Advanced Placement Chemistry Course Outline
2015-16

The AP Chemistry course provides students with a college-level foundation in chemistry together with the development of strong science practices. Students deepen their understanding of chemistry and hone their lab skills through hands-on labs and inquiry-based investigations. The AP course content is organized around six Big Ideas (listed below).

Textbook: *Chemistry the Central Science* by Brown & Lemay, 11th edition.

Chapters 1,2 Introduction/Chemistry Basics
Chapter 3 Stoichiometry: Calculations with Chemical Formulas and Equations
- Lab Activity - 17 Stations Activity
- Lab Activity - Relative Mass Puzzle

Chapter 4 Aqueous Reactions and Solution Stoichiometry
- Lab #1: Separation and Qualitative Determination of Cations and Anions
- Lab (optional): Gravimetric Analysis of a Metal Carbonate
- Lab #2: Determination of the Concentration of a Copper(II) Sulfate Solution Unknown
  - Pre-Lab: **Beer's Law Pre-lab and Excel Workshop**
- Lab #3: Analysis of Food Dyes in Beverages

Chapter 5 Thermochemistry
Chapter 19 Chemical Thermodynamics
- Lab #4: Designing a Hand Warmer

Chapter 10 Gases
- Lab #5: Determination of Molar Mass of Volatile Liquids
- Lab #6: Separation of a Dye Mixture Using Chromatography

Chapter 11 Intermolecular Forces, Liquids, and Solids
Chapter 13 Properties of Solutions (omit colligative properties)

Chapter 14 Chemical Kinetics
- Lab Activity: Kinetics Computer Lab
- Lab #7: Kinetics of Crystal Violet Fading

Chapter 15 Chemical Equilibrium
- Lab #8: The Determination of Keq for FeSCN2+
- Lab #9: Applications of LeChatelier's Principle

Chapter 16 Acid-Base Equilibria
Chapter 17 Additional Aspects of Aqueous Equilibria
Lab #10: Acid-Base Titrations
Lab #11: Preparation of Buffer Solutions
Lab #12: Properties of Buffer Solutions (inquiry lab)

Chapter 20 Electrochemistry
Lab #13: Measurements Using Electrochemical Cells

Chapter 6 Electronic Structures of Atoms
Chapter 7 Periodic Properties of Elements
Chapter 8 Basic Concepts of Chemical Bonding
Chapter 9 Molecular Geometry and Bonding Theories
Lab #14: Molecular Geometry (Dry-Lab)

Review/Practice Exam (2 weeks)
AP Exam--Monday, May 2, 8:00 a.m.

Big Ideas

- The chemical elements are the building blocks of matter, which can be understood in terms of the arrangements of atoms.
- Chemical and physical properties of materials can be explained by the structure and the arrangement of atoms, ions, or molecules and the forces between them.
- Changes in matter involve the rearrangement and/or reorganization of atoms and/or the transfer of electrons.
- Rates of chemical reactions are determined by details of the molecular collisions.
- The laws of thermodynamics describe the essential role of energy and explain and predict the direction of changes in matter.
- Bonds or attractions that can be formed can be broken. These two processes are in constant competition, sensitive to initial conditions and external forces or changes.

Course Description

Advanced Placement Chemistry is a full year college-level course for students who intend on taking the AP Chemistry exam. AP Chemistry has been approved by the College Board and is equivalent to a first year college chemistry course. AP Chemistry follows College Board standards for Advanced Placement courses, and focuses on inorganic chemistry with the emphasis on quantitative relationships. Students are expected to spend significant time studying outside of the classroom, working collaboratively in small groups, and performing laboratory work. AP Chemistry aims to provide students with the framework, factual knowledge, and analytical skills necessary to deal critically with theoretical aspects of chemistry. Laboratory work is a required component of this course.

Course Objectives

- Students will develop advanced inquiry and reasoning skills.
- Students will be able to provide logical and reasonable explanations for complex scientific problems and phenomena in chemistry.
- Students will perform college-level, inquiry-based laboratories in chemistry.
- Students will gain exposure to college-level chemistry curriculum and opportunities.
- Students will take the Advanced Placement Chemistry Exam in May.