

General and Organic chemistry **Lab**

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General and Organic chemistry

Lab

Policies and Information

Laboratory Teaching and Technical Staff:

Laboratory Directors:

General Chemistry

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Organizational Information

The *Laboratory Director* supervises the day-to-day operation of labs. The Lab Director works with the teaching assistants (TAs) to ensure that the laboratories are safe and functional, and to ensure that all chemistry students across all lab sections are graded uniformly. Any questions or concerns about your TA should be brought to the Lab Director. Enrollment questions for the chemistry labs are also handled by the Lab Director. The Lab Director also coordinates and correlates all aspects of your chemistry course: lab, discussion, and lecture.

Please note: each lecture instructor will inform you about the grading policy for the lecture material (homework, exams, etc.). If you turn in your homework late, you must contact the lecture instructor, and **not** the lab director.

Lab reports are to be handed in only to your TAs.

Neither the Lab Directors nor the TAs will be available from 1:20 PM to 1:30 PM during which time there are pre-lab meetings.

Laboratory Fee

Each quarter part of your student life fee will go towards a laboratory fee when you register for any chemistry course that involves a lab. This fee will cover some of the cost of chemicals, supplies, and maintenance of the equipment used by you in the lab segment of the course. You will be charged for excessive breakage or loss of equipment.

If you drop the course during the quarter, you must check out and return your key to the Lab Director.

Students who only take the lecture part of the course, having passed the lab portion once before, must see the Lab Director for a section assignment.

Attendance

The lab period begins promptly at 1:30 PM and ends at 5:30 PM. You must be in lab at 1:30 PM - tardiness will not be tolerated! If you are more than 20 minutes late to lab or miss lab without a valid written excuse, you will not be allowed to perform the experiment and will have to make up the lab on a later date with a late penalty of 50 points deducted.

Attendance is mandatory.

Arrive early to secure your coats, book bags, etc. in the hallway lockers. You will be required to share a locker and will have to provide your own lock. Your TAs will start the laboratory with important instructions and advice for the lab. Repeated failure to arrive on time will result in a loss of points or expulsion from lab.

Your laboratory work may only be performed during the scheduled lab hours. You will need to start cleaning and putting away your glassware fifteen minutes before the end of class.

Make-up Labs

If you miss an experiment for a valid reason, e.g., death in the family or medical emergencies, you may make it up in another lab period **during that same week**. You will need to present medical or legal documents to validate your absence. All arrangements must be made through the Laboratory Director and must be made if possible before the lab period you will miss. If you wish to reschedule a lab for something other than the valid reasons discussed above, you must see the Laboratory Director **one week in advance** of the lab period you wish to reschedule in order to obtain possible approval.

Obtain a make-up lab request form from the Lab Director. This form will be signed by the TA who supervises your make-up experiment. You must attach the signed make-up request form to your lab report so that your TA knows you have completed the work. Reports without this form will not be accepted.

No make-ups will be allowed during Check In and Check Out weeks. You must be present in your assigned section during these two weeks.

The above make up procedures will be strictly adhered to.

Prelab Assignments

Before an experiment, there is a discussion period in which your TA may review the lab procedures with you and troubleshoot some challenging ideas or methods. Therefore, you are expected to read the experiment before that discussion period and review it again prior to lab.

You are also expected to prepare your notebook before lab, to ensure that all required information is recorded in clear, organized form. Notebook preparation will be graded and included among the factors contributing to your lab grade.

For some experiments, the manual gives you an additional, more specific prelab assignment, consisting of questions, graphs, calculations, etc. Please put your answers to the prelab questions in your notebook. Prelab assignments not completed by the beginning of the lab period will

receive a grade of zero. When you have a make-up lab in another period, you will hand in the corresponding prelab assignments to the host TA.

Notebooks

All the experiments require the use of a laboratory notebook. If you are reading this, you have purchased the correct notebook. The blue (or yellow) carbon copies of your notebook pages will be handed to your TA at the end of each experiment.

For all experiments, you should record observations. For quantitative experiments, the observations also include numerical data. In simplest terms: you record what you saw, and what you learned from it.

Observations are the changes you saw, measured, etc. before, during, and after an operation. Watch for the following: color, smell, turbidity, gas bubbles, and heat. In addition, record the quantitative readings of your instruments as well as any qualitative tests (litmus).

Notebook Guidelines in General Chemistry:

- Enter all data directly into your notebook, not on loose scraps of paper! Although the notebook must be legible, accuracy is far more important than penmanship, and you must therefore use your notebook as your primary scientific record, even at some sacrifice in neatness. Record all data, not just the final value, for weighings (gross, tare, net), titrations, etc. Sooner or later you will make a reading or arithmetic error, and will be able to trace it if you still have the complete raw data.
- At the top of page one of each experiment, put your name, section number, date, and experiment number and title, as well as the name of your General Chemistry lab partner. (Organic Chemistry does not have lab partners.) On the remaining pages, you need to put only your name and date. Recording the date of the experiment is quite important, in some experiments conditions and/or reagent concentrations vary daily.
- Organize your notes so that they can be understood by people other than yourself, specifically, your TA, the lab director, etc. In addition to numerical data, you should provide some connecting prose. Know what to expect, so that you can focus on (and record!) essential observations, without having your circuits jammed by trivia. Note any unusual problems or procedural errors: solution boiled for 10 min. rather than 5 min.; added reagents in wrong order; color was much lighter than anyone else's; spilled sample, etc.
- Put repetitive data into tables, and if possible, plot a rough graph as you go along. You will be able to see whether the data tell a story, whether any data points are off, and whether you can stop taking data. If some of your data are bad you will see that right away, while there is still time to re-measure them.
- Cross out mistakes with a single line so that they are still legible, and note briefly what is wrong with them. Occasionally such "errors" turn out to be right after all, and then it helps being able to read them.

Notebook Guidelines for Organic Chemistry:

- When you arrive at lab your notebook MUST contain the following: all pertinent balanced equations or a description of the experiment, a list of reagents (with columns for molecular weight, amount used, and moles used, as well as any other physical data appropriate to the experiment), the procedure, including waste disposal instructions, written out in your own words in easy to follow phrases, and calculations of theoretical yield for synthetic experiments. The procedure is

provided in your Lab Manual in descriptive style. This information should be extracted and organized in a step-wise fashion.

- You will not be allowed to start an experiment until your notebook is properly prepared. If you have not prepared for the lab, you will be asked to leave and you will not be permitted to take a make up for that experiment.
- You should be able to work from your notebook without referring to the lab manual since your manual is not allowed in lab. All observations must be recorded in your notebook as you carry out the experiment. These observations will be part of your written report.
- For any two period experiments, your notebook must be completed for the entire experiment before the first period of that experiment.

Reports

Reports are due one week after the scheduled completion of the experiment, and will be returned to you a week later. (If your report is not returned to you one week later, please inform the Lab Director.) **Reports will be collected at the beginning of the lab period.** Any reports turned in after that time are late. The grade on late reports will be reduced for each day late. (A day means from 1:30 PM on the due day to 1:30 PM on the day it is turned in - anything turned in after 1:30 PM is considered another day late. This includes weekends as well.) Organic Chemistry lab reports will not be accepted for a grade more than one week late.

There is a final deadline that will be assigned for the acceptance of any late lab reports. If you plan to turn in any reports shortly **BEFORE that deadline**, do make sure that your TA actually receives them. Do not simply leave them on the TA's desk or slide them under an office door: either hand them to the TA in person or use some other verifiable method of delivery.

See the Laboratory Manual for more specific details on lab report format.

Academic Dishonesty

Academic dishonesty will not be tolerated!

Even when you are working with a partner (General Chemistry), you are expected to work independently in making experimental observations, doing final calculations, and writing final interpretations. Conversations with other students about chemical topics, including preliminary interpretations, are *strongly encouraged*, for you will thereby sharpen your understanding of chemical concepts and gain experience in using the language of the subject.

However, be careful not to cross the line that separates such legitimate help from outright cheating. It is fine to ask for explanations of concepts, procedures, techniques, calculations, etc., and then to tackle the work on your own. It is not all right to copy another student's work (even prelabs, outlines, etc.), or to let your lab partner do most of the work. Any assignment turned in should represent your intellectual achievement, not a copy or paraphrase of someone else's. Even if you have collaborated with other students, you should write your report separately. If you appear to be too dependent on others while working in the lab, your TA will deduct points from your lab grade.

It goes without saying that all forms of cheating are forbidden, e.g., faking of data, using crib sheets on exams, etc. Anyone caught cheating will be reported to the Dean of Students in the College. In addition, the total grade for the experiment in question will be reduced to zero, and the course grade (not merely lab grade) may be reduced as well.

Housekeeping

Please do your part in keeping the laboratory clean and safe. Clean up any spills promptly. Always dispose of solid waste, paper, used matchsticks, etc. in the plastic wastebaskets. Broken glassware will be placed in a special cardboard box marked "Broken Glass". Cluttered bench tops interfere with safe, efficient experimentation. Equipment and glassware not being used should be removed or moved out of the way. In brief, give yourself ample, uncluttered working space.

Be sure to put away all your equipment (remember also to return all common equipment) and lock your drawer before you leave the lab. Any equipment that is left out will be put on the center bench of the lab. It is not possible to guarantee that such equipment can be recovered by you.

Remove any debris that has collected in the sink. Remember that a sink is designed to remove liquid waste, not solid waste. Rinse the sink thoroughly with tap water.

Wearing your rubber gloves, use a wet sponge to wipe your lab bench, hood areas and any other counter space you may have used. Use a paper towel to dry the counter/hood/surfaces.

The responsibility for maintaining cleanliness and order in the balance rooms, instrument rooms and labs lies collectively with the entire lab. Therefore, if these areas are not cared for adequately, your TA will ask some of you to take turns each week putting these areas in order.

The TA may lower his/her evaluation of your performance grade if you fail to perform adequate housekeeping duties. If you continue to neglect your housekeeping duties, you will not be admitted to the lab.

Equipment

You will be assigned an equipment drawer(s) in one of the laboratories. After check-in, you are responsible for these items, not merely for their presence but also for their condition. Community equipment (equipment which is to be used by your counterparts in other lab sections) must be returned in good shape to the proper place at the end of a laboratory session. Lost or broken keys will be replaced at a cost of \$5 each.

If you find a balance, pH meter, spectrophotometer, etc. that is not working properly, notify your TA immediately so that it can be repaired or replaced.

Reagents

Chemicals for laboratory use are known as reagents. Most of the reagents that you will use in the laboratory are available in one of the fume hoods. Never take a reagent bottle to your desk, even for a moment. Instead, take clean containers with you when you go to the reagent area and transfer the reagents into your containers.

The volumes of solutions provided for each experiment are intentionally limited and provide for only limited excesses. A ruined portion of an experiment can be repeated only if reagents are available and permission is granted by your TA.

It is very important that the chemical reagents remain uncontaminated. Never insert a foreign spatula, medicine dropper, or other utensil into a reagent bottle, even if you think that the utensil is clean. Use only the spatula or dropper provided. Take only the amount that you need. You should discard any unused portion of a reagent instead of returning it to the bottle. Therefore, it is important that you take only what you need. Be careful in handling the bottle tops and be sure to cap a bottle after use.

Acetone will be available at the center hoods for rinsing glassware. It may only be used at the center hoods. Waste acetone must be disposed of in an organic waste bottle.

Waste Disposal

Some of the chemicals used in this course can be damaging to our environment if they are not properly collected and disposed of. However, with intelligent forethought and care, potential environmental damage can be eliminated. Instructions regarding the proper disposal of chemical solutions and solids are given in each experiment.

Remember, this is your chance to make a difference in preserving a clean and safe environment. You should **NEVER** dispose of chemical solutions in the sinks or solid chemicals in the trashcans unless directed to do so in the lab manual. If any of the waste containers are full, notify your TA so that a new container can be provided. If you have any confusion about waste disposal, consult with your TA. Accidental mixing of incompatible chemical wastes is extremely dangerous.

General and Organic chemistry

Lab

Laboratory Safety

With normal good judgment, the chance of an accident in this course is small. Nevertheless, some of the materials used in the laboratories can be dangerous if mishandled, so the following simple safety rules and precautions are essential.

Safety Rules

1. **Eye Protection**, i.e. chemical splash goggles, must be worn **at all times**. You will be issued a pair of goggles during your first University of Chicago chemistry course. This pair will be required for all your remaining chemistry courses at the University. Use of goggles other than those provided must be approved by the Lab Director.
2. **Rubber Gloves** shall be worn during chemical manipulations including washing glassware.
3. **Laboratory Aprons** shall be worn in all chemistry laboratories.
4. **Clothing** shall cover the legs and shall not be loose or flowing in order to prevent it from coming in contact with hazardous chemicals or mechanical equipment and also to prevent contamination of the work environment. Therefore, no skirts or shorts are allowed in lab.
5. **Shoes** which cover the entire foot are to be worn while working in the laboratory. Shoes with open toes or other exposed skin, such as sandals, are prohibited.
6. **Hair** shall be secured back and off the shoulders in such a manner as to prevent it from coming in contact with hazardous chemicals or mechanical equipment, and also to prevent contamination of the work environment.
7. **Hand Washing** shall be conducted before taking a break and at the end of each laboratory session.
8. **Contact Lenses** are prohibited in all chemistry laboratories because they may absorb certain solvent vapors. In addition, contact lenses represent a special hazard in the event of chemical splash to the eyes, because they tend to concentrate hazardous chemical materials against the cornea and prevent tears from washing it away.
9. **Fume Hood Sash** must be closed to the level indicated by the certification sticker. Keep head and torso outside of the fume hood.
10. **Experiments** must never be left unattended. Once you begin an experiment, you may not leave the building unless you have received permission from your TA.

11. **Application of Cosmetics** is prohibited in the laboratory.
12. **Smoking** is prohibited in the entire Kent chemistry building.
13. **Eating and Drinking** including gum chewing will not be permitted in the laboratory.
14. **Cell Phones and Personal Audio Devices** are prohibited in the laboratory.
15. **Mouth Pipetting** is prohibited.
16. **Glassware** that is broken, cracked or chipped shall not be used. Dispose of all broken glass in labeled containers.
17. **Open Flame Devices** shall never be left unattended.
18. **Electrical Cords** shall be kept away from sinks and walkways. All damaged electrical cords shall be reported to the laboratory TA.
19. **Aisles** must not be obstructed in any way. No equipment, chairs, supplies, or trashes are permitted in exit passageways or aisles. *Coats and book-bags must be stored in the hallway lockers.* Doors to the laboratories shall be kept closed, but exit doors must not be blocked, bolted, or obstructed in any way to block access.
20. **Housekeeping** shall be performed continuously. The laboratory work area must be kept neat and orderly. A disorganized and sloppy laboratory work environment represents a safety risk. Repeated offenses will result in several point deductions for the day's lab.

Other Safety Features and General Comments

IN CASE OF FIRE, YELL "FIRE" LOUD AND CLEAR. Alert your TA and the Lab Director.

If the fire is not put out within a minute, **pull the fire department alarm located in the hallway, and vacate the building.**

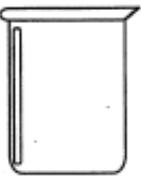
The laboratory is equipped with various safety items for use in an emergency. Your TA will instruct you in their use.

In the event of any injury, whether or not it involves chemicals, go immediately to your TA for first aid, no matter how insignificant the injury may appear. The TA will have available first aid and can summon medical aid in case of a serious injury. A phone for use in emergencies (not for personal calls) is located in the hallway and in the laboratories. Emergency telephone numbers are listed near the phone.

Carefully follow the directions for the disposal of solutions and solids no longer needed. Never return unused reagents to their original bottles.

Special safety instructions will be highlighted in the lab manual. You will be alerted to any special precautions which need to be taken or warned of any notably hazardous materials. *IF YOU HAVE ANY QUESTIONS, OR ARE EVER UNCLEAR ABOUT WHAT TO DO IN A PARTICULAR SITUATION, ASK YOUR TA OR THE LAB DIRECTOR FOR HELP.*

GENERAL CHEMISTRY EQUIPMENT LIST

<p>Beakers</p>  <p>600mL x 1 _____</p> <p>400mL x 1 _____</p> <p>250mL x 3 _____</p> <p>100mL or 150mL x 3 _____</p> <p>50mL x 3 _____</p>	<p>Flasks</p>  <p>500mL x 1 _____</p> <p>250mL x 6 _____</p> <p>125 mL x 1 _____</p> <p>Rubber Stoppers x 6 _____</p>  <p>Watch glass x 2 _____</p>
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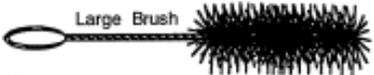
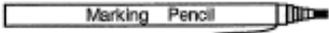
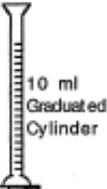
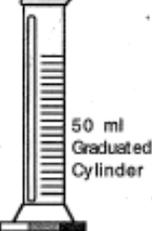
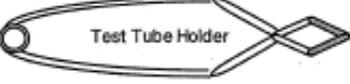
BEAKERS

50 mL	\$2
150 mL	\$2
250 mL	\$2
400 mL	\$3
600 mL	\$3

CYLINDERS

10 mL grad	\$5
50 mL	\$6

Lab drawer should contain **ONE** of each following item. CIRCLE any missing item.

ERLENMEYER FLASKS

125 mL	\$3
250 mL	\$3
500 mL	\$4

MISCELLANEOUS

thermometer	\$5
watch glass	\$1
stir bar	\$5
spatula	\$4
brush	\$2
pencil	\$1
wash bottle	\$2
glass rod	\$1
Test Tube Holder	\$5

Name _____ Section _____ Drawer # _____

Email _____ Phone # _____

By signing this, I certify that all lab drawer equipment is present and in good condition. After signing this form, I will personally take responsibility for the lab drawer equipment and pay (in cash) for any lost or broken items.

Check-In: Signature _____ Date _____

Check-In: Signature _____ Date _____

ORGANIC CHEMISTRY EQUIPMENT LIST

BEAKERS

Size	#	price (each)
50 mL	1	\$2
150 mL	2	\$2
250 mL	2	\$2
400 mL	1	\$3
600 mL	1	\$3

ERLENMEYER FLASKS

Size	#	price (each)
50 mL	1	\$3
125 mL	2	\$3
250 mL	2	\$3
500 mL	1	\$4
suction (250)	1	\$6

FUNNELS AND CYLINDERS

Size	#	price (each)
Buchner	1	\$10
Glass	1	\$3
Plastic	1	\$1
10 mL grad	1	\$5
50 mL	1	\$6

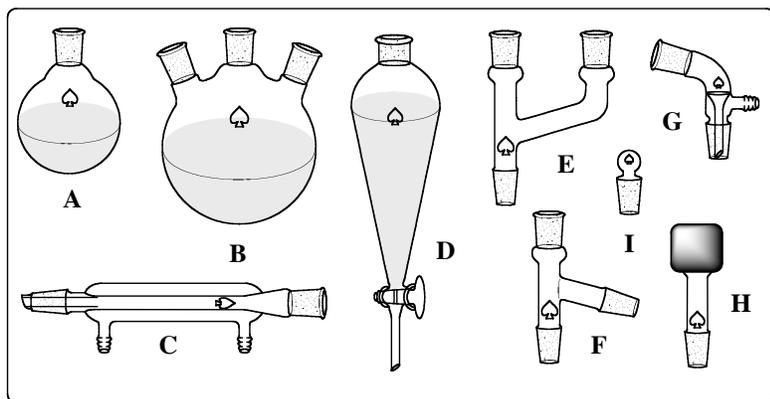
MISCELLANEOUS

Item	#	price (each)
brush	2	\$2
pencil	1	\$1
wash bottle	1	\$2
glass rod	2	\$1
pipet bulb	2	\$0.25
blue clip	1	\$5

Item	#	price (each)
scoop	1	\$1
spatula	1	\$4
drying tube	2	\$1
3 ft. tubing	2	\$2
holed stopper	2	\$1

Item	#	price (each)
thermometer	1	\$5
rubber adapter	1	\$1
watch glass	4	\$1
solid stopper	1	\$1
stir bar	1	\$5

CHEM KIT



Item	price (each)
(A) 25 mL RB flask	\$9
50 mL RB flask	\$9
100 mL RB flask	\$9
250 mL RB flask	\$12
(B) 500 RB 3-neck flask	\$30
(C) condenser	\$30
(D) separatory funnel	\$30
(E) Claisen adapter	\$30
(F) 3-way connecting adapter	\$20
(G) vacuum adapter	\$20
(H) thermometer adapter	\$15
(I) glass stopper	\$8

Name _____ Section _____ Drawer # _____

Email _____ Phone # _____

By signing this, I certify that all lab drawer equipment is present and in good condition. After signing this form, I will personally take responsibility for the lab drawer equipment and pay (in cash) for any lost or broken items.

Check-In: Signature _____ Date _____

Check-Out: Signature _____ Date _____

General and Organic chemistry **Lab**

Safety Compliance Form

I hereby acknowledge that I have received the Laboratory Safety training curricula. I understand that I will be required to adhere to the policies given on pages 7-8 at all times during the laboratory period.

Name: _____	Student ID# _____
Course # _____	Section # _____
Teaching Assistant: _____	Lab Drawer # _____
Signature: _____	Date: _____

This form must be signed and completed before you can begin any laboratory experiments. If you have any further questions regarding safety issues or chemical toxicity concerns you may contact the Lab Directors or the Safety and Environmental Affairs Office (2-9999).