Course Description

The purpose of AP Chemistry is to ensure that the student is prepared to take college chemistry or be placed in the appropriate college chemistry course. The course is organized around the 6 Big Ideas and the Enduring Understandings. The course is divided into two semesters with three, six-week terms in each semester. Laboratory experiments compliment the material under study. The experiments will include inquiry-based labs, and lab time will account for at least 25% of the class – some labs can be completed in one class period but others may require more. For this class, emphasis is placed on application of chemical concepts, not memorization of facts. Each topic will be covered in depth and the students will be assessed after the completion of each unit.

Textbooks (Primary text listed first)


Laboratory

AP Approved Chemistry Laboratory Experiments from Carolina Science and Flinn Scientific

Self- Authored Labs

Lesson Delivery and Homework

Students will have in-class instruction, but will also have the ability to utilize other material to help with their homework assignments. The students are responsible for taking advantage of the materials offered in order to prepare them for success in this course. Once a week, there will also be a ‘free response’ question so that the students can amply prepare for the format of the AP Exam. Students will expect to have homework every night that may require readings, practice problems, analyzing data, or preparing for a future lab. Homework will be given daily, and will be collected as a chapter problem set to ensure that the students had ample time to ask for questions and clarification.


**Summer Assignments**

To better prepare you for the course, there are skills that are necessary for success. To aid in your preparation, there are 4 chapters that encompass the summer assignment. This includes completing a reading guide, a diagram and end of the chapter problems. It is imperative that you complete these and ensure that you understand the material as we will have a test on chapters 1-2 and 6-7 the second week we return. To assist you in any issues that may arise. I will be contacting you via Edmodo.

**Laboratory**

The laboratory portion of this course is designed to be the equivalent of a college chemistry lab. All of the labs that are done within this course are hands-on. Students collect both quantitative and qualitative data, analyze and mathematically manipulate that data where appropriate, and draw conclusions from the data. All of the labs are written up in a lab note book which then can be produced as evidence to a college that the student has indeed had a college level lab experience. The lab report that is completed consists of the following:

1. Title and introduction, including objective
2. Materials
3. Procedure in Paragraph Formatting
4. Data and Calculations
5. Conclusion

The laboratory experiments will be completed during 90 minute periods with ample time for the regular and guided inquiry based labs listed below: In total, a minimum of 16 labs are performed by the students in this course. The guided inquiry labs are noted with a *GI* in front of them.

1. **GI**-Airbag Inflation (*SP: 2, 3, 4 & 7*)
2. **GI**-Percentage of Water in an Unknown Hydrate – a Stoichiometric Determination where the students are required to produce a given amount of anhydrous material. (*SP: 2, 3, 4, 5 & 7*)
3. Determination of an Empirical Formula (*SP:2, 4, & 5*)
4. Determination of an Activity Series (*SP:1, 4, 5, 7*)
5. Predicting Products and Net Ionic Equations (*SP:2, 4, & 5*)
6. Reduction of Permanganate by Titration (*SP:2, 4, & 5*)
7. **GI**-Molarity for Average Household Vinegar (*SP: 2 & 5*)
8. Molar Heat of a Reaction (*SP: 2 & 5*)
9. Hess’s Law (*SP: 2, 3 & 5*)
10. Heat of Combustion of MgO (*SP:2, 4, & 5*)
11. **GI**-Molar Volume of a Gas (*SP: 2*)
12. **GI**-What Makes Hard Water Hard (*SP: 3 & 4*)
13. **GI**-Inquiry Investigation into Behavior of Gases (*SP: 1, 2, 4, 5, 6 & 7*)
14. Determination of Triple Point Pressure of CO₂ (*SP: 3 & 4*)
15. Molar Mass of a Volatile Liquid (*SP: 3 & 4*)
16. **GI**-Determination of the order, k, and Eₐ for a clock reaction. (*SP: 1, 2, 3, 4, 5 & 7*)
17. **GI-**Rate Law Determination for Decomposition of Crystal Violet (*SP: 2, 5 & 7*)
18. **GI-**Le Châtelier's Principle (*SP: 3, 4 & 6*)
19. **GI-**Creation and Testing of a Buffer (*SP: 3 & 4*)
20. **GI-**How Can We Determine the Actual Percentage of H₂O₂ in a Drugstore Bottle of Hydrogen Peroxide? (*SP: 3, 4, 5, 6 & 7*)
21. Investigation of the pH of weak and strong acids as a function of concentration. (*SP: 2, 4, & 5*)
22. The pH of Salt solutions. (*SP: 2, 4, & 5*)
23. Determination of Kₐ by Half Titration (*SP: 3, 4, & 5*)
24. Titration Curves (*SP: 2, 4, & 5*)
25. Creation and Testing of a Buffer (*SP: 2, 3, & 5*)
26. **GI-**The Buffering Properties of Common Household Items. (*SP: 3, 4, 5, 6 & 7*)

**Technology**

Many technologies are used within this course. Students use their laptops to help analyze data, make graphs, write reports, and also to record any information that they may need. Analytical balances, pH probes, and spectrophotometers will be used in the laboratory setting as well.

**Tests**

At the completion of each unit’s lectures, inquiry activities, problem sets, and labs, a unit test is given. Like the AP Exam, the unit test consists of 2 parts – multiple choice and free response. A semester exam is also given after the culmination of a semester (January and June). These assessments will show strengths and weaknesses of the students in order to better prepare the students for the AP Exam.

**Review**

Review sessions throughout the year are common; however, the bulk of the review occurs from mid-April until the exam. During this time students are given multiple choice and free response reviews for each unit or topic. Any review times outside of school will be noted through Edmodo.

***This is an expected outline of the course, and as the instructor, I reserve the right to adjust any portion of it to accommodate the needs of the course.***

**Consent**

I understand that this is an Advanced Placement Course and is to prepare students to be successful for the AP exam. In order to do so, I understand that this will require work that is equivalent to that of a college-level course. I also understand that if I do not complete the summer course, I am starting the school year with a disadvantage. *Please sign and return by August 26, 2019 to me.*

Student Name: ___________________________  Student Signature: ___________________________
Parent Name: ___________________________  Parent Signature: ___________________________
AP Chemistry Summer Assignment

These are due on
8/26/2019

Chapter 1 Problem Set (starting on page 32): 23
Complete odd problems, 11-55, which is broken down into daily read, diagram, and exercise.

Chapter 2 Problem Set (starting on page 70): 36
Complete odd problems, 9-79, which is broken down into daily read, diagram, and exercise.

Chapter 6 Problem Set (starting on page 241): 33
Complete odd problems, 11-73 and 97&101, which is broken down into daily read, diagram, and exercise.

Chapter 7 Problem Set (starting on page 280): 37
Complete odd problems, 7-81, which is broken down into daily read, diagram, and exercise.
1. Read sections for chapters 1-4.
2. For each of the following, describe the most important parts of the section and include a diagram. No less than 2 sentences and no more than 5 sentences per section. *The diagram could be a timeline, an example, a key that describes symbols, practice problems, mathematical explanation of what the section was talking about etc.*

### 1.1 The Study of Matter

**Explanation:**

**Diagram:**

### 1.2 Classification of Matter

**Explanation:**

**Diagram:**

### 1.3 Properties of Matter

**Explanation:**

**Diagram:**
1.4 Unit of Measurement

Explanation:                       Diagram:

1.5 Uncertainty in Measurement

Explanation:                       Diagram:

1.6 Dimensional Analysis

Explanation:                       Diagram:
2.1 The Atomic Theory of Matter

Explanation: 

Diagram:

2.2 The discovery of the Atomic Structure

Explanation: 

Diagram:

2.3 Modern View of the Atomic Structure

Explanation: 

Diagram:
2.4 Atomic Weights

Explanation:  

Diagram:

2.5 The Periodic Table

Explanation:  

Diagram:

2.6 Molecules and Molecular Compounds

Explanation:  

Diagram:
2.7 Ions and Ionic Compounds

Explanation:  

Diagram:

2.8 Naming Inorganic Compounds

Explanation:  

Diagram:

2.9 Some Simple Organic Compounds

Explanation:  

Diagram:
6.1 The Wave Nature of Light

Explanation: 

Diagram: 

6.2 Quantized Energy and Photons

Explanation: 

Diagram: 

6.3 Line Spectra and The Bohr Model

Explanation: 

Diagram:
6.4 The Wave Behavior of Matter

Explanation:  

Diagram:

6.5 Quantum Mechanics and Atomic Orbitals

Explanation:  

Diagram:

6.6 Representations of Orbitals

Explanation:  

Diagram:
6.7 Many-Electron Atoms

Explanation:  

Diagram:

6.8 Electron Configurations

Explanation:  

Diagram:

6.9 Electron Configurations and The Periodic Table

Explanation:  

Diagram:
7.1 Development of The Periodic Table

Explanation:  

Diagram:

7.2 Effective Nuclear Charge

Explanation:  

Diagram:

7.3 Sizes of Atoms and Ions

Explanation:  

Diagram:

7.4 Ionization Energy

Explanation:  

Diagram:
7.5 Electron Affinities

Explanation:  
Diagram:

7.6 Metals, Nonmetals, and Metalloids

Explanation:  
Diagram:

7.7 Trends for Group 1A and Group 2A Metals

Explanation:  
Diagram:

7.8 Trends for Selected Nonmetals

Explanation:  
Diagram:
Make flashcards and **memorize** the names, symbols and charges of the common ions listed below.

<table>
<thead>
<tr>
<th>Names, Formulas, and Charges of Some Common Polyatomic Ions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NH₄⁺</strong> Ammonium</td>
</tr>
<tr>
<td><strong>C₂H₃O₂⁻</strong> Acetate</td>
</tr>
<tr>
<td><strong>CO₃²⁻</strong> Carbonate</td>
</tr>
<tr>
<td><strong>HCO₃⁻</strong> Hydrogen carbonate</td>
</tr>
<tr>
<td><strong>C₂O₄²⁻</strong> Oxalate</td>
</tr>
<tr>
<td><strong>CN⁻</strong> Cyanide</td>
</tr>
<tr>
<td><strong>OCN⁻</strong> Cyanate</td>
</tr>
<tr>
<td><strong>SCN⁻</strong> Thiocyanate</td>
</tr>
<tr>
<td><strong>NO₂⁻</strong> Nitrite</td>
</tr>
<tr>
<td><strong>NO₃⁻</strong> Nitrate</td>
</tr>
<tr>
<td><strong>PO₄³⁻</strong> Phosphate</td>
</tr>
<tr>
<td><strong>HPO₄²⁻</strong> Hydrogen phosphate</td>
</tr>
<tr>
<td><strong>H₂PO₄⁻</strong> Dihydrogen phosphate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Names, Formulas, and Charges of Some Common Ions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Al³⁺</strong> Aluminum</td>
</tr>
<tr>
<td><strong>H⁻</strong> Hydride</td>
</tr>
<tr>
<td><strong>Mn²⁺</strong> Manganese (II)</td>
</tr>
<tr>
<td><strong>Ni²⁺</strong> Nickel (II)</td>
</tr>
<tr>
<td><strong>Zn²⁺</strong> Zinc</td>
</tr>
<tr>
<td><strong>Cd²⁺</strong> Cadmium</td>
</tr>
<tr>
<td><strong>Ag⁺</strong> Silver</td>
</tr>
<tr>
<td><strong>Au⁺</strong> Gold (I) or aurous</td>
</tr>
</tbody>
</table>

More Memorization.

1. Know solubility rules for common ions.

2. Know rules for assigning oxidation numbers.
Start learning the following special case examples of reaction types.

**Synthesis:**

Metal oxide + water → metal hydroxide \[ \text{MgO} + \text{H}_2\text{O} \rightarrow \text{Mg(OH)}_2 \]

Nonmetal oxide + water → acid (polyatomic) \[ \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3 \]

**Decomposition:**

Metal carbonate → metal oxide + carbon dioxide \[ \text{Cs}_2\text{CO}_3 \rightarrow \text{Cs}_2\text{O} + \text{CO}_2 \]

Metal hydroxide → metal oxide + water \[ 2 \text{LiOH} \rightarrow \text{Li}_2\text{O} + \text{H}_2\text{O} \]

Metal chlorate → metal chloride + oxygen gas \[ 2 \text{LiClO}_3 \rightarrow 2 \text{LiCl} + 3 \text{O}_2 \]

**Acid/Base Reactions**

acid + base → salt + water \[ \text{H}_2\text{SO}_4 + \text{NaOH} \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O} \]

metal + acid → salt + hydrogen gas \[ 3\text{Mg} + 2\text{H}_3\text{PO}_4 \rightarrow \text{Mg}_3(\text{PO}_4)_2 + 3\text{H}_2 \]

metal oxide + acid → salt + water \[ \text{CaO} + \text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} \]

carbonate + acid → salt + carbon dioxide + water \[ \text{BaCO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + \text{CO}_2 + \text{H}_2\text{O} \]

(The carbonate ion breaks apart. The other negative ion becomes part of the salt)

nonmetal oxide + hydroxide → salt + water \[ \text{CO}_2 + \text{Ba(OH)}_2 \rightarrow \text{BaCO}_3 + \text{H}_2\text{O} \]

metal oxide + nonmetal oxide → salt \[ \text{Na}_2\text{O} + \text{SO}_3 \rightarrow \text{Na}_2\text{SO}_4 \]

**Letter to AP® Chemistry Teacher**

- This letter will be your way of introducing yourself to your teacher. It should be typed in a MS Word or Google Doc document (not within your email), AT LEAST 1.5 pages, double-spaced with one-inch margins, in black Times New Roman or Cambria 12-point font.

- Your letter should include:
  - Who you are
  - Why you are interested in taking AP Chemistry
  - What you think your biggest challenge in the course will be and how you plan to overcome that challenge
  - What your future college/career goals and aspirations are
  - What you see as your strengths and weaknesses as both a student and a person
  - A description of something important to you (your family, friends, art, etc.) and why
  - Any other information you feel I should know about you.

- You will turn in your letter via email to carson.wise@ymail.com by Friday, Aug 16th.

- I also need your, and your parents’/guardians’ contact information (email and phone). You will submit this information in the same email as your letter to carson.wise@ymail.com.

*In order to receive full credit for this assignment, ALL above specifications must be met.*
2. **Mindset Quiz & Reflection**
   - Determine your “mindset” using the scoring instructions at the end of the survey
   - Write a reflection that answer the following questions (black Times New Roman or Cambria 12-point font)
     - What does the word "mindset" mean to you?
     - How is “mindset” different than “intelligence”?
     - What “mindset” did you score? How do you feel about that score?
     - How do think a “fixed” mindset affects one’s response to setbacks?
     - How do think a “growth” mindset affects one’s response to setbacks?
     - How might this knowledge of the brain help you in an AP class?

3. **Mindset Quiz & Reflection (cont.)**
   - If you want to learn more about “Growth Mindset,”
     - read the following PowerPoint: [http://bit.ly/1n9AVkP](http://bit.ly/1n9AVkP)
     - watch out the following Video:
       - [https://www.youtube.com/watch?v=_X0mgOOSpLU](https://www.youtube.com/watch?v=_X0mgOOSpLU)
       TED Talks: “Carol Dweck: The power of believing you can improve”
     - watch out the following Video:
       - [https://www.youtube.com/watch?v=hiiEeMN7vbQ](https://www.youtube.com/watch?v=hiiEeMN7vbQ)
       Stanford Alumni: “Carol Dweck, Developing a growth mindset”

3. **Purchase AP Chemistry Review Book (not graded)**
   - While I understand asking you to purchase a book for this class might put some undue pressure on you, I am asking that you purchase one of two AP Chemistry study guide books way in advance, with the hope that most, if not all of you can get a book by the start of school. I truly believe in the value of these books. They are fairly inexpensive (less than $20), and can be purchased online or at Barnes and Nobles.

Feel free to contact me as necessary over the summer via email. You can email me at carson.wise@ymail.com. I will try to respond within 48 hours. Have a great summer!

**Advice From Students Who Have Been Through AP Chemistry**

- **THE WORK WILL BE HARD!!!!** Don’t stress, don’t give up and do all of your work (homework, classwork and participate in class) because 9 times out of 10, it will be harder to reach your goal on the tests. However, if you stay focused and retain all of the material, you will be successful.

- Don’t cheat yourself! It may be tempting, but when you work hard, you will get the impact and results you want.

- My advice to incoming AP Chemistry students is to never slack on homework and take advantage of the resources Mr. Wise gives you. Also, never miss any days in class because if you do, you are practically doomed for that entire week of school.

- Don’t slack and let any work pass no matter how easy or hard it is, because once you get behind it’s hard to catch up. So, STAY ON YOUR “A” GAME! Because I slacked and I’ve been behind ever since!
• If you are taking an AP class, make sure you are serious about the work, study and make sure you complete and understand your work. Otherwise, you could wish you’d never taken the class in the first place.

• The secret to success in this is class is to never give up because nothing is impossible. Even impossible says, “I’m possible.”

• My advice for incoming AP Chemistry students is to pace yourself. The work will get harder as it goes on and the workload can get overwhelming. Be sure to make time for your homework and classwork because missing one day is like missing a whole week. Be prepared to lose sleep and devote your time to this class. Mr. Wise is a great teacher will help you when you need it so don’t hesitate to ask. Don’t give up because you will hate it at times, but in the end you won’t regret taking the class.

How to Survive AP Chemistry

Before you panic about the amount of work and material in AP Chemistry, here are a few things to try. All of these methods have been suggested by students successful in the AP Chemistry Course:

• Tape/staple this at the beginning of your notebook!
• Stay organized! There will be a LOT of handouts for this course. Keep them in dated order, secured (not just shoved into your notebook) in folders, and review them before quizzes/tests.
• Extra help: Extra help for the course is available upon request, and most days after school. ASK 24 hours in advance before coming for extra help.
• Form study groups for homework and mastery.
• Do your homework on time! Each homework is preparation for each class. Rather than thinking about as homework as a grade, think about it as a preparation for doing really awesome in class.
• Use 5 Steps to a Five throughout the year! The book has great review questions, summaries, etc. and will help you focus on what’s important.
• Use the following video resources – many of these use YouTube, so will have to accessed via a non-school site:
  o Bozeman Chemistry – GREAT video reviews of specific topics in chemistry.
    • http://www.bozemanscience.com/ap-chemistry/
    • https://www.youtube.com/playlist?list=PLllVwaZQkS2op2kDuFihStNs549LAxkZ
  o Khan Academy – GREAT video reviews of specific topics in chemistry. The chemistry section is the equivalent of AP Chemistry.
    • https://www.khanacademy.org/science/chemistry
  o Sciencegeek.net is website designed for AP Chemistry students
    • http://www.sciencegeek.net/APchemistry/index.shtml
  o Tyler Dewitt Chemistry – GREAT video reviews of specific topics in chemistry.
    • https://www.youtube.com/user/tdewitt451
  o Professor Dave Explains – GREAT video reviews of specific topics in chemistry.
    • https://www.youtube.com/channel/UC0cd_e49hZpWLH3UlwoWRA
# Mindset Quiz

<table>
<thead>
<tr>
<th>Question</th>
<th>Alignment (circle)</th>
<th>Points</th>
</tr>
</thead>
</table>
| 1        | ability mindset – fixed  
personality/character mindset – fixed | ability mindset – growth  
personality/character mindset – growth |
| 2        | ability mindset – fixed  
personality/character mindset – fixed | ability mindset – growth  
personality/character mindset – growth |
| 3        | ability mindset – fixed  
personality/character mindset – fixed | ability mindset – growth  
personality/character mindset – growth |
| 4        | ability mindset – fixed  
personality/character mindset – fixed | ability mindset – growth  
personality/character mindset – growth |
| 5        | ability mindset – fixed  
personality/character mindset – fixed | ability mindset – growth  
personality/character mindset – growth |
| 6        | ability mindset – fixed  
personality/character mindset – fixed | ability mindset – growth  
personality/character mindset – growth |
| 7        | ability mindset – fixed  
personality/character mindset – fixed | ability mindset – growth  
personality/character mindset – growth |
| 8        | ability mindset – fixed  
personality/character mindset – fixed | ability mindset – growth  
personality/character mindset – growth |
| 9        | ability mindset – fixed  
personality/character mindset – fixed | ability mindset – growth  
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| 10       | ability mindset – fixed  
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| 11       | ability mindset – fixed  
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| 13       | ability mindset – fixed  
personality/character mindset – fixed | ability mindset – growth  
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| 14       | ability mindset – fixed  
personality/character mindset – fixed | ability mindset – growth  
personality/character mindset – growth |
| 15       | ability mindset – fixed  
personality/character mindset – fixed | ability mindset – growth  
personality/character mindset – growth |
| 16       | ability mindset – fixed  
personality/character mindset – fixed | ability mindset – growth  
personality/character mindset – growth |
| 17       | ability mindset – fixed  
personality/character mindset – fixed | ability mindset – growth  
personality/character mindset – growth |
| 18       | ability mindset – fixed  
personality/character mindset – fixed | ability mindset – growth  
personality/character mindset – growth |
| 19       | ability mindset – fixed  
personality/character mindset – fixed | ability mindset – growth  
personality/character mindset – growth |
| 20       | ability mindset – fixed  
personality/character mindset – fixed | ability mindset – growth  
personality/character mindset – growth |
| **Total**|                    |        |
What’s your mindset? __________________________ Name: ______________________

<table>
<thead>
<tr>
<th>Growth? Points:</th>
<th>Fixed? Points:</th>
<th>Mindset Scoring:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Strongly agree – 3 points</td>
<td>• Strongly agree – 0 points</td>
<td>• Strong Growth Mindset = 60-45 points</td>
</tr>
<tr>
<td>• Agree – 2 points</td>
<td>• Agree – 1 points</td>
<td>• Growth Mindset w/ some Fixed ideas = 44-34 points</td>
</tr>
<tr>
<td>• Disagree – 1 points</td>
<td>• Disagree – 2 points</td>
<td>• Fixed Mindset w/ some Growth ideas = 33-21 points</td>
</tr>
<tr>
<td>• Strongly disagree – 0 points</td>
<td>• Strongly disagree – 3 points</td>
<td>• Strong Fixed Mindset = 20-0 points</td>
</tr>
</tbody>
</table>

Points: Strong Growth Mindset = 60-45 points, Growth Mindset w/ some Fixed ideas = 44-34 points, Fixed Mindset w/ some Growth ideas = 33-21 points, Strong Fixed Mindset = 20-0 points.