

PART 1

PRELIMINARY EXERCISES

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HOW TO KEEP A LEGALLY DEFENSIBLE LABORATORY NOTEBOOK

Proper recording of your laboratory data and upkeep of your laboratory notebook are essential to conducting good science. As your laboratory instructor will state, you should record sufficient detail in your notebook that another person of your skill level should be able to understand your procedures and comments and be able to reproduce all of your results. In government and industry (the real world), laboratory notebooks are legal documents. They can be used to apply for and defend patents, to show compliance or noncompliance with federal and state laws, and simply as record keeping. In the real world, lab notebooks start off as completely blank pages. You fill in all of your daily laboratory activities, including your conclusions. This laboratory manual is more organized than those used in the real world but will also serve as an example of your laboratory documentation, which will be an essential part of your future job. Except for a few cases, data collection sheets have been omitted intentionally because they are not always present in the real world. You should read the procedures carefully and understand them before you come to lab and have a data collection sheet ready in your laboratory notebook when you arrive in lab.

The laboratory notebook is the basis for your laboratory reports. The language you use in notebooks should be objective, factual, and free of your personal feelings, characterizations, speculation, or other terminology that is inappropriate. The notebook is *your* record of your or your group's work. Entries made by anyone other than the person to whom the notebook belongs must be dated and

signed by the person making the entry. This may seem redundant since you will be dating and signing every page, but this is the standard policy used in government and industry.

Although you will quickly outgrow your laboratory notebook after graduation, you should realize that some laboratory notebooks are permanent records of a research project; that is, they are stored securely for years. The typical life of a laboratory notebook ranges from 10 to 25 years. Notebooks are also categorized by levels of use and include (1) a *working laboratory notebook* (one that is not yet complete and is currently being used to record information), (2) an *active laboratory notebook* (one that is complete but is needed as a reference to continue a project: for example, volume two of your notebook), and (3) an *inactive laboratory notebook* (one that is complete and no longer needed for quick reference).

The guidelines that follow have been collected from standard operating procedures (SOPs) of the U.S. Environmental Protection Agency and the U.S. Department of Energy as well as from my experience in a number of laboratory settings. These practices (and even more detailed ones) are also commonly used in industry. Your instructor will choose which guidelines are appropriate for your class and advise you to place a checkmark by those selected.

Your laboratory instructor will decide what heading or sections your data recording should be divided into, but these usually consist of a (1) a purpose statement, (2) prelaboratory instructions, (3) any modifications to the procedures assigned, (4) data collection, (5) interpretations, and (6) a brief summary of your conclusions. Although your laboratory reports will contain detailed interpretations and conclusions, you should include these in your laboratory notebook to provide a complete account of the laboratory exercise in your notebook. As you maintain your notebook, be aware that if you add simple notes, labels, or purpose statements throughout your data collection, it will make your account of the laboratory exercise much clearer a week later when you prepare your laboratory report.

Suggested Guidelines. Check those that apply to your class.

- 1. Use this notebook for all original data, calculations, notes, and sketches.
- 2. Write all entries in indelible ink (non-water soluble).
- 3. The data collection sections are divided into separate experiments, and within each experiment all laboratory notebook entries should be in chronological order. Note that in the real world, you will maintain separate notebooks for each project you are working on. In your future employment, all entries will be made in chronological order and you will not be allowed to skip from page to page or leave any blank spaces.
- 4. Include a date and initials at the bottom of each page.
- 5. Make minor corrections by placing a single line through the entry and labeling it with your initials and the date.

6. Major alterations or changes to previous entries should appear as new entries, containing the current date and a cross-reference (page number) to the previous entries. In making your corrections, do not obscure or obliterate previous or incorrect entries.

7. Do not remove any pages from the laboratory notebook unless you are specifically advised to do so by your laboratory instructor.

8. If your laboratory manual does not include chart-holder pages, glue or otherwise securely fasten charts, drawings, and graphs in the area provided for each experiment.

9. Designate each blank unused page or portion of a page equal to or greater than one-fourth of a page with a diagonal line through the unused portion to indicate that portion of the page is intentionally being left blank. Along the line write "intentionally left blank," with your initials, and date it.

10. Reference to a name, catalog number, or instrument number should be made when nonstandard items are being used or when the laboratory contains more than one piece of that equipment.

