

AP Chemistry Syllabus

Teacher: Kim Everett

E-mail: EverettKimberlyJ@mcsk12.net

Phone: 416-8820

For specific dates and assignments, please see my Teacher Web pages.

Teacher Web Pages : <http://teacherweb.com/TN/RidgewayHighSchool/KimberlyJoEverett/index.html>

College Board has approved this syllabus.

Text:

Zumdahl, Steven S., and Susan A. Zumdahl. *Chemistry*. 6th ed. Boston: Houghton Mifflin Company, 2003.

Laboratory Text:

Vonderbrink, Ph.D., Sally A. *Laboratory Experiments for Advanced Placement Chemistry*. 2nd ed. Batavia, IL: Flinn Scientific, Inc., 2006.

Supplemental Materials:

Demmin, Peter E., and David W. Hostage. *Multiple-Choice and Free-Response Questions in Preparation for the AP Chemistry Examination*. 5th ed. USA: D & S Marketing Systems, Inc., 2005.

Fogolino, Paul. *Cracking the AP Chemistry Exam*. New York: Random House, Inc., 2006.

Assignments:

- Vocabulary is due the first day of each chapter.
- Chapter outlines are due the third day of each chapter.
- Assigned problems are due on the day of the chapter test. Problems are assigned from Zumdahl's *Chemistry*. Multiple choice questions and free response questions are assigned from Demmin's *Multiple-Choice and Free-Response Question in Preparation for the AP Chemistry Examination*, and Fogolino's *Cracking the AP Chemistry Exam*.

Class Management:

- Notes are given via PowerPoint presentations, and are held to a minimum.
- Assigned problems are begun in class and finished at home. Solutions to problems are reviewed in class in teacher-lead and student-lead sessions
- A spirit of family is created between students. Students are allowed at times to help or peer teach other students.
- All students in the class take the AP Chemistry exam.
- All make-up work will be completed by appointment after school within five days of the absence.

Labs:

- Labs are conducted weekly and each lab has duration of 1.5 to 2 hours each.
- Students are required to keep a lab notebook of all their completed lab reports.
- Students work in rotating pairs for all labs.
- All labs are hands-on labs.
- During the sixth six weeks there will be a lab practical exam.

Tests:

- Vocabulary: Given in class on the third day of each chapter. For independent study chapters, vocabulary tests are given by appointment after school.
- Chapter: Given in class at the end of each chapter. For independent study chapters, chapter tests will be given during class at the end of the six weeks.
- ACE: On-line tests taken by the student outside the classroom. ACE scores must be e-mailed to the teacher by the day of the chapter test.

Grading Scale:

- Tests: 60%
- Labs: 30%
- Assignments, Outlines, and Vocabulary: 10%

Practice AP Exams:

- A practice AP Exam is given once a semester.

Schedule: First and Second Six Weeks

Week	Chapter	Topics	Approximate # Days
Summer Independent Study	1	Chemical Foundations - Scientific Method, Units of Measurement, Uncertainty in Measurement, Significant Figures & Calculations, Dimensional Analysis, Temperature, Density, Classifications of Matter	Two days during summer - TBA
Summer Independent Study	2	Atoms, Molecules, and Ions - Early History of Chemistry, Fundamental Chemical Laws, Dalton's Atomic Theory, Early Experiments to Characterize the Atom, An Introduction to The Modern View of Atomic Structure, Molecules and Ions, An Introduction to the Periodic Table, Naming Simple Compounds	Two days during summer - TBA
Summer Independent Study	3	Stoichiometry - Atomic Masses, The Mole, Molar Mass, Percent Composition of Compounds, Determining the Formula of a Compound, Chemical Equations, Balancing Chemical Equations, Stoichiometric Calculations, Calculations Involving a Limiting Reactant	Two days during summer - TBA
1	1, 2 & 3	Review - Topics in Chapters 1, 2 & 3	5
2 - 3	22	Organic and Biological Molecules - Alkanes, Alkenes, Alkynes, Aromatic Hydrocarbons, Hydrocarbon Derivatives	7
3 - 4	4	Types of Chemical Reactions and Solution Stoichiometry - Water, the Common Solvent; The Nature of Aqueous Solutions: Strong and Weak Electrolytes; The Composition of Solutions; Types of Chemical Reactions; Precipitation Reactions; Describing Reactions in Solution; Stoichiometry of Precipitation Reactions; Acid-Base Reactions; Oxidation-Reduction Reactions; Balancing Oxidation-Reduction Equations	7
5 - 6	5	Gases - Pressure; The Gas Laws of Boyle, Charles, and Avogadro; The Ideal Gas Law; Gas Stoichiometry; Dalton's Law of Partial Pressures; The Kinetic Molecular Theory of Gases; Effusion and Diffusion; Real Gases	7
End of First Six Weeks Grading Period			
7 - 8	6	Thermochemistry - The Nature of Energy; Enthalpy and Calorimetry; Hess's Law; Standard Enthalpies of Formation	8
8 - 10	7	Atomic Structure and Periodicity - Electromagnetic Radiation; The Nature of Matter; The Atomic Spectrum of Hydrogen; The Bohr Model; The Quantum Mechanical Model of the Atom; Quantum Numbers; Orbital Shapes and Energies; Electron Spin and the Pauli Principle; Polyelectronic Atoms; The History of the Periodic Table; The Aufbau Principle and the the Periodic Table; Periodic Trends in Atomic Properties; The properties of a Group: The Alkali Metals	7
10 - 12	8	Bonding: General Concepts - Types of Chemical Bonds; Electronegativity; Bond Polarity and Dipole Moments; Ions: Electron configurations and Sizes; Formation of binary Ionic Compounds; Partial Ionic Character of Covalent Bonds; The Covalent Chemical Bond: A Model; Covalent Bond Energies and Chemical Reactions; The Localized Electron Bonding Model; Lewis Structures; Exceptions to the Octet Rule; Resonance; Molecular Structure: The VSEPR Model	10
Independent Study	19	The Representative Elements: Groups 1A Through 4A – A Survey of the Representative Elements; The Group 1A Elements; Hydrogen; The Group 2A Elements; The Group 3A Elements; The Groups 4A Elements	2
End of Second Six Weeks Grading Period			

Schedule: Third and Fourth Six Weeks

Week	Chapter	Topics	Approximate # Days
13	9	Covalent Bonding: Orbitals - Hybridizations and the Localized Electrons; The Molecular Orbital Model; Bonding in Homonuclear Diatomic molecules; Bonding in Heteronuclear Diatomic Molecules	5
14 - 15	10	Liquids and Solids - Intermolecular Forces; The Liquid State; An Introduction to Structures and Types of Solids; Structure and Bonding in Metals; Carbon and Silicon: Network Atomic Solids; Molecular Solids; Ionic Solids; Vapor Pressure and Changes of State; Phase Diagrams	8
15-17	11	Properties of Solutions – Solution Composition; The Energies of Solution Formation; Factors Affecting Solubility; The Vapor Pressures of Solutions; Boiling-Point Elevation and Freezing-Point Depression; Osmotic Pressure; Colligative Properties of Electrolyte Solutions; Colloids	8
Winter Break Independent Study	20	The Representative Elements: Groups 5A Through 8A – The Group 5A Elements; The Chemistry of Nitrogen; The Chemistry of Phosphorus; The Group 6A Elements; The Chemistry of Oxygen; The Chemistry of Sulfur; The Group 7A Elements; The Group 8A Elements	2
18	First Semester Final Exams		3
End of Third Six Weeks & End of First Semester			
19 – 21	12	Chemical Kinetics - Reaction Rates; Rate Laws: An Introduction; Determining the Form of the Rate Law; The Integrated Rate Law; Rate Laws: A Summary; Reaction Mechanisms; A Model for Chemical Kinetics; Catalysis	12
21 - 23	13	Chemical Equilibrium – The Equilibrium Condition; The Equilibrium Constant; Equilibrium Expressions Involving Pressures; Heterogeneous Equilibria; Applications of the Equilibrium Constant; Solving Equilibrium Problems; Le Chatelier's Principle	19
23 - 24	14	Acids and Bases - The Nature of Acids and Bases; Acid Strength; The pH Scale; Calculating the pH of Strong Acid Solutions; Calculating the pH of Weak Acid Solutions; Bases; Polyprotic Acids; Acid-Base Properties of Salts; The Effect of Structure on Acid-Base Properties; Acid-Base Properties of Oxides; The Lewis Acid-Base Model; Strategy for Solving Acid-Base Problems	5
Spring Break Independent Study	21	Transition Metals and Coordination Chemistry – The transition Metals: A Survey; The First-Row Transition Metals; Coordination Compounds; Isomerism; Bonding in Complex Ions: The Localized Electron Model; The Crystal Field Model	2
End of Fourth Six Weeks Grading Period			

Schedule: Fifth and Sixth Six Weeks

Week	Chapter	Topics	Approximate # Days
25 - 26	15	Applications of Aqueous Equilibria - Acid-Base Equilibria; Solubility Equilibria; Complex Ion Equilibria	9
26 - 27	16	Spontaneity, Entropy, and Free Energy - Spontaneous Processes and Entropy; Entropy and the Second Law of Thermodynamics; The Effect of Temperature on Spontaneity; Free Energy; Entropy Changes in Chemical Reactions; Free Energy and Chemical Reactions; The Dependence of Free Energy on Pressure; Free Energy and Equilibrium; Free Energy and Work	6
27 - 28	17	Electrochemistry – Galvanic Cells; Standard Reduction Potentials; Cell Potential, Electrical Work, and Free Energy; Dependence of Cell Potential on Concentration; Batteries; Corrosion; Electrolysis	7
29 – 30	18	The Nucleus: A Chemist’s View – The Nuclear Stability and Radioactive Decay; The kinetics of Radioactive Decay; Nuclear Transformations; Detections and Uses of Radioactivity; Thermo-dynamic Stability of the Nucleus; Nuclear Fission and Nuclear Fusion; Effects of Radiation	5
End of Fifth Six Weeks Grading Period			
31 - 33	1 - 22	Review	15
34	All Labs	Review and Lab Practical Exam	5
35		Review and AP Exam	5
36		Fun Labs	5
End of Sixth Six Weeks Grading Period and End of the Second Semester			

AP Chemistry Lab Schedule

Week	College Board Recommended Experiment	Experiment
1	Determination of the Formula of a Compound	Determination of the Empirical Formula of Silver Oxide
2	Analytical Gravimetric Analysis	Analysis of Silver in an Alloy
3		Gravimetric Analysis of a Metal Carbonate
4	Determinations of the Percentage of Water in A Hydrate	Analysis of Alum, $AlK(SO_4)_2 \cdot 12H_2O$
5	Determination of Mass and Mole Relationship in a Chemical Reaction	Finding the Ratio of Moles of Reactants in a Chemical Reaction
6	Determination of Enthalpy Change Associated with a Reaction	Thermodynamics – Enthalpy of Reaction and Hess’s Law
7	Determination of Electrochemical Series	An Activity Series
8	Determination of the Molar Volume of a Gas	Determining the Molar Volume of a Gas
9	Determination of Molar Mass by Vapor Density	Determination of the Molar Mass of Volatile Liquids
10	Separation by Chromatography	Liquid Chromatography
11	Determination of molar Mass by Freezing-Point Depression	Molar Mass by Freezing Point Depression
12	Determination of the Rate of a Reaction and its Order	Kinetics of a Reaction
13	Colorimetric or Spectrophotometric Analysis	The Determination of K_{eq} for $FeSCN^{2+}$
14	Determination of the Equilibrium Constant for a Chemical Reaction	Determination of K_a of Weak Acids

Week	College Board Recommended Experiments	Experiments
15	Standardization of a Solution Using a Primary Standard	Acid-Base Titrations
	Determinations of Concentration by Acid-Base Titration, Including a Weak Acid or a Weak Base:	
16	Determination of the Appropriate Indicators for Various Acid-Base Titrations; pH Determination	Selecting Indicators for Acid-Base Titrations
17	Preparation and Properties of Buffer Solutions	Preparation and Properties of Buffer Solutions
18	Determination of the Equilibrium Constant for a Chemical Reaction	Determination of the Solubility Product of an Ionic Compound
19	Separation and Qualitative Analysis of Cations and Anions	Separation and Qualitative Determination of Cations and Anions
20	Determination of Concentration by Oxidation-Reduction Titration	Oxidation-Reduction Titrations
21	Determination of Concentration by Oxidation-Reduction Titration	Analysis of a Commercial Bleach
22	Measurements Using Electro Chemical Cells and Electroplating	Electrochemical Cells
23		Electrolysis
24	Synthesis of a Coordination Compound and its Chemical Analysis	Preparation and Analysis of Tetraamminecopper(II) Sulfate Monohydrate
25	Synthesis, Purification, and Analysis of an Organic Compound	Synthesis, Isolation, and Purification of an Ester
26		Predicting the Products of Chemical Reactions and Writing Chemical Equations

All labs are hands-on labs.