KEEPING A LABORATORY NOTEBOOK

The laboratory notebook is the most important component of good laboratory performance. It must be an accurate and unambiguous record of your laboratory work. The grade in this course will be a direct reflection of the content of your notebook. All data should be clearly labeled and annotated. Since this course has a laboratory manual, there is no need to reproduce the manual in your notebook. However, you will find that the lab will be much easier and you will be less likely to overlook key steps if you include a brief outline of the procedures to be followed in each experiment in the notebook. It is important that all data be recorded in "real time," i.e., enter measurements and perform calculations as they are done. Waiting to do calculations after the lab is over is a major source of error in this course and will certainly have a detrimental effect upon your course performance.

NOTEBOOK BASICS

A laboratory notebook should be permanently bound. Spiral or loose-leaf notebooks are unacceptable.

Record all data in permanent ink. Test your ink in the back of the notebook for water solubility. No pencils will be allowed in the laboratory.

Reserve the first few pages of the notebook for an index or table of contents. On the front inside cover write
- your name
- phone number
- e-mail address
- semester date
- laboratory course and section number
- instructor's name and
- assigned drawer number(s).

Number all pages consecutively with odd page numbers on the right hand side.

NOTEBOOK FORMAT

The following format can serve as a template for keeping an accurate and useful laboratory notebook:

Title: The start of each notebook page should include the title of the experiment. The first page of the experiment should also include a reference to the relevant pages in the laboratory manual.

Introduction: The introduction should state the purpose of the experiment, what is going to be measured, and any pre-lab literature references such as expected range of results,
literature values or other data relevant to the work being performed. Make sure that all significant balanced chemical equations are recorded.

**Procedure:** There is no need to explicitly copy a given procedure from you lab manual or literature reference. Write a brief outline of the steps to be followed, citing the literature or laboratory manual sources for the procedure that you are using. Be sure to cite any deviations from the referenced procedure that you are using, including modifications that the instructor gives you. Attach (with tape) any relevant handouts, procedure modifications or report forms to your laboratory manual or to the notebook.

**Observations:** Identify all observations and numeric results in a clear manner. Be sure to include succinct observations of any experiment details that you observed.

**Results:** Include a sample calculation for any numeric results with units clearly indicated. Include statistical measures and true values where appropriate.

**Conclusions:** Highlight your final result. Note possible sources of error and the effect that they might have affected your answer. Cite any precautions or modifications that might improve the experiment or decrease the time required.

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**USING THE NOTEBOOK**

No data of any type is to be recorded on scrap paper. All data and observations must be written directly into your notebook and dated.

Use a table format for data whenever possible. This makes comparison of results and data analysis much easier. The column headings of tables should show units and symbols. The table should have a title and sequential number for reference purposes.

Mistakes or errors should be crossed out in a way such that they are still legible. Never erase or obliterate data or tear pages from the notebook. If pages are to be skipped, cross-out those pages but leave the numbering sequence intact.

The usual rules regarding significant figures should be observed. Never report more significant figures than warranted by the measurement (however, when performing calculations, it is wise to record a reasonable number of excess digits since premature truncation of results may result in loss of accuracy.) The final result should contain the number of significant digits required by the least accurately known lab measurement.

In general, the left hand page of the notebook is reserved for calculations and notes.

Printouts from spreadsheets, copies of graphs and spectra should be permanently attached to the notebook. Sometimes it is helpful to print at a reduced size for this purpose. These attachments should be in sequence with the experimental details and should be permanently bound to the notebook. Tape or a glue stick work quite well for this purpose. Be sure to keep a record of the filename of any data stored on a computer or disk.

A rough sketch or representation of spectral data, chromatograms, titration curves, etc. should be recorded in the notebook. Be sure to label the axes with measurement units and give a title to the drawing. A reference of the file name for computer data should be recorded if the data is stored on a disk or server.
If any unusual experimental equipment is used, sketch the setup or include a reference to the directions for setting up the apparatus.

Cite the source of any chemicals that are used. A manufacturer’s name, grade of chemical, and certified purity are important pieces of information that may not be available after leaving the lab.

Record the name and model number of any instrument used in your experiment.

Any "re-submission" of data for grading must have the mistake clearly obvious in the notebook.