

AP Chemistry Free-Response Tips

1. Know the FRQ format. On the AP Chemistry exam, you will have 105 minutes to answer 7 essay questions, broken down like this:

	Long Free-Response	Short Free-Response
How many?	3	4
How much time?	20 minutes for each	8 minutes for each

The Long-Free Response questions are exactly what they sound like: long, multipart questions. Each of these questions will often be based off of one set of data. The Short-Free Response questions are shorter and may contain single or multipart questions.

2. Understand the skills you need. According to the CollegeBoard, the 7 essay questions will assess a few essential skills. These include:

- Experimental design
- Quantitative/qualitative translation
- Analysis of authentic lab data and observations to identify patterns or explain phenomena
- Creation or analysis of atomic and molecular views to explain observations
- The ability to follow a logical/analytical pathway to solve a problem
- Manipulation and interpretation of data
- Making predictions and justifying phenomena

- Using mathematical processes to explain concepts
- 3. Be clear and specific.** Your goal on the AP Chemistry exam is to prove that you have a deep understanding of chemistry concepts. That's why you absolutely must communicate as clearly and as precisely as you can. Avoid vague, unclear, and flowery language. Inject **details**, **examples**, and **evidence** in your answer. Restate the question in your answer in a few words. Do not ramble! If a sentence adds nothing to your answer, do not include it.
 - 4. Use appropriate scientific language.** Do not make the mistake of using improper terms to describe important concepts. For example, do not refer to an atom as a "molecule" or to an intermolecular force as a "bond." Make sure you know how to use proper chemistry symbols and notation. This includes the correct use of superscripts and subscripts, parentheses versus brackets, mol versus m, etc.
 - 5. Pay attention to units and significant figures.** In order to receive full credit on FRQ responses, make sure to include units and correct significant figures in your final answer. If the question does not specify, write your answer to the same number of sig figs as the weakest piece of data.
 - 6. Understand that calculators, formula sheets, and periodic tables alone are not enough to answer questions.** Some AP Chem students have the misconception that their calculator and formula sheets are "cheat sheets," meaning they don't really have to study their math skills since everything is given to them. Yes, you can store equations in your calculator and yes, a formula sheet and periodic table will be given to you on the exam, but these tools are no substitute for actually understanding the material. You need to know how to apply these given formulas to specific problems and this can often involve multiple steps and multiple formulas that build upon each other. The goal of the AP Chemistry exam is to test your mathematical reasoning and quantitative skills, so you can't get away with just winging it on test day. It's also important to note that you will not receive credit for referencing positions on the periodic table or for simply writing the correct formula on your answer sheet.
 - 7. Check if your numerical answers are logical.** Since you can use your calculator on the FRQ portion of the exam, it can be easy to punch numbers into your calculator too quickly, make a typing mistake you don't notice, and come up with a completely wrong answer. Try and combat this by making sure your final answer seems reasonable. For example, there are no negative **equilibrium constants**, Kelvin temperatures, or bond energies. If your answer is negative, does it make sense in this case? ***Don't lose points based on carelessness.***
 - 8. Attempt every part of the problem.** Most free-response questions have multiple parts. If you can't answer part "c" of a question, don't fret; you could still get points for parts "a," "b," and "d." Even if your numbers are off because you can't get question "c," good reasoning could still get you partial credit.
 - 9. Know how to connect and apply math to key terms.** For the AP Chemistry exam, you need to know your vocabulary and definitions, but you also must know how to do

math problems associated with these terms. As an example, take the term *lattice energy*. It's important to know what this term means, but it's also important to know how to apply it in calculations. For example, a question might ask you to calculate the lattice energy of a given crystal lattice composed of sodium and chlorine in a one-to-one ratio.

- 10. Answer in complete sentences.** Since this is the AP Chemistry exam, not the AP Language and Composition exam, you should *not* write your answers in the typical five-paragraph essay format. AP Chem FRQs require that you answer the question and nothing more. This means that you should not add sentences that contribute nothing to your answer or include flowery, vague terms.
- 11. Show all your work.** For questions that involve math and calculations, be sure to include *all* the steps you took to arrive at your answer, even if some of the steps seem obvious. Some questions will give you points for showing your steps as well as for giving the correct final answer.
- 12. Know these essential chemical calculations.** You should know the following problem types and calculations inside and out before taking the AP Chem exam:
 - Percentage composition
 - **Empirical formulas** from experimental data
 - Molecular formulas from empirical formulas
 - Mole fractions
 - Molar solutions
 - Kinetics calculations
 - Gas laws
 - Stoichiometric relations
 - Titration calculations
 - Faraday's laws of electrolysis
 - Standard electrode potentials

- [Equilibrium constants](#)
- Thermodynamic calculations

13. Write down the values given to you and their units. It can sometimes be difficult to figure out which formula to use for free-response questions that involve math. To combat this, write out all the values and their units that are given to you in the question. From there, you should have a clearer picture of (1) what the question is asking you to do, and (2) which formula you should use to arrive at the answer.