General Chemistry Laboratory B
Chemistry 112: Summer 2008
M, W and T, Th , Third Floor Flanner Labs (Flanner 305)

Instructors: Daniel Graham, Conrad Naleway, Sandra Helquist

Lab Assistants: Mary Maliakal, Pawel Kolano, Godfred Boateng, Angela Mahaffey, Matt Sara, Deepika Panawennage, Justin Dowlatshahi.

Description: A one semester hour laboratory course designed to teach basic laboratory techniques and to illustrate experimentally some of the topics covered in chemistry lecture courses.

Pre-Requisites: Prior completion of General Chemistry Lecture 101 and Lab 111.

Text Materials: Handouts developed by DJG and Mark Schofield (Loyola University Chicago, 1997). The course logistics, including this syllabus, were designed by M. Schofield.

Individual experiments will be distributed weekly as handouts in class.

Each student will need a pair of safety glasses. The ones from Chem 111 will do. Alternatively, new safety glasses may be purchased from the bookstore or from the stockroom.

Laboratory Policies and Procedures:

Chemistry 112 consists of eight experiments, eight quizzes, one midterm exam, and a non-cumulative final exam, as indicated on the attached schedule.

Prior to coming to the laboratory, each student is expected to have read through the experiment and have completed the Pre-laboratory assignment. This will help acquaint individuals with the fundamentals and calculations relevant to the experiment. The pre-lab assignments will not be submitted for grading. However, they will assist in preparing for the quiz and carrying out the experimental procedures. Please direct any and all Qs to the teaching assistants and instructors.

Completion of the quiz is a pre-requisite for conducting the experiment for that day. The quiz will begin at the start of each lab period.

A chalktalk will follow the quiz and will be presented by the teaching assistant and/or instructor. Then each student will carry out the experiment for that day, following the procedure detailed in the lab manual.

Every individual will be expected to keep a detailed record of results and notes in a

laboratory notebook. Please record observations and any changes in the procedure. Please sign and date the bottom of each page of the lab notebook--this is standard protocol in chemical research labs, both academic and industrial.

Note that this book must be a bound notebook and not a spiral notebook.

At the completion of the experiment, each student will submit a preliminary data sheet to the Laboratory Assistant.

Housekeeping is very important: please clean up the lab bench and return all reagents and materials to their proper place.

Grading:

1200 points will apply to the second summer lab as follows:

800 points	Experiments (8)	**25** points for a signed data sheet turned in at end of lab period. This is required to receive credit for the experiment. **75** points for the laboratory report. Due dates for laboratory reports will be announced in class. Late laboratory reports will suffer a penalty of five points per working day, 25 points per week. Prior to the deadline for all laboratory assignments, lab reports more than two weeks late will not be accepted. **No laboratory assignments will be accepted after Thursday August 9, 2007.**
120 points	Quizzes (8):	15 points for each quiz.
100 points	Midterm Exam	
100 points	Non-Cumulative Final Examination	
80 points	Lab Evaluation	80 points will be awarded on the basis of performance in lab: observation of safety rules, cleanup, tardiness, notebook preparation, contribution to results gathered in lab partner situations (i.e. each partner must carry his/her own weight.)

Course grades will be assigned on the following scale:

A	90 - 100 %
B	80 - 89 %
C	70 - 79 %
D	60 - 69 %
F	< 60 %

Please direct Qs about about grading and other course aspects to the teaching assistants or instructors.

Attendance:

Attendance is required on each day listed on the schedule. The hectic, compressed summer schedule does not allow for making up missed experiments.

Safety Rules: These are summarized on the attached sheet. Please read them carefully and follow them throughout the course. As is customary in the chemical industry, anyone who violates a safety rule will be given one warning. Any student who violates the safety rules a subsequent time will be asked to leave the lab and will receive a zero on work for that day. After a third violation of the safety rules, the student will be referred to the Dean of his/her college. Failure to adhere to the safety rules will also be reflected in the Lab Evaluation portion of that student's grade.

Check Out: One of the requirements of the course is that you check out at the end. Students who drop the course still have the obligation of checking out so that accounts can be settled. No grade will be issued to any student who has not checked out.

Laboratory Materials:

Each student is responsible for lost or broken laboratory equipment. These items can be obtained from the stockroom on the first floor of Flanner Hall, room 120.

Academic Integrity:

Academic dishonesty will not be tolerated. Although students will work with lab partners, the work submitted by each individual for grading is expected to be that individual's work. If it is determined that this is not the case, the work in question will receive a grade of zero. Furthermore, the incident will be reported to the chairman of the chemistry department and the Dean's office for further disciplinary action. For a more complete discussion of official University policies in this area, consult the "General Academic Standards" section of your undergraduate studies guide..

Registration: You must attend the section for which you are officially registered. Any change of section must be accomplished through the Registrar.

Laboratory Notebook:

A laboratory notebook is an important tool for a working scientist. In it, all observations (masses, volumes of regents, etc.), and procedures are recorded *at the time they are carried out* to ensure an accurate record of results. With care and attention, each student will be able to rely on the laboratory notebook in organizing the results for the laboratory report (see below).

Each notebook must be bound and should include the following:

•At the top of page one of each experiment, each student should record their name, section number, date, experiment title and the name of the lab partner(s). On subsequent pages, each student should record their name and the date.

•*All data* recorded from an experiment. All data should be written (in *pen*) directly into the notebook, not kept on scraps of paper which may be lost or their significance forgotten. This means even the seemingly insignificant things like *mass of weighing paper or volume of water added.* All deviations from the procedure (like *we forgot to add the concentrated* H_2SO_4 *until after we heated the* $KNO_3/CuSO_4$ *solution for 15 minutes.*

•Sample calculations from the pre-lab assignment and notes from the textbook, or the laboratory handout will serve as a good introduction to the experiment and can go into notebook as well

Repetitive data (like Temperature of Stearic Acid during cooling) should be inputted in table format, not just randomly listed.

If a mistake is made entering ~~datums~~ data, this should be crossed out with a single line and the correct value recorded over it. If necessary, add an explanation of the source of the correction (e.g. burette was improperly read the first time).

Laboratory Reports:

Armed with data contained in your laboratory notebook, each student will be expected to write a laboratory report. Typically, this will consist of the following:

•Introduction	An overview of the point behind the experiment, the method you used, and underlying concepts or chemical reactions.
•Procedure	Notation of deviations from the procedure outlined in the experiment (where authorized by your Teaching Assistant).
•Data Analysis	Compilation of your data and calculations relating to the experiment. Plots of data, where appropriate.
•Discussion	Explanation of your results (including sources of error, assumptions behind calculations, questions assigned in the experiment, etc.).

More specific instructions for write-ups and questions to be included in the discussion will accompany the laboratory handouts.

Class Schedule ***The exact order and nature of experiments is subject to change.***

Date (2008)	**Experiment #**	**Title**
July 1,2	1	Statistics and Data Analysis
July 7, 8	2	Chemical Kinetics
July 9, 10	3	Mass Action Constants
July 14,15	4	Equivalent Mass Determination
July 16, 17	5	Super Acid-Base Titrations
July 21, 22	-	Mid-Term Exam
July 23, 24	6	Solubility Product Measurements
July 28, 29	7	Entropy Lab
July 30, 31	8	Precipitation Kinetics
August 4,5	-	Clean-Up and Check-Out
August 6,7	-	Final Exam

GENERAL CHEMISTRY LABORATORY RULES

A chemistry laboratory is a potentially dangerous place. However, most accidents result from simple carelessness and inattention to detail. Being aware of and taking precautions against potential hazards is the best way to PREVENT ACCIDENTS BEFORE THEY HAPPEN. In particular, following the safety rules outlined below can help to insure your safety and the safety of those around you. Since these safety rules are to insure everyone's protection, anyone who violates them will not be allowed to remain in the laboratory.

1. **Wear eye protection at all times.** In any chemistry lab, it is your eyes which are the most vulnerable to permanent damage. Do not remove your eye protection even for a brief moment. Historically, it has been exactly at the moment when a student has removed his/her eye protection to 'get a better look' at something when a chemical splash or explosion has happened right in the student's unprotected face. Some of the chemicals used in lab can cause serious burns to your skin-- just think of the damage they can do to your eyes!

If anything should get into your eyes, go directly to the eye wash station. Wash your eyes with large amounts of water-- a brief rinse is not enough. While at the eye wash, call out for help. Do not remove your eyes from the eye wash until your teaching assistant has assisted you.

While in lab, also do not wear contact lenses. They can trap chemicals against your eyes.

2. **Know the location of fire extinguishers.** Since many common solvents are flammable, fire is a constant threat. In particular, waste acetone in the sinks and troughs is the most common fire hazard. If you have poured acetone into the sink, be sure to flush it down with plenty of water. Check your area for lighted Bunsen burners before working with flammable solvents; before lighting a Bunsen burner, check with your neighbors. Keep the burner burning only for the time it is actually being used.

If your clothing catches on fire, roll on the floor to smother the flames. In the event of a fire, clear the area and notify your teaching assistant at once. Your personal safety and that of others around you should be your first concern.

3. **Know the location of the laboratory safety showers.** Chemicals should be washed from your skin immediately with large amounts of water. If you get a small amount of a chemical on your hands or the lower parts or your arms, this can be accomplished in a sink. For larger spills, however, the safety shower should be used. If in doubt, use the safety shower. Any contaminated clothing should be removed.

4. **Do not eat, drink or smoke in the laboratory.** Do not even bring these items into the laboratory. Also, never taste any chemical in the laboratory.

5. **Do not take chemicals or equipment out of the laboratory.** Do not remove any starting materials, products or other chemicals from the laboratory. Do not bring any chemicals into the laboratory from outside sources. No laboratory work is to be done

outside of Flanner Hall 204. Misrepresenting work done outside the laboratory as work done in the laboratory is an act of academic dishonesty and will dealt with as such.

6. **Do not keep coats, backpacks or books on the lab bench.** These should be kept in the hall lockers and secured with the lab drawer lock.

7. **Bare feet and sandals are not permitted in the laboratory.** This is due to the large amount of broken glass generated in the laboratory.

8. **Wear clothing which does not expose your skin to chemical contact.** Any part of your skin which can not be quickly rinsed off in the sink should be covered. Specifically, do not wear shorts, dresses, skirts which do not cover your legs. Shirts should cover at least the midsection, chest and shoulders. Also, it is a good idea to wear an apron or lab coat to protect your clothing and gloves to protect your hands.

9. **Never work alone in the laboratory.**

10. **Do not perform unauthorized experiments.**

11. **Do not pipet by mouth.**

12. **"Horseplay" will not be tolerated.**

13. **Do not contaminate reagents by returning any excess taken.** First, make every effort to take only what you need. Any excess should then be shared with you neighbors or discarded.

14. **Waste chemicals should be placed in the appropriate containers.** If you are unsure what to do with your chemical waste, consult your teaching assistant.

15. **Cleanliness.** A work area which is not clean is often also not safe. Spills should be cleaned up immediately. Do not allow used paper towels, broken glass, litmus paper, labels, etc. to accumulate at your desk or in the sink. Before you leave, be sure to clean your area, wipe off the desk top and return any equipment you may have used to the place where you found it.

I have read and understood the safety rules outlined above. I also understand that failure to abide by these rules is grounds for being asked to leave the laboratory.

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Signature and Date Printed Name