

**Physical Chemistry Laboratory—CHEM 412A**  
Winter 2010

Dr. Scott Nickolaisen

Office: PS 820

Phone: (323) 343-2382

Office hours: M,W: 10:30 a.m. – 12:00 p.m.

T: 1:00 – 2:30 p.m.

Class hours: M: 12:30 – 6:20 p.m., PS 853

Text: You are not required to purchase the textbook for this course because most of the experimental procedures will be provided as handouts by the professor. Procedures for those experiments found in the textbook may be obtained in the library. The textbook is entitled *Experiments in Physical Chemistry* by Shoemaker, Garland, and Nibler (SGN). The textbook is on 1 hour reserve at the library.

This is a laboratory course in which the principles learned in the Physical Chemistry course are experimentally demonstrated. Brief lectures will be given at the beginning of each lab period and will review the theory and principles underlying each experiment, while labs will be used to illustrate different techniques and measurements. There are six labs that will be performed over the course of the quarter. Students will work in groups throughout the quarter, and each group will rotate through all six experiments. Lab experiments are:

Diffusion of Gases (SGN experiment #5B)

Heats of Combustion (SGN experiment #6)

Heat Capacity Ratios for Gases (SGN experiment #3A)

Homogeneous Gas Phase Equilibrium

Kinetics of the Acid-Catalyzed Conversion of Glycidol to Glycerol

Kinetics of the decomposition of benzenediazonium ion (SGN experiment #23)

A report for each experiment will be the basis for your course grade. Lab reports should include the following information:

Theory—a thorough explanation of the properties to be measured and the principles that allow the desired quantities to be determined with the experimental technique.

Experimental—an outline of the experimental procedure used including the raw data presented in a format from which the reader (Dr. Nickolaisen) can understand exactly what was done and why (tabular and graphical representations of the data are very useful).

Discussion—an explanation of how the raw data was manipulated in order to determine the desired quantities. This should include, when available, a comparison of your values to literature values of the measured quantities. This section should also include a discussion of possible experimental errors and the extent to which they would affect your calculated results. (Anyone using human error as an explanation of possible discrepancies without explicitly describing the type of human error and the magnitude of the effect on the final results will automatically have 20 points deducted from their report score.)

Lab reports will be worth 50 points each and will be due at the beginning of the lab period following the completion of the experiment (*i.e.*, you have one week to complete your lab reports before they are due). Proper organization, neatness, grammar, and spelling will all affect the lab report score. If an experimental procedure cannot be completed within the time allotted during the class period due to unforeseen circumstances, arrangements must be made with the instructor to schedule additional laboratory time. Under normal circumstances, this will not postpone the due date of the lab report.

Student should come to lab prepared to begin the experimental procedure. This requires that students read and understand the experimental outline before coming to class. Additional lab time will not be granted to students who come to class unprepared, and therefore cannot complete the necessary measurements. Laboratory safety practices must be followed including use of safety glasses—all safety glasses must have a Z87 specification to be acceptable.

We will meet as a class on Monday, Jan. 11<sup>th</sup> at the normal lab time to review the theory behind each of the experiments. Students should come to this session prepared to take notes. The schedule of experiments is:

| Date   | 1/25 | 2/1 | 2/8 | 2/15 | 2/22 | 3/1 | 3/8                |
|--|------|-----|-----|------|------|-----|--------------------|
| Diffusion  | A    | F   | E   | D    | C    | B   | make<br>up<br>labs |
| Calorimetry  | B    | A   | F   | E    | D    | C   |                    |
| NO <sub>2</sub> /N <sub>2</sub> O <sub>4</sub> Equilibrium | C    | B   | A   | F    | E    | D   |                    |
| Glycidol/glycerol  | D    | C   | B   | A    | F    | E   |                    |
| Benzenediazonium   | E    | D   | C   | B    | A    | F   |                    |
| Heat Capacities  | F    | E   | D   | C    | B    | A   |                    |

Grades will be based on the following approximate scale:

85% - 100%    A  
 70% - 85%    B  
 60% - 70%    C  
 50% - 60%    D  
 < 50%        F  
 +/- grading will not be used.

*Other Information*

Reasonable accommodation will be provided to any student who is registered with the Office of Students with Disabilities and requests needed accommodation.

Students are encouraged to review the University's policy on academic honesty in Appendix D of the University Catalog.