Your Laboratory Notebook

Maintenance of an acceptable laboratory notebook will be emphasized in the General Chemistry Laboratory courses. Record keeping and data interpretation are skills that you will use throughout your scientific career. The ability to prepare an adequate and reliable record of results is a fundamental requirement for all successful experimental work.

The most important criterion for an acceptable lab notebook is that the record be complete enough for a second person to be able to follow your experimental work, thus being able to repeat the experiment and to obtain the same results. The record must be written **while you do your work**. Your records should reflect your work so well that any odd results can be interpreted later, even if you don't notice them at the time. Later, you can do calculations, etc.

All entries in the laboratory notebook are to be made in ink. If errors are made, simply cross them out with a single line. **Never obliterate entries**; at a later time you may find that this information is useful. All data and observations are to be entered directly into the notebook, not on scraps of paper. While you may want to wait to record data until after the lab is over in order to have a neat notebook, it is more important to have a complete, accurate record of all original data and observations, complete with smudges, spills, and cross-outs. Your laboratory notebook should provide a complete record of the work which you have done throughout the year in the lab. If it is necessary to omit information on a page in your lab notebook, place a large X over the information but do not remove the page from the notebook. (Pages should never be removed from a lab notebook.)

A pre-lab must be written in your laboratory notebook before you will be allowed to participate in lab. The pre-lab includes the following four components:

1. Title
2. Purpose: This is a brief description of why you are performing the experiment and what you expect to learn. Do not copy the purpose straight from the lab book!

3. Procedure: A step-by-step version written in your own words. This should be detailed enough that someone else could use it to replicate the experiment. Complete sentences are not necessary and diagrams can and should be used where appropriate.

Example:

- `clean crucible`
- `dry to const wt. w/heating`
- `add about 5g unknown`
- `heat gently 1st, then strongly for 10-15 min`
- `cool-weigh-reheat-cool-weigh-repeat to const wt.`

4. Calculations: A summary of the calculational steps needed to complete this experiment should be provided after the procedure. Since the pre-lab is completed in preparation for the upcoming experiment, there will not be any data or actual sample calculations on any pre-lab pages.

Data and Observations: Before you leave lab, all relevant measurements and observations must be recorded. Include anything noteworthy that you observe such as color and temperature changes, formation of a precipitate, etc. Large collections of data should be organized into tables for clarity. All numerical entries must have appropriate units. It is not necessary for this section to be extremely neat, but it should be legible and in some sort of order. If you make a mistake recording data cross it out with ONE line. If you have to cross out an entire trial use a large X, and include a brief note as to why you did it. Don't forget to record the numbers of any unknowns.

- **In addition,** include at the top of **every** page:

- `Your name (and lab partner's name if applicable)`
- `Date`
- `Experiment # and Title`

Carbon copies of the pre-lab are to be turned in at the beginning of class. Carbon copies of all lab work and any calculations performed post-lab are to be stapled to the back of the lab report. The laboratory report is to be submitted one week after performing the laboratory experiment.

Copied (with minor modifications) from:
http://chemlabs.uoregon.edu/Classes/Exton/Misc/prelab.html

Pre-Lab

Purpose: To determine the enthalpy of vaporization (ΔH_{vap}) of water and the vapor pressure of water at 65°C.

Procedure:

1. Fill 10-mL graduated cylinder to ~4.6 mL w/ distilled H_2O
2. Cover top of grad. cylinder with finger, invert, and place into tall beaker filled w/ distilled H_2O (3-4 mL air should be trapped)
3. Add water, if necessary, to completely submerge graduated cylinder
4. Heat water in beaker until air bubble expands beyond scale on inverted graduated cylinder. Remove heat.
5. Record volume to nearest 0.1 mL when air contracts to within scale, and record temperature to nearest 0.5°C. Stir bath frequently to eliminate temperature gradients.
6. Record V & T at ~5°C intervals down to ~50°C.
7. Cool beaker H_2O rapidly to ~5°C with ice, catching spilled H_2O in pneumatic trough. Record V, T, and P_{atm}.

Calculations:

- Correct V_o by subtracting 0.2 mL
- Calculate n_{air} using $PV = nRT$
- Calculate P_{air} using $PV = nRT$
- Calculate P_{H_2O} using Dalton's Law of Partial Pressures
- Plot P_{H_2O} vs T in Kelvin.
- Plot $\ln P_{H_2O}$ vs $\frac{1}{T}$ (1/K) w/ best-fit line
- Calculate ΔH_{vap} using best-fit line & Clausius-Clapeyron eqn. (compare to known value of 44.02 kJ/mol)
- Calculate P_{H_2O} @ 65°C using best-fit line & compare to known pressure in Appendix B in textbook)