CHEMISTRY I / Chemistry and the Environment – CHM 113 Lab

North Central College
Winter 2002, Brandt

Lab: Thursday 8-11am and 2-5pm in SC 132.
Text (WWW): You are responsible for bringing in the assigned laboratory assignment. It can be found at http://paul.brandt.faculty.noctrl.edu/. Two laboratory notebooks and protective eyewear are required.
Instructor: Dr. Paul F. Brandt, SC 119, Phone 637-5193, (630) 357-0193(H), pabrandt@noctrl.edu
Office Hours: MF 2:00 – 4:00, and W 9:00 – 11:00 or stop by my open door at any time.

Course Description: This lab will tie the principles learned in lecture into the domain that chemists and all lab scientists enjoy – the laboratory. We will do eight labs where some are very environmentally oriented while others will focus heavily on concepts from the lecture. The final lab will be a tour of the largest local chemical/environmental company in the area, Ondeo-Nalco.

Course Aim: Most of you have had some high school chemistry, but many of you may not have had much laboratory experience. This lab will get most of you at an equal footing in the chemical laboratory. We will cover common chemistry techniques, use of a lab notebook, treatment of data, massing, pipeting, titrations, and handling of chemical substances.

Schedule

Jan 3	Preparation and Properties of Atmospheric Gases
Jan 10	Gravimetric Stoichiometry: Relief is spelled Na-H-C-O-3
Jan 17	Na-H-C-O-3 lab continued
Jan 24	Atomic Structure and Periodicity
Jan 31	Comparison of Energy Content of Fuels
Feb 7	Determination of the Hardness of Water
Feb 14	Determination of Chemical Pollutants in the DuPage River
Feb 21	Reactions of Acids with Common Substances
Feb 28	Redox Chemistry:
Mar 7	Field Trip to Ondeo-Nalco Chemical Company

Evaluation:

Prelab Quizzes	10%
Notebook	40%
Worksheets	40%
Discretionary (e.g., lab clean-up, attitude, etc.)	10%

All points in the lab will total 150 points of the 750 points in the course (20%). **You must pass the lab in order to pass the course**. **Labs are due at the beginning of the following lab period**. Late labs will be assessed a 10% late fee per day. Should there be any problems attending the lab on a particular day or at the time allotted, you must contact me by phone or e-mail prior to the meeting time.

Academic Dishonesty: Your lecture syllabus referred to this subject extensively but the lab write-ups are often an area of difficulty for students. You will be working in pairs throughout the term. However, this does not mean that you will be turning in duplicate work. Everyone keeps his or her own lab notebook and these will be as individualized as your own personality.

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Although you should talk over your data with your partner, and probably even the meaning of the data, **you should nonetheless say what the data means in <u>your own</u> words**.

Laboratory Notebooks: Your laboratory notebook is a record of all your observations, data and calculations from your work in the lab. In the real world, laboratory notebooks are taken very seriously, as they are here! Scientists in governmental, educational and industrial labs are expected to maintain legible, thorough laboratory notebooks, which document their work. A well-written laboratory notebook will enable a company to protect possible patent rights and prevent wasting energy from repeating work previously done. The laboratory notebook will protect the institution and individual scientist in any scientific misconduct or fraud cases.

Faculty evaluation of your laboratory performance will be based upon reading your laboratory notebook and "write-up" rather than upon observing you directly in the laboratory. Therefore, your notebook must be designed to document your technique as well as your results in carrying out a laboratory procedure. The following guidelines have been designed to enable you to communicate effectively through your laboratory notebook.

General Guidelines

1. Always bring your laboratory notebook to each laboratory session. Not bringing it is like going to a job interview without knowing anything about the company. You're unprepared! Should you show up without it, I will ask you to go to the bookstore to buy another. Writing information down on scraps of paper is unacceptable and if seen, these scraps will be thrown away.
2. Label the front cover with your name, course number and lab section.
3. All data, observations and calculations must be recorded directly into the lab notebook with indelible ink - preferably black.
4. Data can often be concisely incorporated and more easily interpreted if it is in the form of a table. Strive to make the notebook readable and understandable.
5. If a mistake has been made, draw a single line through the entry and note the correction. Never completely delete any entry from a laboratory notebook by erasing, using liquid paper, or by removing pages.
6. You are expected to take the time to write neatly and legibly.
7. You must have your notebook initialed and dated by yourself and the instructor at the end of each laboratory period.
8. Word-processed work must be in written in a standard 12-point font.

Your "write-up" will consist of two parts. The *Date, Title, Partner, Objective, Procedure and Data* sections will be recorded in your laboratory notebook during the laboratory session. The *Date, Title, Results, Conclusion, and Questions* sections will be handed in as a word-processed paper. This paper will be combined with the lab notebook for the cumulative grade. The following gives you details of what should be included in each section.

To be included in the laboratory book:

- **Table of Contents:** After each lab you should complete the Table of Contents at the front of the book where you have left a few blank pages to tell others where to find the experimental information.

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- **Page Numbers:** Since you probably won't have a notebook with page numbers already in the book, you need to put them in yourself.
- **Date:** The date on which the laboratory was performed should appear on the top of the first page for each laboratory session.
- **Title:** An appropriate title for the laboratory should appear on the top of the page. This title and the pages on which it appears should be put into your table of contents.
- **Objective:** You should state in your own words (paraphrase rather than merely quote the objectives) what you would accomplish by doing this lab. This will include the purpose of the lab with respect to what you will synthesize, isolate and/or observe as well as what techniques you will learn by doing this lab.
- **Procedure & Data:** You should include one or two brief statements that succinctly describe the procedure next to, or near, all data. Include comments to document good (or bad) technique. You should record any observations (e.g. color, temperature changes, gas evolution, etc.) so that somebody who is using your laboratory as a guide will know that they are performing the experiment correctly. <u>You must record your data directly into your lab book</u>. Any loose pieces of paper found during the lab section will be tossed into the garbage. It is recommended that you set up tables for data collection. All data must be clearly labeled. This section will not be graded for neatness although mistakes and corrections must conform to the procedures outlined above.

To be handed in on paper as a word-processed document (Note: All graphs should be made using a spreadsheet such as Excel. You may neatly hand-write calculations but not equations since MS Word® has the ability to do subscripts and superscripts):

- **Date, Your Name, and Your Partners' Name:** The date on which the laboratory was performed should appear on the top of the first page for the laboratory report. Yours' and your partners' name should also be at the top of the first page of each laboratory report.
- **Title:** An appropriate title for the laboratory should appear on the top of the page.
- **Results:** This is a section for your professor to see the data you collected. Data should be organized in neat, easy to read tables. Be sure to include all of your data; any color changes, state changes, etc must be documented along with numerical data. Graphs and calculations should appear in this section. You need not show all your calculations, but you should include one example for each type of calculation. All numbers need appropriate units. Summarize your results and calculations in neatly prepared graphs and tables. Label tables as Table 1: Title of Table, Table 2: Title of Table, etc. and graphs as Figure 1: Title of Figure, Figure 2: Title of Figure, etc.
- **Conclusion:** This section should only be a few sentences long (maximum of five). You should address all of your objectives and how you accomplished each of them. Be sure to include any major numerical results. For example, if you planned to find the concentration of calcium ion in pond water, you would write, "The concentration of calcium ion in pond water was determined to be 4.0 mM."

- **Questions:** At the end of your lab handouts, a set of questions will be asked. Answer these questions in your write-up after your conclusion. While you do not need to re-copy the question, you should answer these questions in full sentences so that your professor does not need the questions in front of him/her in order to figure out which question you are answering.