

Advanced Placement Chemistry

Credit – 1
Term(s) – 1 Year

Text: *Ebbing, Darrell, D and Gammon, Steven D. General Chemistry. Boston: Houghton Mifflin, 2009.*

Prerequisites:

Biology and Chemistry-Honors (combined B average), Math through Algebra II Standard, Physics is strongly recommended.

Course Description:

Advanced Placement Chemistry is a study of fundamental chemistry principles, including atomic structure, chemical bonding, kinetic theory, chemical kinetics, thermodynamics, solutions, electrochemistry, nuclear chemistry and equilibrium. Recommended for pre-professional, engineering and related science and medicine majors. This class can be taken for either advanced placement or dual credit. Students will have a similar college classroom experience to prepare the students for the next steps they will take in college. Students will learn through teacher lead discussions as well as laboratory inquiry experiences throughout the year. The course is structured around the enduring understandings within the six big ideas described in the AP Chemistry Curriculum Framework.

Course Content:

Advanced Chemistry starts with an overview of the nature of science, scientific method, and basic review of honors chemistry. Atomic structure is followed by stoichiometric analysis of compounds in chemical reactions. Types of chemical reactions follow with solution stoichiometry. Gases are studied along with thermochemistry and electron configuration. General concepts of bonding follow. The semester ends with a study of the properties of liquids and solids and properties of solutions. Second semester starts with chemical kinetics and equilibrium including acids and bases equilibria. Next there is a discussion of thermodynamics and electrochemistry. The course ends with nuclear chemistry, organic and biochemistry.

Course Format:

Each unit/topic will be presented with a variety of learning opportunities. These include, but are not limited to, inquiry-type labs, hands-on activities, discussion, lecture, video and electronic enhancement.

Course Expectations:

It is expected that each student comes to class prepared. Preparation includes completion of any homework assigned, reading of relevant sections/chapters of the text and identification of questions to help with clarification of previous materials. This is an advanced course in which the instructor has high expectations for each student enrolled. First semester there will be a zero hour lab on Wednesdays that begins at 7 am.

Grades:

Each quarter, grades will be determined according to the following percentages:

Homework/Quizzes/Online Quizzes	15%
Exams	55%
Labs	30%

First semester, grades will be determined according to the following

percentages: First Quarter 40%

Second Quarter 40%

Semester Final Exam 20%

Second semester, there is no final exam, so the grade percentages are:

Third Quarter 40%

Fourth Quarter 60%

Course objectives:

In addition to these Morton School District 709 Objectives for Advanced chemistry, objectives for each unit will be posted at the instructor's website:

ADVANCED CHEMISTRY DISTRICT 709 OBJECTIVES

STATE GOAL FOR LEARNING ELEVEN

District Objectives

MASTER

11A.601 Evaluate data from experiments using graphs and other appropriate analytical tools at grade appropriate level

11A.602 Apply problem-solving skills to scientific situations at grade appropriate level

11A.501 Demonstrate appropriate laboratory skills and equipment usage, applying accepted practices at grade appropriate level

11A.502 Demonstrate the use of appropriate scientific tools to measure accurately using the metric system at grade appropriate level

11A.603 Conduct research on science topics using a variety of accepted sources at grade appropriate level

11A.604 Communicate scientific understandings effectively in written and oral presentations at grade appropriate level

11A.701 Conduct an appropriate controlled scientific investigation at grade appropriate level

11A.901 Differentiate between a scientific theory, hypothesis, opinion and fact

11A.902 Demonstrate an understanding of science as an ongoing process open to the collection of new data and the reevaluation of existing data by critically analyzing scientific theories for supporting and non-supporting evidence or by explaining how theories are formulated, accepted, rejected, and changed over time at grade appropriate level

11B.903 Design and conduct a controlled scientific investigation at grade appropriate level

STATE GOAL FOR LEARNING TWELVE

District Objectives

INTRODUCE/DEVELOP/MASTER

Measurements and Calculations

12C.971 Use the metric system by recognizing SI units and memorizing the common prefixes associated with them

12C.972 Solve problems using dimensional analysis and exponential form

12C.973 Recognize and use significant figures to express measured quantities and the results of calculations involving them

12C.974 Utilize the mole concept in conversions with atoms, molecules, and grams

12C.975 Utilize the mole concept to perform calculations based on equations

12C.976 Solve problems involving the behavior of gases based on the kinetic theory model

The Language of Chemistry

12C.977 Predict common oxidation numbers for atoms and write appropriate formulas/names for compounds

12C.978 Write balanced chemical equations

12C.979 Calculate equilibrium constants and determine concentrations of reactants and products when given data for a system at equilibrium

12C.980 Determine the qualitative and quantitative effect on an equilibrium caused by changing concentration, pressure, or temperature

12C.981 Solve problems for special equilibrium situations involving: (a) electrolytes (b) ionization constant expression for water (c) saturated solutions

12C.982 Balance redox equations using the half-reaction method and the oxidation number method

Atomic Theory

12C.983 Identify scientists and their contribution to atomic theory

12C.984 Relate the frequency, wavelength, and energy of radiation

12C.985 Predict the electron configuration of a given element and describe electrons in terms of the four quantum numbers

12C.986 Describe atoms in terms of (a) nuclear structure and (b) Lewis structures

Periodic Properties of the Elements

12C.987 Predict and explain the change in size in the formation of cations and anions

12C.988 Predict and explain trends within a period or group for: (a) covalent radius (b) ionization energy (c) electron affinity (d) metallic character (e) electronegativity

12C.989 Identify chemical and physical properties of metals and nonmetals and relate to placement on the periodic table

12C.990 Name oxyacids and their salts on the basis of their placement on the periodic table

Electrostatic Repulsions and Molecular Structure

12C.991 Explain structure on the basis of the VSEPR theory

12C.992 Utilize Lewis structures to help describe shapes

12C.993 Identify polar molecules on the basis of electronegativities and symmetry

12C.994 Describe the manner in which orbitals combine in terms of sigma and pi bonds

Chemical Bonding

12C.962 Utilize electronegativity trends to predict bond types.

12C.995 Describe the different types of van der Waals forces.

12C.996 Relate intermolecular forces to vapor pressure, boiling point, and melting point.

12C.997 List the types of crystalline solids, describe the structure of each and the properties that result.

12C.998 Utilize the concept of a space lattice and a unit cell to describe the arrangement in solids.

Qualitative Analysis

12C.999 Follow procedure given using known solutions.

12C.900 Successfully plan, explain, complete, and report on the chemical analysis to determine the identities of ions in a series of unknown solutions.

STATE GOAL FOR LEARNING THIRTEEN

District Objectives

MASTER

13A.904 Demonstrate an understanding of ethical decision making in the sciences at grade appropriate level

13A.905 Demonstrate an understanding of the proper development and use of scientific information at grade appropriate level

13B.702 Demonstrate an understanding of the relationship between science and technology at grade appropriate level

13B.703 Demonstrate an understanding of the impact of science on our society at grade appropriate level