

Lab: Graphical Relationship between Mass and Volume

Background:

We have started the year by talking about many of the different properties of matter and substances and how we can use these in identification purposes. Some of the most important properties of a substance are often the intensive properties, as they are a signature of a material/element, regardless of how much of that material you have present.

This lab will also require you to produce a graph of the data you obtain during the lab. The graph, as all graphs should be, will be labeled properly, have a line of best fit, and the slope of the graph will also be calculated.

Problem:

To find out how mass of an object and volume of a substance are mathematically and graphically related; and to discover ways to determine the identity of an unknown substance.

Materials: Wood, Water, unknown metal #_____

Procedure:

Write procedure in lab notebook to collect data in order to produce a graph comparing mass to volume for each of the unknowns (one graph with three lines is fine)

Data:

Create a table (or tables) for all of the data you will collect in this lab.

Analysis:

Make a graph of mass vs. volume of all three substances. Use “rules for proper graphing” in your lab handbook.

Calculate the slope of each line.

Calculate the percent error for each of your substances.

Questions:

1. What does the slope of the line represent?
2. What is the identity of your unknown metal? Explain all reasoning and cite specific data and observations.
3. In what portion of the lab were your numbers least precise? Why? How can you tell?
4. What are other tests you could have completed to help you determine the identity of your metal? Explain
5. Describe your graph, what does it tell you? Do all the numbers on your graph “make sense”?
6. How are Mass and Volume related mathematically? Graphically?
7. What are some practical applications of today’s lab? Explain

Conclusion:

Write conclusion in paragraph form. Remember to state the problem, the calculated results, and percent errors. Discuss possible reasons for your error as well as what you would do differently to get better results.

Known Density Values

Water: 1.00 g/mL

Wood: 0.46 g/cm³

Aluminum: 2.70 g/mL

Copper: 8.96 g/mL

Cobalt: 8.90 g/mL

Nickel: 8.91 g/mL

Gold: 19.32 g/mL

Iron: 7.87 g/mL

Lead: 11.36 g/mL

Silver: 10.49 g/mL

Tin: 7.37 g/mL

Titanium: 4.51 g/mL

Zinc: 7.13 g/mL