AP CHEMISTRY SYLLABUS

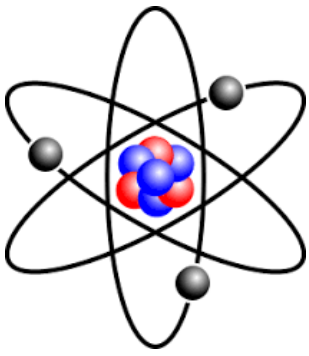
Advanced Placement (AP) Chemistry is a second year, doubled block course (2 hours per day) that is designed to be the equivalent of an introductory college-level course. In AP Chemistry, study focuses on matter, interactions of matter, and energy of matter. Some topics included are thermochemistry, chemical bonding, kinetics, equilibrium, and electrochemistry. Laboratory investigation is an integral part of the course. This course prepares students to take the Chemistry Advanced Placement exam.

Foundations of Chemical Reactions (30 Days)

Students will be introduced to the scientific method and the fundamentals of scientific experiment and analysis. They will learn basic laboratory techniques to prepare them for the intensive hands-on labs that are a requirement of an Advanced Placement science course. The students will be taught the underlying structure of matter, chemical and physical changes, and the nature and classification of chemical reactions. Students will be asked to draw and interpret particulate representations of matter and to think about chemistry at a molecular level. Particular emphasis will be placed on SI (Système International) units, stoichiometric chemical equations, and the mole as a fundamental unit of measurement. The importance of the periodic table as a tool for guidance will be stressed. The importance of aqueous reactions in industry and biology will be covered.

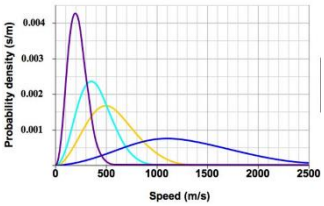
Driving Forces - Thermochemistry & Electrochemistry (19 days)

This will be the student's first exposure to the underlying thermodynamics of chemical reactions. They will study heats of reaction, calorimetry in various forms and the role of entropy in determining what makes some reactions spontaneous or thermodynamically favorable. The manipulation of reactions by changing conditions is discussed at a fundamental level which lends itself to applications in industry and medicine. The construction of electrochemical cells (batteries), the interaction of matter and electricity, and their chemistry is introduced at the end of this unit together with electrolytic cells used for electroplating and the refining of metallic ores.



Interactions of Particles – Atomic Structure, Periodicity, Bonding and IMFs (44 days)

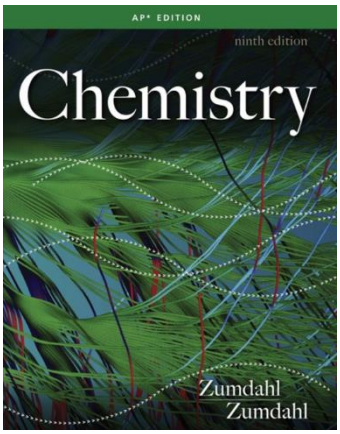
This unit expands on the basic knowledge of the underlying structure of matter from fundamentals. Building from a simple Bohr model of the atom, the students are introduced to the Quantum Mechanical wave model and the electron cloud structure of atoms. The interactions of the nuclei and electron clouds through coulombic attractions and repulsions are used to explain the periodicity of properties as noted from the periodic table and also to explain the formation of compounds from their constituent elements. They are also used to explain the properties and structure of the three phases; solid, liquid and gas. This knowledge is then tied back to Thermochemistry and Electrochemistry from the prior unit.



Kinetics (8 days)

This unit looks at the rates of reactions and the factors that influence rate. Kinetics of reactions can only be determined by experiment and this is used to determine multi-step reaction mechanisms. The role of reactant concentrations and the effect of catalysts are analyzed in addition to the impact of physical changes such as temperature and pressure. The underlying concept of Kinetic Molecular Theory is used to explain the above factors.

Equilibria-General Equilibrium, Acid Base Equilibrium, Titrations and Buffers (38 days)
This unit introduces students to the concept of equilibria (virtually all reactions are reversible to some degree) and the fact that this is a dynamic process that results in the lowest possible energy level. Students will calculate equilibria conditions for a variety of reaction types – general, acid/base, buffer, solubility, and reduction / oxidation (redox). They will be taught how to construct buffers and their importance in medicine and biological systems. The reaction of systems at equilibrium under stress at the conceptual level and the use of this knowledge in industry to influence reactions will be analyzed.



Course Textbook
We will be using the ninth (9th) edition of Zumdahl's AP Edition Chemistry textbook. Students will be given a copy for use at home and they will also have access to an electronic version online from any location. In general, this is an excellent text and covers all the curriculum essential for the AP Chemistry exam. It is also an excellent source for additional problems with the ability to check several answers. It also has tables of fundamental constants and properties that will be needed for the course. Some questions from Zumdahl may be assigned for homework but we will also make use of the University of Texas at Austin "Quest Learning & Assessment System" (https://quest.cns.utexas.edu/). Students will be required to create a student user ID for the system and can then access the system online from anywhere.