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# AP Chemistry Exam Tips

## Preparing for the Exam

You are strongly encouraged to study outside of class. Start to review early in April. Use a study outline (teacher supplied

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for help when you have difficulties. The night before the exam, be sure to remember such basics as getting plenty of sleep, eating a healthy breakfast, and dressing comfortably and warm enough for the room environment.

## Multiple-Choice Questions

There are two types of multiple-choice questions on the AP Chemistry Exam, discrete items and item sets. The discrete items are the typical stand-alone test question in which four choices, A–D, are given from which the correct answer is to be selected. Item sets will have two or more test questions, each with four choices, A–D, based on a graph, an experiment, a set of data, or some other stimulus given at the beginning of the set.

## Pace Yourself

Remember that you will have access to both the AP Periodic Table of the Elements and the AP Chemistry equations and constants sheet for the entire exam.

For even pacing and maximizing your score, try the following strategy:

1. Examine each question for a maximum of 40 seconds (on the average, some will take less time allowing more time for others, like item sets).
2. Quickly determine the subject of the question. Remember that there will be some math questions but their solutions will be based on basic calculations, rounding, estimating, and approximation.
3. By the end of the 40 seconds either:
  1. Mark the correct answer from one of the 4 answer choices.
  2. Mark a “Y” next to the questions that you know how to work but need more time.
  3. Mark an “N” next to the questions that you don’t have any idea how to work.
4. Force yourself to move through 15 questions each 10 minutes and the full 60 questions in 40 minutes.
5. Now make a second pass concentrating on the “Y” questions only. Do not spend any time on the “N” questions. If you don’t know the correct answer see if some key piece of knowledge will allow you eliminate 2 or 3 of the choices. Complete this pass in 40 minutes.
6. Now make your third pass. Focus only on the “N” questions. Attempt to eliminate at least 2 choices. Make an intelligent guess. Any correct “guesses” on this pass are bonus points. You have only 10 minutes, so make it count!
7. You should try to answer all questions. Remember that there is no penalty for guessing.

## Free-Response Questions

There are two types of free-response questions on the AP Chemistry Exam; three are long, multipart questions; and four are short, single/multipart questions. The questions cover all six big ideas in the chemistry course and will pertain to experimental design, analysis of lab data and observations for patterns or explanations, analysis or creating atomic or molecular views to explain observations, translating between representations, and following a logical analytical path to

solve problems. You should pace yourself to allow for approximately 10 minutes each for the short questions and about 16 minutes each for the long questions.

## Read the Whole Question First

Read each free-response question all the way through **before** doing any work. Spend more time reading and less time writing to make sure you really understand what is being asked. A good approach might be to start reading at the bottom and read back to the beginning to get the global view of the problem or question.

## Read All Parts of the Question

The short and the long AP Chemistry questions have several parts. Read all the parts before you start answering and think about how they might be related (sometimes they aren't). If any part asks you to answer a question based on your results to the previous parts, be sure to actually use your prior results to answer. If you couldn't do one of the previous parts, make up an answer and explain what you would have done.

## Maximize Credit

Answer the question that is asked as specifically and concisely as possible. Do not simply restate the question.

When an answer includes multiple options, such as “increases, decreases, or remains the same”, make sure your answer is one of the three options given. If you are asked to select the best answer, make a single selection and justify the reasoning for making that choice.

“Explain or justify your prediction” usually means that a correct prediction without an explanation will not earn a point. Be sure that an explanation or justification goes beyond a simple restatement of information given in the problem.

If you are asked to make a comparison, mention both possibilities and then make a single choice with accompanying justification.

Remember that you might be getting partial credit. Answer any part of the question, about which you have any knowledge.

## Be Clear

Communicate clearly and precisely. Vague, unclear, and rambling answers often make it impossible to determine whether students fully understand the chemistry required in the question.

You may encounter questions that sound strange or unfamiliar. Use the knowledge you have to try to determine what a plausible approach might be. Nothing you put down will earn less credit than a blank page.

Remember, AP readers can best grade your exam if you write legibly and use proper grammar.

Write in pencil or blue-ink pens and avoid using pens that smear easily. Write all answers in the lined spaces provided instead of squeezing words in between the question parts.

Avoid vague generalizations when answering questions. Give details as often as possible.

Do not continue writing further explanations after the question is answered. There will be much more space supplied than you need to respond. Certainly, don't panic because you haven't used all the space provided. Students have been known to contradict themselves when their responses go beyond the required answer.

## **Be Consistent**

Consistency is important. Consider your prior answers: be sure to answer the next related questions based on the prior answers given. If the next answers do not make sense, reconsider your original proposal.

## **Use the Right Words and Symbols**

Use appropriate scientific language when answering questions. It is not acceptable to refer to an atom as a “molecule” or an “ion” or to refer to an intermolecular force as a “bond.”

Know proper chemistry symbols and notation (e.g., **mol** versus **m** versus **M**, **k** versus **K**, parentheses notation versus brackets, the appropriate use of superscripts and subscripts, etc.).

## **Understand Trends**

Understand that referencing a periodic trend or identifying a filled shell or subshell does not constitute an explanation of atomic property differences. You will not receive any credit by referencing a position on the chart, such as in this response: “Na is larger because it is on the left side of the chart” or “is smaller because it is at the top position in its group.” Be able to cite the underlying physical principles of charge attractions and repulsions, often described by using effective nuclear charge, or number of shells, that are responsible for these property trends.

## **Understand Forces**

The bonds between atoms in molecules must be distinguished from the interactions that keep the molecules attracted to each other. The forces within a molecule (Intramolecular) are different from the forces between the molecules (Intermolecular).

## **Calculate Accurately**

Since a calculator is allowed for the entire free-response section, accurate answers are expected. Be familiar with the functions on your scientific calculator in order to select the appropriate calculator buttons. For example, some calculations might involve the entry of numbers in exponential notation, the conversion into or from common and natural logs, and perhaps percent.

Remember that you will have access to both the AP Periodic Table of the Elements and the AP Chemistry equations and constants sheet.

Watch for careless errors; be sure that numbers used for calculations are the numbers given in the question, paying close attention to exponents, especially the sign of the exponent.

Even for simple calculations, show your work. Don't just give them the numbers. A correct answer with no supporting data often will not earn all possible points.

Check the “reasonableness” of numerical answers. (There are no negative equilibrium constants, Kelvin temperatures, or bond energies).

Remember that if you cannot solve an earlier part of a problem, you may still get some credit for a later section by showing how you could use the earlier answer in succeeding parts of the problem, even if you solve a problem by correct substitution of an incorrect or an assumed value.

## **Understand Significant Figures**

Review and consistently apply rules for significant figures, and avoid rounding off before the final answer. (Round calculations to appropriate significant figures at the end of the problem.)

## **Use Correct Units**

Include units in your final answers as appropriate. If no units are specified, use the most convenient units.

## **Draw and Label Graphs Correctly**

Any graph you are asked to draw should have clearly labeled axes with appropriate scales.

Be familiar with the methods used to linearize data, such as using the natural log or the reciprocal of the data.

## **Lab Questions**

### **Designing an Experiment**

In laboratory-based questions, never indicate that you will measure volumes with a reaction vessel, like a beaker or an Erlenmeyer flask. All volume measurements must take place in a calibrated instrument (graduated cylinder, volumetric flask, volumetric pipet, etc.).

### **Error Analysis**

Recognize that a variety of errors implicit in every measurement made in the laboratory will have an effect on final calculated answers—and be able to describe that effect in terms of increasing, decreasing, or having the final result stay the same.

### **Titration Curves**

For complete understanding, recognize the important regions or points in a titration curve. They are the initial pH, the buffer region, the inflection point, the equivalence point, the pH at the equivalence point, and the region where the pH levels off at the end of the titration. Distinguish clearly between endpoint and equivalence point with specific examples from the laboratory (not just by definition). Also be able to compare concentrations of the species at each point and region.

## Percent Error

Distinguish between the different types of percent: percent error, percent yield, and percent of a component.

## Task Verbs

Pay close attention to the task verbs used in the free-response questions. Each one directs you to complete a specific type of response. Here are the task verbs you'll see on the exam:

- **Calculate:** Perform mathematical steps to arrive at a final answer, including algebraic expressions, properly substituted numbers, and correct labeling of units and significant figures.
- **Describe:** Provide the relevant characteristics of a specified topic.
- **Determine:** Make a decision or arrive at a conclusion after reasoning, observation, or applying mathematical routines (calculations).
- **Estimate:** Roughly calculate numerical quantities, values (greater than, equal to, less than), or signs (negative, positive) of quantities based on experimental evidence or provided data.
- **Explain:** Provide information about how or why a relationship, process, pattern, position, situation, or outcome occurs, using evidence and/or reasoning to support or qualify a claim. Explain “how” typically requires analyzing the relationship, process, pattern, position, situation, or outcome; whereas, explain “why” typically requires analysis of motivations or reasons for the relationship, process, pattern, position, situation, or outcome. Also phrased as “give one reason.”
- **Identify/Indicate/Circle:** Indicate or provide information about a specified topic in words or by circling given information. Also phrased as “what is?” or “which?” or other interrogatory words.
- **Justify:** Provide evidence to support, qualify, or defend a claim and/or provide reasoning to explain how that evidence supports or qualifies the claim.
- **Make a claim:** Make an assertion that is based on evidence or knowledge.
- **Predict/Make a prediction:** Predict the causes or effects of a change in, or disruption to, one or more components in a relationship, pattern, process, or system.
- **Represent/Draw/Write an Equation/Complete a Diagram:** Use appropriate graphs, symbols, words, and/or models to describe phenomena, characteristics, and/or relationships.

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