AP Chemistry Summer Review/Jump Start for 2019-20

Happy Summer! This August you will put in some time reviewing material learned in your first chemistry class as well as some time learning new concepts. These concepts will be discussed at the AP Chemistry level when school reconvenes in late August, and I expect that everyone will be able to contribute to the class discussions. There will be quizzes on the material on the days following our in-class discussions of these topics.

To facilitate your review, I am requiring that you purchase a 1-year subscription of FlinnPrep for AP Chemistry at www.flinnprep.com. The subscription is $22.95 and includes access to review materials for all of AP Chemistry including the new units as well as practice exams for the end of the year. The student linking code for my AP Review is btdcg.

I have scanned the FlinnPrep syllabus for the summer work units and noted which students (CP vs. Honors) will be seeing which topics for the first time. Please email me over the summer at hshafer@bishopdiego.org if you have any questions or difficulties with the program.

Summer Units to complete
Unit 1: Nomenclature
Unit 2: Atomic Structure and the Periodic Table
Unit 3: Chemical Reactions
Unit 4: Bonding Basics
Unit 5: Structure and Properties
Unit 6: Stoichiometry
Welcome to the FlinnPREP® AP Chemistry Online Prep Course! Your enrollment in this course is your first step toward a 5 on the AP Chemistry exam. FlinnPREP® covers fundamental concepts in Chemistry using clear and concise text, vibrant images, practice problems with fully worked solutions, illustrative videos, engaging animations and end-of-unit summaries and assessments. All of the content can be viewed on a desktop, tablet or phone, so you can prepare for AP Chemistry conveniently and on the go.

Unit 1 – Nomenclature
- Ionic Compounds
- Cations and Anions
- Cations with One Charge
- Cations with Multiple Charges
- Polyatomic Ions ← memorize these →
- Naming Ionic Compounds and Writing Formulas
- More Examples of Ionic Compound Names and Formulas
- Common Mistakes
- Naming Covalent (Molecular) Compounds
- Examples of Covalent Compounds with Chemical Names and Formulas
- Naming Binary Acids and Oxyacids 🚦

Unit 2 – Atomic Structure and Periodic Trends
- Protons, Neutrons and Electrons
- Ions
- Isotopes
- Average Atomic Mass
- Electron Configuration and Valence Electrons
- Periodic Trends
- Atomic Radius
- Ionic Radius
- Ionization Energy
- Electron Affinity
- Electronegativity

- New to CP
- New to H 12-19
* New to H 17-18
* New all
Unit 3 – Chemical Reactions
• Writing Chemical Reactions
• Balancing Chemical Equations
• Evidence of a Chemical Reaction
• Precipitation Reactions
• Oxidation–Reduction (Redox) Reactions
• Acid–Base Reactions
• Synthesis and Decomposition Reactions

Unit 4 – Bonding Basics
• The Chemical Bond
• Octet Rule
• Electronegativity
• Ionic Bonds
• Covalent Bonds
• Polar and Nonpolar Covalent Bonds
• Lewis Structures
• Rules for Drawing Lewis Structures
• Incomplete and Expanded Octets
• Lewis Structures and Polyatomic Ions
• Resonance
• Determining Electron and Molecular Geometries
• Metallic Bonds

Unit 5 – Structures and Properties
• Molecular Compounds
• Intermolecular Forces and States of Matter
• Dispersion Forces
• Dipole–Dipole Forces
• Hydrogen Bonds
• Ion–Dipole Forces
• Polarity
• Ionic and Atomic Solids
• Ionic Solids
• Nonbonding Atomic Solids
• Metallic Solids
• Network Covalent Solids
• Alloys

Unit 6 – Stoichiometry
• The Mole
• Molar Mass
• Conversion Calculations
• Percent Composition
• Empirical and Molecular Formulas
• Stoichiometry Calculations
• Limiting and Excess Reactants
Unit 7 – Gases
- Pressure
- The Simple Gas Laws
- Charles’s Law (Volume and Temperature)
- Boyle’s Law (Volume and Pressure)
- Avogadro’s Law (Volume and Amount)
- The Ideal Gas Law
- Gaseous Mixtures and Partial Pressures (Dalton’s Law)
- Gas Stoichiometry
- Kinetic Molecular Theory

Unit 8 – Solutions
- Solutions
- Aqueous Solutions
- Solubility
- Solution Concentration
- Solution Preparation
- Dilutions
- Solution Stoichiometry

Unit 9 – Acids and Bases
- Arrhenius Acids and Bases
- Brønsted-Lowry Acids and Bases
- Strong and Weak Acids
- The Acid Dissociation Constant, $K_a$
- What Does “Small” Mean When it Comes to $K_a$ Values?
- The pH Scale
- Autoionization of Water
- Strong Acid Calculations
- Diprotic Acids
- Strong and Weak Bases
- Strong Base Calculations
- Acid–Base Reactions
- Counting $H^+$ and $OH^-$ Ions
- Titrations
- Indicators
Unit 10 – Aqueous Equilibrium
- Weak Acids
- Calculations Involving Weak Acids
- Weak Bases
- Calculations Involving Weak Bases
- Buffers
- Calculating the pH of a Buffer Solution
- Buffer Capacity
- Buffer Problems and Calculations
- The Solubility Product Constant, $K_{sp}$
- $Q$ and $K_{sp}$
- The Common Ion Effect
- Thermodynamics of Solubility

Unit 11 – Thermochemistry
- Average Kinetic Energy
- Maxwell-Boltzmann Distributions
- Temperature
- Kinetic Energy and Potential Energy
- Heat and Work
- State Functions or State Properties
- Enthalpy
- Enthalpy of Reaction
- Hess’s Law
- Calorimetry

Unit 12 – Equilibrium
- What is Equilibrium?
- Equilibrium and Concentration
- Equilibrium and Pressure
- Relating $K_c$ and $K_p$
- Calculating $K_c$ with Known Equilibrium Concentrations
- Calculating $K_c$ with Initial Concentrations and a Known Equilibrium Concentration
- Calculating Equilibrium Concentration from $K_c$ and Remaining Equilibrium Concentrations
- Calculating Equilibrium Concentration from $K_c$ and Initial Concentrations
- Heterogeneous Equilibrium
- LeChâtelier’s Principle
- Changing Concentration in the Equilibrium Reaction
- Adding New Substances to the Equilibrium Reaction
- Changing Temperature in an Equilibrium Reaction
- Changing Pressure in an Equilibrium Reaction
- Reaction Quotient
Unit 13 – Kinetics
- Chemical Kinetics
- Reaction Rates
- Reaction Rates and Stoichiometry
- Rate Laws
- Determining Reaction Orders
- Half-Life
- Integrated Rate Law
- Reaction Mechanisms
- The Collision Model
- Catalysis

Unit 14 – Electrochemistry
- Oxidation–Reduction Reactions and Balancing Equations
- Balancing Redox Equations in Acidic Solution
- Balancing Redox Equations in Basic Solution
- Galvanic Cells (Voltaic Cells)
- Standard Reduction Potentials
- Line Notation
- Gibbs Free Energy, ΔG
- Corrosion
- Electrolysis

Unit 15 – Photoelectron Spectroscopy & Mass Spectrometry
- Ionization Energy and Electronic Structures of Atoms
- Coulomb’s Law
- Principles of Photoelectron Spectroscopy
- Interpreting Photoelectron Spectra
- Number of Peaks
- Peak Position
- Peak Size
- More Examples of Photoelectron Spectra
- Mass Spectrometry
- Electronic and Vibrational Spectroscopy
- UV Spectroscopy
- Infrared Spectroscopy
- Visible Spectroscopy, Beer’s Law

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For more information on this course, please contact the FlinnPREP™ team:
flinnprep@flinnsci.com
800-452-1261 (M–F 7:30 am–5:00 pm CT)
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