

**WHEATON, AP CHEMISTRY
CLASS EXPECTATIONS AND PROCEDURES**

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Textbook

Brown, LeMay, Bursten, Chemistry, The Central Science, tenth edition.

Materials

Notebook to hold all handouts, labs, and returned papers

Section in notebook or spiral for notetaking

Black and White composition book for lab reports

Scientific Calculator (a graphing calculator is recommended)

Black or blue pens (for the lab notebook)

Expectations

An AP chemistry class takes a lot of time and effort on your part. A lot will be asked of you, but you will also be granted a large degree of independence to learn. However, independence and responsibility go hand in hand. Therefore, you will be expected to behave in a polite, respectful, and responsible manner.

Be On Time

You are considered late if you enter the classroom after the late bell (during either of your two periods). If you are excused tardy, show me your SIGNED agenda book, and sit down. If you have a proper excuse, your lateness will not count against you. If your tardy is NOT excused, sign in on the unexcused tardy sheet located on the front table.

After 20 minutes, an unexcused tardy is considered an unexcused absence. Three unexcused tardies =1 unexcused absence.

Be In Class

I realize that certain things may conflict with class time (doctor's appointments, illnesses, sporting events, and class fieldtrips). I feel that it is imperative that you NOT miss this class. Double period AP chemistry is a class that moves quickly and involves many time consuming labs. Missing just one class will put you at a VERY LARGE disadvantage. Please be sure to schedule doctor's appointments for after school and keep other absences to a bare minimum. Student requested counselor appointments should not be scheduled during this class. Unexcused absences are not tolerated. You will receive a zero on all assignments due that day AND for all assignments assigned for the next day if you do not turn in an excuse to the attendance office within three days.

Class Rules

All school policies will be followed. Review the school rules listed in your agenda book.

- At the sound of the 2nd bell the door will be closed. You are to go directly to your seat and quietly begin the work outlined on the board or on the screen. You may sharpen your pencil at this time only.
- You should store all books not in use in the chair racks.
- When you wish to speak, please raise your hand and wait to be called upon.
- You may not leave your seat without permission.
- You are expected to come prepared with 2 pencils, black or blue pens, an eraser, a ruler, a calculator, and a notebook.
- You may not drink or eat in the classroom.
- The floor area near your seat should be clean. You may drop trash in the wastebasket as you leave.
- Desktops will be checked daily to see that they are not marked or soiled.

Whenever rules are needed, of course there must be punishment for disregarding them. I trust that your corporation will be 100 percent so that disciplinary action will not have to be taken.

Grading

There will be homework every day. A test will be given at the end of each unit. It is your responsibility to makeup-missed tests and quizzes. Tests and quizzes that are not made up will receive a grade of "0".

There will be a final exam at the end of the first semester and a lab/Project at the end of the second semester.

Your final quarter grade will come from your grades on:

Summative Assessments = 50%

Labs = 30 %

HW Evaluated for Learning = 20%

Homework

You will be given a syllabus at the beginning of every unit. You will be required to work at least one full hour on chemistry each and every night. This is the minimum amount of time you should devote to this college level class. A minimum of eight to ten textbook, electronic or AP problems should be attempted each night.

If you do not understand a particular problem, you will be expected to first check your notes, then call a friend, then ask your study group, and then finally come in for extra help from your teacher (you must bring your attempted work with you). I am available to offer extra help, but I am teaching you how to be successful in the college environment and how to learn on your own as well! I will occasionally go over some of the homework questions in class - usually with a one-day turnaround time on requested problems.

Lab Reports

Each student will compose a lab report for each experiment performed in class. Most of the lab reports will follow the procedures detailed in the Lab Notebook Guidelines worksheet. The title,

purpose, hypothesis, materials, preliminary lab, procedure, and data tables must be written in the notebook BEFORE the start of the lab.

I strongly suggest that you form study groups (2 to 3 students). I find that this is the best way to prepare for tests and quizzes and to understand the material. Make an appointment to see me after school.

Laboratory Safety

Safety is of vital importance in the lab. As AP chemistry students, you will be assuming much more responsibility for the care of the lab and you will have to be diligent about following all safety rules. UNDER NO CIRCUMSTANCES are you allowed to go into the Chemical Stockroom. You are NEVER allowed to remove chemicals or perform unauthorized experiments. Severe administrative discipline will occur.

Chemistry Problems

I emphasize both the PROCESS and the FINAL ANSWER when you solve chemistry problems. You will be required to show the formula, plug in the numbers and units, and express your final answer with correct significant figures as well as the final units. Full credit will not be awarded if only the final answer is provided. Make sure that you are able to take a problem and identify the "approach" you are going to use to solve it. The ability to classify the chemistry problems is a very important aspect to this class - analyze, evaluate, classify!

AP Exam

You will be expected to register and sit for the AP chemistry exam in May. There is a fee to sit for the exam, which you will pay sometime before May to the AP coordinator of the school (I do not handle this). It is not an easy test, but with some good effort and hard work in this class you will be VERY WELL prepared for it. With dedication from BOTH of us, we will not only make this a good experience for everyone, but also prepare you well for whatever ETS will throw your way!

LET'S ENJOY THIS TIME TOGETHER!

AP Chemistry Topic Outline

This 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 for courses in other fields where general chemistry is a prerequisite. For other students, the AP Chemistry course fulfills the laboratory science requirement and frees time for other courses.

AP Chemistry should meet the objectives of a good general chemistry course. Students should attain a depth of understanding of fundamentals and a reasonable competence in dealing with chemical problems. The course should contribute to the development of the students' abilities to think clearly and to express their ideas, orally and in writing, with clarity and logic. The college course in general chemistry differs qualitatively from the usual first secondary school course in chemistry with respect to the kind of textbook used, the topics covered, the emphasis on chemical calculations and the mathematical formulation of principles, and the kind of laboratory work done by students. Quantitative differences appear in the number of topics treated, the time spent on the course by students, and the nature and the variety of experiments done in the laboratory.

The AP Chemistry course is designed to be taken only after the successful completion of a first course in high school chemistry. It is strongly recommended that credit in a first-year high school chemistry course be a prerequisite for enrollment in an AP Chemistry class. In addition, the recommended mathematics prerequisite for an AP Chemistry class is the successful completion of a second-year algebra course.

Course Outline

I. Structure of Matter

A. Atomic theory and atomic structure

1. Evidence for the atomic theory
2. Atomic masses; determination by chemical and physical means
3. Atomic number and mass number; isotopes
4. Electron energy levels: atomic spectra, quantum numbers, atomic orbitals
5. Periodic relationships including, for example, atomic radii, ionization energies, electron affinities, oxidation states

B. Chemical bonding

1. Binding forces
 - a. Types: ionic, covalent, metallic, hydrogen bonding, van der Waals (including London dispersion forces)
 - b. Relationships to states, structure, and properties of matter
 - c. Polarity of bonds, electronegativities
2. Molecular models

- a. Lewis structures
 - b. Valence bond: hybridization of orbitals, resonance, sigma and pi bonds
 - c. VSEPR
 - 3. Geometry of molecules and ions, structural isomerism of simple organic molecules and coordination complexes; dipole moments of molecules; relation of properties to structure
- C. Nuclear chemistry: nuclear equations, half-lives, and radioactivity; chemical applications

II. States of Matter

A. Gases

- 1. Laws of ideal gases
 - a. Equation of state for an ideal gas
 - b. Partial pressures
- 2. Kinetic-molecular theory
 - a. Interpretation of ideal gas laws on the basis of this theory
 - b. Avogadro's hypothesis and the mole concept
 - c. Dependence of kinetic energy of molecules on temperature
 - d. Deviations from ideal gas laws

B. Liquids and solids

- 1. Liquids and solids from the kinetic-molecular viewpoint
- 2. Phase diagrams of one-component systems
- 3. Changes of state, including critical points and triple points
- 4. Structure of solids; lattice energies

C. Solutions

- 1. Types of solutions and factors affecting solubility
- 2. Methods of expressing concentration (The use of normalities is not tested.)
- 3. Raoult's law and colligative properties (nonvolatile solutes); osmosis
- 4. Non-ideal behavior (qualitative aspects)

III. Reactions

A. Reaction types

- 1. Acid-base reactions; concepts of Arrhenius, Brønsted-Lowry, and Lewis; coordination complexes; amphoterism
- 2. Precipitation reactions
- 3. Oxidation-reduction reactions
 - a. Oxidation number
 - b. The role of the electron in oxidation-reduction
 - c. Electrochemistry: electrolytic and galvanic cells; Faraday's laws; standard half-cell potentials; Nernst equation; prediction of the direction redox reactions

B. Stoichiometry

- 1. Ionic and molecular species present in chemical systems: net ionic

- equations
2. Balancing of equations including those for redox reactions
 3. Mass and volume relations with emphasis on the mole concept, including empirical formulas and limiting reactants
- C. Equilibrium
1. Concept of dynamic equilibrium, physical and chemical; Le Chatelier's principle; equilibrium constants
 2. Quantitative treatment
 - a. Equilibrium constants for gaseous reactions: K_p , K_c
 - b. Equilibrium constants for reactions in solution
 - i. Constants for acids and bases; pK ; pH
 - ii. Solubility product constants and their application to precipitation and the dissolution of slightly soluble compounds
 - iii. Common ion effect; buffers; hydrolysis
- D. Kinetics
1. Concept of rate of reaction
 2. Use of experimental data and graphical analysis to determine reactant order, rate constants, and reaction rate laws.
 3. Effect of temperature change on rates
 4. Energy of activation; the role of catalysts
 5. The relationship between the rate-determining step and a mechanism
- E. Thermodynamics
1. State functions
 2. First law: change in enthalpy; heat of formation; heat of reaction; Hess's law; heats of vaporization and fusion; calorimetry
 3. Second law: entropy; free energy of formation; free energy of reaction; dependence of change in free energy on enthalpy and entropy changes
 4. Relationship of change in free energy to equilibrium constants and electrode potentials

IV. Descriptive Chemistry

Knowledge of specific facts of chemistry is essential for an understanding of principles and concepts. These descriptive facts, including the chemistry involved in environmental and societal issues, should not be isolated from the principles being studied but should be taught throughout the course to illustrate and illuminate the principles. The following areas should be covered:

1. Chemical reactivity and products of chemical reactions
2. Relationships in the periodic table: horizontal, vertical, and diagonal with examples from alkali metals, alkaline earth metals, halogens, and the first series of transition elements
3. Introduction to organic chemistry: hydrocarbons and functional groups (structure, nomenclature, chemical properties).

V.Laboratory

The differences between college chemistry and the usual secondary school chemistry course are especially evident in the laboratory work. The AP Chemistry Examination includes some questions based on experiences and skills students acquire in the laboratory: making observations of chemical reactions and substances; recording data; calculating and interpreting results based on the quantitative data obtained; and communicating effectively the results of experimental work.

Colleges have reported that some AP candidates, while doing well on the examination, have been at a serious disadvantage because of inadequate laboratory experience. Meaningful laboratory work is important in fulfilling the requirements of a college-level course of a laboratory science and in preparing a student for sophomore-level chemistry courses in college.

Because chemistry professors at some institutions ask to see a record of the laboratory work done by an AP student before making a decision about granting credit, placement, or both, in the chemistry program, students should keep reports of their laboratory work that can be readily reviewed.

Chemical Calculations

The following list summarizes types of problems either explicitly or implicitly included in the topic outline. Attention should be given to significant figures, precision of measured values, and the use of logarithmic and exponential relationships. Critical analysis of the reasonableness of results is to be encouraged.

1. Percentage composition
2. Empirical and molecular formulas from experimental data
3. Molar masses from gas density, freezing-point, and boiling-point measurements
4. Gas laws, including the ideal gas law, Dalton's law, and Graham's law
5. Stoichiometric relations using the concept of the mole; titration calculations
6. Mole fractions; molar and molal solutions
7. Faraday's law of electrolysis
8. Equilibrium constants and their applications, including their use for simultaneous equilibria
9. Standard electrode potentials and their use; Nernst equation
10. Thermodynamic and thermochemical calculations
11. Kinetics calculations