

Chem Skills Lab #1: Thickness of Aluminum Foil

Background: Manufactured products like waxed paper and aluminum foil are milled to very uniform thickness. In this laboratory activity, you will be using samples of aluminum foil of a uniform thickness to determine the relationship between the area and the mass of your sample. The relationship, once determined, will allow you to determine the mass of any known area of aluminum foil, or the area of any known mass of aluminum foil. In addition, we will use the density of Aluminum (2.702 g/cm^3) to calculate the actual thickness of a piece of aluminum foil.

Purpose: The purpose of this laboratory is to provide practice in the use of accurate and precise measurements and in the use of significant figures in calculations.

Formulas

$$\text{Density} = \frac{\text{mass(g)}}{\text{volume (cm}^3\text{)}}$$
$$\text{Volume of a rectangle} = \text{length (cm)} \times \text{width (cm)} \times \text{height (cm)}$$
$$\% \text{ Error} = \left| \frac{\text{Actual value} - \text{Experimental Value}}{\text{Actual Value}} \right| \times 100$$

Procedure

1. Cut three rectangles of aluminum foil. Each side of the rectangle must be at least 10 cm long. Each rectangle should have a different area.
2. Carefully measure and record the length and width of each piece of foil with the correct # of significant figures.
3. Measure and record the mass of each piece of foil.

Data

Aluminum Foil Data Table

Sample	Length (cm)	Width (cm)	Mass (g)
1			
2			
3			

Calculations

1. Use the formulas provided and the density of aluminum (given in the background information) to derive a formula to determine the thickness of a piece of aluminum foil
2. Calculate the thickness of each of your 3 pieces of aluminum foil. Use the formula you derived in the 1st calculation and plug in the values from your data table for each trial. Write all values with units and correct significant figures. Be sure to record the correct number of significant figures in your final answer.
3. Calculate the average thickness for your 3 samples of aluminum foil. When you find the average of the 3 values, dividing by 3 does not limit the significant figures in your calculated answer because the 3 is the number of trials, not a measurement. Record this average on a post-it note and add it to the class histogram.
4. Obtain the Actual Value for the thickness of aluminum foil from your teacher and calculate the % error of your average laboratory value.

Analysis

1. Discuss reasons why you found a difference in the thickness of aluminum foil for your three trials. What errors could you have made in preparing, measuring or handling of your samples?
2. How was the class data more informative than your laboratory group data?

Application Calculations (use the accepted value for thickness of aluminum foil provided by your teacher.)

1. Determine the mass of a piece of aluminum foil with an area = 15.0 cm^2 .
2. Determine the area of a piece of aluminum foil that has a mass = 2.5 g.

Conclusion: Write one sentence that refers back to your stated purpose.

