
instructor: Michael S. Elioff, PhD	class meetings:
office: Caputo Hall 320	Thursday 10:00 – 11:50 am Caputo Hall 328
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LABORATORY MANUAL

Permanently bound notebook (spiral or ring binders are not acceptable). Bound notebooks are available in the campus bookstore, on-line, or at retail stores.

SUPPLEMENTAL MATERIAL

Handouts will be posted on your CHEM 111 lab D2L course. You must print them out and read them before lab. Calculator with root function, logs, and antilogs will be useful for lab exercises. *Required:* Safety goggles and closed-toed shoes.

COURSE OBJECTIVES

- 1) To provide the student with an empirical insight into the principles of chemistry.
- 2) To develop an ability in the student to learn and work with a team of peers.
- 3) To develop in the student an appreciation for safety and environmental sensitivity.
- 4) To illustrate, in a laboratory setting, the fundamental laws of chemistry.

INSTRUCTIONS FOR LABORATORY EXERCISES

Please arrive on time, as you will not be given extra time to finish the experiment beyond the designated time. Read about the experiment before coming to lab. It is unsafe and inefficient to read the handout, for the first time, as you are performing the laboratory experiment. **All pre-lab worksheets are due at the beginning of class** and are worth five points each. If the experiment performed is a continuation from the previous week, there will be no pre-lab worksheet. The pre-lab worksheets can be found on D2L. No pre-lab worksheet is due during the first week of classes.

Data sheets with complete calculations are due at the conclusion of each lab. It is expected that all students will complete all laboratory exercises, and all labs will count toward the final lab grade as described below. The data sheets are worth 8 points each and you will be graded on the precision and completeness of your answers.

RECORD-KEEPING IN THE LABORATORY

To properly apply the scientific method, you must record all laboratory observations in a bound notebook in great and graphic detail (pretend you are Leonardo da Vinci; mirror script is optional). The notebook should have a table of contents at the beginning, containing the experiment title, the page on which each experiment begins, and the date(s) during which the experiment was performed. The pages should be numbered, and no pages should ever be removed from the notebook. At the beginning of a new experiment, write a few sentences in the notebook about the purpose of the experiment, the method used, and any partners with whom you will work.

Mistakes are indicated by a single line drawn through them, never by obliterating them beyond recognition, since experimenters often decide later that what was thought to be a mistake was not really a mistake. Observations and data should be recorded directly into the notebook *as you are performing the experiment*. Do not write on paper towels or scrap paper and transfer to the notebook later. This would defeat the purpose of the notebook as a primary source of data. Organize your notebook beforehand when possible by labeling and leaving blanks for experimental parameters that must be recorded, and by making tables for data ahead of time. If you are unsure whether a piece of information should go into the notebook, write it in there. You cannot have too much information. If you have misgivings about the accuracy or precision of the data, or if something went wrong during the experiment, write that in the notebook as well. Later, you will not remember which data you trust and which you do not. Explanatory notes, units, and labels are always important, as is legibility.

GRADING

The maximum number of points for the lab portion of your grade are as follows:

Notebook	40
Data sheets (9)	72
Pre-lab worksheets (8)	40
Lab Practicum	48
Total	200 points

ATTENDANCE

Attendance is necessary in all lab meetings. If you cannot attend lab, due to serious illness or other emergency, you must contact me before the class period begins.

TENTATIVE LAB SCHEDULE

January 18 – Check in and safety briefing.

January 25 – Density & Measurement (exp1)

February 1 – Composition of a Hydrate (exp2, part A)

February 8 – Identification of Common Chemicals (exp6)

February 15 – Identification of Common Chemicals, continued

February 22 – Gravimetric and Volumetric Analysis (exp8, parts A&B)

February 29 – Gravimetric and Volumetric Analysis (exp8, part C)

March 7 – Spring Break; no lab exercises scheduled

March 14 – Titration of Acids and Bases (exp7, part B)

March 21 – Simple Gas Laws (Word file on D2L)

March 28 – Spectrophotometric Analysis of Commercial Aspirin (exp12, B)

April 4 – Spectrophotometric Analysis of Commercial Aspirin (exp12, C)

April 11 – Thermochemistry: Heat of reaction (exp11)

April 18 – Laboratory practicum and checkout (exp6)

April 25 – Molecular models and bonding (exp13)