

Advanced Placement Chemistry © 2009 – 2010 Syllabus

Introduction:

Advanced Placement Chemistry is comparable to a general chemistry course usually taken during the first year of college. This course is designed to help students attain extensive understanding of chemical principles (with an emphasis on chemical calculations and the mathematical formulation of principles), enhance students' ability to think logically and express their ideas clearly, and to deepen students' experience in the chemistry laboratory. In order to take AP Chemistry, a student MUST have completed one unit of honors chemistry. The first eleven chapters of the AP Chemistry textbook used for this course contain topics normally covered in the honors chemistry course. These topics will be discussed rather quickly. It is also required that a student has completed Algebra II.

Textbook:

Brown, Theodore L. et al, *Chemistry: The Central Science*, 11th edition, 2009, Prentice-Hall, (The cost of replacement for this book is \$120.97)

Masterton and Hurley, *Chemistry: Principles and Reactions*, 5th edition, 2006, Thomson, Brooks, & Cole (The cost of replacement for this book is \$87.00)

Additional Supplies:

In addition to your textbook, bring the following items to class every day: notebook or binder for class notes, pencil, pen (blue or black ink), scientific calculator, and a hard bound (composition style) notebook for labs.

Grading:

The categories and percentages for determining your final grade are as follows:

Tests (60%) – Unit tests will usually cover more than one chapter in the book. The test date for a given unit will be announced on the first day of instruction for that unit. Tests will contain both multiple choice and free response items similar to the AP Exam given by The College Board.

Laboratory (20%) – During this course you will complete at least sixteen laboratory experiments, spending no less than one 90 minute period per week in lab. You are expected to keep an accurate record, in your lab notebook, of all work that you do in lab. In addition, you will be asked to write full laboratory reports on selected labs. Should you be absent on the day of a lab, you are expected to make arrangements to make up the lab.

Daily Grades (10%) – Daily grades include class work, homework, and quizzes. Homework exercises and practice problems will be assigned at the beginning of the unit. It is the students' responsibility to keep up with those assignments. Quizzes may or may not be announced.

Final Exam (10%) – The final exam will be cumulative and will include both multiple choice and free response items similar to the AP Exam given by The College Board.

** Letter grades will be assigned in accordance with Cobb County policy: 90-100 = A; 80-89 = B; 74-79 = C, 70-73 = D; below 70 = F

Topic Outline:

- I. Chemical Foundations
 - A. Measurement, Significant figures, Dimensional Analysis, Classifying Matter
 - B. Atoms, Ions, Molecules, and Formula Units; Nomenclature of simple compounds
- II. Atomic Structure and Periodicity
 - A. The Bohr Model and the Quantum Mechanical Model
 - B. Electron Configurations
 - C. Periodic Trends
 - D. Nuclear Chemistry
- III. Bonding
 - A. Covalent Bonding – Lewis Dot Structures, VSEPR Theory, nomenclature of organic compounds
 - B. Ionic Bonding
 - C. Hybridization and Localized Electron Model
 - D. Molecular Orbital Model
- IV. Chemical Reactions
 - A. Classes of Chemical Reactions
 - B. Net Ionic Equations
 - C. Stoichiometry
- V. Gases
 - A. Ideal Gas Law
 - B. Boyle's Charles's, Avogadro's and Dalton's Laws
 - C. Graham's Law of Effusion
 - D. Real Gases
- VI. Solids, Liquids and Solutions
 - A. Properties of Liquids and Solids
 - B. Properties of Solutions – Colligative Properties
- VII. Chemical Kinetics
 - A. Differential Rate Laws
 - B. Integrated Rate Laws
 - C. Reaction Mechanisms
 - D. Collision Theory
- VIII. Chemical Equilibrium
 - A. General Equilibrium Conditions
 - B. Acid / Base Equilibria
 - C. Applications of Aqueous Equilibria – buffers, titrations, and solubility equilibria
- IX. Thermodynamics
 - A. Calorimetry
 - B. Calculating Enthalpy – standard enthalpies of formation, bond dissociation energies, Hess's Law
 - C. Entropy, Free Energy, and Spontaneity
- X. Electrochemistry
 - A. Standard Reduction Potentials
 - B. The Nernst Equation
 - C. Writing and Balancing Redox reactions in acidic or basic solution

Laboratories:

- I. Paper Chromatography of Indicators
- II. Atomic Emission Spectroscopy (Spectral Tubes and Flame Tests)
- III. VSEPR / Molecular Models
- IV. Double Replacement Reactions
- V. Copper to Copper Stoichiometry
- VI. Formula of a Hydrate
- VII. Molecular Weight of a Volatile Liquid
- VIII. Graham's Law of Effusion
- IX. Colorimetric Analysis / Beer's Law
- X. Colligative Properties
- XI. Acid Catalyzed Iodination of Acetone
- XII. Relating Equilibrium, pH, and K_{sp}
- XIII. Hydrolysis of Salts
- XIV. Standardization of NaOH with KHP
- XV. Hess's Law
- XVI. Electrochemical Cells

The AP Exam:

The AP exam is a cumulative assessment that will be administered in May. It is an important part of the AP program, thus each student that completes this course is expected to take the exam. The exam will contain multiple choice and free response questions. The free response portion of the test will contain a combination of essay or problem solving items. Each unit test that you will take during this course will be modeled after the AP exam. Beginning in April, I will schedule review sessions to go over items from previous administrations of the AP exam. These review sessions will be outside of class time; however I will provide advanced notice so you may make plans to attend.