South Pasadena • AP Chemistry

Name _____
Period ___ Date ___/___/___

1 • Matter and Measurement

DENSITY LABETTE

Everyone knows that density = $\frac{\text{mass}}{\text{volume}}$. We want to measure the density of a metal slab.

A data table is a good way to keep track of information and to make it easy to read by others. Since the slab is rectangular, we will determine the volume using the formula, V = L x W x H
[L = longest measurement, W = medium measurement, H = smallest measurement of the slab]

DATA	mass of metal slab	± .01 g	
	length of metal slab	± .01 cm	
	width of metal slab	± .01 cm	
	height of metal slab	± .01 cm	± .01 cm

1. Explain why the length measurement is made ± .01 cm. This ruler is similar to the ruler used.

2. Which measurement in your data table is the least precise? Justify your answer by calculating the % error implied by "± .01" in each measurement.

% Error:	mass of metal slab	
	length of metal slab	
	width of metal slab	
	height of metal slab	

We can improve the precision of the height measurement by measuring 10 slabs together and then calculating the average. DATA: height of 10 metal slabs _____ ± .01 cm
Write your new value next to the DATA table above. Note that this is not "data"… it is a calculation.

3. What is the calculated volume of the slab? _____ (use new value of height)
What are the units?

4. Given the uncertainties in the measurements, what is the maximum volume someone might get measuring your slab with your ruler? _____ Show work below:

5. How should the **volume** of your slab be reported? _____± ___ cm^3
   Justify your answer.

6. What is the **density** of your slab? _____
   What are the units?

7. What is the maximum density someone might get for your slab? How should the density of your slab be reported? _____

Analysis:

8. Knowing that the actual density of aluminum is 2.699 $g \cdot cm^{-3}$, determine the accuracy of your results by calculating the % error.

9. Given that the density of aluminum is 2.699 $g \cdot cm^{-3}$ and that density = $\frac{\text{mass}}{L \times W \times H}$, ***calculate*** the **height** of your slab from your remaining data.

10. The density of the aluminum is an "intensive property". It does not depend on the size of the piece of aluminum used. Use the same method as in Question 9 to calculate the thickness of a piece of aluminum foil. Show your work.

DATA		
	mass of aluminum foil	± .01 g
	length of aluminum foil	± .01 cm
	width of aluminum foil	± .01 cm
	thickness of aluminum foil	