CHEM 445, Physical Chemistry Laboratory I
Fall, 2012, 12F

Instructor:
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-021L, 240 BRL, 1220 – 0420 We
-022L, 240 BRL, 0630 – 1030 We
-023L, 240 BRL, 0630 – 1030 Th
-024L, 240 BRL, 1220 – 0420 Fr
-025L, 240 BRL, 1230 – 0430 Th

LABORATORIES WILL MEET DURING THE FIRST WEEK OF THE SEMESTER, BEGINNING WEDNESDAY, AUGUST 29, 2012, and will include safety orientation, introduction to the lab, and Experiment 0. Attendance at the safety orientation is required before any laboratory experiment may be done.

There is no text for this laboratory course.

The experiments are available as PDF files under Laboratory Experiments on Sakai for students enrolled in the course. The experiments may be copied and printed using Adobe Acrobat Reader. A notebook containing a copy of each experiment is available at each station. You need not bring your own copy.

Definitions and calculations of standard deviations and propagation of error analyses are available in many standard works on analytical or physical chemistry (including Harris, QUANTITATIVE CHEMICAL ANALYSIS).

The CHEM/BIOC Library has standard reference works (CRC Handbook of Chemistry and Physics, International Critical Tables, Lange's Handbook, etc.) and monographs that may contain data for comparison with your experimental data. Some Web sites (NIST, etc.) contain reliable information. Not all Web sources are reliable. A Google search actually provides occasionally useful information.

Six experiments will be done this semester in rotation:

Exp. 1 Freezing Point Depression
Exp. 2 Partial Molar Volume
Exp. 3 Effect of Ionic Strength on the Solubility of Calcium Sulfate
Exp. 4 Heat of Combustion and Formation of a Compound
Exp. 5 Formation Constant for Monothiocyanatoiron(III)
Exp. 6 Vapor Pressure of a Pure Liquid

Because of equipment and space limitations, the experiments are not in sequence with discussions of the topics in CHEM 418 or CHEM 443. At the end of each experiment there is a brief paragraph with text references and reminders that most of these concepts were covered in freshman chemistry and CHEM 120 or CHEM 220 (prerequisites for the course).

You will generally do each of these experiments with a partner. There will be rotation of partners throughout the semester. The schedule will be posted for each section on Sakai and on the door to 240 BRL. Missing a laboratory period is a major problem for you and your lab partner. There are no "snow days" to make up a lab later in the semester. Make every effort possible to attend your lab section. In the event that you cannot attend for an acceptable reason, let your lab partner, the Lab Instructor, and Munson know – in advance. The labs are full and it is not possible to complete an experiment in another scheduled lab period. Lateness is an inconvenience to your lab partner.

You have two weeks to perform each experiment {except Exp. 0, data analysis) and write a report. With proper preparation before the laboratory, with good laboratory techniques, and perhaps with some good luck, each experiment can be completed in a single laboratory period. However, the second lab period is available to finish an experiment or to repeat part of the experiment if your data

are inconsistent. Your object in performing these experiments is to obtain reliable data. All of the experiments work and part of your grade is based on the accuracy/precision of your results.

Even if you have obtained all of the necessary high quality data, **you must spend a substantial part of the second lab period in the lab** (or library or computer room) analyzing your data. This time guarantees that you and your lab partner can meet and is an opportunity for you to ask questions about the analysis of the data from the Lab Instructor (or Munson). Collaboration in writing reports consists of both partners working together on all parts – not an assignment of parts: "I'll write the introduction and procedure; you do the data analysis."

It is difficult, if not impossible, to write a good laboratory report if you begin the night before it is due.

Grading

Your laboratory notebook and performance in the laboratory, as evaluated by the Lab Instructor, count as 1/8 of the grade. Lab performance includes preparation of the notebook before the laboratory period, attendance on time, proper lab technique and chemical disposal, and cleaning your equipment and work area after the experiment is completed.

A written final exam will count as 1/8 of the grade. This exam {multiple choice/short answer} covers procedures and analysis of data from the experiments. Questions from previous exams are available on Sakai.

Lab reports are due electronically by the beginning of the lab period when the next experiment begins. You have two weeks to do the experiment and write the report. An electronic copy of your report as .pdf should be submitted via the UDEL Drop Box.

A penalty of 2 points per day, including weekends, will be deducted for late lab reports, **except under unusual circumstances that should be arranged with your Lab Instructor in advance.**

Each person should record all data in its notebook. Be careful to save your data and analyses. Your computer may "eat your data" or have other malevolent effects no more than once during the semester without late penalty.

The lab reports will be graded on a numerical scale, as given below for course grades. Twenty points of the grade are based on the accuracy and precision of your data. Eighty points are given for the analysis and presentation of the data. The Sakai site has detailed information about the lab reports.

Tentative Course grading

92 – 100	A
89 – 91	A-
86 – 88	B+
82 – 85	B
78 – 81	B-
74 – 77	C+
69 – 73	C
64 – 68	C-
58 – 63	D+

CHEM 445 Course Learning Goals

{Numbers in parenthesis indicate the departmental goal to which each goal is applied.}
After successful completion of this course a student should be able to do the following:

1. Apply theoretical principles and mathematical analysis to the solution of problems. (1)
2. Perform experiments with modern instrumentation. (6)
3. Use computer for data acquisition and analysis. (5)
4. Work effectively with others in performing experiments and writing reports. (8)

5. Be able to write clear technical reports. (10)
6. Understand and practice proper laboratory safety procedures. (7)
7. Understand and practice ethically correct presentation of scientific data. (9)