Laboratory Notebooks

The proper documentation of experimental procedures, data, and observations is as important in the practice of experimental science as the experiment itself. Without such documentation, it is impossible to reproduce an experiment, report it to others, or, the case where a new, important discovery has been made, to prove who the discoverer is. The laboratory notebook is the primary means of documenting procedures, observations, discoveries, and data, and so must be maintained with care.
The laboratory notebook has the following characteristics:

a.) It must be written legibly and in ink. Ink entries are relatively permanent, while pencil entries are abraded away with time and eventually cannot be read. Writing so that others can read the laboratory notebook is essential, so that any other person knowledgeable in organic chemistry would know exactly what you did and observed, and would be able to reproduce the experiment based on your notes.

b.) All observations and data are written directly into the notebook. Writing them elsewhere and copying them into the notebook allows for copying errors. At times, you will be working with other people for laboratory experiments. Although you are working together, you each still must record all ideas and results into your notebook. The exception would be if the two of you did separate projects, then discussed your results with one another in order to draw conclusions. It is important to acknowledge the contributions of others to the conclusions that you draw, so include your partner's name if appropriate. In addition, if you receive help from others or from reference books to complete your laboratory, acknowledge the person or literature reference. There is nothing wrong with obtaining help, as long as you acknowledge the source!

c.) Nothing should be erased. Mistakes should be crossed out with a single line, so that the original information is still readable beneath the cross-out.

d.) Only laboratory work is recorded in the notebook. Class notes, library reference work are not useful to others reading your record of experimental procedures and observations.

e.) Your descriptions of procedures, observations, and data should be sufficiently detailed to allow another to repeat the experiment and confirm your results only using your notebook as a guide.

Within these guidelines, this notebook outline should be followed as closely as possible for each experiment. However, depending on the experiment, some of the suggested items are not appropriate and need not be included. Sometimes for a multiple-week experiment, it will be appropriate to prepare only one pre-lab for all of the weeks and other times, a separate prelab for each week will be useful. In any case, only one conclusions section is appropriate for a multiple-week experiment.

a.) Use a bound notebook

b.) Number every page in your notebook before starting the first laboratory.

c.) Reserve pages 1-3 for a Table of Contents, and update that table after each lab period.
d.) Use ink.
e.) Date all notebook pages as you add data to your notebook.
f.) Do not skip pages.
g.) Do the pre-lab portion of your notebook writing **before** you come to lab by entering the following:
    a. The title of the experiment
    b. Statement of purpose
    c. References (i.e. pages from your text, other sources used from the library for physical characteristics of your reagents)
    d. A brief description of the method used, or a balanced equation for each chemical reaction of the experiment.
    e. A table of reagents, listing the relevant physical properties of the compounds involved, including the predicted products. This includes, molecular masses, quantities (grams and moles), boiling points, densities, etc. You will likely need an additional reference to obtain this data (e.g. Aldrich, CRC, Merck Index).
    f. Answers to any pre-lab questions.
    g. Experimental procedure.
h.) Enter what you do and observe directly into the notebook as you perform the experiment during the lab. If you anticipate the collection of data, set up a table in advance in your notebook, which will make it easy to record and evaluate the data later. Again, the running account of the experiment should be written while the work is being done. Things to note:
    a. All measurements that you make (i.e. masses and volumes).
    b. Observations you make of colors, physical states (solid, oil, liquid), and behavior of a reaction, especially changes in any of these properties.
    c. Any difficulties that you have with the procedure.
i.) After you have completed the experiment, complete any calculations needed and enter them directly into the notebook. These calculations may include percent yields, estimated uncertainty, interpretations drawn from data, and a presentation of your results. In addition, an explanation of observations you made in your running account and discussion of possible sources of error.