

AP[®] CHEMISTRY SYLLABUS FOR 2009-2010

COURSE GOALS

In accordance with College Board guidelines, AP Chemistry is designed to be the equivalent of a first year college chemistry course. AP Chemistry students develop their skills in logic, critical thinking, written and oral communications, with a strong emphasis on applications of mathematics and problem solving. The students add greater depth and understanding to familiar concepts, such as atomic structure, bonding, and chemical equations, and learn new ideas not typically taught in high school chemistry, such as thermodynamics, electrochemistry, and equilibrium.

The laboratory portion of the course includes challenging and relevant experiments. Each experiment has been chosen to teach and reinforce chemistry concepts and develop practical hands-on skills needed in the lab, such as making observations of chemical reactions, designing experiments, following safe practices, recording data, calculating and interpreting data, reaching conclusions, and communicating experimental results.

GENERAL INFORMATION

AP Chemistry meets for five double periods weekly (470 minutes/week). There are approximately 32 weeks prior to the AP Chemistry exam in May. Experiments are completed during this time each week, for an average of one and half double periods per week, totaling about 48 double periods for the entire course.

Students taking AP Chemistry should first complete honors or college-prep Biology, Chemistry, and Algebra II or higher, and have the recommendation of his/her Chemistry instructor. There is one section of AP Chemistry, with an enrollment of about ten students.

AP Biology is also offered, in addition to nine other non-science AP courses. The cost of the AP exam is covered by the district. The district encourages, but does not require that student take the AP exams.

LABORATORY FACILITIES & EQUIPMENT

The laboratory is a separate room from the classroom. It is shared with students from the high school chemistry classes, but has locking storage drawers and cabinets. The lab was remodeled a few years ago, with ample water, gas, and electrical supplies. In addition to the usual high school equipment, the room contains a fume hood, oven, centrifuge, pH meters, a spectrophotometer, a gas chromatograph, and an electronic analytical balance. The school maintains several carts with laptop computers and Vernier probes. These computers are shared by all members of the science department. Of particular importance to AP Chemistry, the probes include pH, temperature, and voltage.

GRADING

The grade for AP Chemistry will be determined as follows:

45% Exams

15% Quizzes

15% Homework & Classwork

25% Laboratory Work & Reports

with the following percentage divisions for letter grades:

A: 90-100%

B: 80-89%

C: 70-79%

D: 60-69%

F: <60%

There are four exams in the first semester and three in the second, formatted to simulate the AP exam with a combination of multiple choice and free-response questions. The final exam will be the third exam of the second semester and is given after the AP exam. Weekly quizzes will be short, emphasizing one or two points, and will also follow the AP exam format. Exams and quizzes will include lab material where appropriate. Exams with low scores (<60%) may be retaken to earn up to a score of 60% (D). Quizzes may not be retaken.

Homework is assigned and reviewed regularly, formally due two days before a quiz or exam. Homework consists of problem sets assigned from the textbook or other materials, and/or problem sets developed by the instructor. The classwork portion of the grade includes oral presentations of assignments and lab work, and participation in small group and whole class discussions, problem solving, and other activities. Assignments are expected to be on time. Missing or late work, including lab reports, will be subject to a 50% grade reduction. Homework may not be redone, but the lowest assignment of each marking period will be dropped.

In the lab, students develop skills in handling basic lab and measurement apparatus. They learn lab processes such as synthesis, separations, titrations, spectrophotometry, qualitative analysis of ions, and gravimetric analysis. Students have considerable opportunity for collecting, recording, interpreting, mathematically manipulating, graphing, evaluating, and reporting qualitative and quantitative data from their work.

Lab scores include the pre-lab assignments, the skills exhibited in the laboratory, and the quality, accuracy, and completeness of the lab reports. Some experiments require the students to work in pairs, however, each student is responsible for his/her own lab report. Students maintain a binder containing of all experiments and reports, written in ink. Computer generated reports, spreadsheets, and graphs may be included in the binder. Lab reports are graded weekly. Reports with low scores (<60%) may be revised to earn up to a score of 60%, or up to 50% if the report was late. Most labs require a full report.

COURSE REQUIREMENTS

The following should be brought to class everyday:

textbook

lab manual

pens and pencils

safety goggles

scientific calculator (graphing calculator recommended)

binder or folder with plenty of paper (will likely need more than one before the course is finished)

binder for laboratory reports (1 to 1½ inch)

Students will actively participate in every aspect of AP Chemistry. Participation includes diligent note taking, asking and answering questions, helping other students with problems, presenting homework and labwork for the class, plus safely performing all aspects of the experiments, including set-up and clean-up in the lab. When assigned, students are expected to complete all computer-based problem sets, tutorials, and virtual labs. As needed, students will stay after school for help or to complete homework or lab assignments.

As soon as you feel you have fallen behind or are having trouble - **talk to the instructor!** Everyone needs a little help now and then. Come in for help when you need it.

Students are expected to attend class regularly. Work missed during an absence, including lab work and assessments, must be completed within the time lines set by district policy. Unexcused absences will result in a zero for all missed work plus appropriate disciplinary action. Absences for meetings, assemblies, sports, etc., should have prior approval. Work missed for such events must still be completed on time unless other arrangements are made.

Students will participate in the two week intensive review for the May 11, 2010 AP Chemistry Exam by completing, reviewing, and discussing practice tests, lab data, and test taking strategies. All students are expected to take the exam.

FIRE DRILL AND EVACUATION PLAN

At the sound of the alarm you should:

Turn off all equipment and gas if in the lab.

Take all valuables with you.

Go left to stairway "E" and exit building. When outside, proceed right (south) along the driveway.

Remain with the class until we have been called back into the building or receive other instructions.

PRIMARY COURSE MATERIALS

Brown, Theodore L., H. Eugene LeMay, Jr., and Bruce E. Bursten. *Chemistry: The Central Science*. 10th ed. Upper Saddle River, NJ: Prentice Hall, 2006.

Nelson, John H., and Kenneth C. Kemp. *Laboratory Experiments for AChemistry: The Central Science*. @ 10th ed. Upper Saddle River, NJ: Prentice Hall, 2006.

Hauge, Eugene R., and Jane D. Smith. *The Ultimate Chemical Equations Handbook*. Batavia, IL: Flinn Scientific, 2001.

SUPPLEMENTARY MATERIALS

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

Long, Gary. *Math Review Toolkit for AChemistry: The Central Science*. @ 10th ed. Upper Saddle River, NJ: Prentice Hall, 2006.

Beran, J. A., *Laboratory Manual for Principles of General Chemistry*. 7th ed. Danvers, MA: John Wiley & Sons, 2004.

Models - ball and stick, space filling, and framework kits

AVAILABLE REFERENCE TEXTS & MATERIALS

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

Chang, Raymond. *Chemistry*. 3rd ed. Boston, MA: McGraw Hill, 2003.

Kotz, John C., and Paul Treichel, Jr. *Chemistry and Chemical Reactivity*. 5th ed. Fort Worth, TX: Saunders College Publishing, 2003.

Jones, Loretta, and Peter Atkins. *Chemistry: Molecules, Matter, and Change*. 4th ed. New York, NY: W.H. Freeman & Co., 2003.

Brady, James E., and Fred Sense. *Chemistry: Matter and Its Changes*. 4th ed. Danvers, MA: John Wiley & Sons, 2004.

DEMONSTRATIONS SOURCES

Summerlin, Lee R., and James L. Ealy, Jr., *Chemical Demonstrations: A Sourcebook for Teacher*. 1st ed. Washington, DC: American Chemical Society, 1985.

Summerlin, Lee R., Christie L. Borgford, and Julie B. Ealy. *Chemical Demonstrations: A Sourcebook for Teacher Volume 2*. 1st ed. Washington, DC: American Chemical Society, 1987.

2009-2010 AP[®] CHEMISTRY SYLLABUS

All chapters refer to Brown, LeMay, & Bursten, *Chemistry: The Central Science*. 10th ed. Laboratory experiments refer to Nelson & Kemp, *Laboratory Experiments for Chemistry: The Central Science*, except where noted.

Summer Assignment Schedule	
Chapter & Topic	Due
Ch 1 Introduction: Matter and Measurement	July 24
Ch 2 Atoms, Molecules, and Ions	August 8
Ch 3 Stoichiometry: Calculations with Chemical Formulas & Equations	August 19 <i>first day of school</i>

Week	Dates	Days	Chapter & Topics	Lab Assignments
1-2	Aug 19 - Sep 3	12	<p>Ch 1 Introduction: Matter and Measurement</p> <ul style="list-style-type: none"> • classification & properties of matter • units of measurement • uncertainty in measurement • dimensional analysis <p>Ch 2 Atoms, Molecules, and Ions</p> <ul style="list-style-type: none"> • evidence for the atomic theory • atomic masses, determination by chemical & physical means • atomic number and mass number, isotopes • molecular & ionic compounds • inorganic nomenclature 	<p>Basic Lab Techniques</p> <p>Identification of Substances by Physical Properties</p> <p><i>9/4 no school</i> <i>9/7 Labor Day</i></p>
3-4	Sep 7 - Sep 18	9	<p>Ch 3 Stoichiometry: Calculations with Chemical Formulas and Equations</p> <ul style="list-style-type: none"> • law of conservation of mass • chemical equations, balancing • chemical reactivity and products of chemical reactions • formula weights • the mole • empirical formula • stoichiometry • limiting reactants 	<p>Separation of Components of a Mixture</p> <p>Chemical Reactions</p>

Week	Dates	Days	Chapter & Topics	Lab Assignments
5-6	Sep 21 - Oct 2	10	Exam One - Ch 1, 2, & 3 Ch 4 Aqueous Reactions and Solution Stoichiometry <ul style="list-style-type: none"> • types of solutions • precipitation reactions • net & complete ionic equations • acid-base reactions • oxidation-reduction reactions • methods of expressing concentration • solution stoichiometry 	Percent Water in a Hydrated Salt (Beran) 10/2 End of MP-1
7-8	Oct 5 - Oct 16	8	Ch 5 Thermochemistry <ul style="list-style-type: none"> • state functions • first law: change in enthalpy, heat of formation, heat of reaction • Hess's law • heats of vaporization & fusion • calorimetry Ch 6 Electronic Structure of Atoms <ul style="list-style-type: none"> • nature of light, quantized energy • atomic spectra, Bohr model • electron energy levels • quantum numbers, atomic orbitals • electron configurations & periodic table 	Thermochemistry and Hess' Law (Vonderbrink) Chemicals in Everyday Life <i>10/8-10/9</i> <i>Staff Development</i>
9-10	Oct 20 - Oct 31	10	Ch 6, continued Exam Two, Ch 4, 5, & 6 Ch 7 Periodic Properties of Elements <ul style="list-style-type: none"> • periodic relationships, such as atomic radii, ionization energies, electron affinities, oxidation states • horizontal, vertical, & diagonal relationships with examples from alkali metals, alkaline earth metals, halogens, & the first series of transition metals 	Chemical Reactions of Copper and Percent Yield An Activity Series (Vonderbrink)

Week	Dates	Days	Chapter & Topics	Lab Assignments
11-12	Nov 2 - Nov 13	9	<p>Ch 8 Basic Concepts of Chemical Bonding</p> <ul style="list-style-type: none"> • octet rule • types of bonding: ionic, covalent, etc. • polarity of bonds, electronegativity • Lewis structures • resonance • lattice energy <p>Ch 9 Molecular Geometry and Bonding Theories</p> <ul style="list-style-type: none"> • relationships to states, structure, & properties of matter • valence bond, hybridization, sigma & pi bonds • VSEPR • molecular orbitals • geometry of molecules & ions, relation to properties of structure 	<p>Gravimetric Analysis of a Chloride Salt</p> <p>Molecular Geometry</p> <p><i>11/11 Veteran's Day</i></p> <p>11/13 End of MP-2</p>
13-14	Nov 16 - Nov 24	7	<p>Exam Three - Ch 7, 8, & 9</p> <p>Ch 10 Gases</p> <ul style="list-style-type: none"> • pressure • laws of ideal gases, equation of state of an ideal gas, partial pressures • kinetic molecular theory (KMT) • Avogadro's hypothesis & the mole concept • kinetic energy & temperature • deviations from ideal laws 	<p>Molar Mass of a Volatile Liquid</p> <p><i>11/25-29 Thanksgiving</i></p>
15-16	Nov 30 - Dec 4	10	<p>Ch 11 Intermolecular Forces, Liquids, and Solids</p> <ul style="list-style-type: none"> • KMT viewpoint on liquids & solids • properties of liquids • phase diagrams • change of state, including critical & triple points • structure & bonding of solids 	<p>Molar Volume of a Gas</p>

Week	Dates	Days	Chapter & Topics	Lab Assignments
23-24	Feb 1 - Feb 12	9	Ch 16 Acid-Base Equilibria <ul style="list-style-type: none"> • Brønsted-Lowry, Arrhenius, & Lewis acids and bases • pH scale, K_a and pK_a • strong acids & bases • weak acids & bases • acid-base properties of salt solutions 	Determination of the Dissociation Constant of a Weak Acid Preparation & Properties of Buffer Solutions (Vonderbrink) <i>2/12 Staff Development</i>
25-26	Feb 15 - Feb 26	10	Ch17 Additional Aspects of Aqueous Equilibria <ul style="list-style-type: none"> • common ion effect • buffers • acid-base titrations • solubility equilibria, K_{sp} • solubility product constants and precipitation • factors that effect solubility • amphoterism 	<i>2/15 Presidents' Day</i>
27-28	Mar 1 - Mar 12	9	Ch17 Aspects of Aqueous Equilibria, continued Exam Six, Ch 15b, 16 & 17 Ch 19 Thermodynamics <ul style="list-style-type: none"> • spontaneous processes • second law and entropy • free energy of formation, free energy of reaction • free energy, enthalpy and entropy changes 	3/5 End of MP-4 <i>3/11-3/20 DSTP Math, Reading, & Writing</i>
29-30	Mar 15 - Mar 26	10	Ch 19 Thermo, continued Ch 20 Electrochemistry <ul style="list-style-type: none"> • oxidation-reduction reactions • oxidation number • balancing redox reactions & electrons • voltaic cells, cell EMF, half cell potentials 	Bleach Analysis (redox titration, Vonderbrink)
	Mar 28 - Apr 5		Ch 21 Nuclear Chemistry <ul style="list-style-type: none"> • nuclear equations • transmutation • half-lives & radioactivity • fission & fusion • chemical applications 	<i>3/28-4/5 Spring Break</i>

Week	Dates	Days	Chapter & Topics	Lab Assignments
31-32	Apr 5 - Apr 16	9	Ch 20 Electrochemistry, continued <ul style="list-style-type: none"> relationship of change in free energy to electrode potentials the Nernst equation batteries corrosion, & electrolysis Ch 21 Nuclear Chemistry, continued	Galvanic Cells; the Nernst Equation (Beran) Qualitative Analysis of Cations and Anions (Vonderbrink)
33-34	Apr 19 - Apr 30	10	Ch 21 Nuclear Chemistry, continued Exam Prep & Practice Exams	4/23 End of MP-5 Review of Experiments
35-36	May 3 - May 14	10	Exam Prep & Practice Exams AP Chemistry Exam - 5/12 in the morning Exam Seven, Ch 19, 20 & 21 Ch 12 Modern Materials <ul style="list-style-type: none"> liquid crystals biomaterials ceramics superconductivity thin films 	Preparation of Aspirin & Oil of Wintergreen
37-39 (3 weeks)	May 17 - Jun 4		Ch 12 Modern Materials, continued Course Survey Final Exams	5/17 End of MP-6 5/18 & 5/19 DSTP <i>Sci & Soc Studies</i> 5/28 Staff Development ½ day 5/26, 5/27, 5/28 Final Exams 5/31 Memorial Day 6/1 Last Student Day 6/4 Graduation