

## Chemistry 2325 Organic Chemistry Lab II Spring Semester, 2008

**Professor in Charge:** Vernon D. Parker, W 345, 797-1697, [vparker@cc.usu.edu](mailto:vparker@cc.usu.edu)  
Office hours: M, T, Th 1:30-2:30

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*Students with physical, sensory, emotional or medical impairments may be eligible for reasonable accommodations in accordance with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973. All accommodations are coordinated through the Disability Resource Center (DRC) in Room 101 of the University Inn, 797-2444 voice, 797-0740 TTY, or toll free at 1-800-259-2966. Please contact the DRC as early in the semester as possible. Alternate format materials (Braille, large print or digital) are available with advance notice.*

**Lab Fee (required):** \$45.00 used for the purchase of equipment and supplies for the lab.

**Lab Manual:** Download from Web CT

**LabText:** Experimental Organic Chemistry” by Mohrig, Morrill, Hammond and Neckers

**Notebook:** Student Laboratory Notebook (Hayden McNeil Specialty Products) USU Bookstore

**Safety:** Eye protection (glasses or safety goggles - no contact lenses) and appropriate shoes are required at all times in the Lab. Safety goggles may be purchased in Chem Stores in the basement of Maeser. No eating and drinking is allowed in the Lab. All waste chemicals must be placed in proper containers (usually in the hood). Report all spills or accidents to your TA immediately for assistance. A Lab coat or apron, other expendable clothing is a good idea. Don't wear your best clothing to lab.

**Grading:** Grades will be based on lab reports, evaluation of your lab notebook, quizzes, and evaluation by your TA.

Project reports (4 x 100 pts)	400
Pre-Lab notebooks (8 x 30 pts)	300
Quizzes (4 x 25 pts each)	100
Evaluation (safety, cooperation, independence)	<u>100</u>
	900 (Total)

*Project reports:* These are to be 1 – 4 page computer drafted documents. They must include the title of the project and a brief description (~ 50 words), a summary of the experimental procedures and results, all data collected and all calculations performed, and a concluding statement (what was learned from the results?). In addition you will be assigned several problems or questions which are to be answered at the end of report.

*Lab notebooks:* Before leaving the laboratory at the end of a lab period you must hand in the duplicate copy of your notebook pages including the data you gathered and the observations you made during the experiment.

*Pre-lab quizzes:* Four quizzes will be given during the semester at the beginning of lab. These quizzes may cover any material from the preceding project or the current one.

*Evaluation:* You will be evaluated by your TA on your preparedness, your adherence to safety rules, your cooperativeness, and your ability to work efficiently.

A grade of 90% is guaranteed an A- and 95% an A.

Make-up policy: Students who miss an experiment and furnish a valid excuse to the instructor may attend another section in the same week if space is available. The student must contact the TA of the section for the make-up lab before starting the experiment. Missing the second experiment will result in a grade of zero for that lab. Students missing more than two labs will receive a grade of F for the course.

### **The Laboratory Notebook**

A lab notebook is a permanent record of experiments carried out in the laboratory. Everyone who may be occupied in the scientific research must learn to keep a proper record of their experimental conditions and observations. In industrial laboratories this is of such importance that notebook pages are signed by the researcher and by a colleague who serves as a witness. The notebook serves as a legal document to establish claims of discovery.

Your TA will be continually evaluating your notebook usage, both in the manner in which you enter data in the lab and in the copies which you hand in at the end of each lab period. The following guidelines should be followed:

- 1) All entries must be in ink. NO PENCIL!
- 2) Each notebook page must be dated as it is used.
- 3) Notebook entries must not be erased or obliterated. Cross out erroneous entries with a single line and make the correct entry nearby.
- 4) Data must be entered into your notebook directly as you gather it. Using scraps of paper for any records for later transfer to your notebook is unacceptable.

General format: Before you come to the laboratory you should enter the following into your notebook to help you prepare for the experiment (and for a possible quiz!).

- 1) The top of the first notebook page for each experiment should contain the title of the experiment. This should be followed by a brief statement of the purpose.
- 2) Write balanced chemical equations showing the overall process you will perform.
- 3) Write an experimental outline in sufficient detail so that you could do the experiment without referring to the textbook. One possible format for this is to draw a vertical line down the center of the page and write the experimental outline on the left side of the page and then enter your observations at different points of the experiment on the right side.
- 4) Carefully sketch the apparatus that you propose to use in the experiment. Your TA will check your apparatus sketch before you begin your experiment.

Your TA will give you other specifics about how your notebook should be organized and maintained.

**Course Objectives:** Chemistry 2325 laboratory projects are somewhat more advanced than the experiments in the Chem 2315 laboratory course and are designed to complement the Chem 2320 lecture course. The course deals with multi-step syntheses, organic spectroscopy including infrared spectroscopy, NMR spectroscopy, and Mass Spectroscopy.

## Chemistry 2325 (Spring 2008) – Organic Chemistry Lab II – Experiments

<u>Lab Week</u>	<u>Activities</u>	<u>Lab Manual</u>	<u>Time Period</u>
1	Check In, Safety Discussion		1/14 – 1/17 (M - R)
1	Unknown Identification – IR Spectroscopy		1/14 – 1/17 (T – M)
2	Demonstration of NMR Spectroscopy		1/22 – 1/28 (T – M)
	Structure Assignment of Unknowns		
3	Demonstration of GC – Mass Spectrometry		1/29 – 2/4 (T – M)
	Structure Assignment of Unknowns		
4-5	Project 1 – Interconversion	Project 1	2/5 – 2/19
4	Step 1: Oxidation of 4- <i>tert</i> -Butylcyclohexanol		2/5 – 2/11
	(T – R)		
5	Step 2: Reduction of 4- <i>tert</i> -Butylcyclohexanone		2/12 – 2/14 (T – R)
5	Step 2: <b>Monday Sections only on Tuesday</b>		<b>2/19 (T)</b>
6-8	Project 2 – Synthesis of Dilantin	Project 2	2/25 – 3/21
6	Step 1: Synthesis of Benzoin		2/25 – 2/28 (M – R)
7	Step 2: Synthesis of Benzil		3/4 – 3/7 (M – R)
	<b>!! Spring Break – March 10 – 14 (M – F) !!</b>		
8	Step 3: Synthesis of 5,5-Diphenylhydantoin (Dilantin)		3/18 – 3/21 (M – R)
9-12	Project 4 – Multistep Synthesis of Tetraphenylphthalic Anhydride	Project 4	3/25 – 4/19
9	Step 1: Synthesis of 2,3,4,5-Tetraphenylcyclopentadienone		3/25 – 3/28 (M – R)
10	Step 2: Diels-Alder Synthesis of Dimethyl 3,4,5,6-Tetraphenylphthalate		3/31 – 4/3 (M – R)
11	Step 3: Synthesis of Tetraphenylphthalic Acid		4/7 – 4/10 (M – R)
12	Step 4: Synthesis of Tetraphenylphthalic Anhydride		4/14 – 4/17 (M – R)
13	Check Out and Course Evaluation		4/21 – 4/24
	(M – R)		