Guide to Writing Scientific Laboratory Reports
Chem 122 · Spring 2018

There are seven required sections of a laboratory report and should follow the format of an article in *Analytical Chemistry* (http://pubs.acs.org/journal/ancham). Two examples of lab report #1 are provided on the 122 website (do not copy for your lab report 2!). Detailed feedback will be given by the TAs and the instructor on each report. Since this course fulfills a general education W course, you will have the opportunity to revise the first formal lab report, Lab #2 (and its score!).

Writing skills are a key part of any science education since writing will be required for subsequent careers in science. The ability to effectively communicate ideas and results is crucial whether one goes on to graduate studies, directly into industry or into any area related to chemistry. The ACS Style Guide (http://pubs.acs.org/isbn/9780841239999) is an excellent source of information on writing a scientific laboratory report.[1] **You must use the template placed on the 122 website, which will ensure proper spacing, format and content.** Use passive voice only, i.e. no personal pronouns. Written laboratory reports will be at least 1250 words, not including figures such as spectra. Lengthy discussion is discouraged; stick to the topic at hand. The requirements of the first formal lab report will be given in class.

1) Title and Author. The title should be original, not from the lab handout. It clearly describes the experiment in approximately four to ten words. Include the characterization method in the title.

2) Abstract. The abstract is a one paragraph (up to 150 words) overview of the experiment and should summarize the experiment and key results including the characterization method(s) (just give the name here), key spectroscopic results, the IUPAC name of the compound and pertinent quantitative results such as wavelengths of absorption maxima and molar absorptivities. Include units and errors in all numerical values and all figures of merit (FOMs).

3) Introduction. The introduction section for 122 reports must be at least 500 words in length, not including figures, equations, tables or charts. Some examples of the paragraph topics: 1) brief introduction to the subject material and its importance; 2) objectives of the study; 3) theory behind the method(s) of analysis (provide more detail than given in lecture!) For the latter, include a labeled schematic (fully detailed and not from the lecture notes) and description of the instrument, preferably from the book but include citation if obtained elsewhere. **There must be at least seven (more is ok) formal literature references (i.e. journal articles or books), numbered sequentially when cited in the text and placed in the references section** (see below). Zotero manages citations, is free (http://www.zotero.org) and will be overviewed during lecture. For a given reference, use the same number if it's cited again. The lab handout should be one of the seven references. Non-formal references such as URLs, the Skoog textbook or the references in the handout can be used but won't count towards the seven reference minimum. Keep the topics general and wrap up the introduction with a sentence about this experiment (e.g. "In this experiment, iron will be determined by …").

4) Experimental. The experimental section is written as prose (i.e. not point form) and uses the *past tense* and *passive voice* (no personal pronouns) to explicitly and sequentially describe the actual experiment. The goal is to enable other scientists to duplicate your work. This section includes, but is not limited to: a complete description of the reagents, including the order of

addition and quantities; brief description of the experimental apparatus **including brand and model numbers**; any changes to the procedure of the handout.

5) Results and Discussion. The results and discussion section presents the data that was acquired ***and interprets the data***. It should be at least 500 words in length, not including figures, equations, tables or charts. All tables (e.g. M.W., color, % yield, M.P., ε and UV-Vis stretches) and figures must be properly labeled, sequentially numbered as they appear in the text ***and have a one-sentence caption.*** Figure captions go below the figure, table captions above the table. Spectra and graphs must clearly display axis labels and units ***with a reasonable number of significant digits. If there are too many zeros then use scientific notation, placing the powers of 10 in the axis label***. The figures can all be placed at the end of the report or after the paragraph to which they're referred. Experimental results are compared with those reported in the literature whenever possible. Be sure to discuss the figures of merit, the sources of error and the benefits/disadvantages of the method.

This section may be broken into two separate sections if preferred. In this case, the results section both displays *and summarizes the data collected* (i.e. it should have prose and refer to the figures), while the discussion section interprets the data.

6) Conclusions. The conclusions are *not* a simple summary of the experiment or a repetition of the abstract. It should be one paragraph in length and tie together all of the data in a manner that makes some sort of statement as to the relevance of the results. What does it all mean? Other possible topics include future work or the efficacy of the method.

7) References. At least seven (7) relevant literature references must be cited and one should be the lab handout. Scholarly, peer-reviewed, scientific journals and books are the only source for these references; *websites and the textbook can be used but won't count toward the seven minimum*. The format must follow that found in the aforementioned journal *Analytical Chemistry* or the ACS Style Guide (http://pubs.acs.org/isbn/9780841239999).[1]

The best method for finding literature on a desired subject is through scientific search engines to which the campus subscribes, namely SciFinder Scholar or Web of Science (links are on the library's Chemistry homepage, see the 122 website). Article type may be further specified such as a review, which are ideal introductions to a topic. Zotero allows one to download the citation information, cite the reference in Word and auto-format the reference list into ACS style. In addition, the Science & Engineering Library ~~contains~~ used to contain hardcopies of these journals and many hardcopy sources ~~though note that these reference texts may not be checked out~~.[2-4]

References

1. ~~Coghill, A. M.; Garson, L. R., Eds. *The ACS style guide: effective communication of scientific information, 3rd ed.*; American Chemical Society: New York, NY, 2006 (Science & Engineering Library, Reference Section, QD8.5 .A25 2006~~ ← Another victim of the mid-June 2016 library "purge" but available at https://pubs.acs.org/isbn/9780841239999.
2. ~~*Chemical Abstracts*; American Chemical Society: Columbus, OH, 1907-Present (Science & Engineering Library, Reference Indexes and Abstracts, QD1.C43~~ ← Another victim of the mid-June 2016 library "purge"; use instead SciFinder Scholar or Web of Science.
3. ~~Buckingham, J., Ed. *Dictionary of Organometallic Compounds*; Chapman & Hall: New York, NY, 1984 (Science & Engineering Library, Reference Section, QD 411 .D53 1984~~ ← Another

victim of the mid-June 2016 library "purge"; use instead Dictionary of Inorganic & Organometallic Compounds, dioc.chemnetbase.com.

4. ~~King, R. B., Ed. *Encyclopedia of Inorganic Chemistry*; Wiley: New York, NY, 1994 (Science & Engineering Library, Reference, Chemistry Corner, QD 148 .E53 1994 volumes 1 to 8).~~ ← Victim of the 2012 library reference section removal; ordered in 2017 and again in 2018.

Breakdown of marks for each section

Title and Abstract:	10
Introduction:	25
Experimental:	10
Results and Discussion:	25
Conclusions:	10
References:	10
Composition:*	10

*The composition part of the grade will be assigned by the instructor. This score is an overall evaluation of the layout of the paper, including grammar, paragraph structure, title, figures, tables and figure & table captions.

Submit all first and final drafts as Word file (.doc or .docx) by e-mail only.
Must be e-mailed to your TA by 5 pm of the Friday due date.