

Instructions for Notebook Keeping

by Axel Schwekendiek, Ph.D.

January 3, 2007

Abstract

A notebook should be kept for laboratory experiments only using a Scientific Notebook Co. book (<http://www.snco.com/>) or other bound book. The notebook should be written in ink, and each page signed and dated. Mistakes are not to be erased but should be marked out with a single line. Try to keep your notebook with the idea that someone else must be able to read and understand what you have done. Most (if not all) of your work should be understandable without using additional references, lab manuals, or external descriptions, handbooks, or brochures (these may simply not be available at a later date or hard to come by). The notebook should always be up-to-date and can be collected at any time.

1 INDEX

An index containing the title of each experiment and the page number should be included at the beginning of the notebook.

2 WHAT SHOULD BE INCLUDED IN YOUR NOTEBOOK?

Essentially everything you do in the laboratory should be in your notebook. The notebook should be organized by experiment only and should not be organized as a daily log. Start each new experiment on a new page. The top of the page should contain the title of the experiment, the date, and the page number. The page number is important for indexing, referring to previous experiments, and for labeling materials used in a given experiment. If an experiment spans more than one page, note the page on which the experiment continues if it's not on the next page. Each experiment should include the following:

1. Title/Purpose: Every experiment should have a title and it should be descriptive. An example would be "Large-scale plasmid preparation of plasmid pXGH-5 for transfection into tobacco protoplasts".

When starting a new project, it is a good idea to introduce the overall strategy prior to beginning the first experiment. This serves two purposes. First, it forces you to think about what you are doing and why and sometimes things look differently when written down than they do in your head. Second, ideas can be patented, and a thorough description of your hypothesis and experimental strategy with appropriate documentation can be helpful for any future intellectual property issues (not relevant for this course).

2. Background information: This section should include any information that is pertinent to the execution of the experiment or to the interpretation of the results. For example, if it is a repeat experiment, state what will be done differently to get the experiment to work. If it's a cloning experiment, include what the strategy is and how the recombinants will be screened. A simple drawing of the plasmid map can be helpful. This is not like the introduction to a paper. Include anything that will be helpful in carrying out the experiment and deciphering the experiment at a later date. For the most part, notebooks are not written for today but for the future.
3. Materials: This section should include the key materials, i.e., solutions or equipment, that will be needed. It is not necessary to include every piece of lab equipment required, i.e. vortexer, pipetman, etc, but you should include any specialized equipment and the manufacturer, i.e, a phosphoimager or real-time PCR instrument. Composition of all buffers should be included unless they are standard or are referenced. Pre-packaged kits should be identified as to the name of the kit, the vendor, the catalog number, and - most importantly - the lot number (some batches sometimes just don't work). Biological samples should be identified by genus and species, strain number, tissue type, and/or genotype with the source of the material identified. Enzymes should be identified by name, vendor, concentration, and again lot number. DNA samples should be identified as to
 - (a) type of DNA, i.e., chromosomal, plasmid, etc,
 - (b) purity (miniprep, gel purified, PCR product)
 - (c) concentration, if known, and
 - (d) source, (include prior experiment number if the DNA was isolated in a previous experiment).

Include all calculations made in preparing solutions. The sequence of all oligonucleotides must be included or referenced. Agarose gels should be identified by percentage and buffer used. If any of these materials were used in previous experiments, include only the reference to that earlier experiment, do not repeat the information again.

4. Procedure: Write down exactly what you are going to do before you do it and make sure you understand each step before you do it. In general, Xerox copies of procedures are not acceptable for several reasons:
 - (a) You should include everything you do including all volumes and amounts; many protocols are written for general use and must be adapted for a specific application.
 - (b) Writing a procedure out helps you to remember and to understand what it is about. It will also help you to identify steps that may be unclear or that need special attention.
 - (c) Some procedures can be several pages long and include more information than is necessary in a notebook. However, it is good laboratory practice to have a separate notebook containing methods that you use on a regular basis (this is not required for this course). If an experiment is a repeat of an earlier experiment, you do not have to write down each step but refer to the earlier experiment by page or experiment number. If you make any changes, note the changes and why. Flow charts are sometimes helpful for experiments that have many parts. Tables are also useful if an experiment includes a set of reactions with multiple variables. It is good practice to check off steps as they are completed or reagents as they are added to prevent you from losing your place or for forgetting to add something. All procedures should be referenced.
5. Results: This section should include all raw data, including gel photographs, printouts, colony counts, autoradiographs, etc. All lanes on gel photographs must be labeled and always identify the source and the amount of any standards. This section should also include your analyzed data, for example, transformation efficiencies, calculations of specific activities or enzyme activities.
6. Conclusions/Summary: This is one of the most important sections. You should summarize all of your results, even if they were stated elsewhere and state any conclusions you can make. If the experiment didn't work, what went wrong and what will you do the next time to try to trouble shoot?

Adapted from: <http://www.research.umbc.edu/%7ejwolf/method3.htm>