

AP Chemistry Syllabus

Mrs. Carson

Book: Chemistry: The Central Science, 13th Ed. by Brown/LeMay/Bursten, et al.

You are taking a college-level class. You can, and should, expect to work independently at an accelerated pace though help is available if you come ask. You may choose to take the AP Chemistry exam in May. Passage of the exam may result in receiving college credit for this course, depending on the decisions by your choice of university and/or major course of study.

Students taking AP Chemistry will deepen their understanding of chemical principles and fundamentals as well as develop their ability to solve problems. This course will contribute to the students' ability to think clearly and to express ideas with clarity and logic, both in written and oral work. Laboratory experience will increase student competence in lab settings, strengthening students' abilities to design experiments, conduct experiments, and analyze data.

The following is a general outline of the course and may change as needs arise.

Ch. 1 Introduction: Matter and Measurement

Review of matter, measurements, significant figures, and unit conversions for problem solving

Ch. 2 Atoms, Molecules, and Ions

Review of atoms, molecules, ions, formulas and naming of compounds

Ch. 3 Chemical Reactions and Reaction Stoichiometry

Review of chemical equations, the mole, using the mole to predict masses of reactants and/or products, empirical and molecular formulas, limiting reactants, theoretical and percent yield

Ch. 4 Reactions in Aqueous Solution

Review of precipitation and acid-base reactions, introduction to oxidation-reduction reactions, concentrations of solutions, solution stoichiometry

TEST Ch. 1-4

Ch. 5 Thermochemistry

Review energy, First Law of Thermodynamics, enthalpy and heat flow, heats of reaction and formation, calorimetry, Hess's Law

TEST Ch. 5

Ch. 6 Electronic Structure of Atoms

Particle and wave nature of light and matter, quantum mechanical model of the atom and orbitals, orbital diagrams, and electron configurations

Ch. 7 Periodic Properties of the Elements

Effective nuclear charge, periodic trends in atomic radii, ionic radii, ionization energy, electron affinities, group trends

TEST Ch. 6-7

Ch. 8 Basic Concepts of Chemical Bonding

Ionic bonds, covalent bonds & bond energy, bond polarity, Lewis dot structures, formal charge

Ch. 9 Molecular Geometry and Bonding Theories

Geometry of molecules, molecular polarity, VSEPR theory, hybridization and atomic orbital theory (brief mention of Molecular Orbital theory)

TEST Ch. 8-9

Ch. 10 Gases

Review of gas laws under ideal conditions, mole fraction in gas mixtures, kinetic molecular theory of gases, and deviation from ideal gas behavior

Ch. 11 Liquids and Intermolecular Forces

Properties of liquids, energetics of changes in state, intermolecular forces, phase diagrams

Ch. 12 Solids and Modern Materials

Metallic solids, ionic solids, molecular solids, covalent-network solids

Ch. 13 Properties of Solutions

Solution process, factors affecting solubility, saturation, solution concentration

TEST Ch. 10, 11, 12 & 13

Ch. 14 Chemical Kinetics

Concept of rate of reaction, rate expressions, rate constants, orders of reactions, collision model, activation energy, reaction mechanisms, catalysts

TEST Ch. 14

Ch. 15 Chemical Equilibrium

Concept of dynamic equilibrium, equilibrium constants, LeChatelier's principle

Ch. 17 Additional Aspects of Aqueous Equilibria (Sect. 17.4 - 17.7 only)

Solubility equilibria and K_{sp} , selective precipitation

TEST Ch. 15 & 17.4-17.7

Ch. 16 Acid-Base Equilibria

Arrhenius, Bronsted-Lowry and Lewis acids and bases; pH and pOH, weak acid and bases; hydrolysis of salts; molecular structures of acids and bases

Ch. 17 Additional Aspects of Aqueous Equilibria (Sect. 17.1 - 17.3 only)

Common ion effect, buffers, acid-base titrations, and indicators

TEST Ch. 16-17 (acid/base topics only)

Ch. 19 Chemical Thermodynamics

Factors in spontaneity of reactions, entropy, Gibbs free energy, standard free energy change, free energy and the equilibrium constant

Ch. 20 Electrochemistry

Oxidation and reduction, balancing redox equations, voltaic and electrolytic cells, standard half-cell potentials

TEST Ch. 19-20

Ch. 23 Chemistry of Coordination Compounds (if there is enough time)

Metal complexes, ligands, chelating agents, coordination numbers, geometry of coordination complexes, crystal field theory

TEST Ch. 23

AP Exam and Final Exam Preparation

Prepare for AP exam/final exam

AP CHEMISTRY EXAM / FINAL EXAM

Qualitative Analysis Laboratory

Identification of an unknown using techniques from qualitative analysis

Independent Research Topic

Research the chemistry of a topic of importance in modern living; write a paper and deliver an oral/visual presentation of the research