Research Center for
Pharmaceutical Nanotechnology
Tabriz University of Medical Sciences
RCPN

Managing Laboratory Notebook

How to keep a proper lab book

A good test of your work is the following question: could someone else, with an equivalent technical background to your own, use your notebook to repeat your work, and obtain the same results?
For that matter, could you come back six months later, read your notes, and make sense of them?
If you can answer yes to these two main questions, then you are keeping a good notebook.

Golchin. A
12/30/2015

"Please read before coming to lab"

A lab notebook is a complete record of procedures (the actions you take), the reagents you use, the observations you make (these are the data), and the relevant thought processes that would enable another scientist to reproduce your observations. This generally includes an explanation of why the experiments were done, including any necessary background and references, how the experiments were performed and the results of the experiments. It is important to understand that your lab notebook is a "legal document". In the case that your research contributes to the issuing of a patent, it will be closely scrutinized because it documents your group's claim to the discovery. Also, if any allegations of fraud are brought against your published work, your lab notebook is used to validate your findings and defend your claims.

In short, a laboratory notebook is…

- A daily record of every experiment you do, think of doing, or plan to do
- A daily record of your thoughts about each experiment and the results thereof
- The basis of every paper and thesis you write
- A record that would enable successive scientists, working on the same project, to pick up where you left off or reproduce your result

A lab notebook is not…

- A journal
- A record of communications
- A place to compile lab protocols/manuals
- Yours to take home

What goes in the lab notebook?

- Notebook name
- Inside cover or cover page
- Your name and year
- General project name
- Lab mailing address
- Table of Contents
- Body of notebook
- Experimental entries

Different types of lab notebooks

- Bound/Stitched Notebook
- Loose Leaf/Three Ring Binder Notebook
- Electronic Notebook

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Notebook	Advantages	Disadvantages
Bound/Stitched Notebook *(RCPN adhere this type of notebook)*	• Numbered pages • Pages are not easily removed • Durable • Holds Up under disputes of fraud and intellectual property	Projects are written in order they are done, difficult organizing multiple projects
Loose Leaf/Three Ring Binder Notebook	• Easily organize different projects and insert suppor0ng documents • Cheap enough to have a notebook for each project	Sheets fall out, difficult to authenticate
Electronic Notebook	• Able to quickly search for projects • Electronic log of entry dates • Easy to share entries	Requires electronic security, corrupted files, software compatibility issues

Guidelines

1. Pages should be bound and numbered sequentially. Loose-leaf notebooks should be avoided and permanent bindings used to avoid any suggestion that pages might have been removed or inserted. Laboratory notebooks in a series should also be numbered sequentially. Numbered pages show that no pages have been deleted or added.
2. It is advisable to keep different notebooks for different projects or different aspects of the same project. Notebooks should be clearly identified on the outside cover.
3. On the front cover of the notebook should be a description of what is contained in it (for example, cloning of the X gene and characterization of its product). The first and last dates of entry should also be written on the front cover.
4. Write down everything you do. If you don't write your procedure you will not be able to repeat your experiment exactly.
5. Dates should be recorded unambiguously (i.e. 8 July 2002 not 8/7/02 or 7/8/02) to avoid confusion arising if the dates are written in the UK and read in the US.(different countries)
6. Electronic notes should be avoided. However, if such notes are taken hard copies of the entries should be printed out regularly, signed, dated and affixed to consecutive pages of a bound notebook.
7. Describe all equipment you are using (e.g. Shimadzu Bio-Spec Mini spectrophotometer).
8. Photographs, computer generated data, and so forth should all be stuck into your notebook in such a way that they will not come loose. If the format of these data is too large for your laboratory notebook, sign and date such data and file them in a loose-leaf ring file that can clearly be identified. Record the location of these documents in your notebook.

9. When following a written protocol, you do not have to rewrite every word. It is sufficient to reference where the protocol is written (e.g. “I ran an SDS-PAGE gel using the protocol from the Chem 184 Reader, 2008 Appendix, p.6”).
10. You must have your lab notebook signed by your lab professor before you leave lab each day. Any pages not signed on the day the experiment was performed will adversely affect your lab notebook grade.
11. Include a conclusion (2-4 sentences) at the end of each day. Possible questions to address include:
    - What have you learned from the day’s experiments?
    - Was anything particularly difficult, easy, confusing, interesting, and useful?
    - How did your work get you closer to your final goal?
12. Corrections must be made by drawing a single line through the entry. If you leave more than four lines at the bottom of a page, cross through the area to indicate that those lines were unused. Never use Whiteout.
13. Remember, laboratory notebooks and their contents are confidential and of great value. Store them in safe places and report any loss or theft to your supervisor immediately. When you leave your laboratory for any length of time, inform your supervisor of the whereabouts of your laboratory notebooks. When you leave the institution permanently, ensure that your notebooks are handed over to your supervisor.
14. Some abbreviations are created by the individual researcher to reduce characters in saved file names and simplify long names, so For abbreviations that are unique to the project and regularly used, reserve the last few pages of the notebook to define the abbreviators, or create a code book or data dictionary.
15. Laboratory notebooks should not leave the laboratory.
16. Some laboratory notebooks come equipped with carbon copies. These types are the best and safest. If your notebook is not of this type, you should make photocopies of the complete notebook. But why do you need copies?
    - Once you have completed a laboratory notebook, your supervisor will probably want to keep the original. You will therefore need copies to help you in completing your research. You will often need to check back on what you did a few months ago.
    - You might leave your institution before you have time to write up your research for publication or patenting. You will need a copy of your notebook to enable you to do this. Your supervisor will also need a copy to ensure correctness of data and interpretation. (The latter is just one reason why it is so important for you to comment on your data in your lab notebook, making suggestions, interpretations, and so forth.)
    - Another scientist might have to take up where you left off. Although your supervisor will have your lab notebook, your successor will also need to have a copy to help her or him continue your work. It will be essential that your results can be repeated.

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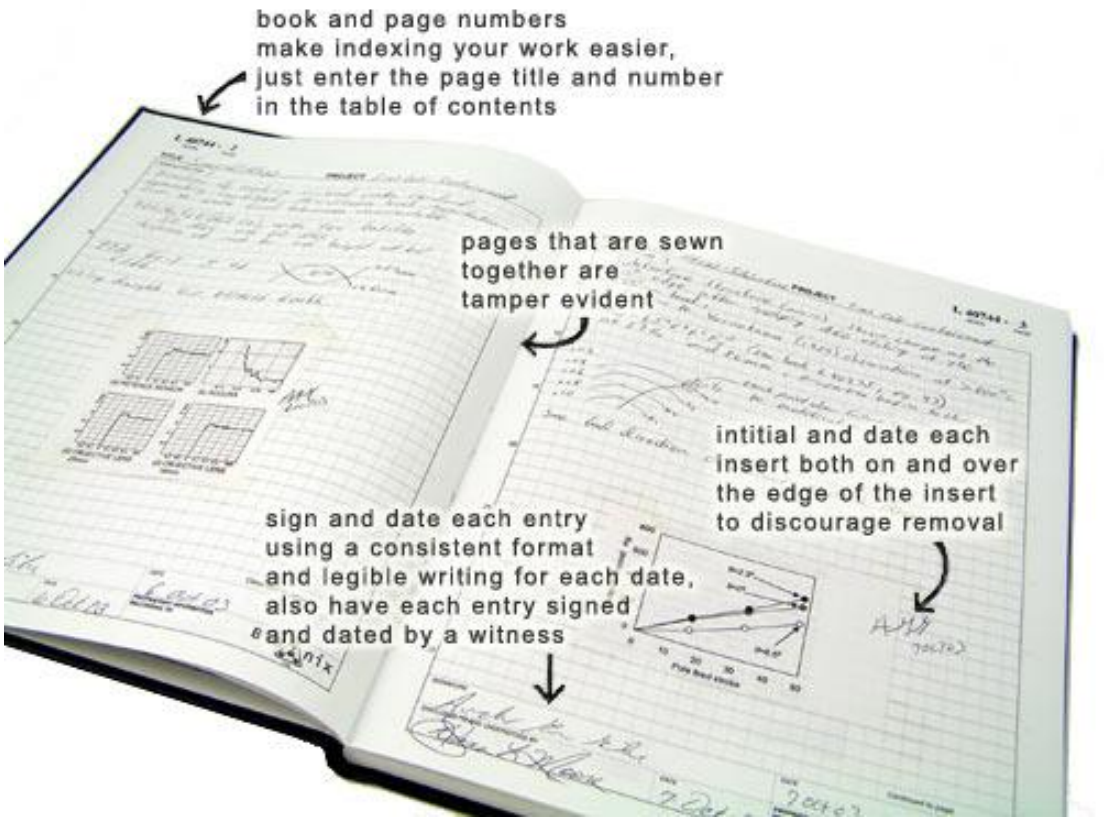
Notebook Checklist

- As you record your activities in the laboratory, ask yourself, "Did I..."
- Keep up with the table of contents?
- Date each page?
- Number each page consecutively?
- Use continuation notes when necessary?
- Properly void all blank pages or portions of pages (front and back)?
- Enter all information directly into the notebook?
- Properly introduce and summarize each experiment?
- Include complete details of all first-time procedures?
- Include calculations?

Example:



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References

1. Guidelines for keeping a laboratory notebook - Rice University, http://www.ruf.rice.edu/~bioslabs/tools/notebook/notebook.html
2. Basic Principles and Best Practices Philip Ryan, PhD Scientific Program Analyst Office of Intramural Training and Education https://www.training.nih.gov/assets/Lab_Notebook_508_(new).pdf
3. University of California, San Francisco, UCSF Department of Neurological Surgery https://ita.ucsf.edu/about/faq/what-are-standards-keeping-lab-notebooks
4. University of Oxford, Guidelines for keeping laboratory notebooks https://www.admin.ox.ac.uk/media/global/wwwadminoxacuk/localsites/researchdatamanagement/documents/labnotes_policy.pdf
5. Instructions for using your laboratory notebook, Massachusetts Institute of Technology Department of Mechanical Engineering.
6. Good laboratory notebook practices, Created by office of research compliance and training, Supported by Columbia University standing committee on the conduct of research.
7. Lab notebooks, Harvard University http://sites.fas.harvard.edu/~mcb116/topics/notebook.html
8. Book Factory http://shopping.netsuite.com/s.nl/c.ACCT107430/sc.23/category.5594/.f

Good luck!

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