

Chemistry 42

Introductory Organic Chemistry Spring 2010

Laboratory

<u>Laboratories,</u>	L01	Mondays	12:50 – 3:35 PM	Cook A313	Zhe Zhang
<u>Teaching</u>	L02	Mondays	5:10 – 7:55 PM	Cook A313	Zhe Zhang
<u>Assistants</u>	L03	Tuesdays	8:30 – 11:15 AM	Cook A313	Quesia DeSousa
	L04	Tuesdays	1:00 – 3:45 PM	Cook A313	Timothy Boyd
	L05	Tuesdays	5:30 – 8:15 PM	Cook A313	Timothy Boyd
	L06	Wednesdays	12:50 – 3:35 PM	Cook A313	Ross Grimshaw
	L07	Thursdays	1:00 – 3:45 PM	Cook A313	Geoffrey Giampa
	L08	Thursdays	5:30 – 8:15 PM	Cook A313	Geoffrey Giampa

<u>TA Contact Info</u>	Zhe.Zhang@uvm.edu	Cook A328	TBA
<u>Office Hours</u>	Timothy.Boyd@uvm.edu	Cook A313	TBA
	Ross.Grimshaw@uvm.edu	Cook A310	TBA
	Geoffrey.Giampa@uvm.edu	Cook A307	TBA
	Quesia.De-Sousa@uvm.edu	Cook A231	TBA

Required Textbooks and Course Materials

Laboratory Notebook (available in the bookstore- any bound variety will do)

Safety Glasses (also available in the bookstore, in a variety of fashion frames)

Breakage Card (available from the stockroom – it's a good idea to buy this before labs begin)

Grading

Remember: you must earn a passing grade in the laboratory to receive a passing grade for the course. There are eleven lab experiments; you are required to attend every lab period. More than two laboratories missed for any reason will result in a failing grade for the course (unless you are granted an incomplete by your dean). Missed labs can be made up only in the case of unusual or extreme circumstances (serious illness, family emergencies, etc.) and only with written documentation from your dean's office. Otherwise, all missed labs will be assigned a score of zero. The lowest laboratory score *for an attended lab* will be dropped: the resulting ten scores (15 points for each lab) will constitute your lab grade for the course.

The grade for each lab will be determined as follows:

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| 1. Prelab Questions | 2 points | (how prepared are you to carry out the experiment?) |
| 2. Prelab Quiz | 3 points | (how prepared are you to carry out the experiment?) |
| 3. Lab Notebook Pages | 2 points | (how good were your observations of the experiment?) |
| 4. Conclusion | 2 points | (how well did you understand the experiment?) |
| 5. Results, Postlab Questions | 4 points | (how well did you perform the experiment?) |
| 6. TA evaluation | 2 points | (how well did you perform the experiment?) |

1. You should arrive to the lab period having read through the description of the experiment in the lab manual, and having answered the prelab questions. These questions must be answered before you arrive – your TA will check these sheets for the completed questions before you begin the experiment. Having reviewed this material and answering these questions should be adequate preparation for the lab quizzes that will begin each lab period.

- The prelab quiz will be a very brief five-minute quiz at the beginning of each lab period based on the objectives of each experiment, the hypotheses involved and important details of the experimental procedure.
- During the lab, you will record your experimental procedure in your lab notebook, as well as the relevant experimental results you obtain. You will need to turn copies of these sheets in as a part of your lab report. These should contain descriptions of the procedure you actually carried out, not simply a procedure copied from the manual.
- You will write a paragraph-long discussion and conclusion. This conclusion should answer the questions:
 - Did you accomplish the objective of the experiment? How do you know? If not, why not?
 - Do your experimental observations support or contradict your hypotheses?
- During and after the lab, you should complete the lab manual sheets with your results, observations and conclusions in the spaces provided, as well as answer the postlab questions. Finally, your TA will assign one point as an evaluation of your performance in the lab.

The lab report will consist of four components: the prelab question sheet, the results and postlab question sheet, copies of your lab notebook pages and your written conclusion.

Even though each TA will follow these grading guidelines, subtle differences in their potentially different approaches will be taken into account by normalizing the lab grades for each section.

One week after you finish the experiment, your lab report will be due.

Schedule of Lab Experiments:

Dates	Lab
2/1 – 2/5	Molecular Models of Alkanes
2/8 – 2/12	Distillation of Wine
2/22 – 2/26	Bromination of an Alkene
3/1 – 3/5	Alkylation of an Arene
3/15 – 3/19	Isolation of Limonene
3/22 – 3/26	Nucleophilic Substitution of Alkyl Halides
3/29 – 4/2	Chromatography of Spinach Pigments
4/5– 4/9	Oxidation of an Aldehyde
4/12 – 4/16	Reactions of Carbohydrates
4/19 – 4/23	Synthesis of Aspirin
4/27 – 4/30	Synthesis of Soap

Things to do before your first laboratory period:

- Purchase bound lab notebook, safety glasses, breakage card
- Read the description of Experiment 1 online, and answer the prelab questions.
- Read, review, remember and revere the safety guidelines given below. Also read section 0 in your lab manual.

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Laboratory Safety

The organic laboratory is a very safe place to work if safety precautions are always observed. Caution, careful thought, and knowledge of the characteristics of what one is working with are necessary to avoid accidents and injuries since potentially hazardous apparatus and inflammable, toxic, and/or corrosive chemicals are sometimes used. The following rules and procedures will be observed.

Rules

- 1) **Always wear safety goggles in the laboratory.** (Do not wear contact lenses).
- 2) Avoid any personal contact with chemicals. Many have a physiological effect (e.g., narcosis, toxicity, allergenicity, etc.). It is best to wear plastic or rubber gloves. If you spill any chemical on your skin, wash it off at once with soap and water (some chemicals are absorbed through the skin). Do not inhale chemicals or put them in your mouth.
- 3) Never do chemical work or make apparatus set-ups except during a regular period when an instructor is present.
- 4) Performance of unauthorized experiments is not allowed.
- 5) Horseplay in the laboratory is strictly forbidden.
- 6) Drinking, eating, or smoking in the laboratory is prohibited.
- 7) Removal of chemicals and equipment from the lab is forbidden.
- 8) Report all accidents and injuries, however minor, to the instructor.
- 9) Be cognizant of the dangers associated with any apparatus or chemicals that you use.
- 10) Extraneous sources of sound (radios, etc.) are not permitted.
- 11) Do not work in the laboratory while under the influence of drugs or alcohol.
- 12) Dress properly (shoes, etc.). Clothing can prevent a chemical from reaching the skin. Lab coats or aprons are recommended.
- 13) Do not pipet by mouth.
- 14) When leaving the laboratory make sure all gas, water, steam, and electricity are turned off.
- 15) **Know the location of exits, safety showers, and eye fountains.**
- 16) Never use open containers (beakers) for flammable or volatile solvents.
- 17) Read labels carefully. There are big differences in reactivity and toxicity between chemicals with similar names (e.g., sodium sulfate and sodium sulfide).
- 18) Do not heat flammable solvents, even a small amount, unless a condenser is attached to the vessel containing the solvent. Never place solvents in an open beaker. Solvents must not be poured in the vicinity of a flame.
- 19) Protect the hands with gloves or a towel when pushing glass tubing or thermometers into stoppers or rubber tubing. Lubricate the hole with water or glycerol. Protection is also necessary when removing glass tubing and thermometers from stoppers, etc. Cut away the rubber if it is stuck.

- 20) The working space, drawers, cabinet and shelf above your bench should be neat and clean at all times and especially when you leave for the day. **Neatness is good technique.**
- 21) Be careful not to construct closed systems with no openings to the atmosphere. They can explode if heated.
- 22) Be very careful not to touch equipment that has been heated until it has had time to cool.

In Case of Accident

1) **Fires:** Personal safety is most important. Make sure everyone gets out of the room and the building. Only after the safety of all is assured, should the matter of extinguishing the fire be considered. Because a few seconds delay can result in very serious injury. Every person in the laboratory should plan in advance what he will do in case of such an emergency.

If a person's clothing catches fire, they need help. Prevent them from running. Put them under the safety shower and pull the chain (it is less effective to smother flames with a fire blanket or lab coats). Never turn a carbon dioxide fire extinguisher on a person.

2) **Chemicals:** If corrosive chemicals are spilled on the clothing immediate showering (with clothing on) is the best remedy. If chemicals are spilled on the skin, wash them off with large volumes of water. If the chemical is spilled in the eye, it should be washed out immediately at the eyewash fountain. If corrosive chemicals are spilled on the lab bench, dilute them with a large volume of water and then neutralize with sodium bicarbonate if an acid was spilled, or with dilute acetic acid if a base was involved.

3) **Injuries:** All injuries (burns, cuts, etc.), no matter how minor, must be treated immediately by the competent medical staff at the Student Health Center or hospital emergency room. Report the injury to your lab instructor. He will have someone take you or accompany you to the infirmary if necessary.

Housekeeping

Certain habits of cleanliness and order are essential in carrying out your laboratory work successfully.

- 1) Throw paper, sand, alumina and other safe solids in the waste cans, not in the sinks.
- 2) Wash all glassware before returning it to your drawer.
- 3) Start cleaning up 10 minutes before the end of the period.
- 4) Make sure your desk top and shelf is clean at the end of the day.
- 5) Put hazardous wastes in labeled containers provided for that purpose. Instructions for disposal of most wastes are provided in the lab manual. If you are in doubt, ask your instructor.

Product and Derivative Samples

Most experiments will involve preparation of a product or derivative, they should be turned in as soon as possible at the end of the experiment. The sample should be dried, weighed and placed in a suitable dry bottle. Narrow-mouthed bottles should be used for liquids and wide-mouthed ones for solids. The bottle should be of such a size that it is about half-full when the sample is added. A neatly printed label with the following information should be affixed to the bottle: name of compound, b.p. or m.p. range observed, weight of compound, percentage yield, name of submitter, and notebook page.