

Laboratory Notebook Guidelines

The main purpose of your laboratory notebook is to be a permanent record of your experiments. During an experiment, you will use it to record data and observations necessary to complete lab reports that explain your results. But, an additional benefit is that using a lab notebook will help you prepare for upcoming experiments, which in turn will help you be more efficient, organized, confident, and safe in the laboratory.

General Guidelines

- 1) **Always use pen.** Notebook entries need to be in permanent ink, never pencil. One rationale behind this is that scientists should always report the data that they observe and never falsify or modify data.
- 2) **Record data on the right side of each page.** This leaves the left side of each page available as scratch paper, for quick notes, or for unexpected recordings on the day of the experiment.
- 3) **Write down everything immediately.** Record all data, including measurements and observations, as they happen in lab. A common mistake is to think that you will remember things to write down later. Always include units with measurements and record values with the proper number of significant figures according to the precision of the device.
- 4) **Be complete, yet concise, and write clearly.** Your notebook is a permanent record of your experiments for yourself, but a huge part of science is the confirmation of results via the replication of experiments by other scientists, so you should also think of your notebook as a guide for someone else that wants to perform the experiment. It should contain everything they would need to repeat what you have done and they need to be able to read it to do that. It is possible to write too much though, so try to be concise.
- 5) **Strikethrough mistakes.** If you make a mistake when writing something, strikethrough the erroneous entry by drawing a line through it. Then, write your correction next to the strikethrough. This applies to single words or even large sections that need to be corrected. The original entry should still be legible behind the strikethrough. Do not use white out and never erase anything.

Initial Set Up

- 1) **Use a bound notebook.** Select any notebook that has pages that are permanently attached (bound) to the spine; notebooks with perforations that allow for pages to be torn out are not acceptable. Never remove pages from your notebook. Composition books are an inexpensive, but good option. Notebooks with gridlines help make tables and graphs look neat and organized.
- 2) **Write your name, course, and section on the front cover.** Optional: include contact information on the inside of the front cover in case you lose your lab notebook. This also a great place to record contact information for your lab partner(s).
- 3) **Number all of the pages.** Both the front and back sides of each page need to be numbered. The outside corners are a convenient location.
- 4) **Create a Table of Contents on the first page.** Leave a few pages blank for future entries to the table of contents. Include columns for the date of experiment, experiment title and/or experiment number, and the page number(s). Fill in the information when you do an experiment to keep it up to date.

Individual Experiments

For each experiment that you perform, you must prepare your lab notebook prior to lab. Start on a new page and include the following sections. *Note: Your instructor may ask you to complete prelab questions in your notebook.*

- 1) **Title** – Write down the full title of the experiment at the top of the page. Include the experiment number if applicable.
- 2) **Date of Experiment** – Write down the date that you are completing the experiment at the top of the page. If an experiment runs for more than one day, write the new date at the top of a new page or create a new section (*e.g.* draw a line across the page).
- 3) **Purpose** – Write one or two sentences describing the purpose of the experiment. Do not copy the purpose from the experiment handout/manual; copying is plagiarism. You need to state the purpose in your own words. Read through the experimental protocol and think about the following questions: What is the main objective? What are you trying to observe, determine, measure, etc.? How will that be accomplished? What methods or techniques will be used? What are you learning about?
- 4) **Safety Hazards** – List any chemical or physical hazards that you might encounter during the experiment. Sometimes hazards are stated explicitly in the experiment handout/manual, but sometimes they are not and you will have to determine the potential hazards yourself. Look up any chemicals that you will be working with to determine the safety concerns. Here are a few resources. Remember to cite any sources you use.
 - Material Safety Data Sheet (MSDS). From the State of Vermont: <http://hazard.com/msds/index.php>
 - Chemfinder by Cambridge Software. It's free-ware, but registration is required. www.chemfinder.com
 - Chemspider. This is a free chemical database from the Royal Society of Chemistry (UK). www.chemspider.com
- 5) **Procedure** – Summarize the main steps of the procedure in your own words. Do not copy the procedure written in the experiment handout/manual; that is plagiarism and also very inefficient! Instead, read through the experimental procedure and then determine what you need to write down in your lab notebook so that you can perform the experiment. Be detailed enough that all major steps are present, but concise enough to be efficient. For example, you can write "Weigh out 0.1 grams." but you don't need to state that you need to tare (zero) the balance first. Feel free to use numbered lists, bullets, sketch diagrams or flow charts – anything that helps you plan and organize the steps.
- 6) **Data and Observations** – You will fill in your data and observations in this section during the experiment, but it needs to be set up in advance. Replicate any data tables provided in the experiment handout/manual. If no tables are provided, design your own. Include space for writing down observations as well as measurements.

Note: The following sections can be set up and completed after the experiment.

- 7) **Calculations** – Show all work for necessary calculations. Write out each step of the calculation so that others can follow it. One sample calculation is sufficient for each type of calculation if the same calculations are repeated multiple times. For multi-step calculations, carry one to two extra digits throughout the intermediate steps and then only round at the end. If answers to intermediate steps need to be recorded, show the unrounded number in your sample calculation and the rounded answer separately (nearby or in results section).
- 8) **Results** – Create tables to display the results of the experiment. Often, experiments involve the collection of a lot of data that is then analyzed to yield experimental result(s). This might be determining an average and/or standard deviation of many measurements, or the answer to a multi-step calculation, or even a summary of physical observations. Determine the results and then design an organized way to present those results. If an experiment generates a lot of results, you may want to summarize the major results in a single table at the end of the section.

Note: Your instructor may ask you to include Discussion and Conclusion sections.