The most important aspect of lab is being well-prepared before you arrive. Before the **start** of each lab, ensure your notebook includes: 1. Date (each page, upper right), 2. Page Number (each page, upper right), 3. Name, 4. Experiment Title 5. Reference, 6. Introduction, 7. Procedure, and 8. BLANK Data Table.
You do not have to number. They are provided to help you keep track of what is needed.

1. Date: January 13, 2025
2. Page Number: 1

Sample Lab Notebook Example

(HAND WRITTEN, BLUE/BLACK INK, RIGHT SIDE OF NOTEBOOK PAGES ONLY!!!)

Notebooks are checked each week unless otherwise specified by Dr. D. Missing or incomplete sections (1–8) will result in no stamp from Dr. D, a zero for the assignment, and possible dismissal from the lab.

3. Name: Charlie Horse

4. Page Title: Measurement and Density Lab

5. Reference: Experiment 1 from "CSN Chemistry 121 Lab Manual"

6. Introduction

The purpose of this experiment is to practice accurate and precise measurements using common laboratory equipment, such as a balance, graduated cylinder, and ruler. We will also calculate the density of two metal blocks of silver and compare the results to the accepted value of 10.49 g / cm^3. We will also determine the density of an irregular shaped object using the displacement method. Lastly, we will determine if our percent error from the true density of silver is less than five percent. This experiment emphasizes the importance of proper significant figures and unit reporting.

7. Procedure

How do you know the procedure? Use the procedure in the lab manual; rewrite it in your own words, making it brief and clear. This will be checked.

1. Gather all materials, including a metal sample, 50 mL graduated cylinder, ruler, and analytical balance.
2. Measure and record the mass of the metal sample using an analytical balance. Ensure the balance is tared before weighing.
3. Use a ruler to measure the dimensions (length, width, and height) of the metal sample if it has a regular shape. Record all measurements to the nearest millimeter.
4. Repeat these steps for another sample for trial 2. Calculate the average density for the two trials.
5. If the sample is irregular, fill the graduated cylinder with 20.0 mL of water and record the initial volume. Submerge the metal sample completely in the water and record the final volume.
6. Calculate the volume of the metal sample using the appropriate formula (displacement method or geometric calculations).
7. Compute the density of the sample using the formula: Density= Mass / Volume

8. Compare your calculated density with the accepted value provided in the lab manual.
9. Properly clean all materials and return them to their designated locations.
10. Show instructor data and clean lab space for signature before leaving.

8. Data Tables

Ensure your blank data table is in your notebook at the start of class, use the experiments as a template to construct your tables.

Regular-Shaped Object

Trial	Mass (g)	Length (cm)	Width (cm)	Height (cm)	Volume (cm^3)	Density (g/cm^3)
1	35.40	2.50	1.20	1.10	3.30	10.73
2	36.21	2.59	1.31	1.14	3.86	9.38

Irregular Object (Displacement Method)

Trial	Mass (g)	Initial Volume (mL)	Final Volume (mL)	Volume (mL)	Density (g/mL)
1	35.40	~~190.0~~, 20.0	24.5	4.5	7.87

9. Calculations

If you make a mistake, it is okay. Just put a single line ~~throught~~ through it. Don't make an inky mess and **DO NOT TEAR OUT PAGES**!

Provide one of every calculation, no matter how simple. I do not need repeating calculations. Label, include units, and use proper significant figures.

Regular-Shaped Object

1. $V = L \times W \times H = 2.50\ cm \times 1.20\ cm \times 1.10\ cm = 3.30\ cm^3$
2. Density = Mass/Volume = $35.40\ g/3.30\ cm^3 = 10.73\ g/cm^3$
3. Average density = $(10.73 + 9.38)/2 = 10.1\ g/cm^3$
4. Percent error = $|$ Experimental Value − Accepted Value/ Accepted Value $|$ × 100 = $|10.1-10.49/10.49|$ × 100 = 3.72 %

Irregular Object

1. Volume = Final Volume − Initial Volume = 24.5 mL − 20.0 mL = 4.5 mL
2. Density = Mass/Volume = 35.40 g / 4.5 mL= 7.87 g / mL

10. Conclusion

The goal of this lab was to practice accurate and precise measurements using common laboratory equipment and to determine the density of both regular and irregularly shaped objects. This purpose was successfully achieved as the calculated densities for both objects closely aligned with the accepted values provided in the lab manual. Specifically,

A strong conclusion should clearly state 1. if the purpose was achieved, 2. summarize your findings with respect to accepted values (if provided), 3. address unknowns if applicable, and 4. use 3rd person along with complete, professional sentences.

the density of the regular-shaped object was determined to be 10.73 g / cm³, and the density of the irregular object was 7.87 g / mL.

For the regular-shaped object, our calculated percent error from the accepted density of silver (10.49 g/cm³) was 3.72%, which is below the 5% threshold. This indicates that our measurements and calculations were accurate and precise. Maintaining a percent error below 5% is critical as it demonstrates minimal deviation from the true value, ensuring the reliability of our results and adherence to scientific standards.

These results validate the accuracy of the measurements and calculations performed during the experiment. This process demonstrated the importance of proper measurement techniques, careful use of significant figures, and consistent unit reporting. No unknowns were identified in this lab, but the experiment reinforced fundamental skills necessary for future laboratory work.

Answer all final questions in your NOTEBOOK. Do not attach additional sheets unless instructed by Dr. D.

11. Final (Post Lab) Questions

1. How do significant figures impact the accuracy of your density calculation?

Answer: Significant figures ensure that the precision of the calculation matches the precision of the measurements, preventing overstated accuracy.

2. What sources of error could influence your results in this experiment?

Answer: Possible sources of error include inaccurate measurements of the water displacement, not accounting for air bubbles trapped with the irregular object, or balance calibration errors.

Congrats, you are done. Once you have finished writing the lab, it still needs to be graded. Submit your completed lab to Canvas for grading within one week of the stamp date to avoid penalties. Late submissions lose points after one week, and after two weeks, a zero will be assigned.