

How to Study for Chemistry

A.K. El-Ashmawy

Most students who take Chemistry expect it to be like all the other courses they've had either in high school or in college. However, this is not the case. Typically, students study by reading through their notes and maybe working some problems before the exam. They try to use flashcards and memorize information. The reason why this is not effective and causes the student to struggle and be frustrated is that they have to change the way they approach studying for the course. Your goal should be to develop your critical thinking skills by studying for understanding not for memorization.

According to Bloom's taxonomy, there are six levels of critical thinking, starting with basic knowledge and progressing toward higher level critical thinking. The six levels of Bloom's taxonomy are:

1. **Knowledge:** Basic recall of facts and data: times, dates, names, formulas, etc.
2. **Comprehension:** Not just knowing the most important data associated with a concept, but also articulating relationships among data – to grasp the principal meaning of a concept.
3. **Application:** Taking a concept under study and using it in a new or hypothetical situation to arrive at a correct answer.
4. **Analysis:** Breaking something into component parts – looking at individual items for trends or evidence for generalization.
5. **Synthesis:** Presenting items or thoughts together in new ways, based on presented criteria.
6. **Evaluation:** Arguing for the validity or relative worth of a viewpoint or process, based on established criteria.

To develop critical thinking skills and better understanding, the student should paraphrase the concepts they are learning, ask "why" or "how", work as many problems as possible, think about how different concepts relate to each other, and think of the various possible applications of the concepts.

First, where you study makes a big difference. Often, students study at home or in their rooms where there are lots of distractions. They are not "in the mood" to study when at home. I encourage you to maximize your time by studying at the college or a public library close to home so you can really focus on the material. Actively studying with purpose for one hour is more efficient than studying several hours at home with distractions of food, sleep, computer games, other responsibilities, etc.

I. Be prepared for lecture.

Look at the syllabus to know what chapter and topics are to be covered, and read the textbook beforehand. To effectively and actively read the textbook, follow these steps.

- A. Use the section heading to come up with two or three questions before you read that section. Try to tie any previous information or knowledge in the questions you ask up front.
- B. As you read the section, look for the answers to your questions. Take notes as you read and write down any questions you have from your reading.
- C. Plan to spend 15-20 minutes per section. Take short breaks between sections to keep your mind focused.

II. Prepare questions to bring to lecture each time, and ASK THEM!

- A. The notes you took from reading the chapter and sections should serve as basic notes for the lecture. You can add to your notes the important points and concepts given in lecture.
- B. As you listen through the lecture, try to see how the concepts fit together and get the answers to your questions.
- C. If the answers to your questions are not given or obvious to you through the lecture, ask the question!

III. After each lecture, review concepts and problems covered in class

- A. Review the notes from each lecture the same day and re-write them as needed.
- B. Review the previous lecture notes along with the newer notes you've taken to allow for melding of the concepts.
- C. If applicable, work as many problems as you can before the next lecture.
- D. A general rule of thumb is to study 2-3 hours outside of class for each hour you are in class (includes lecture and recitation).

IV. Make sure you do any assigned homework.

- A. If there is homework assigned, complete it as soon after the lecture as possible. This allows you enough time to get help if you get stuck
- B. Visit the professor during office hours or make an appointment to get help.
- C. Check to see if there is any online homework posted. Complete as much of it as you can based on what you learned from lecture and from reading your textbook.

- V. For the next lecture, bring the questions you had from the previous lecture as well as the questions you have from your reading for the topics to be covered in that lecture.**
- A. Keep a sheet where you have your questions.
 - B. Write your answers as you go through the lecture. This will help you study and understand the material afterwards.
 - C. If you have a question that was not answered through the lecture, you should ask it before the end of that lecture.
- VI. Study everyday.**
- A. Regardless of how well you know the information, review it everyday along with all the previous notes from the class.
 - B. After a while, you will have good command and understanding of the concepts and how they relate to each other as well as the corresponding problems.
 - C. As the semester progresses, you will find that you understand more and more the earlier topics, which are now in your long-term memory.

Top 5 Signs of Insufficient or Poor Studying

- 5. "I forgot we had homework."
- 4. "I don't remember how we worked that problem in class."
- 3. [After seeing exam score] "...but I studied more than six hours before the test."
- 2. "I am so lost; I don't know where to start!"
- 1. "I don't even know what question to ask!"