

## AP Chemistry Formal Lab Report Guidelines

This handout provides guidelines for writing a formal, typed laboratory report. Routine, casual lab "write-ups" may follow a similar format and style, but they are usually written in pen during the lab on the lab handout, and do not require as much work as a formal report.

### General Tips

- Be concise. In scientific writing, it is very important to say as much as is needed while using as few words as possible. Lab reports should be thorough, but repetition should be avoided. The entire report should be clear and straightforward.
- Write in the third person. Avoid using the words "I" or "we" when referring to the experimental procedure. For example, instead of "I boiled 50 mL of water for 10 minutes," the report should read, "50 mL of water was boiled for 10 minutes." This can be a bit difficult to get used to, so it is important to pay close attention to the wording in the report.
- Use correct verb tenses. Many students become confused when trying to decide whether to use past or present tense in their reports. The general rules for verb tenses are as follows:
  - The experimental procedure has already been conducted, so use the past tense of the verb when referring to it:
    - The purpose of the experiment was...
    - The compound was weighed to 5 g...
  - The report, equipment, and theory still exist, so use the present tense of the verb for them:
    - The purpose of this report is... Bunsen burners are used...
- Be prepared for the lab. All formal labs will have a pre-lab to complete, which will include reading the lab procedure, answering a few questions and preparing any necessary tables or charts for data collection.
- Take good lab notes. When conducting the lab, it is important to write down all the results that will be needed for the report as well as all observations, any materials and equipment used, and anything out of the ordinary that may have happened. Notes should be clear enough, so they are easy to review when writing the final report. Good notes will help you to write an insightful and accurate report.

### Format

- 1.5-spaced, simple font (Arial, Times New Roman or similar), size 11-pt
- 1" margins
- Bold-face subheadings for each of the sections
- Any sources used should be cited using APA format, including using in-text citations

### Sections

1. Title Page
  - a. Title of the experiment – descriptive but not too long
  - b. Name of student and name of lab partners (one report must be submitted per student)

- c. Date(s) on which the experiment was conducted and due date
- d. Course name and teacher

## 2. Introduction

- a. This introduction is also often referred to as the 'purpose' or 'plan' section. It should include two main categories:
  - i. Purpose or objective of the experiment expressed clearly in only one or two sentences, including the main method used to accomplish the purpose.  
*e.g.* The purpose of the experiment was to determine the percentage by mass of acetic acid in vinegar using acid/base titration.
  - ii. Background and theory pertaining to the experiment. This can include information from previous research, explanations of theories, methods or equations used, diagrams, etc.; for the example above, you might want to explain the theory behind acid/base titration and a brief description of the setup and process you will use in the experiment. If research is done for this section, be sure to cite any sources used.

## 3. Experimental

### a. Materials and Methods

- i. This is usually a simple listing of the equipment used in the form of a bulleted list, but it should be complete and accurate. Graphics of more complex setups may also be included if they would be helpful.

### b. Experimental Procedure

- i. This section includes the process of the experiment exactly as it was done in the laboratory. In general, this section can read: "Refer to the procedure outlined in the lab handout.", but any student-developed procedures should be written in a numbered list.
- ii. Indicate any changes made to the lab procedure given.

## 4. Results

- a. Raw data (weights, temperatures, etc.) organized into graphs or tables. Each graph, table, or figure should be labeled and titled properly. No tables, graphs or images should be included unless they are discussed in the results.
- b. Write out any important results in sentence form. This will help the key results to stand out from all the calculations, tables, and figures that normally dominate the results section.
- c. Calculations. Usually, only a sample of each calculation is needed. For example, if the percentage of acetic acid in 10 samples of vinegar has to be calculated and then averaged, write out the calculation for only one of them. Correct significant figures should be used in all calculations. Make sure units (cm., mL, etc.) are included in all calculations, and that major results of each calculation stand out from the rest of the numbers. Long, detailed calculations can be included as an appendix (see below).

## 5. Discussion

- a. This should be the most detailed section of the report. The main question to be answered in this section is, "What is the significance of the results?"
- b. The following points should be considered and included in the discussion:
  - i. Answer to discussion questions

- ii. Discussion of results (what did you find out?)
  - iii. Explain the results in terms of the objective of the experiment
  - iv. Explain how the experiment could be improved if you were to do it again
- For quantitative labs, include:
- v. Compare expected results with actual results (percent yield, percent error)
  - vi. Analyze experimental error
6. Conclusion
- a. Write 2-3 sentences that summarize the conclusions from the results. Do not give any information that was not included elsewhere in the report.
7. References/Appendices
- a. A works cited (APA style) should be included to show any resources used to write the report. This needs to include references for any images used.
  - b. An appendix can be used for pre-lab questions, large amounts of calculations or data and graphs or tables that didn't make it into the report. These appendices are sections at the end of the report, and should be clearly labelled as an appendix. Only include one type of information in each appendix – you may need more than one!

# Formal Lab Report Rubric

Total Points	
Possible Points	60
Grade	

Name: \_\_\_\_\_

## Title Page

- Lab title
- All relevant information included

**Total** \_\_\_\_\_ /2

## Introduction

### Purpose

- Clearly indicates the objective of the experiment
- One to three sentences

### Background Information

- Summary of concepts used in the lab
- Meets requirements outlined in lab handout
- All information cited appropriately

Writing/Content Quality \_\_\_\_\_ /5

**Total** \_\_\_\_\_ /10

## Experimental

### Materials

- Included in point form
- Complete, including quantities of chemicals

### Procedure

- Relevant, reasonable procedure
- Listed in numbered steps, or reference to lab handout
- Past tense and third person

**Total** \_\_\_\_\_ /5

## Pre-Lab

- Completed prior to performing the lab
- Meets requirements outlined in lab handout

Pre-lab Questions \_\_\_\_\_ /3

**Total** \_\_\_\_\_ /5

## Format and Conventions

- Proper font and font size, spacing and margins
- Sections clearly labeled and in the correct order
- Report is neat and organized
- Spelling and grammar are mostly correct
- Written in third person (no I, we, you...)

**Total** \_\_\_\_\_ /5

## Results

- Raw data from the lab included (not rewritten)
- Correct units and significant digits included in all measurements and calculations
- Tables, graphs and charts are used to show data, and are labeled
- Important results are highlighted in writing
- Results are accurate and complete, including any calculations

Writing/Content Quality \_\_\_\_\_ /5

**Total** \_\_\_\_\_ /10

## Discussion

- Discussion questions are answered
- Results are discussed and related to the purpose of the lab
- Error is calculated and discussed (when applicable) and improvements are recommended
- Present tense and third person
- No factual or conceptual errors

Discussion Questions \_\_\_\_\_ /5

Writing/Content Quality \_\_\_\_\_ /5

**Total** \_\_\_\_\_ /15

## Conclusion

- No new information given
- Short and concisely restates purpose and results
- Indicates if objective of experiment was met

**Total** \_\_\_\_\_ /3

## Works Cited

- All sources listed for facts/diagrams
- Full bibliographic information given for all sources
- In-text citations done in all sections of report
- Sources cited using proper format
- Works cited included at end of report

**Total** \_\_\_\_\_ /5

## Comments and Improvements

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### Writing Quality

- Insufficient Evidence [0]: Fails to convey information adequately; significant information missing; analysis lacking
- Developing [2]: Not so good – you made some big mistakes or your explanation does not show that you know what you're talking about. You had some okay parts, but other parts weren't good.
- Functional [3]: Mostly good, but you made some errors that show you might not completely understand. You might have missed an important part of the explanation.
- Proficient [4]: You get it, but you made a few minor errors. You might have missed part of the explanation, or had a mistake in your explanation, reasoning or calculations.
- Advanced [5]: Excellent job. Perfect. You totally got it, and you were able to explain it really well.