

## Chemistry Laboratory 2125, Fall 2014

**INSTRUCTOR:** Dr. Hemant Sharma; Office: PSCI 411D, [hsharma@utep.edu](mailto:hsharma@utep.edu)  
**Office Hours:** M, W 9:00 –10:00 and by appointment (747-7565)  
**LABORATORY:** M 11:30-2:20 (**12522**) CCSB 1.0506; M 11:30-2:20 (**14111**)  
CCSB 1.0508; W 2:30-5:20 (**12523**) CCSB 1.0506; W2:30- 5:20  
PM (**15822**) CCSB 1.0508.  
**TEXT:** Experimental Organic Chemistry, (A Small -Scale Approach) By  
Charles F. Wilcox and Mary F. Wilcox  
(Tip: this book is often available used)

The basic safety rule in this course is that **SAFETY GOGGLES MUST BE WORN IN THE LAB AT ALL TIMES**

If you do not have Goggles, or refuse to wear them, then you will not be allowed to participate in the course activities, or remain in the lab.

**Course Objectives:** The Objectives of this course are that you:

- Become familiar with basic organic chemistry methods, reactions and techniques
- Learn how to comply with laboratory safety polices
- Maintain a proper laboratory notebook
- Learn how to follow proper chemical waste disposal procedures

Your semester grading will be done as follows

- a) Adherence to laboratory safety, good laboratory technique, and laboratory hygiene (1/3)
- b) Weekly quiz (1/3)
- c) weekly laboratory group report (1/3)
- d) Grades will follow the following scheme:

90-100:	A
80-<90:	B
70-<80:	C
60-<70:	D
<60:	F

Students who miss a lab for an unexcused reason will lose 100% of the credit for that week. No makeup labs or makeup quizzes are provided for an unexcused absence, and you will not receive credit for a group report submitted for a week that you miss.

An excused absence would include, for instance, a sanctioned university activity that you must attend. For example if you participate in UTEP sports, or if you are presenting research results at a conference. Other excused absences are the discretion of the TA, and may have to be approved by the Instructor of Record. For an excused absence, your TA has several options to implement, at his/her discretion:

- 1) Offer the makeup lab (or QUIZ) within your section at another time during the semester. You may have to work on two labs at once

- 2) Offer the makeup lab (or QUIZ) in another section of the course which you can attend. Your TA and you will need to arrange for the grading to be transferred to your TA by the other TA.
- 3) Excuse the lab (and/or QUIZ) completely and give you full credit. This option may rarely be offered.

All students are expected to have read the information about each lab in the Wilcox/Wilcox text book in advance, so that they are fully prepared for the weekly quiz at the beginning of each pre-lab, and for the laboratory activity of that day, see detailed curriculum below. Students should also know the structures of the chemicals they are working with. The structures may be found in the students' organic chemistry text book, in chemical catalogs, or on the internet (Google, Wikipedia, etc.)

Students will form groups of two to conduct the lab experiments. Each group will maintain a laboratory notebook in which each lab will be described. The weekly laboratory notebook report of Friday's lab must be submitted to the TA on the following Tuesday the latest in his mailbox. The TA will grade each group notebook entry and return the notebooks by the next scheduled lab. Notebook entries should be made with a permanent pen, not with a pencil. Students should not erase or white-out any entries, and no pages should be removed. If there is an error, the error should be crossed out and corrected. The notebook entries should be complete and legible rather than perfectly neat. All group members are equally responsible for their notebook entries. The entry should be as succinct but complete as possible. For example, when reporting the reaction yield, it is sufficient to write Yield: 5g, 87%, rather than a full sentence. An easy A can be obtained for the notebook when the following format is strictly followed:

1. Date
2. Title (e.g. Determination of the melting point of.....)
3. Reference (e.g. Wilcox/Wilcox text book, Chapter X, page Y)
4. In case of a reaction, the reaction scheme and mechanism should be shown.
5. Amounts used in table format (g or mL as well as moles)
6. Brief description of the experiment (e.g. Compound A was placed into a 50 mL round bottom flask and cooled down in an ice bath. Then compound B was quickly added under stirring.....)
7. Observations (e.g. color change, precipitation, reaction is exothermic, gas evolution, etc.)
8. Work-up procedure, if applicable
9. Purification procedure, if applicable. Appearance of the product (white powder, yellow crystals, colorless oil, foul smelling liquid)
10. Characterization (Provide analytical data, e.g. melting point, R<sub>f</sub>-value based on thin layer chromatogram, etc. If instrumental access is available: What characteristic IR absorptions or NMR peaks are present?)
11. Reaction yield reported in g (or mL) and % of the theoretical yield, if applicable.

Note that hoods and benches are labeled, and your group of two will always work in the same hood/bench. ALL chemical activities are done in the hood. The bench is for maintaining your notebook and supplies for your activity. Please make sure that labeled equipment remains in the hood or on the bench that matches that labeling.

If your class needs to keep chemical intermediates from one week to the next, each section has been provided with a locker for storage:

If you have a morning lab, the locker will be labeled with your day (e. g.: “Monday”) and “AM”. If you have the early afternoon lab, you will be in the “PM1” locker, and if you have the later afternoon lab, you will be in the “PM2” locker.

### **Some important safety rules:**

- Always know the danger of the chemicals you are working with, e.g. sulfuric acid. You should research the safety and chemical reactivity of all reagents before coming to class and ask your TA if you have any further questions.

- Always wear goggles. This is a State law. You do not have the choice to not comply.

- Always wear lab coats
- Know where the eye wash, safety shower, and fire extinguisher are located
- Wear closed shoes (no rubber slippers or open sandals)
- Long hair must be tied back
- Wear long pants (no skirts or shorts)
- No hats
- No food/drink items are allowed in a chemistry laboratory
- Keep your work space clean!!!!
- If there is a chemical spill, inform the TA immediately.
- If you are injured (a cut, inhalation of toxic gases, acid burn on skin, etc.) inform your TA immediately. We are required to file reports of all injuries, no matter how minor, and also to offer you the option to seek medical aid.

### **Some important waste information:**

- None of the waste can go down the drain.
- Organic solvent waste, aqueous waste, solid waste, and glass waste is collected separately and placed into designated waste containers.
- You are not permitted to leave the lab for the day without properly disposing of chemical waste.
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Attendance to the pre-laboratory lecture is mandatory. If you skip more than two labs, you will not get the passing grade.

We shall work on multi-step organic synthesis. Convergent synthesis of hexaphenylbenzene, Chapter 41. This semester long exercise is meant to simulate a

typical synthetic laboratory experience. This semester long exercise is meant to stimulate a typical synthetic laboratory experience.

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<u>Date</u>	<u>Experiment / Exercise</u>	<u>Chapter</u>	<u>Quiz</u>
2 <sup>nd</sup> Week	Safety Lecture & Check In	01	
3 <sup>rd</sup> week	Benzaldehyde	6	1
4 <sup>th</sup> Week	(E)-Stilbene	28	2
5 <sup>th</sup> Week	(E)-Stilbene continued	28	-
6 <sup>th</sup> Week	Stilbene dibromide	28	3
7 <sup>th</sup> Week	Diphenylacetylene	28	4
8 <sup>th</sup> Week	Benzoin	48	5
9 <sup>th</sup> Week	Diphenylacetylene/ Benzil	28,48	6
10 <sup>th</sup> Week	Tetraphenylcyclopentadienone	34	7
11 <sup>th</sup> Week	Hexaphenylbenzene	41	8
12 <sup>th</sup> Week	NMR Spectroscopy	41	9
13 <sup>th</sup> Week	Catch Up & Check out		

You are required to follow all the safety rules and procedures in the laboratory.

**Safety:** Since Safety is so important, it will be among the lead topics of your syllabus:

- 1) Goggles: You are required to follow all the safety rules and procedures in the laboratory. **GOGGLES MUST BE WORN IN THE LAB AT ALL TIMES.** As soon as you enter the lab, you should have your safety goggles on, regardless of whether any laboratory activity is underway. You cannot remove your safety goggles until you leave the lab. Students who refuse to comply with safety goggle rules will be asked to leave the lab, and in the event they refuse to leave, will be escorted out by University police.
- 2) Hot Glassware: Hot glassware looks the same as cold glassware. Use care when working with a reaction apparatus that is being heated or with the glassware that may be attached to or removed from the apparatus as hot glass cannot be distinguished from cold glass

- 3) Broken glassware. If glassware breaks in the lab, use extreme care in handling it. If you need assistance, ask your TA. Broken glassware should be placed in the broken glassware container.
- 4) Chemical waste disposal. Make sure you seek guidance from your TA in disposal of chemical waste. Some waste containers are only meant for certain kinds of waste. Mixing the wrong chemical waste can produce a violent chemical reaction and/or fire.
- 5) Injuries: All injuries must be reported to your TA.

The Material Safety Data Sheets (MSDS) for all of these substances are available on line on [Environmental Health & Safety web page](#) of the UTEP.