Guidelines laboratory notebook
Bachelor Biosciences

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Introduction

Correct use of a laboratory notebook, or lab book, is part of doing scientific research. You will not only have to use a lab book during all lab courses, but also during research internships, when you start a PhD-project or work at a research & development department of a company. A lab book contains the base of your results and the reports you write. For that purpose, your lab book should be clear, legible and available for your supervisors or colleagues in case your data is used in a scientific publication. The department of your internship is owner of your data and lab book.

This document states the guidelines to be followed when writing a lab book, both before and during an experiment.

General guidelines

The purpose of a lab book is to provide all information necessary for yourself *and* others to perform the experiment exactly like you originally did. The general guidelines result from this purpose.

1. The lab book is durable, you will have to use it during the entire study.
    a. Use an A4 sized, ruled hard cover notebook. The first lab book will be handed out at the first course you have to use it, a new one can be bought at BeeVee.
    b. Write with a ballpoint pen (non-erasable).
    c. Never use loose pieces of paper.
2. The lab book is legible, work neatly.
    a. Do not work on scratch paper first, but write *everything* immediately, and readable, in the lab book.
    b. If scratch paper is really necessary, use the left pages of the lab book. On the right pages the information can be copied in a legible way.
    c. Make corrections neatly by drawing a line though your mistake. Do not erase your mistake.
    d. In case of lack of space, refer to a correct clause by using an asterisk (*).
3. The lab book is well organised, others should also be able to find what they are looking for.
    a. Use page numbers.
    b. Make a table of contents on the first few pages. Name the experiments and courses in the first column and associated page numbers in the second column.

c. You can choose to start each new experiment on a new page. In that case, you need to reserve enough space for each experiment. However, it can be difficult to estimate the number of pages needed per experiment in advance. Therefore, you can also choose to write the experiments in chronological order (e.g. experiment #1 protocol on page 3 and the results on page 15, with in between the protocols of other experiments). If you refer to these page numbers correctly in your table of contents, this is no problem at all.

Use of lab book before conducting an experiment

You may also type this instead of writing it up. In this case, always make sure you print it out and paste it in your lab book before the practical.

Administrative

1. Give date of conducting the experiment.
2. Give experiment title (for lab sessions like in course manual).
3. Number experiments corresponding to those in the table of contents.

Research question and (if applicable) hypothesis

4. Give research question.
    a. Be specific, e.g. add species to be studied or type of medium to be used.
    b. A research question (what you want to discover/figure out) is not the same as a learning objective (what you learn yourself by conducting the experiment, e.g. applying certain experimental techniques).
5. Give, when applicable, a hypothesis.

Experimental protocol

Some researchers write this part while conducting the experiment. However, to save time during the practicals, and to know in advance what you are going to do, we advise you as a student to write it beforehand.

6. Indicate relevant literature references, e.g. when a general protocol is used.
7. Give safety data of to be used chemicals.
8. Show required chemical calculations.
9. Give required dilution series.
10. Make a step-by-step overview of conduction of the experiment:
    a. Describe every step into detail.
    (Example of single step: add 100 µl NaOH 0,1 M to solution A)
    b. Make a bulleted list of the different steps
    c. Be concise.
    d. Be thorough, making course manual unnecessary during the experiment.

e. In case an existing general protocol is used, do not copy by hand, but print and paste it in your lab book. Only referring to external sources is insufficient.
f. Give, when necessary, a schematic overview of the experimental set-up.

Note: a detailed step-by-step overview makes copying lists of materials unnecessary.

Observations and raw data

11. Give, when applicable, a table to fill in the results during the actual experiment.

Use of lab book during an experiment

Experimental protocol

1. Make a bulleted list of every deviation from the step-by-step overview; do not repeat the step-by-step overview.
2. Explain used codes on tubes/flasks/etc.
3. Give location of samples, e.g. used slot in gel, or used stove for incubation.

Observations and raw data

4. Write down what you see while running the experiment (not only the final results).
5. Show data with correct units (e.g. in the tables you made beforehand).
6. Show, if applicable, drawing/picture/blotting paper/etc. Draw according to the drawing rules for biological drawings (Skills Portal Biosciences: www.science.ru.nl/biologyskills).
7. Give the filename and location of digital data, e.g. pictures.
8. Indicate which data are less reliable because of (possible) errors.
9. Save unreliable data (don't erase them) and keep it legible.

Analysed data

10. Analyse data, often by using calculations and software.
11. Depending on the type of research and department, calculations in lab book are elaborate or brief. Note that during lab courses, calculations are given in such a way that the teacher is able to judge their quality.
12. Show graphs/tables summarizing your results (like in results section of report).

Conclusion

13. Give concise conclusions based on your observations.
14. Link conclusions to research question and (if applicable) hypothesis.
15. Indicate if experiment needs to be replicated and give suggestions for further research.