Organic Chemistry Laboratory
CHEM 2461

Winter Quarter, 2008

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Text: "Microscale Operational Organic Chemistry", by John W. Lehman

General: Lab is scheduled from 2:00 to 5:30 on M, Tu, W, Th or 6:00 to 9:30 on Tu. Please come, on time, to your assigned lab section. Attendance will be taken. Each lab will begin with a brief introduction to the experiment to be done that day.

Read the **Introduction** (pp. 2-8) and the **A Guide to Success in the Organic Chemistry Lab** (pp. 8-11) sections in the lab text.

The schedule of experiments for the quarter is attached. Please read the experiment **before** coming to lab and do the "Before You Begin" assignments. You will not be allowed to begin the experiment until the TA has verified that you have completed the "Before You Begin" assignments and you have prepared your lab notebook for the experiment. If you read the experiments before lab and plan your time well, you will find it easy to complete the experiments in the allotted time or less. Planning ahead will also enable you to use your time most effectively. For example, an experiment might require that a reaction mixture be heated for one hour. The best use of your time would be to get the reaction started immediately. Then, while the reaction is being heated, you could distill the product from the preceding experiment, take melting points, wash glassware, or even study. In addition, you will find it advantageous to clean your glassware before you leave for the day. When you come for the next lab, your glassware will be clean, dry, and ready to use.

Safety: READ PP. 14-23 IN THE LAB TEXT.

The organic laboratory is a potentially dangerous place. However, no accidents need occur **if you are careful and are constantly aware of what you are doing and why.** Read the directions given in each experiment carefully and in advance. Pay particular attention to any special safety precautions that are given for an experiment. Make sure you understand each step of the experimental procedure and any potential dangers. If you have questions, ask! Use your common sense and, above all, **THINK!**

The following safety rules will be in effect at all times:

1. Safety glasses must be worn <u>at all times</u>.

2. Wear proper attire; gloves and lab coats when necessary; shoes (no sandals); no shorts.

3. No flames or smoking allowed in the lab.

4. No food or drink allowed in the lab.

5. No horseplay allowed in the lab.

6. Keep all work areas clean and orderly. This includes your bench, the balance table and the hoods. Clean up all chemical spills immediately.

7. Use proper disposal procedures, as specified by your TA, for all chemicals and solutions.

8. Be careful to avoid contaminating the reagents. Close all containers snugly after use.

9. Be sure to read the labels on chemical containers carefully. Many chemical names are very similar.

10. Most organic chemicals are toxic to some extent. Treat them all with respect. Avoid getting them on your skin or clothing and avoid extensive breathing of their fumes. Work in the hoods when the experimental directions so instruct.

11. No students are allowed in the lab unless the TA is present. Only students assigned to that lab section are allowed in the lab.

12. No chemicals, glassware or equipment are to be removed from the lab. No unauthorized experiments are to be done.

Notebooks: Read Appendix II (pp. 792-796) in the lab text.

You must have a **bound** lab notebook (not spiral). You should use the style described in the lab text. The "Before You Begin" assignments must be completed in your lab notebook before lab. You will not be allowed to begin the experiment until this material is complete. All data, observations, etc. must be entered directly in your notebook at the time the information is obtained in the lab. Your notebook will not be graded on neatness, only on completeness.

Reports: Read **Appendix III** (pp. 792-796) in the lab text. We will use a slightly modified version of the description in the text. The report for each experiment must be typewritten and all structures must be done using a structure drawing program such as ChemSketch. The report should include:

Title of the experiment
Your name and the date

Introduction

This section has a statement of the problem and any applicable chemical equations. See the beginning of the discussion section on p. 795.

Observations

Data

Calculations

Results

Discussion

Conclusions

Exercises

Include the answers to any Exercises that are assigned in the syllabus.

Excluding the data, calculations, and graphs, the report should be a maximum of two pages long. The Discussion section can be considerably briefer than that of the sample lab report in the text.

Unless you are told otherwise, each report is due at the beginning of the next lab after the completion of the experiment. Reports will be penalized 30% for lateness. Reports more than two periods late will not be accepted.

Products: The syllabus specifies that the product should be turned in for several experiments. Submit the product in a clean, labeled test tube along with the report. The label should use the format on p. 44 of the lab text.

Grading: Your grade will be based on a total of 1000 points, distributed as follows:

Before You Begin Assignments, 10 pts/exp	90 points
Lab reports, 80 pts/exp	800 points
Products, 10 pts/exp	50 points
Lab notebook, other than BYB Assignments	40 points
Subjective	20 points

Schedule of Laboratory Experiments
Winter Quarter, 2008

Week of Jan. 7

Check In

Look over the equipment shown in Appendix I (pp. 788-790).

Experiment 1 Drawing Chemical Structures on the Computer

Bring your laptop computer to this lab. You will download a free program for drawing chemical structures from the Internet. This is the program that you will use it to draw any structures in lab reports for subsequent labs. (You may load the program before coming to lab if you so desire.) Access www.acdlabs.com on the Internet. Click "Downloads". You must register first. Then download ChemSketch. You will learn to use this program during this lab. The procedure for this experiment and the structures to be drawn in your lab report are available on Blackboard. The report for this experiment need only include the title, your name and date, and the structures you are instructed to draw.

Also, go to www.mdli.com and download the Chime program that is appropriate for your computer. This program enables you to view molecules in three dimensions and will be very useful in class. This program is self-extracting. Click "run" when prompted and the program will be installed on your computer.

Week of Jan. 14

Experiment 2 Separating the Components of "Panacetin"

Be sure you have read the Introduction (pp. 2-11) in the lab text. Read the "Scenario" and the "Applying Scientific Methodology" sections of experiment 1 on pp. 26-27. Read experiment 2, pp. 34-39. Do the "Before You Begin" assignments. Briefly outline the "Directions" for the experiment in your lab notebook. Include "Exercises" 1 and 2 in your lab report. Turn in the aspirin product with your lab report. The report is due during the week of Jan. 21.

Week of Jan. 21

Note that Monday, Jan. 21, is a holiday. The Monday lab is rescheduled to Thurs. 2 - 6 pm.

Experiment 3 Identifying a Component of "Phenacetin"

Read experiment 3 on pp. 41-45 in the lab text. Include "Exercises" 1, 2, 3, and 4 in your lab report. Turn in the phenacetin product with your lab report. The report is due during the week of Jan. 28.

Week of Jan. 28

Experiment 4 Synthesis of Salicylic acid from Wintergreen Oil

Read experiment 4 on pp. 46-53 in the lab text. Include "Exercises" 2, 3, and 4 in your lab report. Turn in the salicylic acid product with your lab report. The report is due during the week of Feb. 4.

Week of Feb. 4

Experiment 5 Preparation of Synthetic Banana Oil

Read experiment 5 on pp. 55-62 in the lab text. Purify the product by distillation this week, but do the analysis by gas chromatography next week. Include "Exercises" 2, 3, and 4 in your lab report. Turn in the isopentyl acetate product with your lab report. The report is due during the week of Feb. 18.

Experiment 6 Acid-Base Strength of Organic Compounds

Read Minilab 36 on pp. 500-502 in the lab text. You should have time to do this Minilab during the 1 hr. reflux period of Experiment 5. The report is due during the week of Feb. 11.

Week of Feb. 11

Experiment 7 Stereochemistry

The procedure for this experiment is available on Blackboard. The report is due during the week of Feb. 18.

Week of Feb. 18

Experiment 8 TLC Analysis of Drug Components

Read experiment 15 on pp. 125-129 in the lab text. Include "Exercises" 1, 2, and 3 in your lab report. The report is due during the week of Feb. 25.

Week of Feb. 25

Experiment 9 Reaction of Butanols with Hydrobromic Acid

Read experiment 28 on pp. 218-225 in the lab text. Omit the IR (infrared spectroscopy) part of the experiment. Include "Exercises" 1, 2, and 5 in your lab report. Turn in the distilled product with your lab report. The report and the product are due during the week of March 3.

Week of Mar. 3

Experiment 10 Reactivities of Alkyl Halides in Nucleophilic Substitution Reactions

Read Minilab 16 on pp. 475-6 in the lab text. The report is due on Monday, Mar. 7. Turn in your lab notebook for grading along with your last report.

Clean Up and Check Out

After you have finished the experiment, make sure all of your glassware is clean and the contents of your drawer are complete. Then check out of the lab. If you do not check out, you will get an incomplete.