

Guide to Formal Laboratory Reports

Chem 122, Principles of Instrumental Analysis

Fall 2010

Report writing skills are an important part of a chemistry education and will be required for any career 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 is an excellent source of information for writing a scientific laboratory report.¹ Text should be double-spaced, left- or fully-justified and written in the impersonal, passive voice. Written laboratory reports for this course will be fifteen to twenty pages in length in total inclusive of all sections and figures.

Each student writes their own report, even though the experiments are performed in pairs. There are seven required sections for a laboratory report or journal article and should follow the format of an ACS article in *Analytical Chemistry* (<http://pubs.acs.org/journals/ancham>) or *Journal of the American Chemical Society* (<http://pubs.acs.org/journal/jacsat>). The links and several samples articles are on the Chem 122 website.

1) Title and Author. The title should be succinct and original, not from the lab handout. It describes the experiment in approximately four to fifteen words and should be written last, when the author has a clearer understanding of the experiment.

2) Abstract. The abstract is a brief, one paragraph summary of the experiment. The abstract highlights outstanding features of the experimental results, such as new reaction pathways, key spectroscopic results, synthetic discoveries or difficulties that were overcome. Name the characterization method(s) used. Pertinent quantitative results, including figures of merit and percent yield, must be included. A browsing reader often reads only the abstract of a paper in a scientific journal. Here the author showcases the work and entices the reader to read the entire article. As for the title, the abstract should be written last.

3) Introduction. The introduction is at least three pages in length, not including figures. Some examples of the basic questions that should be addressed: 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!). **Use only proper literature references** (i.e. journal articles or books, **no URLs**), numbering sequentially and place them in the references section (see below). Use a number only once for a given reference; if it's quoted again, use the same number.

4) Experimental. The experimental section is written as prose (i.e. not point form) and uses the *past tense* and *passive voice* (no 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, quantities and method for their addition; brief description of the experimental apparatus, including brand and model numbers and a labeled schematic (fully detailed and not from the lecture notes); any changes to the procedure. Many authors write the experimental section first since this section simply reports the method in a conventional format without the need to explain the results.

5) Results and Discussion. The results and discussion section presents the data that was acquired in the experiment *and interprets the data*. All tables (e.g. % yield, M.P., ϵ and UV-Vis stretches) and figures must be properly labeled, sequentially numbered **and contain a suitable caption**. Spectra and graphs should clearly display labels and units of the axes, with a reasonable number of significant digits and scientific notation. While the experimental section delineates specific details including quantities and grades of reagents, this section summarizes the observations and discusses the impact of the results from a theoretical and technical viewpoint. Comparison of the results to the literature enhances marks! The results and discussion section may be broken into two separate sections if desired. In this case, the results section displays or summarizes the data collected, while the discussion section interprets the data. Be sure to discuss the figures of merit and sources of error.

6) Conclusions. What does it all mean? The conclusions are **not** a simple summary of the experiment, or a repetition of points that were made earlier in the report. It is one paragraph in length and ties together all of the data to state the relevance of the results. Other possible topics include discussion of future work, other methods that could have been used or the efficacy of the method.

7) References. *At least ten relevant literature references must be cited.* Assign each reference one number, using same number if the reference is used again in the text. Scholarly, peer-reviewed, scientific journals and books must be used. **Web sites are not a valid source**, but can be used beyond the ten minimum. The writing format of the references must follow that found in the journal *Analytical Chemistry*, *J. Am. Chem. Soc.* or the ACS Style Guide.¹ *Analytical Chemistry* is a good source to see the expected format of your entire report.

The main method nowadays for finding literature on a desired subject is through scientific search engines to which the campus subscribes, namely SciFinder Scholar and Web of Science (links also on the 122 website). These crucial search engines allow researchers to search published scientific journals by subject or author, and article type may be further specified, such as review. In addition, the Science & Engineering Library contains hardcopies of these journals, and many hardcopy sources,²⁻⁴ though note that these reference texts may not be checked out.

References

1. The ACS Style Guide: A Manual for Authors and Editors; Dodd, J. S., Ed.; American Chemical Society: Washington, DC, 1997. (Science & Engineering Library, Reference Desk, QD8.5 .A25 1997)

2. Chemical Abstracts; American Chemical Society: Columbus, Ohio, 1907- Present. (Science & Engineering Library, Reference Indexes and Abstracts)
3. Dictionary of Organometallic Compounds, Buckingham, J., Ed.; Chapman & Hall: London, 1984. (Science & Engineering Library, Reference Desk, QD 411 .D53 1984)
4. Encyclopedia of Inorganic Chemistry, King, R. B., Ed.; Wiley: New York, 1994. (Science & Engineering Library, Reference, Chemistry Corner, QD 148 .E53 1994)

Breakdown of Marks per Section of Report

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

Submit electronic format only: Word (*.doc or *.docx) or RTF.

Must be e-mailed to your TA by noon (12:01 pm) of the Friday due date.