

CHEM 445, Physical Chemistry Laboratory I
Spring, 2012, 12S

Instructor:	-021L, 240 BRL, 0630 – 1030 Mo
Burnaby Munson	-022L, 240 BRL, 0630 – 1030 Tu
217 BRL, 831-2917	-023L, 240 BRL, 1220 – 0420 We
bmunson@udel.edu	-024L, 240 BRL, 0630 – 1030 We
	-025L, 240 BRL, 0630 – 1030 Th

LABORATORIES WILL MEET DURING THE FIRST WEEK OF THE SEMESTER, BEGINNING MONDAY, FEBRUARY 6. The first meeting will include safety orientation and introduction to the lab. 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

Additional information that may be useful for this course is available on the CHEM 446 Home Page. 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 of an Electrolyte

Exp. 2 Partial Molar Volume of an Electrolyte

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

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.** Lateness is an inconvenience to your lab partner.

You have two weeks to perform each experiment 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. If you have a laptop computer bring it to the lab to record and begin analyzing your data during the first lab period. If you don't have a laptop, bring a USB drive to use on one of the computers in the lab.

Even if you have obtained all of the necessary high quality data during the first week, **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 not 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. In addition, you are to submit data, in the prescribed Excel form, for each experiment, except Exp. 4.

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.**

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 is 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)