

Class Title: ADVANCED PLACEMENT CHEMISTRY

Teacher's Name: Mr. Hortert

Room Number: D-4

Planning Pd: A-days pd.5, B-days pd 5, C-days pd 3 Phone #: 410-943-4511 ext: 1563

Email: hortertd@dcpsmd.org

Class Length: 60-120 minutes

TEXTBOOK: Zumdahl, Steven. *Chemistry*. 9th ed.
SUPPLEMENTARY TEXT: Brown, Theodore. *Chemistry: The Central Science*, 2006, A.P. ed.
LABORATORY MANUAL: Hall, James. *Experimental Chemistry*. 7th ed.
LAB RESOURCES: Vernier CBL and associated probeware
TI-83 Silver graphing calculators
Graphical Analysis software
Holmquist, Dan. *Chemistry with Calculators*. 3rd ed.
ONLINE STUDY CENTER: college.hmco.com/pic/zumdahl7e

PREREQUISITES: Algebra I and Algebra II and Honors Chemistry I.

COURSE DESCRIPTION: Advanced Placement Chemistry is an intense course offered for advanced students who wish to pursue a program of post-secondary study. Students will have the opportunity to take the Advanced Placement Examination in chemistry. The course provides the principles of chemistry through a program of theory, experimentation, and problem solving. The course emphasizes chemical calculations and the mathematical formulation of principles. A.P. Chemistry meets 5 days per week for 60-120 minutes depending on the rotating schedule. Laboratories average one per week and provide hands-on experience. Students will communicate their results in written laboratory reports. A major unit test will follow each unit and students are required to take the AP chemistry exam at the conclusion of the course.

COURSE OUTLINE: **SEQUENCING OF THE FOLLOWING UNITS MAY VARY**

Unit 1: Chemical Foundations: dimensional analysis, uncertainty, significant figures

Unit 2: Atoms, Molecules, and Ions: formula writing, oxidation states, nomenclature, atomic theory

Unit 3: Stoichiometry: mole, atomic weight, molecular formula, balancing equations, limiting reactants, empirical formulas, percent composition, percent yield, and solution stoichiometry

Unit 4: Atomic Structure and Periodicity: atomic spectra, Bohr atom, quantum numbers, atomic orbitals, electron configurations, periodic table, trends in the periodic table

Unit 5: Chemical Bonding: Lewis structures, ionic bonding, bond polarity, octet rule and its exceptions, resonance, VSEPR model, and hybridization

Unit 6: Types of Chemical Reactions and Solution Stoichiometry: aqueous solutions, electrolytes and nonelectrolytes, molarity, types of chemical reactions: precipitation reactions, acid and base reactions, redox reactions

Unit 7: Gases: pressure, the gas laws of Boyle, Charles, and Avogadro, the ideal gas law, gas stoichiometry, Dalton's law of partial pressure, the kinetic molecular theory of gases, effusion and diffusion, real gases and their characteristics

Unit 8: Thermochemistry: the nature of energy, enthalpy and calorimetry, Hess' law, heats of formation, bond energies, heats of reactions; endothermic and exothermic reactions, laws of thermodynamics, heating curves, entropy, Gibbs free energy

Unit 9: Liquids and Solids: intermolecular forces, properties of liquids, structure and types of solids, changes in state

Unit 10: Chemical Kinetics and Chemical Equilibrium: reaction kinetics, rate law expressions, order of reactions, rate constants, activation energy, catalysts, reaction mechanisms, law of mass action, equilibrium expressions, calculations of K and equilibrium concentrations, Le Chatelier's principle, and factors that affect equilibrium

Unit 11: Acids and Bases: pH; K_a , K_b , and K_w expressions; titrations; degree of ionization; indicators; equivalence points; Arrhenius, Bronsted-Lowry, and Lewis acid theories

Unit 12: Electrochemistry: Oxidation and reduction half cells and equations, electrochemical (voltaic) cells, standard voltages, Nernst equation, Faraday's laws

Grading Scale

90%-100%=A,
80%-89%=B,
70%-79%=C,
60%-69%=D,
less than 60% =E