

# GUIDE TO WRITING A LAB REPORT – FOR CHEMISTRY AND BIOCHEMISTRY STUDENTS

This guide provides an overview of the purpose of each section of a lab report. At the undergraduate level, lab report requirements will be outlined at the beginning of the semester for each class. Note that different teaching assistants (who will be grading your work) have different ideas of what a lab report should look like, so it is recommended that you ask exactly what they expect before you submit anything.

**STYLE:** A lab report is written factually and directly in the 3rd person: no I's or we's, no flowery language, no ellipses, no metaphors, no slang, no rhetorical questions and no exclamation points! Keep your report as bland as possible.

**REFERENCING:** Do not plagiarize. Cite all your sources, whether you've quoted them, paraphrased them, or simply used a figure or two. **Ask your teaching assistant what referencing method he/she would like you to use.**

**FORMAT:** To get a really good idea of what a lab report should look like, skim through scientific journals.

**ABSTRACT:** What, how, and what happened?

At the top of any journal article (scientific or not), you will find an abstract. The abstract is a concise and yet detailed summary of the report. It exists so that very busy researchers can learn what you've achieved and how you've achieved it, without having to read your whole report. It should contain the purpose of your experiment, the method and conditions used (e.g., RP-HPLC using a Waters Symmetry Shield column; 8% ACN as the mobile phase at a flow rate of 1.1 mL/min.; UV detection at 265 nm, etc.), the results, and your conclusions. It should be no longer than a short paragraph. Many TAs require an abstract in a lab report—find out if your TA expects one.

**INTRODUCTION (OR THEORY):** What's this all about? Why do this experiment?

In this section, include any theory that may be relevant to understanding your report. Position your readers; prepare them for what they are about to read. Tell them why you're doing what you're doing. Present information that suggests why your work is interesting, why the method you've chosen may prove successful, and what conclusions may be drawn from the experiment. All of this means including background information, maybe a little history, reaction schemes, etc. Keep it short and general: save the juicy bits for the discussion section (described below). The introduction should be no longer than a ½ to ¾ of a page (single-spaced).

**EXPERIMENTAL (OR PROCEDURE):** How exactly did you do it?

This section should look like a recipe out of a cookbook. Share your operating procedure (exact volumes, amounts, incubation times, etc.), so that your results can be reproduced by other chemists and biochemists. Usually, you will be borrowing the procedure from a lab manual, a textbook, or a journal article, so don't bother copying the whole thing out: it is sufficient to make reference to the source. However, any changes that you bring to that prescribed procedure must be mentioned here.

**RESULTS:** What happened?

As much as possible, your results should be tabulated to allow for quick reference. All tables and figures (graphs, diagrams) should be numbered and labeled. This is so you can refer to them in your discussion section. The results section should also include your sample calculations, if any. (Don't be shy to squish these into a footnote if you can).

**DISCUSSION:** What did you do? Why? What happened? Why?

This is the most important section of your report. This is where you give a detailed account of what happened in the experiment.

- Provide possible reaction mechanisms; tell your reader why you added reagents A, B, C when you did, why you collected your fraction at temperature X, why you detected your analyte at wavelength Y, etc. A common way to proceed is to step through the procedure while discussing points of interest.
- The most important question here is, why? Your teaching assistants want to see that you understand the chemistry (physics and whatever else you need) behind the experiment.
- The discussion section is also where you interpret your results and draw conclusions. Refer to your tables and diagrams. You should be comparing your results to expected values (calculated or from the literature) - this often means doing some research in the library.
- Often experiments done in a lab setting do not work out on the first try, so it is normal to not achieve exactly what you sought out to. If you obtained poor results, the discussion section is your opportunity to hypothesize as to why. (Mentioning that your lab partner is a goofball won't fly). TAs in general like to see an ability to think critically and creatively. You can suggest amendments to the procedure or even to the method. In almost any course other than analytical chemistry, how you interpret your results is more important than the results. This will be the longest part of your report, but two pages should be plenty.

**CONCLUSION: What, how, what happened and why?** The conclusion section is very similar to the abstract. It's just a quick overview of what was done and how. More emphasis can be put on the results and on how future experiments may further inform the theories discussed in the introduction.