

Which Container Keeps Your Coffee the Hottest?

Report Recommendations

Introduction:

This should contain a clear statement of the problem, its goals, and your general approach to solving the problem. A typical introduction might be a short paragraph in length. As you do more original work, the significance of the present work in the context of what is known should be stated. Do not copy the goals listed for the investigations in your report introduction. Those goals merely represent a checklist of items to complete during the investigation.

Statement of the problem

For the coffee experiment this will likely be something along the lines of determining which container keeps the coffee hottest.

Statement of goals

This may be the same as the problem statement though should include the goal is learning to use the PASCO's

General approach to the problem

Authors should give a very brief statement of their approach to solving the above stated problem. This should NOT be an experimental section but should be more of a general approach to the problem. An example might be "Thermal insulating abilities were compared by determining heat loss of hot water in three containers over a fixed time period."

Form and style

Is this *really* an introduction to the experiment?

Experimental:

Enough detail should be given in this section so that another chemist, not otherwise familiar with the work, could repeat the experiments. Do not write your experimental section in second person voice. You are describing what you did, not providing directions for someone else (another chemist with the same training as you have) to follow.

- (a) You must identify all materials used. Include any information you have on the purity and concentrations of the materials. You should list reagents, such as acids, bases, and solvents, that are normally available, but you need not describe them in detail. You should give formulas of all compounds, together with their chemical names, at least once.*
- (b) Unless it is standard equipment, you should describe apparatus, with a drawing if necessary, and with names and sources of specific equipment if they are not widely known. You should list commercially available equipment, but you need not describe it in detail.*
- (c) Include a description of how the work was done. For experiments involving established procedures, reference to the appropriate source of the procedure may suffice. You should include all the background data, equations, and formulas necessary to the experiment.*

The main idea here is TERSE, TERSE, TERSE! Another chemist should be able to reproduce their procedure AND data handling. It is important to realize that these are being written for other chemists so things such as glassware size etc are not included unless integral to the procedure.

- Logical description of the procedure as ACTUALLY followed
Imagining you are a chemist or another student—could you follow it?
Experimental must include such things as:
 Approximate amount of water heated
 amount of water used in determination
 how water volume was measured
 what the actual initial temperature of measurement was
 which cups were studied
 what time (or temperature) range was studied
- Description of data handling
 What data was collected, and how. Also, what graphs must be made and what information is to be taken from the graphs.
- Form and style
 Is this an experimental section? Is there extra, useful information?
- Other items
 Diagram of the PASCO apparatus
 Paragraph, not outline, format (Note: this is a requirement.)

Results and Discussion:

For most reports, the presentation of the results and the discussion of their significance may be separated into two distinct sections. Occasionally, however, a chronological approach might be preferable. Regardless of the outline you follow, several points should be noted:

- (a) The major experimental results, including the original data, the calculated results, and at least one detailed sample calculation showing how the final results were obtained should be presented. It may be appropriate to include the theory behind your calculations. Include only relevant data and describe assumptions you made in the collection of the data. Introduce equations, figures, graphs, and tables where necessary for clarity and conciseness.*
- (b) All numerical data should be reported in accepted, self-consistent systems of units. Report the precision of the work, theoretical values if known, and the relative error of the experimental result. If your results differ significantly from expected values, or if the precision is worse than should be obtained with your procedure, discuss the possible sources of error in detail.*
- (c) In the discussion of the significance of the results, an objective explanation is essential. You should point out the limitations of the work. You should also interpret, compare, and contrast your results with reports available from other sources. Try to correlate your results with the chemical principles or reactions involved.*

Results always need to be presented in a clear and concise manner so that another chemist could scan the article and abstract relevant information as needed quickly and correctly. These are almost always in table format and have all the major results. If you calculated it or said you were going to determine it, it should be in this/these tables and explanation. Journal articles usually combine tabular data with a text description.

Graphs:

In this lab, you should have 6 graphs. There should be 2 graphs for each data run in any 2 of the three common temperature scales.

Titles on all graphs

Axes labeled

At least half-size if imbedded in text; full sheet of paper if not embedded in text

Data labeled

Graphs given figure numbers and referred to in text.

Data

There should be included tables with the original data printed out (see point (a) above)

amount of water used in determination

what the actual initial temperature of measurement was

which cups were studied

what time (or temperature) range was studied

Discussion

The discussion section states the major conclusions drawn from the results in light of how these results compare to or contrast with previous findings by other scientists. Every article makes certain claims of results found. Here is where you must show that you were correct in making your conclusions and that your results mean what you say they mean.

Some things that should be included:

Which cup insulates the best

AND why you arrive at that conclusion

Sources of error—did the graph show a ‘heating’ time for the probe and if so, how did you treat the data

Form

Is this/are these *really* a results and discussion section(s)?

Conclusion:

A summary adds to the value of the presentation. It should be interpretive and not repetitious. Discuss how the results relate to the goals of the experiment and any conclusions that may be drawn from the experiment. Consider any alternate conclusions or explanations. The problem may not have been solved completely; if so, you might suggest an approach or a refinement that could be used for further study.

Conclusion

This is much like a concluding paragraph on an essay and is a summary statement related to the purpose of the lab.

Improvements to the procedure

This may or may not be present but is an excellent way to show you are thinking about what was done in the lab.

Form and style

Is this *really* conclusion section?