

THERMODYNAMICS AND KINETICS LABORATORY

CHE 3811 Fall Semester 2010

Course Description: (1-4) 1 hour credit. Concurrent enrollment in or completion of CHE 3803. Laboratory study of selected physiochemical principles and methods to exemplify the contents of CHE 3804. Data acquisition, data analysis and report writing are stressed.

Instructor: Stephan B.H. Bach, Associate Professor

Office Hours: Monday and Wednesday 10 to 11 AM, and as always by appointment

Office: BSE 1.104D **Laboratory:** BSE 0.112

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TA: Douglas Dee

Text: "Experiments in Physical Chemistry", 8th ed., C.W. Garland, J.W. Nibler, D.P. Shoemaker, McGraw-Hill, ISBN 978-0-07282842-9, and handouts

Software: Microsoft Word and Microsoft Excel. Can be purchased through UTSA Microsoft Sales Or Open Office equivalent.

Objectives: Demonstrate physical chemical principles, teach some techniques of experimental physical chemistry, electronics and the methods of record keeping and report writing.

Safety: No sandals or shorts will be allowed in the lab. Safety glasses must be worn at all times when working with chemicals, equipment, or at a hood. Food and drinks are to be left out of the lab. No contacts are allowed to be worn in lab.

Quizzes: Quizzes (20% of your final grade) will be given in a ~~random~~ and ~~spontaneous~~ manner as needed so that you **do not dare to get behind!** Final quiz is worth 10% of the total grade

Notebook: Each student is required to keep a quality laboratory notebook with numbering and duplicates. **Duplicate pages will be handed in at the end of each lab period and returned the next lab period. Failure to follow this procedure will result in that lab report not being accepted and you will receive a 0 for that lab report.** Permanent ink must be used with no erasures and no original pages torn out. The notebook should be a first draft and not recopied; any clarifications or corrections should be made directly in the notebook and properly dated. All pertinent information about the experimental procedure used should be recorded as well as all information that might influence that data: temperature, balance number, atmospheric pressure, brand names of reagents, purity, model and settings of equipment as well as any unusual occurrences that may later be important. If the data is not in your notebook, it may not be used in the report. Notebooks will be checked on an irregular basis. It should be possible to reproduce the experiment from the notebook and the references made in it.

Reports: For each experiment you will turn in a report. Each report will be worth 100 points. **These reports will be typed, 12 pt type, 1.5 spacing.** Graphs and tables should be clearly labeled and referred to by number in the text. 10 points will be deducted for each day that a report is past due. Any report over 1 week late will not be accepted. Your report should be appropriately and adequately referenced. The report should contain the following sections:

Introduction: This section includes the basic principles of the experiment, the underlying principles of the equipment used, be well referenced, and describe to the reader how and why the experiment did or did not work (1 to 2 pages).

Experimental: This section describes to the reader (*e.g. your instructor*) what was done and what was used to do it. You should also use this section to explain what each partner did (when applicable) in making the measurements. This section should be brief but complete.

Results and Error Analysis: This section will contain the data and the data analysis and a discussion there of in terms of the quality of the data. Tabular reporting of data will be used. All experimental data must be reported with appropriate confidence intervals (error bars). Discussion of the precision and the uncertainty in the data in terms of its affect on the experimentally determined physical quantities is a must. Most lab reports will require a formal propagation of errors.

Discussions and Conclusion: This section explains the data and the physical quantities determined from the data in terms of the background presented in the Introduction. It will include a discussion of how the results compare to theoretical and/or other experimental (published) results. Discuss what the experimental results prove or disprove with respect to the theory presented in the Introduction. It may also contain observations regarding the experiment itself.

References: The Introduction will contain most of your references since you did not develop the theory! It is recommended that at a minimum you use your lab text and your Physical Chemistry text as references. All references will be annotated in the text with either a superscript (¹) or in brackets ([1]) following the ACS recommended style. The list of references should be together on the last page of the text.

The introduction and the experimental portions of the lab report must be turned in before you can proceed with the lab! **The completed lab REPORTS ARE DUE as noted! Emergencies will be handled on an individual basis.**

Technique and Safety: This is a subjective grade. It will be determined from observations of laboratory technique. Everyone starts with the maximum possible score. Points will be subtracted for improper use of equipment, failure to clean up after class, failure to wear safety equipment, unsafe activities of any type, contamination of reagents, and any other improper behavior or practice. First offenses will count less than repeated offenses. **Students ignoring repeated warnings will be removed from the laboratory and dropped from the Course with a grade of F.**

Grades: Grades will be determined by averaging the grades received for the lab reports and technique and safety and quizzes as described below

Distribution of Points

Lab Reports	60 %
Technique and Safety	10 %
Quizzes	30 %

Grading Scale (in %)

A	90 to 100	D	60 to 69
B	80 to 89	F	59 and below
C	70 to 79		

Lab reports will be graded in two parts

Part A: This part will be worth 50% of the lab report grade and will include the Introduction, Experimental, Sources of error and how they will be dealt with, and references. This part will be handed in before you begin your lab. Failure to do so or handing an incomplete Part A will result in you not being allowed to do the lab and therefore getting a zero for that lab.

Part B: This part will be worth 50% of the lab report grade and will consist of a results sheet that you will need to fill out. The results sheet will be handed out to you before you begin the lab.

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Experiments in Physical Chemistry, 8th Ed., C.W. Garland, J.W. Nibler, D.P. Shoemaker

Week	Date	Where	Topic
1	August 23		No Class
2	August 30	I, II, III A - E	Introduction, Error and Error Analysis Use of Computer Software, Lab Reports Newton's Law of Cooling
3	September 6		Labor Day, No Class this week, work on Newton's Law
4	September 13	XXI, II Handout	Errors in Measurement Lab
5	September 20	Handout	Permeability Lab
6	September 27	Exp 28	Viscosity Laboratory
7	October 4	Exp 28	Viscosity Laboratory
8	October 11	Exp 15	Binary Liquid-Solid Phase Transition
9	October 18	Exp 15	Binary Liquid-Solid Phase Transition
10	October 25	Exp 6 Handouts	4 lab rotation, Absolute Zero, Ideal Gas Law Adiabatic Gas Law, Bomb Calorimeter
11	November 1		4 lab rotation, Absolute Zero, Ideal Gas Law Adiabatic Gas Law, Bomb Calorimeter
12	November 8		4 lab rotation, Absolute Zero, Ideal Gas Law Adiabatic Gas Law, Bomb Calorimeter
13	November 15		4 lab rotation, Absolute Zero, Ideal Gas Law Adiabatic Gas Law, Bomb Calorimeter
14	November 22		Thanksgiving Holiday November 25 + 26
15	November 29		Lab Final (Usual lab time)

The Management reserves the right to modify the syllabus, if necessary during the course of the semester!