

Chem 1L

Introduction to Organic Chemistry Lab

Description: Techniques are taught for separation of compounds: distillation, crystallization, extraction and chromatographic procedures in the context of reactions learned in Chem 1. Students learn the use of GC instrumentation for the analysis of reactions.

Location: Braun Lecture Hall

Time: Lecture: Mon & Wed. 1-2pm

Lab: Mon. & Wed. 2-6pm

Instructor: Dr. Hillary Hua

hillaryh@stanford.edu

TAs: Young Chang

yac3@stanford.edu

Andrew Schaefer

aschae@stanford.edu

Jade Shi

jadeshi@stanford.edu

Matthew Sach

mdsach@stanford.edu

Office Hours

Instructor: 233 Mudd Thursday & Friday 1-2 pm

TA: Chem 1 Office Hours

Required Materials

1. J.R. Mohrig, C.N. Hammond, P.F. Schatz. *Techniques in Organic Chemistry* (3rd Edition)
2. Laboratory Notebook with duplicate pages.

Lab Schedule

Date	Lecture	Laboratory	Readings	Lab Skills
Mon. June 24	Safety	Check-In Safety Briefing & Form Extraction demonstration of 2,6-dichloroindophenol	Techniques # 11: p 113- 131	Separatory funnel & Drying
Wed. June 26	Solubility: Extractions	Expt. 1: Extraction of (+) and (-) Carvone	Technique #16: p. 207- 211	Chromato- graphy
Mon. July 1 Lab Report 1 Due	TLC & Polarimeter	Expt. 2: Substitution Reactions of Alkyl Halides	Techniques #17: p. 221- 233	Distillation
Wed. July 3	Boiling Points & Distillation	No Lab	---	
Mon. July 8 Lab Report 2 Due	Gas Chromatography	Expt. 3A: Dehydration of cyclohexanol	Technique #19: p. 256-270	Mole calc. Yield calc.
Wed. July 10	Quiz Mass Spectrometry	Expt. 3B: Epoxidation of cyclohexene	Technique #23: p. 405- 410	Rotary Evaporator
Mon. July 15 Lab Report 3 Due	Chem 2L Begins	See Chem 2L syllabus		

Safety:

A safety form will be handed out at the start of each term outlining all guidelines and policies. This form **must** be signed before working in the lab.

- 1). Safety goggles must be worn in the laboratory at all times!
- 2). Required clothing and apparel include: long pants, long sleeves and close toed shoes. Even though it is warm outside you must come prepared! You will be sent home to change if you do not come in dressed for lab!
- 3). Gloves are available for your use and must be worn for all experiments. Do not use gloved hands in common areas and in hallways (handles on doors etc) to avoid cross contamination!
- 4). Substances that are volatile, flammable, and/or toxic should be handled in the hood. In general, all experiments will be done in the hoods.
- 5). Know the location of the eye wash, safety showers, extinguishers and exits in the lab.
- 6). If a chemical spills or an accident happens, alert the TA or instructor.
- 7). Clean up the common areas on bench tops, near the balances and instruments when you are done.
- 8). If you get a chemical on your skin, wash with copious amounts of water immediately.

Waste:

-Pour nothing down the sinks but uncontaminated water!

-All other chemicals used in the lab must be put in the appropriate waste container. There are organic, acidic aqueous, basic aqueous and solid waste available everyday and special waste containers depending on the experiment. Follow your instructions from your TA if you aren't sure.

Grading

3 Lab Reports	80%
Quiz- 7/10 in class	20%

The laboratory report component will generally consist of three parts for each experiment: a pre-lab assignment, in-lab data and observations, and a post-lab assignment (lab results/discussion and questions) for a total of ten points. If the lab report consists of two parts, each report will be valued at 10 points for a total of 20 points possible.

Pre-lab Assignment (1 pt):

Handouts for the lab are available on coursework. Doing the pre-lab assignment is meant to prepare you for the lab. Therefore you must come to lab with it done, otherwise you will not be allowed to do the lab for safety reasons. For the pre-lab, you need to write into your notebook the following items:

- I. Experiment Title
- II. Date you are doing the lab
- III. Experiment Objective: what is the purpose of the lab?
- IV. Reaction Scheme (structural formula equation given in lab handout): Reactants with reagents over the arrow and products to the right of the arrow.
- V. Reagents and Products Information
 - a. Structure
 - b. Molecular Weight
 - c. Density
 - d. Melting Point/boiling Point
 - e. Safety Information
- VI. Experimental Procedure (on divided page; on left hand side is procedure and on the right hand side is left blank for observations made during lab)

In-Lab (3 pts): Data and Observations

- VII. Data: In your notebook, list any and all data and observations that you collected in the lab (the lab handout lists some of the important information to include).

On the right hand column of the divided notebook, write down in your notebook all data and observations during the lab so that someone could repeat your experiment and understand what you observed. This includes the precise amount of reagents and solvent that you actually used and all observations like color changes, precipitates, gas evolution etc. Data, conclusions and results for all your experimental work should be included in your notebook. A running commentary of the experimental procedure should also be included with all observations made during the experiment. Do not record what the lab handout tells you to do, but rather what you **DID** do. **FOLLOW THE GUIDELINES AT THE END OF THIS SYLLABUS FOR GOOD NOTEBOOK KEEPING.**

Post-Lab (3 pts): Calculations, Results/Discussion, & Conclusion

- VIII. Calculations (in your notebook): Use this data to do your calculations such theoretical yield, percent yield, R_F etc.
- IX. Results & Discussion (type): Discuss the results and mention any sources of error, interpretation of those results (for example, is your compound what you think it is? Is it pure? Etc). Interpret and attach to your report any spectra or chromatogram that you refer to you in your discussion.
- X. Conclusion (type): Under the conclusion heading: draw any conclusion from your data and state whether you met the objective of the lab that you mentioned in your pre-lab work.

Post-Lab Questions (3 pts):

Attached to every lab handout are three questions that can be answered in your notebook after the conclusion or attached on a separate piece of paper. If you have any questions, you can go to office hours or ask your TA for help.

Attendance: There are **no** makeup labs or quizzes. If you miss a lab due to an illness or other special circumstance, you must contact the instructor immediately.

Handing in Lab Reports:

Every Monday the lab report for the previous week is due. There is a cover page you need to attach to the top of your notebook pages, and any questions and spectra/chromatograms need to be attached at the end.

Students with Disabilities:

Students who may need academic accommodation due to disability must initiate the request with the Student Disability Resource Center (SDRC) located within the Office of Accessible Education (OAE). SDRC staff will evaluate the request with required documentation, recommend reasonable accommodations, and prepare an accommodation letter for faculty dated in the current quarter in which the request is being made. *Students should contact the SDRC as soon as possible since timely notice is needed to coordinate accommodations.* The OAE is located at 563 Salvatierra Walk (phone: 723-1066).

Notebook Guidelines

Please review the following guidelines before making entries into your lab notebook.

- 1). The notebook should have carbon copy pages, so that they can be removed to turn in your lab report.
- 2). Your handwriting should be neat and legible- if what you wrote can not be read it can not be graded (or used by someone else to theoretically repeat what you did!).
- 3). Every page in your notebook should have your name, the date of the lab, the name of your TA and experiment number.
- 4). Use a pen to write in your notebook. If you make a mistake- draw one line through the error and continue writing.
- 5). Make sure that you use the divider to prevent writing on subsequent carbon copies. If your carbon copy is illegible- hand in the original or make a photocopy.
- 6). Graphs, spectra, charts etc should be attached by staple to notebook pages. Each should be completely labeled.
- 7). All entries should be legible and sufficiently detailed:
 - use proper names for instruments and glassware; "10 mL Erlenmeyer flask" instead of "flask"
 - indicate the specific concentration of chemicals used: "0.1 M" rather than "dilute"
 - indicate how the reagents were measured: there is a big difference between using a graduated cylinder and a micropipette
 - record the sequence in which reagents were added, precise reaction times and how reactions were heated
 - display any calculation in full detail with units for ease of verification