



School District of Marshfield **Course Syllabus**

Course Name: AP Chemistry

Length of Course: Year

Credits: 1

PREREQUISITES: Chemistry Honors (118) or Chemistry (116) with instructor's consent, Advanced Algebra Regular (207) or Advanced Algebra Honors (208) and Honors Course Application.

Course Description:

The AP Chemistry course is designed to be the equivalent of the general chemistry course usually taken during the first college year. For some students this course enables them to undertake, as freshmen, second-year work in the chemistry sequence at their institution or to register in courses in other fields where general chemistry is a prerequisite. For others the AP Chemistry course fulfills the laboratory science requirement and frees time for other courses. Topics include the structure of matter, kinetic theory of matter, chemical equilibria, chemical kinetics and thermodynamics.

Emphasis is on problem solving on paper and in the laboratory.

NOTE: Concurrent enrollment in Pre-Calculus or Calculus is recommended.

REQUIREMENTS: This course moves quickly, requires nightly homework, and time outside of the scheduled class to complete labs and ask questions. Some colleges award up to 10 college credits for a "5" on the AP Chemistry exam.

Learning Targets:

- Collect and analyze data
- Describe and classify matter
 - Physical / Chemical properties / changes
 - Classification of Matter: Mixture (solution, colloid, suspension), pure substance (element: metal, nonmetal, metalloid, compound)
 - Experience the diversity of matter in regards to metals / nonmetals, ionic and covalent compounds, polar and nonpolar molecules, solutions, acids and bases, organic and inorganic compounds

- Understand the atomic theory: organization of the atom and periodic table; how the theory predicts chemical bonding behavior and properties of substances; historical development
- Understand and apply the mole concept to stoichiometric calculations
- Explain changes in matter and energy in terms of types of reactions, net ionic equations, solution chemistry, thermodynamics, kinetic molecular theory, equilibrium, nuclear reactions, simple organic reactions
- Understand the rules scientists use: SI measurement; significant digits; tabulation of numbers, graphing; naming and formula writing-organic and inorganic; scientific method; analysis of data
- Understand the contribution to chemistry of relevant scientists

First Quarter – 9 weeks

1. Review of 1st Year Chemistry – 2 weeks
 - A. Introduction to matter
 - B. Atoms, molecules, ions,
 - C. Stoichiometry
2. Aqueous Reactions – 3 weeks
 - A. Net ionic equations
 - B. Redox equations
 - C. Solution stoichiometry
3. Thermochemistry and Gases – 4 weeks
 - A. Calorimetry and Hess's law
 - B. Bond energy and enthalpy
 - C. Ideal gas law
 - D. Gas stoichiometry

Second Quarter – 9 weeks

4. Chemical Kinetics – 3 weeks
 - A. Reaction rates and rate laws
 - B. Collision theory
 - C. Reaction Mechanisms
5. Equilibrium – 6 weeks
 - A. Equilibrium calculations and Beer's law
 - B. Le Chatelier's principle
 - C. Equilibrium constant
 - D. Acids and bases
 - E. Common ion and buffers
 - F. Titrations
 - G. Solubility constant

Third Quarter – 9 weeks

6. Chemical Thermodynamics and Electrochemistry – 3 weeks

- A. Entropy and free energy
- B. Voltaic cells and standard voltages
- C. Nerst equation

7. Atomic Structure – 3 weeks

- A. Electron configurations and quantum numbers
- B. Periodicity and activity series
- C. Lewis structures and molecular geometry
- D. Hybridization

8. Intermolecular Forces and States of Matter – 3 weeks

- A. Solids and liquids
- B. Concentrations of solutions
- C. Colligative properties
- D. Intermolecular forces

Fourth Quarter

9. Review for AP Exam – 5 weeks

- A. Complex ions
- B. Nuclear chemistry
- C. Atomic structure
- D. Organic chemistry
- E. Equilibrium and kinetics
- F. Practice problems, sample questions, tests

10. Post AP Activities – 4 weeks

- A. Demonstrations – practice and performances
- B. School forest counselors

Required Core Resources:

- *Chemistry, The Central Science, Twelfth Edition, AP Edition*
Authors: Theodore L. Brown, H. Eugene LeMay, Jr., and Bruce E. Bursten, Publisher: Pearson / Prentice Hall Copyright: 2010
- *Chemistry, The Central Science, Solutions to Red Exercises*, Authors: Theodore L. Brown, H. Eugene LeMay, Jr., and Bruce E. Bursten, Publisher: Pearson / Prentice Hall Copyright: 2010
- *Laboratory Experiments for Advanced Placement Chemistry, 2nd Edition*, By: Sally Ann Vanderbrink, PhD, Publisher: Flinn Scientific, Inc, Copyright: 2006
- *The Ultimate Chemical Equations Handbook, Student 2nd Edition* By: George R. Hague. Jr, and Jane D. Smith, Publisher: Flinn Scientific, Inc, Copyright: 2010
- (UCEH on syllabus)