

# Format for Chemistry 11 Labs

The Chemistry 11 course requires the completion of numerous laboratory experiments and investigations. You will be given a lab. instruction handout for each of the labs, however, you **MUST** also keep a record of it in your laboratory notebook. The lab. notebook should be organized in the following manner:

1. Keep a table of contents at the beginning of the binder.
2. For each lab, start with the printed lab handout from a teacher and based on that handout, prepare a lab. report in your lab. notebook.
3. The lab handout might contain pre – lab and/or post – lab questions. You **MUST** complete pre – lab questions prior to a specific lab and the post – lab questions **MUST** be complete on the lab. report due date. You **MUST** also show all work for credit.
4. Then include the lab report completed according to the following format.

## Lab Report Format

Lab reports need to be neat, organized and written in a scientific manner, meaning that the writing is objective and uses the past tense.

- **TITLE:\*** Placed at the top of the first page, this should include the title of the experiment, the name(s) of the person(s) performing the experiment, and the date it was performed.
- **OBJECTIVE/PURPOSE:\*** This is a statement of the purpose of the lab. What are the main reasons you are performing this experiment? Be specific...don't just restate the title or copy the generic objectives from the given lab packet. It's only one or two sentences.
- **CHEMICAL REACTION:\*** List the balanced chemical reactions involved in the experiment, if applicable.
- **EQUIPMENT:\*** Include a bulleted list of materials and chemicals needed to complete the experiment.
- **SAFETY CONSIDERATIONS:\*** List applicable safety rules to consider in this experiment, special handling and disposal instructions based on MSDS pages.
- **PROCEDURE:\*** In your own words, write a brief summary of the procedure in paragraph format. Do not include lengthy, detailed directions. A person who understands chemistry should be able to read this section and know what you are doing.
- **DATA/OBSERVATIONS/RESULTS:\*** This is where you record all the measurements and observations you made during the lab, and attach any graphs and charts generated during or after the lab to display your data. All data should be organized into labeled data tables with correct significant figures and labeled units. Graphs and charts **CAN** be computer-generated and include titles, axes labels and units where applicable.

**\*items that must be completed before lab is to be performed**

**(if any of the items are missing, you will not participate in that particular laboratory experiment)**

- **CALCULATIONS/RESULTS:** Include all pertinent calculations. For all calculations, you need to show how the calculations are carried out. Include all units in all calculations; be sure to show how they cancel. Show work for calculations, express all answers to the correct number of significant digits and include units. For repetitive problems, provide one sample calculation (with appropriate units) for each type of calculation. Percent error should be calculated in this section.
- **DATA ANALYSIS:**
  - Present the data that you collected or calculated during the experiment
  - Discuss how you obtained the data (explain your calculations but DO NOT restate procedure)
  - Graphs: Make the graphs an appropriate size, at least ½ page. Always use graph paper, and be sure to label all axes with names and units, and give each graph a title. Not all activities will require a graph.
  - For example, in your “DATA/OBSERVATION/RESULTS” section you recorded the freezing point of unknown sample #1 to be -5°C. In the “DATA ANALYSIS” section you will further analyze that data: **“We used an electronic temperature probe and determined the freezing point of sample #1 to be -5°C as noted in Figure 2 by the flat portion of the curve. This shows that the addition of a solute (NaCl) lowered the freezing point by 5°C when compared to the curve of the pure sample shown in Figure 1.”**

### *Data Analysis Section*

<i>DO</i>	<i>DON'T</i>
present the <u>data</u> you collected	give opinion that your data was good or bad
discuss <u>how</u> you obtained your data and explain complex calculations	describe details of the procedure again or explain every addition or subtraction step in words
refer to data tables, charts, and graphs by their title (i.e. Figure 1-2)	use the phrase, “our graph shows...” or start sentences with numbers
analyze <u>how</u> your data supports or rejects your hypothesis or objective	assume the reader will understand your data without an explanation
focus on <u>facts</u> you can support with your data and/or observations	describe what you think or what you think should have happened
compare your results to known or expected values by calculating percent error, difference, standard deviation, etc.	expect the reader to trust your results without proof

- **CONCLUSION:** Discuss and analyze your data! This section should include a thorough discussion of the results of the experiment and needs to be written as one or several paragraphs. Be sure to include a discussion of the theory: What do the calculations/observations/graphs reveal? Why does or doesn't the experiment work? What theory was demonstrated in this experiment? Compare the results with standard values and list the percent error (when applicable). State whether the results were too high or too low. Suggest two sources of error related to the data you collected that would have caused these experimental results. Human errors and miscalculations are NOT acceptable sources of error and MUST NOT be mentioned as a sources of errors. Hypothesize why the errors occurred and what might be changed to avoid these errors. This section must reflect thought and understanding on your part.
  - For example, **“We showed that solutes such as NaCl lower freezing points of pure substances because when we added NaCl, the freezing point dropped by 5 degrees Celsius. When we compared this to a literature value, we found out that the actual drop in temperature should have been 4 degrees Celsius. This difference between our value and the actual value represents an error of 20 % which seems too high. This error might have been caused by having impurities in our “pure sample” or NaCl. To find out whether the suggested causes of errors really played a role in our experiment, we should analyze the purity of the “pure sample” and NaCl by chromatography.”**

### Conclusion Section

DO	DON'T
briefly restate the objective ("In this lab we...")	list procedural steps
state whether or not you met the objective and provide <u>simple</u> data to support this statement	write, "We met the objective." and fail to support this statement with proof
list/explain any significant errors <u>and</u> how they influenced the data	write, "human error messed up our lab" or unjustly blame the equipment
make suggestions for improving the procedure, process and/or outcome of this experiment if you were to repeat it	criticize the procedure or equipment without offering an idea for fixing the problem

- **POST – LAB QUESTIONS/PROBLEMS:** Answer questions with complete sentences and in such a way that the question that was asked is understood. Solve any problems showing all work and with the correct number of significant figures.

#### Lab Grades:

- **The starred portions: (title, purpose, chemical reactions, equipment, safety, procedure, and data tables) need to be done before the lab is completed; they will be checked or collected and graded at the beginning of class on lab day.**
- **The other lab report sections (calculations, graphs, questions, analysis) will be collected and graded after the lab has been completed.**
- **All labs must be completed by everyone.**
  - **If you miss a lab and you HAVE a doctor's note, you must make it up. If you know you will be gone on a lab day, let me know, we can most likely switch the schedule around and do it a day you'll be there.**
  - **If you miss a lab and you DO NOT HAVE a doctor's note, you will have 0 for that lab. NO EXCEPTIONS!**
- **At the end of each quarter the entire lab book will be collected and graded for neatness and organization. You may need the binder for proof of advanced level lab work when you get to college; it could be your ticket to skipping freshman level chem. in college/university.**
- **The lab portion of Chemistry 11 will account for 20% (subject to change) of your grade.**