

Advanced Placement Chemistry

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Textbook:

Zumdahl, Steven S. and Zumdahl, Susan A. *Chemistry*. Houghton Mifflin Company, 2007. 7th ed.

Laboratory Texts:

Hall, James F. *Experimental Chemistry*. Houghton Mifflin Company, 2007. 7th ed.

Randall, Jack, et al. *Advanced Chemistry with Vernier*. Vernier Software & Technology. 2004

AP Chemistry. WARD'S Natural Science Establishment, Inc., 1999.

COURSE EXPECTATIONS

This course will follow The College Board's objectives. As stated in the AP Chemistry Course Description:

AP Chemistry is designed to be the equivalent of the general chemistry course taken during the first college year. For some students, this course enables them to undertake, in their first year, second-year work in the chemistry sequence at their institution or to register for courses in other fields where general chemistry is a prerequisite.

This course will be geared to prepare students to successfully perform on the College Board AP Chemistry exam. Course structure will emphasize these main topics (and the corresponding percentages) that appear on the examination: Structure of Matter (20%); States of Matter (20%); Reactions (35-40%); Descriptive Chemistry (10-15%); and Laboratory (5-10%).

Also, this course contains a laboratory component comparable to college-level chemistry laboratories. AP Chemistry is for students seriously considering pursuing a career in chemistry or a career that relies heavily on Chemistry as well as any student that enjoyed 1st year Chemistry and wants to earn AP credit.

COURSE Timeline

Start	End	Class unit	Zum Ch	Topics	Wks	
1st weeks of school 8/21/08 - 8/29/08		1	1	Chemical Foundations		1st Q
		2	2	Atoms, Molecules and Ions		1st Q
		3	3	Stoichiometry		1st Q
		4	4	Reactions in Solution		1st Q
09/01/08	09/12/08	5	5	Gases	2	1st Q
09/15/08	10/03/08	6	6	Thermochemistry	3	1st Q
10/06/08	10/24/08	7	16	Chemical Thermodynamics	3	1st Q
10/27/08	11/07/08	8	17	Electrochemistry	2	2nd Q
11/10/08	12/05/08	9	12	Chemical Kinetics	3	2nd Q
12/08/08	12/19/08	10	13	Chemical Equilibria	2	2nd Q
01/05/09		11	14	Acids and Bases	1.5	2nd Q
	01/30/09	12	15	Aqueous Equilibrium	1.5	3rd Q
02/02/09	02/06/09	13	7	Atomic structure and Periodicity	1	3rd Q
02/09/09	02/27/09	14	8, 9	Chemical Bonding	3	3rd Q
03/02/09	03/06/09	15	10	Solids and Liquids	1	3rd Q
03/09/09	03/13/09	16	11	Properties of Solutions	1	3rd Q
03/16/09	03/20/09	17	18	Nuclear Chemistry	1	3rd Q
03/23/09	03/27/09	22	22	Organic Chemistry	1	4th Q
03/30/09	05/11/09	AP Exam Review, 4 wks				4th Q

05/12/09**AP CHEMISTRY EXAM**

<p>Unit 1 - Ch. 1 Chemistry Foundations</p> <p>1.1 Chemistry: An Overview</p> <p>1.2 The Scientific Method</p> <p>1.3 Units of Measurement</p> <p>1.4 Uncertainty in Measurement</p> <p>1.5 Significant Figures and Calculations</p> <p>1.6 Dimensional Analysis</p> <p>1.7 Temperature</p> <p>1.8 Density</p> <p>1.9 Classification of Matter</p> <p>Unit 2 - Ch. 2 Atoms, Molecules, and Ions</p> <p>2.1 The Early History of Chemistry</p> <p>2.2 Fundamental Chemical Laws</p> <p>2.3 Dalton's Atomic Theory</p> <p>2.4 Early Experiments to Characterize the Atom</p> <p>2.5 The Modern View of Atomic Structure: An Introduction</p> <p>2.6 Molecules and Ions</p> <p>2.7 An Introduction to the Periodic Table</p> <p>2.8 Naming Simple Compounds</p> <p>Unit 3 - Ch. 3 Stoichiometry</p> <p>3.1 Counting by Weighing</p> <p>3.2 Atomic Masses</p> <p>3.3 The Mole</p> <p>3.4 Molar Mass</p> <p>3.5 Percent Composition of Compounds</p> <p>3.6 Determining the Formula of a Compound</p> <p>3.7 Chemical Equations</p> <p>3.8 Balancing Chemical Equations</p> <p>3.9 Stoichiometric Calculations: Amounts of Reactants and Products</p> <p>3.10 Calculations Involving a Limiting Reactant</p> <p>Unit 4 - Ch. 4 Types of Chemical Reactions and Solution Stoichiometry</p> <p>4.1 Water, the Common Solvent</p> <p>4.2 The Nature of Aqueous Solutions: Strong and Weak Electrolytes</p> <p>4.3 The Composition of Solutions</p> <p>4.4 Types of Chemical Reactions</p> <p>4.5 Precipitation Reactions</p> <p>4.6 Describing Reactions in Solution</p> <p>4.7 Stoichiometry of Precipitation Reactions</p> <p>4.8 Acid-Base Reactions</p> <p>4.9 Oxidation-Reduction Reactions</p> <p>4.10 Balancing Oxidation-Reduction Equations</p>	<p>Unit 5 - Ch. 5 Gases</p> <p>5.1 Pressure</p> <p>5.2 The Gas Laws of Boyle, Charles, and Avogadro</p> <p>5.3 The Ideal Gas Law</p> <p>5.4 Gas Stoichiometry</p> <p>5.5 Dalton's Law of Partial Pressures</p> <p>5.6 The Kinetic Molecular Theory of Gases</p> <p>5.7 Effusion and Diffusion</p> <p>5.8 Real Gases</p> <p>5.9 Chemistry in the Atmosphere</p> <p>5.10 Characteristics of Several Real Gases</p> <p>Unit 6 - Ch. 6 Thermochemistry</p> <p>6.1 The Nature of Energy</p> <p>6.2 Enthalpy and Calorimetry</p> <p>6.3 Hess's Law</p> <p>6.4 Standard Enthalpies of Formation</p> <p>6.5 Present Sources of Energy</p> <p>6.6 New Energy Sources</p> <p>Unit 7 - Ch. 16 Spontaneity, Entropy, and Free Energy</p> <p>16.1 Spontaneous Processes and Entropy</p> <p>16.2 Entropy and the Second Law of Thermodynamics</p> <p>16.3 The Effect of Temperature on Spontaneity</p> <p>16.4 Free Energy</p> <p>16.5 Entropy Changes in Chemical Reactions</p> <p>16.6 Free Energy and Chemical Reactions</p> <p>16.7 The Dependence of Free Energy on Pressure</p> <p>16.8 Free Energy and Equilibrium</p> <p>16.9 Free Energy and Work</p> <p>Unit 8 - Ch. 17 Electrochemistry</p> <p>17.1 Galvanic Cells</p> <p>17.2 Standard Reduction Potential</p> <p>17.3 Cell Potential, Electrical Work, and Free Energy</p> <p>17.4 Dependence of Cell Potential on Concentration</p> <p>17.5 Batteries</p> <p>17.6 Corrosion</p> <p>17.7 Electrolysis</p> <p>17.8 Commercial Electrolytic Processes</p>
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<p>Unit 9 - Ch. 12 Chemical Kinetics</p> <p>12.1 Reaction Rates</p> <p>12.2 Rate Laws: An Introduction</p> <p>12.3 Determining the Form of the Rate Law</p> <p>12.4 The Integrated Rate Law</p> <p>12.5 Rate Laws: A Summary</p> <p>12.6 Reaction Mechanisms</p> <p>12.7 A Model for Chemical Kinetics</p> <p>12.8 Catalysis</p> <p>Unit 10 - Ch. 13 Chemical Equilibrium</p> <p>13.1 The Equilibrium Condition</p> <p>13.2 The Equilibrium Constant</p> <p>13.3 Equilibrium Expressions Involving Pressures</p> <p>13.4 Heterogeneous Equilibria</p> <p>13.5 Applications of the Equilibrium Constant</p> <p>13.6 Solving Equilibrium Problems</p> <p>13.7 Le Chatelier's Principle</p> <p>Unit 11 - Ch. 14 Acids and Bases</p> <p>14.1 The Nature of Acids and Bases</p> <p>14.2 Acid Strength</p> <p>14.3 The pH Scale</p> <p>14.4 Calculating the pH of Strong Acid Solutions</p> <p>14.5 Calculating the pH of Weak Acid Solutions</p> <p>14.6 Bases</p> <p>14.7 Polyprotic Acids</p> <p>14.8 Acid-Base Properties of Salts</p> <p>14.9 The Effect of Structure on Acid-Base Properties</p> <p>14.10 Acid-Base Properties of Oxides</p> <p>14.11 The Lewis Acid-Base Model</p> <p>14.12 Strategy for Solving Acid-Base Problems: A Summary</p> <p>Unit 11 - Ch. 15 Applications of Aqueous Equilibria</p> <p>Acid-Base Equilibria</p> <p>15.1 Solutions of Acids or Bases Containing a Common Ion</p> <p>15.2 Buffered Solutions</p> <p>15.3 Buffer Capacity</p> <p>15.4 Titrations and pH Curves</p> <p>15.5 Acid-Base Indicators</p> <p>Solubility Equilibria</p> <p>15.6 Solubility Equilibria and the Solubility Product</p> <p>15.7 Precipitation and Qualitative Analysis</p> <p>Complex Ion Equilibria</p> <p>15.8 Equilibria Involving Complex Ions</p>	<p>Unit 12 - Ch. 7 Atomic Structure and Periodicity</p> <p>7.1 Electromagnetic Radiation</p> <p>7.2 The Nature of Matter</p> <p>7.3 The Atomic Spectrum of Hydrogen</p> <p>7.4 The Bohr Model</p> <p>7.5 The Quantum Mechanical Model of the Atom</p> <p>7.6 Quantum Numbers</p> <p>7.7 Orbital Shapes and Energies</p> <p>7.8 Electron Spin and the Pauli Principle</p> <p>7.9 Polyelectronic Atoms</p> <p>7.10 The History of the Periodic Table</p> <p>7.11 The Aufbau Principles and the Periodic Table</p> <p>7.12 Periodic Trends in Atomic Properties</p> <p>7.13 The Properties of a Group: The Alkali Metals</p> <p>Unit 13 - Ch. 8 Bonding: General Concepts</p> <p>8.1 Types of Chemical Bonds</p> <p>8.2 Electronegativity</p> <p>8.3 Bond Polarity and Dipole Moments</p> <p>8.4 Ions: Electron Configurations and Sizes</p> <p>8.5 Formation of Binary Ionic Compounds</p> <p>8.6 Partial Ionic Character of Covalent Bonds</p> <p>8.7 The Covalent Chemical Bond: A Model</p> <p>8.8 Covalent Bond Energies and Chemical Reactions</p> <p>8.9 The Localized Electron Bonding Model</p> <p>8.10 Lewis Structures</p> <p>8.11 Exceptions to the Octet Rule</p> <p>8.12 Resonance</p> <p>8.13 Molecular Structure: The VSEPR Model</p> <p>Unit 13 - Ch. 9 Covalent Bonding: Orbitals</p> <p>9.1 Hybridization and the Localized Electron Model</p> <p>9.2 The Molecular Orbital Model</p> <p>9.3 Bonding in Homonuclear Diatomic Molecules</p> <p>9.4 Bonding in Heteronuclear Diatomic Molecules</p> <p>9.5 Combining the Localized Electron and Molecular Orbital Models</p> <p>Unit 14 - Ch. 10 Liquids and Solids</p> <p>10.1 Intermolecular Forces</p> <p>10.2 The Liquid State</p> <p>10.3 An Introduction to Structures and Types of Solids</p> <p>10.4 Structure and Bonding in Metals</p> <p>10.5 Carbon and Silicon: Network Atomic Solids</p> <p>10.6 Molecular Solids</p> <p>10.7 Ionic Solids</p> <p>10.8 Vapor Pressure and Changes of State</p> <p>10.9 Phase Diagrams</p>
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Unit 15 - Ch. 11 Properties of Solutions

- 11.1 Solution Composition
- 11.2 The Energies of Solution Formation
- 11.3 Factors Affecting Solubility
- 11.4 The Vapor Pressures of Solutions
- 11.5 Boiling-Point Elevation and Freezing-Point Depression
- 11.6 Osmotic Pressure
- 11.7 Colligative Properties of Electrolyte Solutions
- 11.8 Colloids

Additional chapters/topics (time permitting)

Ch. 19 Representative Elements: Groups 1A - 4A

- 19.1 A Survey of the Representative Elements
- 19.2 The Group 1A Elements
- 19.3 Hydrogen
- 19.4 The Group 2A Elements
- 19.5 The Group 3A Elements
- 19.6 The Group 4A Elements

Ch. 20 Representative Elements: Groups 5A - 8A

- 20.1 The Group 5A Elements
- 20.2 The Chemistry of Nitrogen
- 20.3 The Chemistry of Phosphorus
- 20.4 The Group 6A Elements
- 20.5 The Chemistry of Oxygen
- 20.6 The Chemistry of Sulfur
- 20.7 The Group 7A Elements
- 20.8 The Group 8A Elements

Unit 16 - Ch. 18 The Nucleus: A Chemist's View

- 18.1 Nuclear Stability and Radioactive Decay
- 18.2 The Kinetics of Radioactive Decay
- 18.3 Nuclear Transformations
- 18.4 Detection and Uses of Radioactivity
- 18.5 Thermodynamic Stability of the Nucleus
- 18.6 Nuclear Fission and Nuclear Fusion
- 18.7 Effects of Radiation

Additional chapters/topics (time permitting)

Ch. 21 Transition Metals and Coordination Chemistry

- 21.1 The Transition Metals: A Survey
- 21.2 The First-Row Transition Metals
- 21.3 Coordination Compounds
- 21.4 Isomerism
- 21.5 Bonding in Complex Ions: The Localized Electron Model
- 21.6 The Crystal Field Model
- 21.7 The Biologic Importance of Coordination Complexes
- 21.8 Metallurgy and Iron and Steel Production

Ch. 22 Organic and Biological Molecules

- 22.1 Alkanes: Saturated Hydrocarbons
- 22.2 Alkenes and Alkynes
- 22.3 Aromatic Hydrocarbons
- 22.4 Hydrocarbon Derivatives
- 22.5 Polymers
- 22.6 Natural Polymers

AP Recommended Experiments

As stated earlier, the lab component in this course is comparable to a college-level course. Each student will complete a portfolio of labs. Listed below are the 22 recommended experiment topics from the College Board AP Chemistry Course Description. Listed with each experiment topic are several complimentary choices to meet the College Board recommendations. For each unit of study, two experiments will be performed. Labs choices will be based upon time constraints as well as student interest. Lab experiment completion times range from 1-4 class periods.

<ol style="list-style-type: none">Determination of the formula of a compound (Zumdahl Ch 2)<ol style="list-style-type: none">Hall #7-9,20Vernier #1Ward # 36 W 7016Determination of the percentage of water in a hydrate (Zumdahl Ch 3)<ol style="list-style-type: none">Hall #12Vernier #2Ward #Determination of MM by vapor density (Ch 5, 10)<ol style="list-style-type: none">Hall # 15, 16Vernier #5Ward # 09Determination of MM by freezing-point depression (Ch 11)<ol style="list-style-type: none">Hall #22-24Vernier #4Ward - # 03Determination of the molar volume of a gas (Ch 5)<ol style="list-style-type: none">Hall #13-15Vernier #5Ward #Standardization of a solution using a primary standard (Ch 14, 15)<ol style="list-style-type: none">Hall #30Vernier #6Ward # 10Determination of concentration by acid-base titration, including a weak acid (Ch 14, 15)<ol style="list-style-type: none">Hall #29Vernier #7, 19Ward #Determination of concentration by oxidation-reduction titration (Ch 4)<ol style="list-style-type: none">Hall #31Vernier #8Ward # 01Determination of mass and mole relationship in a chemical reaction (Ch 3)<ol style="list-style-type: none">Hall #10-11Vernier #9Ward # 00	<ol style="list-style-type: none">Determination of the equilibrium constant for a chemical reaction (Ch 13)<ol style="list-style-type: none">Hall #26Vernier #12, 19Ward # 05Determination of appropriate indicators for various acid-base titrations; pH determination (Ch 14, 15)<ol style="list-style-type: none">Hall #29Vernier #11Ward #Determination of the rate of a reaction & its order (Ch 12)<ol style="list-style-type: none">Hall #25, 41Vernier #12, 25Ward # 04Determination of enthalpy change associated with a reaction (Ch 6)<ol style="list-style-type: none">Hall #17Vernier #3Ward # 02Separation and qualitative analysis of cations & anions (Ch 15)<ol style="list-style-type: none">Hall #43-48Vernier #14Ward # 14Synthesis of a coordination compound and its chemical analysis (Ch 21)<ol style="list-style-type: none">Hall #35-36Vernier #15Ward #Analytical gravimetric determination (Ch 3)<ol style="list-style-type: none">Hall #34Vernier #16Ward #Colorimetric or spectrophotometric analysis<ol style="list-style-type: none">Hall #Vernier #17Ward # 13Separation by chromatography (Ch 2)<ol style="list-style-type: none">Hall #9Vernier #18Ward - # 07
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19. Preparation & properties of buffer solutions (Ch 15) <ul style="list-style-type: none"> a. Hall #28 b. Vernier #19 c. Ward # 20. Determination of electrochemical series (Ch 17) <ul style="list-style-type: none"> a. Hall #32, 33 b. Vernier #20 c. Ward # 	21. Measurements using electrochemical cells & electroplating (Ch 17) <ul style="list-style-type: none"> a. Hall # b. Vernier #21 c. Ward # 06 22. Synthesis, purification, & analysis of an organic compound (Ch 22) <ul style="list-style-type: none"> a. Hall #37-39 b. Vernier #22 c. Ward # 08, 20, 36 21
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GRADING

Each 9-weeks grade consists of a weighted accumulation of points by assignment type.

Assessment weights for quarter grade

60% - Tests

25% - Labs/Experiments

15% - HW, quizzes, notebooks, misc.

Calculating Semester grade

- **Students who earn a C or better in an AP course AND take the AP COLLEGE BOARD EXAM will NOT be required to take the END of COURSE EXAM.**

If taking AP College Board Exam - 50% for each 9-week grade.

If not taking AP College Board Exam - 40% for each 9-week grade, 20% for exam.

Grades can be viewed online through the Parent Assistant program.

CLASSROOM EXPECTATIONS

1. Students will be highly encouraged to take the AP exam.
2. A significant amount of work will need to be done by students outside of class time.
3. Bring all necessary materials to class. (**pencil**, paper, textbook, calculator, lab materials.)
4. Attendance is critical for success. It is your responsibility to determine what was missed.
5. Obtain a **separate folder** and **3-ring binder** for **AP Chemistry** paperwork **only**.
6. All assignments will be in pencil, unless typed. No assignments in pen.
7. All assignments will be on loose leaf paper, without the “torn spiral edges”.
8. A graphing calculator is highly recommended.
9. Students must have access to a computer and internet (school and/or home).
Assignments and related materials will be on the class website (www.mcsoh.org/mhs/science/Hamman/Hamman_index.html) to view. Also, some assignments will be turned in by using email (*A separate paper explains expectations*).
10. Supplemental projects will be assigned throughout the year.
11. Weekly practice AP exam questions.
12. Unit/Chapter tests in AP exam format.

LAB EXPECTATIONS

1. The labs performed in this class will complement the topic areas in the AP Chemistry Exam. These experiments are just as important as the text.
2. All students will be expected to keep a graded lab notebook.
3. Students will constantly change lab partners to experience working with different students.
4. If it is not a designated lab day, students WILL NOT be in the lab area. An experiment may be set-up for another class.
5. The students are expected to complete the pre-lab assignments. Efficient usage of the lab time as well as successful outcomes will result from the pre-lab assignments.
6. SAFETY COMES FIRST. Students will follow ALL directions for an experiment. The procedures will not be altered by the students.
7. During lab sessions the lab area may be very crowded. Be very aware of what is happening at your lab station, table and in the room.
8. Defacing of lab tables, deliberate destruction of equipment or unapproved experiments will result in severe punishment and probable removal from the class.
9. Students must bring lab goggles to class or they will receive a ‘zero’ for the lab.

CHAPTER EXPECTATIONS

1. Students will download a chapter/unit assignment page. Each page will contain several items including (but not limited to) important sections or topics, labs/experiments to be completed, and suggested homework to be assigned.
2. As stated earlier, many assignments will be turned in electronically. You will need to be able to email assignments. A separate file will have more specific information
3. Students will collect and organize a ‘Chapter notebook’ using a folder. This is where the current chapter papers should be kept and brought to class every day.
4. Students throughout the year will collect all chapter paperwork and organize them in a ‘Course notebook’ using a 3-ring binder. (*A separate paper explains expectations*).

STUDENT & PARENT/GUARDIAN ACKNOWLEDGEMENT

I, _____, have downloaded and read the AP Chemistry syllabus. I understand my responsibilities and the expectations of this course. I will abide by those expectations as well as all the rules stated in the MHS Student Handbook.

Student signature _____

Date _____

I have received my child's copy of the AP Chemistry syllabus.

Parent/Guardian signature _____

Date _____