

[The course syllabus is adapted from Syllabus 2, by Karen Campbell, in the College Board "Teachers' Guide to AP Chemistry."]

### **COURSE DESIGN**

This course is taught with three goals in mind: [1] students will practice and successfully sit for the AP Chemistry Exam in May, [2] students will learn more chemistry than they did in their first-year course and build their understanding of chemical concepts, especially mathematically, and [3] students will successfully compete at the annual State Chemistry Competition at URI in late May. Wherever possible, the guidelines and advice of the College Board will be followed.

AP Chemistry meets one period in each three-period cycle, plus the Advisory period. This means the class meets an average of 3 hours per week PLUS one two-hour lab. Your advisory period will be AP Chemistry, and for the most part will not be available for other activities. If you have signed up for two AP Sciences your teachers will work out how to divide your time.

### **CLASS EXPECTATIONS**

The student is expected to be on time and present in class every period of every day that this class meets. S/he is responsible for missed notes and assignments through their own sources. After-school help is available for students with no unexcused class time, or by written request for appointment after illness. Students should bring their own textbook, notebook, pencil, and scientific calculator to class every day. Students should work honestly and diligently on homework assignments, and expect to spend approximately 5-7 hours of independent study per week.

### **MATHEMATICS**

Many of the topics studied in AP Chemistry require fluency in mathematics and arithmetic. Students should be familiar with basic algebra, linear equations, exponents, logarithms (natural and base 10), geometry and graphing. These topics are reviewed in Appendix A of the textbook. A scientific or graphing calculator is recommended. Calculators will not be supplied.

### **GRADING**

Homework will be assigned but not collected. The student is expected to complete the homework in a timely manner, check their work, and ask questions during classroom reviews. Exam questions will be taken from these problems and released AP Exams. In keeping with the philosophy that AP Chemistry is a college-level class taken in high school, make-up tests will not be offered.

Concept Grades will be calculated by averaging all assignment grades within the concept; Term Grades will be the average of completed concepts. Graded assignments include (but are not limited to):

- **Tests**, consisting as much as possible of questions from released AP exams. See below.
- **Labs**, formal write-ups of in-class laboratory work. These will often be written collectively with your group or partner.
- **Analyses**, which are focused questions about a given lab. These may be error analyses, or calculations based on provided data. These will be individually written and graded, and are similar to a college "lab quiz."
- **Other**, which may include short research papers, research projects, short story analyses, procedural writing, or other assignments that may develop during the course of the class. Especially important in this category are MHS Portfolio Tasks.

### **HONOR CODE**

Students are expected to earn all grades honestly. Work that is not completed honestly will be given a grade of zero and will not be available for revision. This includes (but is not limited to) receiving *or giving* information through any means during a test or a quiz, and plagiarism and copying (including homework). Working together is encouraged, but you are reminded to discuss together *then* write independently. This description is in addition to any Honor Code described in the Student Handbook.

## LABORATORY

AP Chemistry includes a number of laboratory investigations that will be completed during school hours. You are expected to follow all procedural and safety instructions diligently. ANY unauthorized experiments or unsafe behavior will result in assignment of an x-period and possible disciplinary referral.

**Laboratory Reports** should include the following elements, whether written in your notebook or passed in as a stand-alone assignment:

1. A **heading** section, to tell the reader what experiment was performed, who performed it, who they worked with, and when the investigation took place. For reports remaining in your notebook, much of this will be on the cover.
2. A description of the **purpose or hypothesis**, depending on the nature of the investigation.
3. A **procedure** or reference to a procedure (don't write it out if you didn't write it yourself). If you do write it out, it should be a numbered list (like this one) of what you actually did.
4. A **data & observations** section. Data should be recorded with proper descriptions, significant figures, and labels, according to the rules listed *here*. [Link will be listed on syllabus].
5. An **analysis** section, which would vary from lab to lab. This may be calculations and results, or an essay, or a series of questions.

In some cases, the lab will be written up in your notebook but just one section will be collected and graded.

## "YOUNG SCIENTISTS IN RESIDENCE"

Once or twice during the year we will spend a day at the Gaudet School, teaching some basic concepts of chemistry to seventh grade students. It will (a) a lot of fun (b) some kind of portfolio task and (c) mandatory. The details of this program will be developed during the school year.

## TEXT & WEB RESOURCES

Brown, Theodore L., et al. *Chemistry: The Central Science*. 8th ed, Prentice Hall.

- Accompanying lab manuals and student study guides will be issued.
- [http://wps.prenhall.com/esm\\_brown\\_chemistry\\_8e/](http://wps.prenhall.com/esm_brown_chemistry_8e/)

The College Board      [www.collegeboard.com/homepage/?student](http://www.collegeboard.com/homepage/?student)

My web page              [www.zahm.org/ap](http://www.zahm.org/ap)

My e-mail                 [kzahm@mpsri.net](mailto:kzahm@mpsri.net)

## COURSE TIMELINE

### SUMMER BEFORE SCHOOL (six weeks)

#### Chapter 1 and Chapter 2: Introduction to Atoms, Molecules, and Ions

Basic concepts of measurement, atomic structure, the periodic table, and nomenclature.

Lab: Paper Chromatography [AP List #18]

Lab: Determination of the Formula of A Compound [AP List #01]

Lab: Determination of Percentage of Water in a Hydrate [AP List #02]

Note: labs will be during the school year, but these are the ones associated)

### QUARTER ONE (nine weeks)

#### Chapter 3: Stoichiometry

The mole concept, empirical and molecular formulas, and calculations based on balanced equations.

Test: Chapters 1-3

#### Chapter 4: Solutions

Properties of solutions, simple solution chemistry, acid-base, redox, and precipitation reactions.

Lab: Determination of Mass/Mole Relationships (Ag/Cu RedOx) [AP List #09]

Lab: Determination of Concentration by RedOx Titration [AP List #08]

Lab: Qualitative Analysis of Ions [AP List #14]

Lab: Analytical Gravimetric Determination [AP List #16]

Lab: Determination of an Electrochemical Series [AP List #20]

Test: Chapter 4

#### Chapter 5: Energy Relationships in Chemical Reactions

Endothermic and exothermic reactions, enthalpies of reaction, and Hess's Law.

Lab: Determination of Enthalpy Change for a Reaction [AP List #13]

Test: Chapter 5

#### Chapter 6 and Chapter 7: Electronic Structure of the Atom and Periodic Properties of the Elements

The quantum theory, behavior of electromagnetic waves, and periodic table trends.

Lab: Spectrophotometric Determination of Iron [AP List #17]

Lab: Diffraction Grating Calibration

Lab: Analysis of Hydrogen Spectrum (Young's Experiment)

Test: Chapters 6-7

### QUARTER TWO (nine weeks)

#### Chapter 8 and Chapter 9: Bonding and Molecular Geometry

Basic bonding, Lewis structures, resonance structures, polarity of molecules, molecular geometry, and molecular orbital theory.

Test: Chapters 8-9

#### Chapter 25: Organic Chemistry

Structures, nomenclature, basic functional groups, and common hydrocarbons.

Lab: Synthesis of an Ester [AP List #22]

#### Chapter 10: Gases

Gas laws and kinetic molecular theory.

Lab: Finding the Molar Mass by Vapor Density [AP List #03]

Lab: Determination of the Molar Volume of a Gas [AP List #05]

Lab: Determination of R

Test: Chapter 10

### Chapter 11: Intermolecular Attractive Forces

The types of attractive forces between molecules, phase diagrams, and changes of state.

Lab: Determination of the Size of a Molecule

### Chapter 13: Properties of Solutions

The solution process, methods of expressing concentration, and colligative properties.

Lab: Molecular Mass by Freezing Point Depression [AP List # 04] (or)

Lab: Molecular Mass by Boiling Point Elevation [AP List # 04] (or)

Lab: Identification of a Solvent by Determination of  $k_f$

Test: Chapters 11-13

### QUARTER THREE (nine weeks)

#### Chapter 14: Kinetics

Rates of reaction, rate laws, and reaction mechanisms.

Lab: Determination of a Rate Law [AP List #12]

Test: Chapter 14

#### Chapter 15: Chemical Equilibrium

The essentials of equilibrium and Le Chatlier's Principle.

Lab: Determination of an Equilibrium Constant [AP List #10]

Test: Chapter 15

#### Chapter 16 and Chapter 17: Acid-Base and Other Aspects of Equilibrium

Weak acids, weak bases, and pH. Also, titration curves, buffers, solubility product constants, and the common ion effect.

Lab: Standardization of a Base [AP List #06]

Lab: Titration of a Strong Acid with a Strong [Standardized] Base [AP List #07]

Lab: Titration of a Weak Acid with a Strong Base [AP List #07]

Lab: Preparation and Properties of a Buffer Solution [AP List #19]

Lab: Determination of Appropriate Indicators for Titration [AP List #11]

Lab: Identification of a Diprotic Acid by Titration

Test: Chapters 16-17

### QUARTER FOUR (six-nine weeks)

#### Chapter 19: Thermodynamics

Entropy and Gibbs free energy.

#### Chapter 20: Electrochemistry

Balancing of RedOx reactions, cell  $emf$ , electrolysis, and the Nernst Equation.

Lab: Electroplating/Measurement using Electrochemical Cells [AP List #21]

#### Chapter 24: Chemistry of Coordination Complexes

Lab: Synthesis & Analysis of a Coordination Compound [AP List #15]

### And Finally...

#### AP CHEMISTRY EXAM

State Chemistry Competition Preparation

State Chemistry Competition

NECAP Science testing (Juniors)

Pilot labs