

**CHM122L - Organic Chemistry I Lab  
Spring 2007**

**Instructor:** Dr. S. Bruce King  
**Office:** 15B Salem Hall (758-5774)  
**Labs:** 10 Salem Hall, Monday 2-6  
**Office Hours:** open door policy or by appointment  
**E-mail:** kingsb@wfu.edu  
**Course Web Page:** <http://www.wfu.edu/~welderco>

**Required Texts:** Zubrick, The Organic Chem Lab Survival Manual, A Student's Guide to Techniques, 6<sup>th</sup> ed., 2004.

Laboratory Notebook with duplicate, carbonless pages

<b>Grading Scheme:</b>		<b>Percentage</b>
Midterm Exam	March 5 (through IR and NMR experiments)	10%
Final Exam	April 30 (cumulative)	15%
Reports and Products	11 reports, 1100 points (see table)	75%
Total		100%

Letter grades will be assigned according to a scale generated at the end of the semester. Class scores may be adjusted to account for teaching assistant grading discrepancies. In the event of TA grading discrepancies, the instructor will determine whether the discrepancy is due to difference in actual performance of students or to difference in grading styles of individual TA's. If the difference is determined to be due solely to TA grading style, then the scores from the different lab sections will be adjusted to compensate.

**Midterm and Final Exams** are designed to test whether or not you understand the concepts and techniques taught and used in the lab. For instance, how does an impurity affect a melting point? Why is it important to allow a solution to cool slowly while crystals form? How does the rotovap work? Where (specifically) is safety equipment located? How would a particular experimental error affect the results of an experiment? Can you calculate percent yields for reactions? Could you predict products for reactions that are very similar to reactions carried out in the lab? If you truly understand the experiments and the equipment that we use in lab, you should not have difficulty with the exams.

**Attendance at pre-lab lecture is mandatory!** Safety issues will be discussed in the pre-lab lecture. You cannot participate in the lab if you do not attend the pre-lab. Pre-lab lectures will begin promptly at 2 pm. Deductions in your report grade will occur if you arrive late to pre-lab.

If you know you will miss a lab, inform your instructor and your teaching assistant. Students are not allowed to make up missed experiments. If you have a valid excuse (illness with a doctor's

note, death in the family, or university-related travel) for missing a lab, then your lab grade will be based on fewer reports and product grades. You will still be responsible on the midterm and/or final for the material you missed in the lab. The instructor, not the TA, will determine if the absence is excused!

### **Safety:**

We are required by the Occupational Safety and Health Administration (OSHA) to provide safety information to you. Much of this safety information is presented in a video at the beginning of the semester. However, it is your responsibility to pay attention to chemical hazards and to learn the location of safety equipment and Material Safety Data Sheets. All students will be required to pass a safety “quiz” early in the semester. Answers to questions on this quiz can be found in the safety video, in the lab text, on safety posters in the first floor halls, or in the lab rooms. Handouts and safety information, including Material Safety Data Sheets, can be found on the course web page at <http://www.wfu.edu/~welderco/122L/>.

Students should familiarize themselves with the basic safety practices:

- Never work in the laboratory alone or perform unauthorized experiments.
- Learn the location of the nearest fire extinguisher, eye-wash, safety shower, and exits.
- Wear safety glasses at all times in the laboratory.
- Do not wear sandals or shorts in the laboratory. Legs must be covered!
- Handle all chemicals with care, avoid contact with skin and clothing, avoid inhalation.
- Do not eat, drink, or smoke in lab.
- Dispose of chemical waste properly.
- Report accidents immediately to the TA or instructor.
- Keep book bags and personal items off the floor of the lab room.

### **Laboratory Notebooks:**

- Each student is required to have a laboratory notebook with duplicate pages.
- The duplicate pages of the notebook should be torn from the notebook and given to the TA once a write-up for an experiment is completely finished.
- Notebook should be written in ink, preferably a ballpoint pen.
- Notebook entries must be neat, organized, clearly written, and legible to be considered for grading. Unintelligible scrawl will not be graded.
- The experimental procedure should be written so that another person could use your notebook to repeat your experiment.

**Notebook Organization:** See Zubrick Ch. 2 for a notebook outline and a detailed example.

1. Name, Class, Teaching Assistant, Instructor (inside front cover)
2. Table of Contents: Leave two blank pages at the front of the book for a TOC if the notebook publisher does not include one. Keep a running (and up-to-date) TOC that includes the experiment title and notebook page number. Your teaching assistant will occasionally check TOC entries.

**For each experiment:**

**Pre-Lab**

1. Date Experiment Is Performed
2. Experiment Title
3. Purpose or Objective (one or two sentences should suffice)  
(*Include steps 4-6 for experiments in which chemical reactions are carried out.*)
4. Balanced Equations for Reactions Performed (Including Structures)
5. Amounts of All Reagents used including:
  - Amount in grams or mLs
  - Molecular Mass
  - Number of Moles
6. Calculation of Theoretical Yield
7. Experimental Procedure: Read laboratory procedure before lab and prepare a short, abbreviated procedure (see Zubrick Ch. 2), flow chart or outline. Avoid the use of the first person. Leave room in your notebook to record actual experimental observations or changes in planned procedure. For any Spartan computer labs, you should refer to the handouts rather than rewriting the entire procedure in your notebook. *You should be able to do the experiment from your notebook and without the lab text. **If you come to lab prepared, your experiments will go more smoothly, and you should be able to finish the experiment by 6 pm. If you do not prepare for lab, you may not be able to complete the experiment, and you will experience more difficulties.*** Basic Lab Skills and Special Equipment information can be found online <http://www.wfu.edu/~welderco/122L/>.
8. Describe any particular safety hazards and the planned disposal of chemical wastes.

**During Lab**

Record all procedures and observations in ink directly into your notebook. It is impossible to write this section before the lab and difficult to completely write it afterwards. Be sure to indicate any experimental observations in this section (color change, gas evolution, heat produced, increase or decrease in reagents, etc.)

**After Lab**

1. Calculate percent yield of the desired product (before and after purification, if applicable)
2. Organize (tabulate) physical data for desired product (mp, bp, TLC, GC retention time, etc.)
3. Discussion/Conclusions: Comment briefly on experiment. Were the objectives of the experiment met? If there were problems, comments should be made on what possibly occurred and solutions to avoid the problem.
4. Answer any assigned questions.

## Lab Reports:

Eleven lab reports will be required this semester. For each report, turn in the duplicate pages from your notebook, typed answers to questions, and a typed discussion. Also include Excel graphs and data points as necessary. If you were given or obtain spectra, include the spectra in your final report. Include electron-pushing mechanisms when instructed to do so. Reports are due at the beginning of a class period as indicated in the chart.

The teaching assistant will use 10% of each report grade to distinguish the most prepared, safety conscious students from those who are less prepared for, late to, or careless in lab. To earn high performance points, you should read the experiment before lab, complete the pre-lab notebook entries prior to lab, wear appropriate lab attire (including safety glasses) at all times, act professionally in the lab, and help keep the lab and your lab drawers clean. You should work efficiently in lab and ask intelligent questions of your TA when necessary. You will automatically receive deductions for safety violations and bad lab techniques, such as leaving caps off bottles, writing on scrap paper, possibly contaminating reagent bottles, or improper waste disposal.

For experiments in which products are submitted for grading, a portion of the report grade will reflect the product. Be aware that 20% (50 points) of your painkiller report grade will be directly related to how well you separate and isolate the three components of the painkiller. Other product grades will have less impact on the overall report grade.

Report	Experiment	Due Date	Report Value
1	Conformational Analysis	January 29	100 points
2	Moonshine	February 12	100 points
3	Pigments in Paprika	February 19	100 points
4	IR	February 19	50 points
5	NMR	February 19	50 points
6	Components of a Painkiller, Crystallization, Melting Point	March 26	250 points
7	Mass Spectrometry	March 26	50 points
8	Benzopinacol and Pinacolone Rearrangement (including Spartan)	April 16	100 points
9	Alkenes from Alcohols (GC)	April 13	100 points
10	Diels-Alder	April 30	100 points
11	Unknown	April 30	100 points
Total			<b>1100</b>