAP-UP

Test (CS): Acid-Base Equilibria Wrap-Up

Take a computer-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

Test (TS): Acid-Base Equilibria Wrap-Up

Take a teacher-scored test to assess what you have learned in this unit.

Duration: 1 hr Scoring: 50 points

UNIT 10: AP CHEMISTRY SEMESTER 2 EXAM

LESSON 1: AP CHEMISTRY SEMESTER 2 EXAM

Exam: AP Chemistry Semester 2 Exam

Take a computer-scored exam to demonstrate your mastery of concepts and skills covered this semester.

Duration: 1 hr Scoring: 100 points

Final Exam: AP Chemistry Semester 2 Exam

Take a teacher-scored exam to demonstrate your mastery of concepts and skills covered this semester.

Duration: 1 hr Scoring: 100 points