

Sample Laboratory Report

Name: Janet Blair

Section: 2

Date: September 3, 1990

Experiment Number and Title: Experiment 4: Mass, Volume, and Density

Purpose: (Give a clear, concise description of exactly what the experiment was intended to demonstrate.)

The purpose of this experiment was to investigate the relationship between mass and volume for a metal and to determine if that relationship can be used as an identifying property of the metal.

Equipment/Materials: (List the equipment and materials that you actually used in the experiment.)

graduated cylinder (25-mL)

centigram balance

metal A

ruler (cm)

metal B

Methods: (Describe all laboratory techniques and types of calculations that you used in the experiment.)

Mass measurements were made by weighing clean, dry samples of metals on a centigram balance. The mass measurements were made to the nearest 0.01 g.

Volume measurements were made by the method of water displacement. A 25-mL graduated cylinder was half-filled with water and the volume recorded. The volume was read at the bottom of the meniscus. Then the metal sample was immersed in the water in the graduated cylinder. The new volume, of the water and the metal sample together, was read and recorded. The volume of the metal sample was determined by subtracting the initial volume of the water from the final volume. The density of each sample was calculated by dividing the mass of the sample by its volume.

Other groups in the class had different-size samples of the same metals, A and B. Class data was pooled to obtain data points for graphing mass (the independent variable) versus volume (the dependent variable) for each metal. The slope of the line obtained for each metal is equal to mass/volume and represents the density of the metal. The slope was determined according to the formula $y = mx + b$, where x = mass value, y = the volume associated with that mass, m = slope of the line, b = y-intercept of the line.

Procedure: (Describe the major steps of the procedure exactly as you carried them out. Include here any qualitative observations you made during the experiment.)

We received one sample of metal A and one sample of metal B from the teacher. Metal A was shiny, smooth, and black. Metal B was dull, rough, and tan in color. We cleaned and dried the samples using tap water and paper towels. Metal B was more difficult to dry than metal A. We then weighed each sample on the centigram balance as described above and recorded the masses. We weighed metal A first and metal B second. I did the weighings and Paul recorded the data.

We then made the volume measurements using the water displacement method described in the Methods section. Paul added the samples to the water and I made the initial and final volume readings. We did this first for metal A and then for metal B. After making these measurements, we dried the samples and returned them to the teacher.

Data and Calculations: (Record here any measurements and calculations that you make during the experiment. Make sure to clearly distinguish between the two. Be especially careful to include units for all measurements and all calculations. Pay close attention to significant figures and clearly indicate when you have made a calculation. If possible, present your data in the form of a table and/or graph so that patterns in the data may be more easily recognized.)

<i>Group 1 Data and Calculations</i>		
<i>Quantity</i>	<i>Metal A</i>	<i>Metal B</i>
<i>mass</i>	<i>10.10 g</i>	<i>33.41 g</i>
<i>volume of water alone</i>	<i>12.0 mL</i>	<i>19.7 mL</i>
<i>volume of water and metal</i>	<i>15.8 mL</i>	<i>23.5 mL</i>
<i>volume of metal</i>	<i>3.8 mL (15.8 mL – 12.0 mL)</i>	<i>3.8 mL (23.5 mL – 19.7 mL)</i>
<i>density of metal</i>	<i>2.7 g/mL (10.10 g/3.8 mL)</i>	<i>8.8 g/mL (33.41 g/3.8 mL)</i>

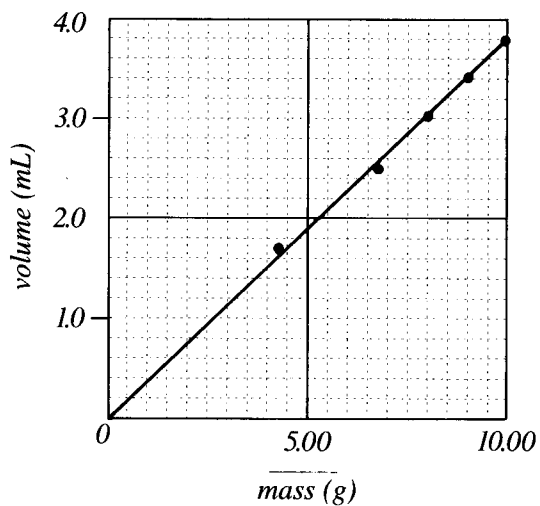
<i>Class Data and Calculations</i>						
<i>Lab Group*</i>	<i>Metal A</i>			<i>Metal B</i>		
	<i>mass</i>	<i>volume</i>	<i>density</i>	<i>mass</i>	<i>volume</i>	<i>density</i>
<i>1</i>	<i>10.10 g</i>	<i>3.8 mL</i>	<i>2.7 g/mL</i>	<i>33.41 g</i>	<i>3.8 mL</i>	<i>8.8 g/mL</i>
<i>2</i>	<i>4.31</i>	<i>1.7 mL</i>	<i>2.6 g/mL</i>	<i>34.62 g</i>	<i>3.9 mL</i>	<i>8.9 g/mL</i>
<i>3</i>	<i>8.05 g</i>	<i>3.0 mL</i>	<i>2.7 g/mL</i>	<i>27.63 g</i>	<i>3.1 mL</i>	<i>8.9 g/mL</i>
<i>4</i>	<i>9.00 g</i>	<i>3.4 mL</i>	<i>2.6 g/mL</i>	<i>21.00 g</i>	<i>2.4 mL</i>	<i>8.4 g/mL</i>
<i>5</i>	<i>6.25 g</i>	<i>2.5 mL</i>	<i>2.5 g/mL</i>	<i>20.92 g</i>	<i>2.5 mL</i>	<i>8.4 g/mL</i>

**1 = Janet & Paul 2 = Phil & Pat 3 = Ellen & Emily 4 = Dave & Alice 5 = Frank & Bill*

Graph of Class Data for Metal A (Remember to plot the independent variable on the x -axis, horizontal, and the dependent variable on the y -axis, vertical axis.)

*Class data for Metal A
(mass versus volume)*

<i>mass (x)</i>	<i>volume (y)</i>
10.10 g	3.8 mL
4.31 g	1.7 mL
8.05 g	3.0 mL
9.00 g	3.4 mL
6.25 g	2.5 mL



Results and Conclusions: (Record here the answers to all the questions in the Results and Conclusion section of the experiment. Also answer any additional questions that your teacher may ask.)

1. *The results of this experiment indicate that the density of a specific substance is a constant. They indicate also that the densities of different substances can be quite different. For these reasons, density should be useful in the identification of substances.*

(And similarly for the remainder of the questions posed in the lab manual.)