

Chemistry 338 sec 3: Organic Chemistry Lab Fall 2014

Instructor: Dr. Timothy Hagen (thagen@niu.edu) **Office:** FR 350

TA: Zheng Zhang (Aaron) (zzhang1@niu.edu) **Office:** FR 351/LaT 334

Lab Meeting Time: Wed 6:00-8:50pm **TA Office Hours:** M/W/Th 1:00 - 1:30 pm; Tu 11:00 – 11:30 am

Text Book: Pavia, D.L.; Lampman, G.M.; Kriz, G.S.; Engel, R.G. *Introduction to Organic Laboratory Techniques; A Microscale Scale Approach*, 3rd ed.

Safety: Safety is the number one priority in the organic laboratory, since all chemicals are toxic to varying degrees. Wear appropriate clothing (NO shorts, NO open-toe shoes, NO tank-tops). **ALL STUDENTS MUST WEAR EYE PROTECTION AND CLOSED-TOE SHOES AT ALL TIMES during the class.** Leg coverings are also required. **Goggles are available free of charge at the chemistry stockroom, and they must be the type approved by the Chemistry Department.** **No food or drinks are permitted in the laboratory.** Waste chemicals must be properly disposed. Notify TA of any glassware breakage, chemical spills, or emergencies immediately. Your lab area, lab equipment, etc. must be cleaned prior to leaving the lab. Refer to the textbook for a more comprehensive discussion of safety. The Department of Chemistry has a zero tolerance policy for safety violations, and points will be deducted for violating the safety rules (see the section on grading). Pregnant students should consult with their doctors regarding the risks of being enrolled in this and other laboratory-based classes.

Class Attendance and General Advice: Regular attendance is essential for a successful and pleasant experience in organic chemistry laboratory. Lab starts promptly at 6pm, so be on time. You must attend every lab session unless you have a university-sanctioned excuse, of which you have to inform your TA in advance. If for some unforeseen reason you will not be able to attend lab, please alert your TA and Dr. Hagen as soon as possible. **There will be no make-up labs**, and unexcused absence during a lab will result in a zero for that experiment. Also note that some labs require multiple periods; you must attend all sessions to receive credit for the experiment.

Pre-Lab Preparation: Read all the material in the textbook pertaining to the lab before

showing up to class. Note for that for several early experiments you are also required to read the corresponding technique section in Part VI of the book (see schedule of experiments). There are no formal pre-lab questions to do for the laboratories, but there are post-lab questions, which you are supposed to answer after you have completed the experiment.

Laboratory and Reports: During the laboratory, your data should be recorded into a laboratory notebook (in ink), and the **data pages must be signed by the TA prior to your departure from lab**. Laboratory notebooks must be kept neat and must have duplicate, numbered pages. Regular paper notebook pages or composition notebooks are not acceptable. Lab reports should be in your own writing, and copied lab reports will receive a grade of zero. Even though you may conduct your experiments in pairs, the lab reports, including all calculations and answers to questions, should be prepared individually. The reports should be written neatly and legibly in black or blue ink. Pencils, white out, or colored pens (other than black or blue) are not permitted or acceptable for your notebooks. Lab reports are due at the beginning of the following lab period after an experiment is completed (multiple-period labs will be due the next lab period after completion) as indicated in the schedule of experiments. The following information should be included:

To be prepared before lab:

- 1). Name, Date, and Experiment Title (e.g. "Recrystallization of Sulfanilamide").
- 2). Purpose. A brief summary of what you are trying to accomplish and/or learn from this experiment, (not just a restatement of the title). List methods, etc.
- 3). Data. Include all information pertinent to the experiment, including any and all safety hazards; MSDS sheets can be found at <http://www.hazard.com/msds/index.php>. For example, if you are recrystallizing sulfanilamide, you would want to draw the chemical structure, list important physical properties (such as melting point), and note any safety hazards associated with the compound. The mechanisms of reactions (if you are running a reaction) must be shown. Include equations and quantities of materials needed.

To be recorded in lab:

- 4). Procedure. The procedure performed during the lab on that day and observations, such as color changes, formation or disappearance of a precipitate, evolution of heat or gas, etc.
- 5). Results. Weights of the products, melting point ranges, etc. Theoretical and percent yields should be calculated if it pertains to the experiment. **Obtain TA's signature at this point.**

To be written after lab:

- 6). Conclusions. A brief, but informative conclusion to the lab stating the results obtained and discussing the possible reasons for those results. Mention possible errors, and how they could be avoided in the future. This may improve your techniques for later experiments.
- 7). Answers to post-lab questions. See schedule of experiments for the list of questions.

Quizzes:

Quizzes will include short question/answers related to

- theory (such as the definitions in the prelab reading)
- procedure (why you added acid to the water and not the other way around)
- reactions (you should be able to write down the reaction which was performed in the lab)
- calculations (percent yield)

There will be five pre-lab quizzes (see the schedule of experiments), each mainly about the experiments performed since the previous quiz. Tardiness to a quiz will result in a zero for that quiz. There will be no make-up quizzes. Your lowest grade on a quiz will not factor into your final grade. During the last class period, there will be a written final exam consisting of multiple choice and short answer questions.

Grading: Your grade in organic laboratory is largely based on the work done performing the assigned experiments and understanding the techniques/procedures. The lab reports will be graded based on the quality of your data, your presentation of the results, and your answers

to post-lab questions. You must prepare your report individually, and violation of this rule will result in zero points for both laboratory partners. Following safety rules is an important part of any laboratory work, thus points (in parentheses) may also be deducted for following safety violations:

Goggles/shoes not being worn (at all times except pre-lab discussion) (20 points) Chemical spill not cleaned (near balance, at your work area, in fume hoods) (10 points) Food/drink in lab (5 points) Improper waste disposal (10 points) Disposing of glass in waste basket (should use the "Glass Waste" container) (5 points)

The course grade will be assigned based on your point totals from the lab experiments and reports, quizzes, and the final. The points total is as follows:

Lab Reports (10 at 80 points each)

Quizzes (5 at 25 points each, lowest dropped)

Final Exam (100 points)

Total: 1000 points

Course Grading Scale (as 100%)

A: 92 – 100% A- : 90 – 92%

B+: 87 – 89% B: 80 – 86%

C+: 77 – 79% C: 70 – 77%

D: 60 – 69% F: 0 – 59%

Schedule of Experiments

Lab Date	Quiz	Experiment Number and Title	Post-Lab Questions
Tu 08.27		Check In/Techniques 1-6 (be familiar)	
Tu 09.03		Experiment 2A/Technique 11 Recrystallization of Sulfanilamide	1,2
Tu 09.10		Experiment 2B Recrystallization of Fluorene	
Tu 09.17		Experiment 3D/Technique 12 Extraction	8,10 on p.708
Tu 09.24	Quiz 1	Experiment 10/Technique 20 Thin-Layer Chromatography (TLC)	1,2,3,5
Tu 10. 01		Experiment 6/Technique 14,15 (1,2,4,5) Fractional Distillation	1,4,5,6 on p. 729
Tu 10.08	Quiz 2	Experiment 57A Clove Oil	2,3
Tu 10.15		Experiment 30A, Technique 23 Resolution of Enantiomers	3,6,7
Tu 10.22	Quiz 3	Experiment 19 Alkyl Halides	1,2,3,4
Tu 10.29		Experiment 22 Dehydration	1,2a-d
Tu 11.05	Quiz 4	Experiment 21A <i>n</i> -Butyl Bromide	2,3,4,6 (n-butyl bromide)

Tu 11.12		Experiment 21B <i>t</i> -Pentyl Chloride	1,3,5 (t-pentyl chloride)
Tu 11.19	Quiz 5	Check out	
Tu 11.26		No Class (Thanksgiving)	
Tu 12.03		FINAL EXAM	