

# Mass and Volume Lab

	a	b	c	d	e
Sample color	Mass of Sample, (g)	Initial Volume, (mL)	Final Volume, (mL)	Volume of sample, (mL) (c - b)	$\frac{\text{mass}}{\text{volume}}$ (a ÷ d)
1					
2					
3					
				AVERAGE:	

## Water

	a	b	c	d	e
Sample Water	Volume, (mL)	Initial mass, (g)	Final Mass, (g)	Mass of sample, (mL) (c - b)	$\frac{\text{mass}}{\text{volume}}$ (d ÷ a)
1					

## Lab Book Rubric (55 points)

1. Mass and Volume data table for your metal is complete **(10 points)**:
  - a. Columns a – e complete
  - b. The average for column e is calculated.
  - c. You indicated the color of the metal as red or silver.
2. Mass and Volume data table for water is complete **(5 points)**:
3. You sketched **the mass vs. volume graph** in your lab book **(20 points)**:
  - a. You labeled the x-axis volume, and the y-axis mass.
  - b. You wrote the linear equation ( $y = mx + b$ ) and filled in value of the slope the y-intercept.
  - c. You labeled the coordinates of your three data points.
  - d. You labeled the coordinate of the y-intercept.
  - e. You determined if the graph results are accurate by calculating the 5% rule stating either:
    - i. *The y-intercept is valid because it is 5% or less of y-maximum.*
    - ii. *The y-intercept is not valid because it is greater than 5% y-maximum.*
  - f. The graph title states the color of your metal.
  - g. You drew the trend line (straight line).
4. You **identified the metal** from the table of density and wrote in your lab group **(5 points)**:

Our lab group's unknown metal is \_\_\_\_\_

5. Accuracy Section **(10 points)**:
  - a. You calculated the percent experimental error for the density of your metal **and showed your work.**
  - b. You calculated the percent experimental error for the density of water and showed your work.
  - c. You stated if your experimental value for density of your metal is accurate. (percent error equal or less than 5%) or not (percent error is greater than 5%).
  - d. You stated if your experimental value for density of your metal is accurate or not and why (accurate: percent error equal or is less than 5%, or not accurate: percent error is greater than 5%).
  - e. You stated if your experimental value for density for water is accurate or not and why (accurate: percent error equal or is less than 5%, or not accurate: percent error is greater than 5%).
6. Precision Section **(5 points)**:
  - a. You calculated the percent range for your density values **and showed your work.**
  - b. You stated that data is precise because the data range is 10 % or less
  - c. Or you stated the data is not precise because the data range is greater than 10% .

## CALCULATIONS FOR MASS AND VOLUME LAB.

### ➤ Percent experimental error calculation:

$$\% \text{ experimental error} = \frac{|\text{accepted value} - \text{experimental value}|}{\text{accepted value}} \times 100$$

Example: using 7.2 g/ mL as the accepted value of density of tin & 6.8 g/ml as the experimentally determined value of density for zinc.

$$\% \text{ experimental error} = \frac{|7.2 - 6.8|}{7.2} \times 100 = 5.5\%$$

The accepted values for density are shown below.

	Water	Aluminum	Silver	Brass	Copper	Gold	Tin	Lead
(g/mL):	1.0	2.7	10.5	8.3	9.0	19.3	7.2	11.3

The experimental value for density is the average value from column e in your data table for the metal and in column e for water (the values you experimentally determined).

### Accuracy

If your %experimental error is equal to or less than 5% your results are accurate.

If your %experimental error is greater than 5% your results are not accurate.

### ➤ Percent range calculation:

$$\% \text{ range} = \frac{\text{highest value} - \text{lowest value}}{\text{lowest value}} \times 100$$

$$\% \text{ range} = \frac{12.6 - 8.1}{8.1} \times 100 = 55.5\%$$

### Precision ( Your data is or is not precise):

If your % range is equal to or less than 10% your data is precise.

If your % range is greater than 10% your data is not precise.