The Importance of Good Lab Notes

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Guidelines on Keeping a Good Laboratory Notebook

A laboratory notebook is a scientist's most valuable tool. It contains the permanent written record of a researcher's mental and physical activities from experiment and observation, to the understanding of new phenomena. A laboratory notebook is a researcher's diary. The act of writing the notebook forces one to stop and think about what is being done in the laboratory. After the experimental data is recorded, the researcher begins to study, analyze, evaluate, and interpret the notebook. New ideas and questions are written down and the laboratory notebook evolves into an expression of the Scientific Method.

It is important for innovators and inventors to keep detailed and organized notes while working. Formalized notes can help when returning to them much later to review the fine details as if they were taken yesterday. Keeping well-organized notes is a skill that is often required by employers. It is also important that notes are legible to other people. Never think of laboratory notes as “private property”. They must be written in such a way that someone else may repeat any experiment or process that is documented.

1. Introduction

Begin reporting an experiment by recording the date and title of the experiment on the very top of a new page. Below this, list a statement of the purpose of the experiment, and reference the source of the experiment.

Laboratory work costs money and manpower that should be carefully managed. Keeping well-organized notes can ensure that nothing is wasted throughout the scientific process.

2. The Experimental Plan

This section, mainly for readers to understand what is going on, includes a few simple sentences to state the work to be done. A flowchart, outline, or list of steps may be appropriate. It is good practice to include notes on safety.

3. The Observations and Data Section

This is the heart of the experiment where observations made during the course of the experiment are recorded. These notes and data support the testing of the hypothesis and application of the Scientific Method.

Record the data as completely as possible and leave interpretations for later. Don't be embarrassed about writing down mistakes or accidents--- if a product is dropped, record in the notebook "Product was accidentally dropped on the floor; used paper towels to recover some of it."

A bound notebook with consecutive page numbers should always be used, never loose-leaf paper. Always use a pen, not pencils. A table of contents should begin each notebook to ensure easy access to older notes. Notes must be taken in chronological order, and pages are to be dated as work progresses. Separate notebooks are utilized for separate projects. Outside materials such as, slides, graphs, gels, etc. should be pasted into the notebook with a date and signature to ensure the material has been “witnessed”.

The methods and criteria for which an experiment or process took place should be clearly defined so that they are reproducible. If the method used is from someone else’s
notebook, copies should be made and pasted in one’s own notebook. Some questions to keep in mind: Did I keep up with the table of contents? Did I date and sign each page? Did I enter all of my data directly into my notebook? Did I include calculations and complete details of all experiments conducted? Always remember that when an experiment is not properly recorded it is worthless. Lab notes are the essence of a scientist’s work and should not be taken lightly.

Write down everything! Results hinge on exactly what is done, not how nicely “sugarcoated” in the notebook. A few general notes to remember:

Laboratory notes are kept as the property of the lab, and should be treated as such. Such notes are likely to be archived electronically. The same care that goes into writing notes should be taken when organizing them into electronic files. Back ups should be made. Files can be stored on a blank CD or in an external hard drive. Data should be easily accessible, coordinate with the lab supervisor to find out the best method for electronically storing data.

A final point is the inclusion of the actual raw & spectral analysis data. Many advisors encourage researchers to catalogue and store data in separate files or binders. A researcher would then have a separate file for each compound made containing IR data, NMR data, spectroscopic data, etc. This data is then catalogued and cross-referenced to the laboratory notebook. Alternatively, paste the spectroscopic data into the lab notebook at the appropriate position.

4. Discussion of Results.

Begin this section with a heading such as "Discussion" or "Data Evaluation" or some other phrase that clearly separates this section from the data and observations. This section provides the opportunity to 'think in the notebook' and can contain calculations, charts, graphs, rearranged data or interpreted data. New ideas should be recorded here. How could the experiment be improved? An idea may occur only once, and only briefly: catch it and record it onto the page.

5. Conclusion.

The last section should summarize the goal of the work, what was done and what was learned. Typically this can be done in a few concise sentences.

SOURCES: http://www.ruf.rice.edu/~bioslabs/tools/notebook/notebook.html
http://ccc.chem.pitt.edu/wipf/Courses/NoteBook&Report.html