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How to Win Chem 30

A Candid Rant on an Age-Old Question

Disclaimer

Please note that this is my personal opinion (which just so happens to be 100% true). Others, including classmates, your parents, other grad students, other TFs, and some professors may have different advice. They are wrong. If you have downloaded this handout off the Interweb and disagree with me, don't bother sending me letters or e-mails. If you'd like to voice a dissenting opinion, make your own handout and post it on your own chemistry Web site. The views expressed in this paper do not necessarily reflect the views of management. Thanks for reading and have a nice day.

In two years of teaching orgo courses here, the question asked most frequently of me has been, "how do I study for this exam?" Invariably, the answer is the same:

***Problems*. You must do problems. You must do as many problems as possible.**

Organic chemistry is a game and the person who does the most problems and understands them wins. The proper way to do problems is without the answers in front of you. I don't know what it is, but it's just so damned tempting to delude yourself into doing the problem "in your head" and then glancing at the answers to check yourself. Actually take the time to write out solutions, then check those when you are done. You may just learn a thing or two by forcing yourself to figure something out. What do you do when you run out of problems?

***More* Problems. You must do more problems.**

Organic chemistry is a difficult subject that requires a lot of involved reasoning. Maybe that's why places like med schools care about it so much. To improve your chemical reasoning, you must gain experience to build your "chemical intuition." How do you do this?

By working problems—lots of problems.

But Paul, you ask, "What about other things?"

Well, you should probably go to lecture. Since they're taped, I really can't think of a reason why, but if you don't go to lecture, you run the risks of errors with videotaping, missing a handout, and irritating a professor from whom you may eventually wish to seek a recommendation. You should also read through the book and handouts, but there is a proper way to go about doing this, too. William von Eggers Doering, a legendary organic chemist, made the fantastic statement, "Chemistry should be read with a pencil." When you read, make notes and work out mechanisms to satisfy yourself that the material jives with your understanding of chemistry. It also makes for good mechanism practice. But when you are done reading, get back to doing more problems. Sleep can wait.

There is a wealth of organic chemistry problems available to you. So many that if you start doing them now and don't sleep until the end of reading period, you will never be able to finish them all. Thus, the issue becomes one of prioritization—what are the best problems to do first?

1. Obviously, you should start with all of the problems that are directly associated with this course. Do the problem sets. Look at the course problem database. Look at practice exams. Do the problems posed in the lecture slides.

2. Chem 206 Web site (http://www.courses.fas.harvard.edu/~chem206/). If you go to this site, don't freak out. This is a graduate course and much of the material is "above your head," but I would argue that it is not out of reach once you learn the concepts in Chem 30. Prof. Evans designed Chem 206—it is "his baby"—so you can get a good idea of what he thinks is important. You may notice a distinct similarity to the material presented in Chem 30, especially in the lecture slides and some of the questions.

3. *Organic Chemistry* by Maitland Jones. This is my favorite organic chemistry textbook. Jones presents everything in terms of molecular orbital theory and his problems are top notch. Loudon is a good book, but Jones is better in my opinion. You may want to get your hands on the student solutions manual by Henry Gingrich.

4. *Advanced Organic Chemistry* by Bernard Miller. This is a nice, thin book that hits on a lot of points that we're talking about in Chem 30. Each chapter has a short list of good problems, although there is no solutions manual available to the general public (that I know of).

5. *The Art of Writing Reasonable Reaction Mechanisms* by Robert B. Grossman. Welcome to arrow pushing 101. This book has a lot of sage advice on doing arrow pushing mechanisms and some less-straightforward types of problems in organic chemistry. I must admit that I expected a little bit more from a book with its intriguing title.

6. *Frontier Orbitals and Organic Chemical Reactions* by Ian Fleming. This is a very nice book about MOs in orgo. It doesn't have problems, but that doesn't mean it isn't useful for practice. Take "Bull" Doering's advice and "read with a pencil." When you come across an interesting reaction, see if you can build the molecular orbitals, identify the HOMO/LUMO, and figure out the reaction from first principles.

7. *Organic Chemistry* by Leroy Wade. There are a lot of problems in this book. Most of them are low-level, straightforward problems which are great for "skill drills." You can use these to make sure you know your reactions and most of the basic concepts taught in sophomore orgo. The problem is that most of the problems fall below what you would expect to find on a typical chem 30 exam.

8. The WWW. All respectable universities in the country and Yale offer courses in organic chemistry. Many of them have course Web sites where instructors post problem sets and exams in mass volume. Here are a number of examples. You can find many more.

Princeton:	http://www.princeton.edu/~mjjr/ORGO/301A-04.html	(★★★★★)
	http://www.princeton.edu/~mjjr/ORGO/TOC.html*	
	*This could be the start of something nice—but not yet.	
Duke:	http://www.chem.duke.edu/undergraduate/general/classinfo.html	(★★★★)
Brown:	http://www.chem.brown.edu/education/courses.htm	(★★★★)
Maryland:	http://www.chem.umd.edu/courses.html	(★★★)
CalTech:	http://chemistry.caltech.edu/groups/dad/ch41/index.htm	(★★)
	http://chemistry.caltech.edu/classes/ch41/41main.html	