

## Chemistry 125 Fall 2012, Advanced Organic Chemistry Lab

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**SacCT site:** <https://online.csus.edu>

**Course Introduction:** The emphasis of Chemistry 125 is the application of the tools of chemistry to the synthesis of organic molecules, the separation of mixtures of organic compounds, and the subsequent identification of these compounds. Chemistry 125 focuses on discovery-based learning, i.e. the concept that learning comes as you solve various organic chemistry puzzles. In this laboratory you will run several synthetic experiments, but you will not be provided with the structures of the products (contrary to the approach in Chemistry 25). The products will be unknowns whose structures you will determine by the interpretation of infrared, NMR, and mass spectral data.

Each of the basic experiments will require a written report, formatted in the style of papers in the Journal of the American Chemical Society (a realistic model for the senior thesis), as well as a final poster project with presentation. All reports must be done with a word processor. Spectra must be embedded in the body of the text close to the point of discussion. All structures must be drawn with ChemSketch, ChemDraw, ISIS Draw, or some other structure drawing program. No handwritten reports or additions to the reports will be accepted.

**Textbooks for This Course:** Two textbooks are needed for Chemistry 125. The first one is the text you used for Chemistry 25 or your first semester organic laboratory. This book will provide you with a review and guide as to how to do some of the standard operations in the laboratory. Be sure to review each technique as you do it again in this laboratory. If you have never performed a technique, thoroughly study the appropriate section in your old text and discuss it with the instructor.

The second text required for this course is "Spectrometric Identification of Organic Compounds," 7th edition, by Silverstein, et al. This book is indispensable when trying to analyze IR, NMR, and mass spectral data. If you suspect that you have a certain type or class of compounds, look in the index to find the sections on IR, NMR, and mass spectra for that kind compound. In your reports give the reference to the page in Silverstein where your supporting assignment is found.

### **Items to Purchase for This Course**

1. Silverstein, R.; Webster, F.; and Kiemle, D.; "Spectrometric Identification of Organic Compounds." 7th ed.
2. Bound laboratory notebook. You will be required to keep notes in this book and will turn it in to your instructor at the end of the semester. **The notebook must be with you at all times in the lab.**
3. Safety **Goggles** (**not** glasses). These are required for protection of your eyes. The rule is: "No Goggles, No Work in the Laboratory!"
4. Gloves (latex, nitrile, or rubber). Purchase nitrile or latex gloves through the Bookstore or most local hardware stores. Alternatively, you may buy a pair of rubber gloves from a grocery store. Be sure to get the correct size; a larger size is easier to get on and off. Gloves should always be worn when you pour liquids from one container to another and during extractions. The rule for this class is: "No Gloves, No Work in the Laboratory!" This is for your protection.
5. Chemistry 125 Laboratory Manual and Lecture Handouts.

**Lab Notebook** You are to keep a bound lab notebook which will contain the following:

1. A table of contents
2. Numbered pages
3. Equation for reaction being performed
4. Date of work as it is performed
5. Pertinent physical constants of the organic starting materials and potential products: mp of solids and bp of liquids, molecular weights, densities, etc.
6. An outline of what you are going to do.
7. Any potential hazards such as: fire, toxicity, etc. See Dangerous Properties of Industrial Materials edited by Sax for a listing of hazards of known compounds or check any Material Safety Data Sheet (MSDS)-found in the service center or on-line.
8. A record of what you actually did: Correct masses and moles of reactants, volumes of liquids, concentrations of solutions, actual procedure (not what the experimental procedure told you to do), observations of reaction process, clean-up procedures, mass of product (mp, bp, etc where appropriate), analyses performed with summary of conclusions drawn from analyses.

This information, along with the spectral and chromatographic (HPLC, TLC, etc) data, will be used in writing the lab report.

### Experiments and Required Work

1. **Homework Sets.** In order to learn how to interpret and assign spectra to structural features in organic compounds several spectral problem homework sets will be assigned. In addition there will be a homework set dealing with nomenclature and basic calculation review, and an extraction homework set based on the use of the computer program Excel. All points for homework will be added together and scaled to 100 pts
2. **Experiments.** A total of 5 experiments will be completed through the course of the semester. Each of the first four experiments will require either a formal lab report to be written or a PowerPoint presentation (see instructor). The fifth experiment will be presented in poster format (see below).
3. **Poster Project.** The culmination of this laboratory is the successful completion of an individual project which will be described in a poster that will be displayed in the joint poster session for Chemistry 125, 133, 141 and 164, to be held during finals week on Friday, December 17<sup>th</sup> at either 8 am or 10:30 am (to be determined based on graduation schedule). **Attendance at the poster session is mandatory!** Project topics will be chosen from a list provided by your instructor. You cannot pass the class without participating in the poster session.
4. **Exam.** An exam will be given during the sixth-eighth week of semester (depending on class schedule). Note that the poster project is considered to be the final exam for this course!

### Approximate Point Distribution for the Final Semester Grade

	Points
Experiment 1	100
Experiment 2	100
Experiment 3	100
Experiment 4	100
Poster Project	140
Technique / Lab book	60
Homework Problems	100
Exam	<u>100</u>
Total	800

**Grading will follow the percentages of the total points earned:**

**100-90% A to A-, 89-80% B+ to B-, 79-70% C+ to C-, 69-60% D, below 60% F**

Extra information, due dates, and sample grading forms can be found on the SacCT website. Check this site frequently for updates, class schedule changes, announcements, etc.

**Accommodations:** Students with disabilities requiring special help or accommodations should see the instructor as soon as possible.