

Organic Laboratory II (CHE 235) Fall 2018

Time:

Location:

Instructor:

Office Hours:

Contact Info:

Required Material:

- “*Macroscale and Microscale Organic Experiments*” Houghton Mifflin Publishing Company, 6th edition, 2001
- Laboratory Notebook
- Safety Goggles (*provided*)
- Padlock for drawer (**student provided**)
- Paper towels and liquid soap (**student provided; often shared by students**)

Learning Goals

Students will learn the ability to analyze data and form conclusions. They will utilize critical thinking to solve complex chemical problems, e.g. understanding of structure-reactivity relationships, synthetic logic, spectroscopy, problem solving. They will develop skills in recognizing hazards, minimizing risks, and safe laboratory practices. They will also develop the ability to understand physical properties of chemicals (eg. Molecular weight, acidity, polarity, electronegativity), chemical reactivity, kinetics, thermodynamics and equilibria. They will learn to perform calculations related to chemical reactions (eg. Molecular Weight, molarity, Percent Yield) and to perform various measurements. They will demonstrate the ability to communicate through the writing of lab reports. In lab reports students must exhibit the drawing of chemical structures and the description and analysis of chemical processes.

Course Objectives

The aim of the Organic Chemistry Laboratory Series is to provide you with an opportunity to learn about the synthesis, separation, purification, and identification of organic compounds. This course consists of weekly laboratory sections which involve experiments designed to help students develop the observational and critical thinking skills that are essential prerequisites for a successful career in science (or any professional field). You are expected not only to perform the experiments in the laboratory, but also to think about the principles behind the experiments.

Safety

Safety will be strictly enforced! All students must sign a safety agreement before working in lab. Students are required to follow all safety rules, **wear safety equipment (goggles)** and proper clothing (**NO open-toed shoes, shorts, miniskirts, or sleeveless tops**) at all times. Food, media devices (e.g. mp3 players) and cellphones are not permitted. Failure to follow safety rules will result in loss of points from lab score. In extreme cases expulsion from the lab section and a zero score for the week's experiment may be warranted.

Experiments

A calendar of experiments and detailed instructions on lab reports is provided on Blackboard. This calendar provides the list of experiments, reading and assignments. See the instructions for writing in your lab notebooks. Experiments should be clearly written, important data highlighted and 3-4 pages long.

Absences and Late Lab Reports

Please note the due date given for lab reports by the instructor. They are to be submitted at the start of class. Make-up labs are not allowed. Late lab reports can be penalized by up to 100% depending on how late the assignment is and the instructions you are provided.

Grading

The course grade is comprised of 2 components: Experiments and a Final Quiz.

Experiments

Lab reports are graded out of 10 pts. Grading is based upon:

- 1) neatness/organization and clarity of writing,
- 2) lab skills and performance,
- 3) lab preparation and cleanup,
- 4) tardiness,
- 5) analysis.

Pre-labs are checked at the beginning of every lab. The **Post-lab** write-up **must be typed**. **Lab reports** are due at the **beginning of class the next week**. If you miss a lab, it is your responsibility to turn the due lab report within the week it is due **not at the next course meeting**, otherwise points will be deducted.

Grading Rubric

	<i>Pre-lab</i>	<i>In-lab</i>	<i>Post-lab</i>
<i>Presentation/Organization</i>			
<i>Lab Skills,Tardiness,Clean-up</i>			
<i>Data collection</i>			
<i>Analysis</i>			

Final Quiz

The final covers all of the principles from all the experiments done during the semester.

The table below breaks down the how grades will be assigned:

Assignment Types	# Assignments	Points Each	Total Points	% of Final Grade
Lab	12(1 report is dropped)	10	110	91%
Final Quiz			10	9%

Cleanup Points: In the organic chemistry teaching labs you are expected to take care of the equipment and lab space that you use. If you fail to return equipment to their proper place or leave your area untidy, you will be deducted points.

Academic Honesty

Academic dishonesty will not be tolerated. While collaboration in lab is allowed, written lab work is an individual effort.

Copying from any portion of the written work from other students is not allowed and constitutes academic dishonesty. For the college's policy towards academic integrity see the Lehman Undergraduate Bulletin.

<http://www.lehman.edu/undergraduate-bulletin/academicintegrity.htm>

- ❖ **Text:** K. L. Williamson and K. M. Masters; "Macroscopic and Microscale Organic Experiments," Brooks/Cole, Cengage Learning, 6th Edition, 2011. ISBN13: 978-0-538-73362-5
- ❖ **Chemistry Laboratory Notebook:** Available in the bookstore or outside sources.

List of Experiments and Assignments

Meeting	Reading	Experiment
1		Check In. Lab Equipment and Glassware pp.12-14, Discussion of writing "The Laboratory Notebook." pp.18-25 Discussion of Laboratory Safety and Waste Disposal, pp.26. Safety Video
2	Chp 55 p 668	The Borohydride Reduction of a Ketone: Macroscalescale (p 670) Emphasis on the absolute configuration of stereogenic centers in the product.
3	Chp 41 p 529	Acetylsalicylic Acid (Aspirin): Exp Synthesis of aspirin using three different catalysts (macroscale p533). Omit boron trifluoride etherate. Get the MP of your aspirin. Test for aspirin purity: Ferric chloride test for phenols (hand outs)
4	Chap 48 p 617	Diels Alder Reaction: Exp 1; Cracking of Dicyclopentadiene (macroscale p 622) will be done by the instructor. Exp 2; Synthesis of <i>cis</i> -norbornene-5,6-endo-dicarboxylicanhydride (microscale pp623)
5	Chp 22 p 356	Oxidation: Cyclohexanol to Cyclohexanone: Exp 22.3 (p 361). <i>Continue to completion following 'The isolation of Cyclohexanone from the Steam Distillate' (p.362)</i>
6	Chp 12 pp 239	NMR Spectroscopy: Write only one page introduction in your lab notebook. Instructor discretion for the method of presentation.
7	handouts	Qualitative Instrumental Organic Analysis. Special instructions by the instructor. Functional group determination of unknown compounds, wet chemistry.
8	40 and Handouts	Esterification: Synthesis of Oil of Wintergreen (methyl salicylate) 12 (p 239) <u>and</u> Use of NMR instrument: Obtaining the spectra of the unknowns.
9	Chp 29 p 406	Friedel-Crafts Alkylation: Exp 29.4 1,4-di- <i>t</i> -butyl-2,5-dimethoxybenzene (microscale p 413). (Follow procedure only to the end of..... 'wash the crystals thoroughly with water.')
10	Chp 25,40	(1) Catalytic Hydrogenation: Exp 25.4 (p 385) Transfer hydrogenation of olive oil (microscale p 515 and p 387) and Isolation of Products (p 387); (2) Esterification and Hydrolysis: Exp 40.5 Saponification: The preparation of soap (microscale, p 525).
11	Chp 38 p 490	Grignard Synthesis: (1) Exp 38.1 Phenylmagnesium bromide (microscale p495); (2) Exp 38.2 Triphenylmethanol (p 497)
12	Chp 63 Pp 719	Carbohydrates and Sweetners: (1) Exp 63.1 Molisch test (p 723); (2) Exp 63.2 Red Tetrazolium (RT) test (p 723); (3) Exp 63.4 Bial's test (p724).
13	Chp 37 p 484 Chp 67 p 757	I. Dibenzalacetone by the Aldol Condensation: Exp Synthesis of dibenzalacetone (macroscale p 486). II. Polymers: Synthesis and Recycling: Experiment 67.1 Nylon by Interfacial Polymerization (p763) Procedure (Macroscale, p 765)
14		Final Quiz and Check Out