

Physical Chemistry Laboratory 2009-2010

1. Lab Work

In this course, you will generally have to plan the chemical system to be studied, prepare or order reagents and research details of the experimental procedure before the lab period. I reserve the option of requiring pre-lab reports if I see inadequate preparation; these would be due the day before your lab. The safety rules must be followed always.

2. Lab Reports

Complete written lab reports in the style of a journal article are required in this course. Since this is a “W” course, the report must be turned in for proofreading, then rewritten for a grade. Clarity, grammar and spelling are graded along with math, error analysis, quality of data and quality of scientific discussion. Lab reports should demonstrate that:

- you have competently carried out an experiment and recorded the relevant results accurately;
- you know how to analyze the results, statistically and scientifically;
- you understand the theory used to interpret the results.

General advice: write so that someone at your level of knowledge, but completely unfamiliar with the experiment, could understand what was done and what was learned.

Drafts, Deadlines, etc.

- The draft must be complete and polished; a rough draft will be rejected.
 - The draft must be marked “DRAFT”, be double spaced, include sample calculations and lab notebook pages.
 - If turned in by 11:00 AM, the corrected draft will be available for pickup by 11:00 AM on the next weekday.
 - The proofread draft must be turned in with the final.
 - The final report should be about 3 pages of single-spaced text.
 - The final report must be turned in to Turnitin and to me, on paper.
 - Due dates and late penalties are specified in the syllabus.
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3. Report Format

If you think this is picky, wait until you deal with a journal editor.

Heading: *name, lab partner, date of lab work, date of report*

Title: *long enough to be informative; up to 2 lines*

Abstract: *summary of the report, including principal result, in about 8 lines.*

Introduction: *purpose and method of the experiment, summary of the relevant theory in your own words, including principal equations. (But don't say, “The purpose of the experiment was...”)*

Experimental: *a very brief summary of the experimental method with reference to a complete procedure.*

Results *include observations and measurements (just the facts; no interpretation). This section may include tables, graphs and statistical analysis.*

Discussion: *interpretation and discussion, significance of results, relation of results to theory, comparison to literature values, sources of error.*

References: *every report must have at least 2 references: one for the procedure and one for the theory.* References should be end notes, not footnotes. Citation should be a superscript number. *Required format:*

Journals: N. Author, *Journal Title*, **Volume**, page (year)

Books: N. Author, *Book Title*, Publisher, City (year), page number

Handout: N. Author, "Title," Course no., University (year)

Web pages: Title, (author if available), source institution, url, date accessed

Note: *very few web sites* are acceptable sources of information for this course.

Included in the draft but not in the final report:

Sample calculation: *calculation for one complete trial from collected data to final result.*
(Optional—helps me check your calculations)

Lab notebook pages: *signed and dated photocopies must be attached to the draft.*

These should show all raw data and document the lab work. Each lab notebook should contain a complete record of the experimental work. If data is obtained directly by computer, a printout should be taped into the lab notebook. Likewise, printouts of spectra and other plots obtained during the course of experimental work should be taped into the notebook. Photocopy if needed.

4. Honesty

Lab data is usually obtained by 2 partners, but reports must be written independently. Anything but raw data (obtained together) from another person's report is plagiarism.

Any passages or "unique phrases" taken from literature must be in quotes or set off from the rest of the text and properly referenced.

Diagrams, graphs, tables and text must be original. **Scanned or downloaded material is absolutely prohibited in reports.** (Exception: a drawing made by you may be scanned provided the original is included in the draft.)

Literature values of physical properties (usually required for comparison with your results) must be properly referenced.

Turnitin checks each report against the web and other reports for suspicious material. Paper and electronic versions must be identical.

Cases of plagiarism will result in a grade of zero and a letter to the registrar.

5. Writing equations

Math is part of our language, and it should read as part of a sentence: think of an equation as a clause containing the verb "equals." Equations should be set off on their own line, numbered and punctuated, and symbols should be explained. For example, the ideal gas law is

(1) $pV = nRT,$

in which p is the pressure, V is the volume, ...

6. Graphs and data tables

Graphs must be numbered and have descriptive titles ("Figure 2: Relationship of viscosity and concentration for aqueous isopropanol at 25⁰C"). Since the titles are sometimes long, do not use the chart title feature of the spreadsheet. Do not show equations or R² values on charts. Report slopes and intercepts in the text, with uncertainty and units.

Data tables also must be numbered and have descriptive titles. A pasted spreadsheet is not acceptable as a table in a report.

7. Units

Tables and graphs contain unitless numbers. Units in tables and axis labels should be represented as described in class. For example, an entry of 2.55 in a column headed “concentration /(10^{-4} g/L)” means concentration = 2.55×10^{-4} g/L.

8. Long version

The long version of this lab syllabus is required reading. It is available at http://muweb.millersville.edu/~iannone/pchem/Long_lab_syllabus.pdf. It has further comments on report sections, examples of graphs and equations, a list of MS Office shortcuts and a growing collection of common lab report mistakes.