Standard Deviation Report Write-up

This should be a formal report with the following sections. The report must be submitted on Blackboard and on paper. There will be a link to upload the formal report, and the spreadsheet. Both the formal report and spreadsheet must be submitted electronically. You will also submit the lab book pages; excel sheets and formal report in class.

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| --- | --- | --- | --- |
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1. Title Page with experiment title, name, instructor, section number and date.
2. Objective – This is a statement of the purpose of the experiment and how this experiment will fulfill this purpose.
3. Introduction –Include some background information. This should include definitions of the three types of error, precision, accuracy, mean, deviation, % error, and standard deviation. It should explain why standard deviation is a useful statistical tool. It should include any important equations with the variables defined. You should also make a statement explaining how the experiment will achieve the objective of the experiment. (this will not be a copy of the theory in the 141 lab book)
4. Procedure - reference the procedure you followed for the experiment. Follow the reference guidelines found on blackboard. If any changes have been made to the experiment by the instructor they should be explicitly described here.
5. Results and calculations – Make a table which shows the true value, mean volume, and standard deviation for each device. Also show (like table 1.4) within what limits you would expect 68%, 90%, and 99% of the measurements to fall. Should also have a table for the coke and diet coke showing the mean density and standard deviation for these liquids. Please show sample calculations (these may be hand written)
6. Discussion -

For Part A: Glassware

* 1. For each piece of equipment, classify the precision and accuracy of the volume contained or delivered as good, fair, or poor. Include a discussion of why you classified each type of equipment as you did. Be sure to include data to justify your classification scheme.
  2. The error analysis assumes that all of the errors are random and indeterminate. Do you detect at least the possibility of a determinate or nonrandom error in any of the volume measurements? If so, tell which method it is and what the source of this error is.
  3. Compare the precision of the data for the three piece of equipment using standard deviation to that of estimating it by significant figures. What can you conclude from this comparison?

For Part B

* 1. Explain how you chose which glassware to use to determine the density of the soda samples. Be sure to use data to validate any conclusions you make in this section.
  2. Look up the density of Coke and Diet Coke on the internet and discuss the accuracy and precision of your data to the true value. Be sure to include data to justify your conclusions.

**NOTE: Discussion is not a place to tell me whether or not you had fun or if you liked the experiment. I would love to hear you tell me what you do and do not like in person, but this is not part of a scientific document.**

1. Conclusion – Here you will just tell me the final results of the experiment. I expect to see a 3-4 sentences that state the volume and standard deviation for each measuring device, and the density of both the regular and diet sodas with the corresponding standard deviations.
2. Questions – Answer the questions at the back of the lab

Lab notebook

1. Must submit the copies of the data. Please note that you will need to keep the piece of cardboard provided in the lab notebook behind the duplicate page so that your data does not transfer through several pages. Please press hard enough so that I can read your observations in your running log as well as your numerical values with units (I must be able to read it clearly). You need to keep the originals so that if the report is lost you will have your data.

Note: Many of you did not have your lab notebooks at the time of doing this lab. This means that you will be appending the sheet of paper that you and I signed as containing the **original** data.

1. Make sure that your lab notebook includes the following
   1. Completely referenced procedure including any changes made by the instructor
   2. Any safety precautions that may be necessary. (Were there any here??)
   3. Clearly laid out and completed data tables are nice. Do not redo them just to make them pretty. As long as you have organized the data in a way that you can figure out and explain to me it is OK. Calculated values need not be included as they are on the computer spreadsheets
      1. Be sure to use the correct number of significant figures on all measurements
      2. Be sure to write all data in the lab book in ink when you take the data!
   4. Each data sheet is signed and dated at the end of a day’s work by both the student and the instructor.