Palisades High School
Advanced Placement Chemistry Syllabus
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School Profile:

Palisades High School is a public high school located in rural, Bucks County, Pennsylvania. The high school encompasses grades 9 through 12, with a population of approximately 761 students and 50 teachers. 99% of the district population is white, 1% Asian, and 1% Hispanic. Palisades High School currently has four 90-minute block periods per day. Typical full credit courses are taught every day for one semester (90 class days), but many AP courses are taught every other day for an entire school year.

Description of Course:

The AP Chemistry course is designed to be the equivalent of the general chemistry course usually taken during the first college year. Students will attain a depth of understanding of fundamentals and a reasonable competence in dealing with chemical problems. Lab experiments will be one of the main foci of the course, with a strong emphasis on physical manipulations, processes and procedures, observations and data manipulation, communication, group collaboration, and quantitative and qualitative data analysis. There is a strong emphasis in AP Chemistry on algebraic computations of chemical and mathematical equations. Chemistry I and Algebra I are absolute prerequisites, Algebra II is recommended.

Text:

Chemistry: The Central Science Text; Brown, Bursten, and Lemay; 8th edition, Prentice Hall, 2001 or updated edition
Supplemental Workbook: ISBN-10: 0132367211, *AP* Test Prep for Chemistry*, Waterman, Edward L., Prentice Hall

Course Objectives:

Students will:

1. Demonstrate a working knowledge and understanding of the core content areas of chemistry, which include: structure of matter, states of matter, reactions, descriptive chemistry, and the laboratory.
2. Physically manipulate equipment and materials in order to make relevant observations and collect data.
3. Use collected data to form conclusions and verify hypotheses.
4. Communicate and compare their results and procedures, both informally and formally.
5. Solve chemical problems associated with both qualitative and quantitative data.

Course PSSA Assessment Anchors:

S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.

S11.A.1.3 Describe and interpret patterns of change in natural and human-made systems.

S11.A.2.1 Apply knowledge of scientific investigation or technological design to develop or critique aspects of the experimental or design process.

S11.A.2.2 Evaluate appropriate technologies for a specific purpose, or describe the information the instrument can provide.

S11.A.3.2 Compare observations of the real world to observations of a constructed model.

S11.A.3.3 Compare and analyze repeated processes or recurring elements in patterns.

S11.C.1.1 Explain the relationship between the structure and properties of matter.

S11.C.2.1 Analyze energy sources and transfer of energy, or conversion of energy.

S11.C.2.2 Demonstrate that different ways of obtaining, transforming, and distributing energy have different environmental consequences.

Course Schedule:

Since this is the first time that Palisades High School is offering AP Chemistry, the class schedule is somewhat unknown. The class could meet every other day for the entire school year or every day for one semester, for approximately 90 minutes per class period.

Teaching Strategies

The following strategies will be used to teach the AP Chemistry course:

1. Teamwork activities: In my class, teamwork is different that group work. The students will formulate cohesive, working teams to tackle the problems of learning chemistry. Each student is encouraged to develop his of her role within a specific team in order to advance the conceptual and skill knowledge of the team.
2. Content lectures: The content lectures will be based on the topics of the textbook, but not limited to the scope of the text. All of the lecture materials, including the slide shows, animations, charts, graphs, and other multimedia materials, will be available to the students on the school's internal server and online. You are encouraged to review these materials before and after class to ensure a thorough understanding.
3. Application Projects: Chemistry topics tend to be presented in a very abstract way. Consequently, students tend to struggle with the practical application of the content of the course. In order to obtain a broader sense of the realm of chemistry, you will be required to complete two application projects. One will be individual and another will be a group project. The details of the project will be given in class, but in summary,

you will need to illustrate evidence of chemistry applications through a multimedia presentation.

4. AP Exam Question Presentation: Each student team must complete and present the solution to an open-ended response question. I will gather a pool of questions that will be available for each chapter or unit. The student teams must select a problem to solve together and then present the solution to the class. There will be 1 – 2 presentations per week and each team will present about every 3 – 4 weeks.
5. Laboratory Notebooks: Each student will keep a detailed laboratory notebook that will include all of the laboratory experiments for the course. You must complete all the laboratory experiments, so if you are absent on the day of a laboratory experiment, you must make up the experiment. All of the writing in your bound laboratory notebook must be in blue or black ink. You will include all of the steps of the scientific method for each experiment as the headings for your write-up (Question, Hypothesis, Procedure, Results & Analysis, and Conclusion). The notebooks will be collected every 3 – 4 weeks to be graded. Laboratory experiments will be conducted about one per week (or every 5 class periods)
6. Online Wiki Writing: Each student will be required to create or edit content for the class wiki. You will use this wiki to deepen and share your understanding of the chemistry content with the rest of the class and the world. Wiki writing is counted as a part of the homework grade. Visit the class wiki by clicking on the AP Chemistry link on the following web page: http://palisadeschemistry.pbwiki.com

Materials Needed

You will need to bring the following items to class with you each day. You may not use all of them every day, however, I feel that it is very important to be prepared. Class will be dynamic and what was done in the first class may not be the same as what is done in another. You will be expected to bring:

- A 3-ring binder, bound laboratory notebook, scientific calculator, pencils, and textbook

Notebook Contents

Your notebook is where every piece of class work should go. Place all laboratory handouts, quizzes, notes, homework, projects, AP sample problems and classroom handouts into your notebook. You should number each page and list all items in your table of contents. Your notebook will be a source of collaboration with your class team, so keep it up to date.

Homework

There will be homework assigned from the book. The answers to some of the questions are in the back of the book. Homework will be checked for completeness and graded with either a 1 or 0. Homework will be checked and

graded twice per grading period. Your homework should not be neat, but it should be legible. I want you to work on the problems consistently and bring specific questions that you derive from the homework to class. This is one of the best ways to learn chemistry; to truly determine what it is that you do and do not understand.

I will work out the answers to all of the homework problems that I assign and I will post those in class and online. Review these answers periodically to make sure that the way you are doing the problems is the same as the way I am doing the problems. We do not have to agree on the way to do a problem, since there are often multiple pathways to the same answer. But, if your method of problem solving is different than mine, I would like you to share that with the class. You may be able to help your colleagues understand a problem in a way that is different from how I presented it.

The other component of homework is the AP test prep workbook. The workbook problems are slightly different from the textbook problems in that the workbook is specifically geared toward the types of questions that are asked on the AP Exam. During the course, the workbook should be completed along with the chapter materials. I will not collect or correct workbook problems, but I will answer any questions associated with the workbook. The after-school and test preparation sessions will also rely heavily on the workbook problems.

Grading

Tests	50%
Projects/AP Practice Problem Presentations	20%
Lab Reports	20%
Homework	10%

Attendance and Missed Work

All students are responsible for any class work that he/she misses because of absence. All lab assignments that are missed need to be made up and scheduled by the student. I will not chase you down if you have missed class and some important information. If you are absent, you should check the syllabus to see what was done while you were gone.

If you are absent because of a planned event, like a sport's game or field trip, you should find out what material will be covered beforehand. You should turn in any due assignments for the day as soon as possible.

If you are absent on the day of a lab, you need to make up the lab within 1 week of the day that you come back. There are no exceptions to this rule, since all of the laboratory experiments are essential to the successful completion of the course.

Classroom Norms

- You must have a positive attitude towards learning
- Be aware of your own thinking
- Evaluate the effectiveness of your actions
- Be open-minded
- Push the limits of your knowledge and abilities

Safety Considerations

Safety in the classroom is the primary concern of your instructor. You must adhere to all aspects of the Safety Contract that you will sign at the beginning of the course. Failure to keep a safe environment in the classroom will not be tolerated. Multiple safety infractions may result in expulsion from the course.

Outline of Course Content

1. Chemistry I Review (Chapters 1, 2, 3, 4, 6, 7, 10 of the text) 1-2 weeks
    a. Atomic theory and atomic structure
        i. Evidence for the atomic theory, atomic mass and determination (Chapter 2)
            1. Textbook problems: p. 61 #1,5,15,19,25,31,37,41
        ii. Electron energy levels, atomic spectra, quantum numbers, and atomic orbitals (Chapter 6)
            1. Textbook problems: p. 220 #7,9,13,25,27,43,53,57,65,67,69
        iii. Periodic relationships (Chapter 7)
            1. Textbook problems: p. 254 #5,13,19,29,33,35,37,39,43,49,55
    b. Gases
        i. Gas laws and equations (Chapter 10)
            1. Textbook problems p. 384 #1,7,9,15,17,19,21,25,29,41,43,47,49
        ii. Kinetic Molecular Theory (Chapter 10)
            1. Textbook problems p. 388 #57,61,71,73
    c. Reactions
        i. Predicting products and stoichiometry (Chapter 3)
            1. Textbook problems: p. 95 #3,7,19,35,39,63,65,73,75,79
        ii. Types of reactions in aqueous solutions (Chapter 4)
            1. Textbook problems: p. 137 #1,3,5,7,11,23,27,29,37,41,45,59,63,65,69,71
    d. Laboratory experiment – Colormetric analysis
2. Chemical Bonding (Chapters 8 & 9 of the text) 2 weeks
    a. Binding forces

i. Ionic, covalent, metallic, hydrogen bonding, van der Waals forces
ii. Relationships of states, structure, and properties of matter
iii. Polarity of bonds, electronegativities
iv. Molecular Models - Lewis structures & ionic bonding
v. Textbook problems: p. 295
#3,7,11,15,23,27,29,37,39,45,47,49,51,59,63,67
vi. Laboratory Experiment – Separation and quantitative analysis of cations and anions

b. Molecular Geometry and Bonding Theory
i. Geometry of molecules and ions
ii. Valence Shell Electron Pair Repulsion theory
iii. Valence bond: hybridization of orbitals, resonance, sigma and pi bonds
iv. Textbook problems: p. 344
#1,3,5,9,13,15,19,23,25,27,29,31,33,37,41,43,49,53,59
v. Laboratory experiment – Synthesis of a coordination compound and its chemical analysis

3. Chemical Kinetics (Chapter 14 of the text) 2 weeks
a. Concept of rate of reaction
b. Use of experimental data and graphical analysis to determine reaction order, rate constants, and reaction rate laws
c. Effect of temperature change on rates
d. Energy of activation; the role of catalysts
e. The relationship between the rate-determining step and a mechanism
f. Textbook problems p. 549
#1,3,5,7,9,11,13,15,17,19,21,23,25,29,31,32,35,37,41,43,45, 49,53,57,59,61,63,65,67
g. Laboratory experiment – Determination of the rate of a reaction and its reaction order

4. Chemical Equilibrium (Chapter 15, 16, & 17 of the text) 4 weeks
a. Concept of dynamic equilibrium, physical and chemical; LeChatlier's principle; equilibrium constants
b. Quantitative treatment
i. Equilibrium constants for gaseous reactions; K_p, K_c
ii. Textbook problems p. 585
#9,15,19,23,24,31,33,35,37,43,45,47
c. Acid-Base Equilibria
i. Arrhenius and Bronstead-Lowry acids and bases& amphoterism
ii. Lewis acids and bases
iii. Equilibrium constants for reactions in solution
1. Constants for acids and bases; pH; pK

iv. Textbook problems p633 #3,5,7,9,17,19,27,29,35,37, 39,43,49,51,53,59,63,65,67,69,73,75,79,81,87,89

d. Solubility product constants and their application to precipitation and the dissolution of slightly soluble compounds
   i. Common ion effect; buffers; hydrolysis
   ii. Factors affecting solubility
   iii. Textbook problems p633 #11,13,15,17,19,23,27,33,37,39,43,47,49,53,59
   iv. Laboratory experiment – Determination of equilibrium constant for a chemical reaction: Iron-Thiocyanate complex equilibrium
   v. Laboratory experiment – Preparation and properties of buffers

5. Chemical Thermodynamics 3 weeks
   a. Thermochemistry (Chapter 5 of the text) 1 week
      i. State functions
      ii. First law of thermodynamics
      iii. Textbook problems p. 177 #3,7,11,15,19,21,23,25,27,35,37,39,41,43,49,53,59,61,67,69, 75
      iv. Laboratory Experiment – Determination of enthalpy change associated with a reaction
   b. Thermodynamics
      i. Second Law of Thermodynamics
      ii. Entropy
      iii. Gibbs Free Energy
      iv. Textbook problems p. 742 #1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61,65
6. Electrochemistry (Chapter 20 of the text) 2 weeks
   a. Oxidation-Reduction reactions
   b. Voltaic cells and EMF
   c. Gibbs free energy and the Nernst Equation
   d. Textbook problems p. 794 #3,9,13,21,27,35,45,51,57
   e. Laboratory experiment – Determination of concentration by redox titration: potentiometric titration
   f. Laboratory experiment – Determination of electrochemical series
   g. Laboratory experiment – Measurements using electrochemical cells and electroplating
7. Liquids and Solids (Chapter 11 of the text) 2 weeks
   a. Liquids and solids from the kinetic molecular viewpoint
   b. Phase diagrams of one-component systems
   c. Changes of state, including critical points and triple points
   d. Structure of solids; lattice energy
   e. Textbook problems p. 427 #5,7,11,13,19,23,31,35,37,43,45,49,51,57,59,65,69,71,75

f. Laboratory experiment – Separation by chromatography

8. Introduction to Organic Chemistry (Chapter 25 of the text) 1 week
    a. Hydrocarbons & Nomenclature
    b. Alkanes
    c. Unsaturated hydrocarbons
    d. Functional groups: alcohols, esters, and carbonyl groups
    e. Chirality
    f. Proteins
    g. Carbohydrates
    h. Nucleic acids
    i. Textbook problems p. 1005
       #1,7,11,17,21,25,31,33,41,43,45,49,53,55,57,61,63
    j. Laboratory experiment – Synthesis, purification, and analysis of an organic compound

Disclaimer: "Course content may vary from this outline to meet the needs of this particular group."

Clarification of laboratory experiments: The following laboratory experiments, or their conceptual equivalents, were performed as a part of the Chemistry I course curriculum:

- Determination of the formula of a compound
- Determination of the percentage of water in a hydrate
- Determination of molar mass by vapor density
- Determination of molar mass by freezing point depression
- Determination of the molar volume of a gas
- Standardization of a solution using a primary standard
- Determination of concentration by acid-base titration
- Determination of mass and mole relationship in a chemical reaction
- Determination of appropriate indicators for various acid-base titrations; pH determination

Statement of Participation and Authorship Policies

All students are expected to participate to the best of their ability at all times in this class. Students must put 100% effort into all aspects of this class in order to receive 100% of the benefits of this course. Any less effort on the part of the student will result in less value of the course.

All students must adhere to all applicable copyright laws at all times in the class. Plagiarism will not be tolerated. Any student who submits work as his or her own is responsible for making sure that the entire work is his or her own original thought or creation. Any materials that come from an outside source must be cited in the proper fashion.