

Syllabus
CHM 2201 Organic Chemistry Laboratory I
Fall 2008

- Text: C.E. Bell, D.F. Taber and A.K. Clark, *Organic Chemistry Laboratory with Qualitative Analysis*, 3rd edition, Brooks/Cole-Thomson Learning, Pacific Grove, CA, 2001.
- A Student Laboratory Research Notebook is also required.

Laboratory Location: Mendel 385

Course Goals: Organic Chemistry Laboratory I will provide students with practical experience in using techniques associated with operational organic chemistry. The first part of the course will deal with methods, such as melting point determination, recrystallization, distillation, extraction, thin layer, column and gas chromatography and infrared spectroscopy, used to analyze, identify and purify organic compounds. These skills are crucial in isolating, purifying and analyzing the compounds that will be prepared in the latter part of the course. The reactions that will be carried out have been chosen to illustrate concepts and reactions that are covered in Organic Chemistry I lecture (CHM 2211).

Attendance:

- Attendance is mandatory.
- There are no makeup labs or quizzes.
 - However, if you know in advance that you can will miss your regularly scheduled lab, notify your instructor (try to provide at least a week's notice) and, if scheduling and space permit, you may be able to attend another lab class for that particular lab.
- Must have a written excuse for an absence.
- Unexcused absences will result in a "zero" for that lab and/or quiz.
- You can not miss more than two labs. By doing so, you will not be able to complete the course and will obtain an incomplete for your final grade.

Grading: You will be evaluated based on the following approximate emphasis:

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| 1. Lab Notebooks: | 50% |
| 2. Quizzes: | 30% |
| 3. Technique and Products: | 20%* |

* The actual emphasis may vary slightly from the above grading scheme.

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Laboratory Notebook Requirements

All write-ups must be placed in a Student Laboratory Research Notebook, available along with your text, in the Villanova Bookstore. Use a ball point pen for writing and place all information directly in the notebook as it is obtained. Leave two pages at the beginning for a Table of Contents. It is important that you write clearly and legibly. However, since some writing must be done in the laboratory, you will not be expected to provide polished, formal reports. Note that only the tear-out copies from the notebook are to be handed in for marking. The original copies are to remain in your possession.

Each experimental write-up will consist of three parts:

1. A **Pre-Lab Write-up**, which you must complete before lab and hand in to your TA when entering the lab.
2. Your **Observations** recorded in lab.
3. Your **Conclusions**, which you complete during or after lab (as directed).

A typical **Example of a Laboratory Write-up** will be provided as a handout. Note that your Instructor or TA may also have additional items that they want to be included in experimental write-ups.

► The Pre-Lab Write-up:

On entering the lab, you must present the notebook copy of your pre-lab write-up for that day to your TA. The purpose of the write-up is to demonstrate reasonable preparation for, and knowledge of the experiment to be conducted. If you do not demonstrate such knowledge, either written and/or orally, you will not be allowed to carry out the experiment. It is imperative that you complete the reading assignments and compose your own pre-lab reports. **It is unethical to copy pre-labs, and other parts of your lab reports from other persons or sources. It is also a violation of the Code of Academic Integrity of the College of Liberal Arts and Sciences.**

The Pre-Lab Write-up should include:

1. Your **Name, Course, Section Number, Lab Partner** (if any) and **Date** (at the top of each page).
2. **Title of the Experiment**
3. **Statement of Purpose** of the experiment (a sentence or so regarding the techniques or principles which the experiment demonstrates).
4. **Reaction Sequence** (where applicable). Reactions should be written in standard manner with solvent and temperature information over reaction arrows, and the stoichiometry clearly indicated. Individual steps of multistep processes are to be included.
5. **Table of Physical Constants** of reagents to be used in the experiment. Information (such as boiling points and densities for liquids, melting points for solids, molecular weights, solubilities, etc.) for completing the table may be

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found in the lab text (Appendix C, page 283), in the CRC handbook, at www.chemfinder.com or in an Aldrich Catalog, copies of which are in the laboratory.

6. **Procedure.** The procedure indicated in the lab text and/or from a handout should be recorded in brief outline format. This step-by-step outline should include all information required for conducting the experiment, such as procedures, amounts of chemicals or solvents to use, reaction times and temperatures, and other important considerations (such as "until the color fades", or "add 11.0 M sodium hydroxide with stirring, to pH 9.0").

► Observations (to be recorded in lab):

Observations should be recorded in your notebook as you carry out your experiment.

This means that you will repeat in more detail the actual procedure that you've previously outlined in the pre-lab. Your observation section will be more detailed and much longer than the pre-lab procedure. Also, redraw the reaction sequence, only this time insert beneath the structures the quantities of reagents actually used in the experiment. Record exact amounts of all reagents and solvents, the size and type of apparatus used, how and in what order you mixed the reagents, how long you stirred or refluxed the reaction mixture, how you quenched or stopped your reaction (by pouring into water, for example), any color changes that occurred, how you recrystallized the product, the boiling point of your product if you distilled it (if appropriate use a table displaying the volume of distillate collected and the boiling point range of the distillate), a drawing of your TLC plate showing starting material and product, the melting point of your product, etc. Attach IR and NMR spectra and GC traces to your notebook sections that are handed in for grading. **IN OTHER WORDS, RECORD EVERYTHING THAT YOU DO IN ENOUGH DETAIL SO THAT ANOTHER PERSON WITH A BASIC KNOWLEDGE OF CHEMISTRY COULD REPEAT YOUR EXPERIMENTAL WORK.**

Do not use personal pronouns (I, we, he, she, us, etc.) when writing in your notebook.

Instead of writing "I added 4 grams of phenol to 30 mL of methanol in a 100 mL round bottom flask equipped with a reflux condenser" write "To a 100 mL round bottom flask containing 30 mL of methanol and fitted with a reflux condenser was added 4 g of phenol."

!!!!!! Notebook pages containing your observations must be initialed and dated by your professor or TA before you leave lab for the day. !!!!!!!

► Conclusions include:

1. Results, such as % yields (show calculations) and comparisons between literature values for yields, melting points and boiling points, chromatographic, spectral data with those which you obtained. Interpretation of infrared and NMR spectra.
2. Your interpretation of results which you consider to be unusual, or not in agreement with those indicated in the text or by the instructor. You should focus especially on how errors might have contributed to the outcome.