

Name: _____

Date: _____

THICKNESS OF ALUMINUM FOIL

**This experiment is based on Lab 3A from the Heath Lab Manual*

Objectives:

- 1) To measure accurately and precisely using significant figures.
- 2) To use significant figures correctly in scientific calculations.
- 3) To use scientific notation correctly in reporting results with correct significant figures.

Materials:

four pieces of aluminum foil
ruler
mass balance

Procedure:

- 1) Obtain four pieces of rectangular aluminum foil and record each sheet number in Table 1.
- 2) Measure the length and width of each piece of aluminum foil *in centimetres* using correct significant figures and record in Table 1.
- 3) Find the mass of each piece of aluminum foil with correct significant figures using the mass balance, and record in Table 1.
- 4) When doing calculations for Table 2, express results in the table in scientific notation with correct significant figures. The density of aluminum foil is 2.70 g/cm^3 .

Data and Observations:

Table 1: Aluminum Foil Measurements

Sheet #	Length (cm)	Width (cm)	Mass (g)

Table 2: Aluminum Foil Calculations

Sheet #				
Area (cm^2)				
Volume (cm^3)				
Thickness (cm)				

* $A = LW$ $V = m/d$ $T = V/A$ (thickness same as height)

*When calculating thickness, use the unrounded values for area and volume, but make sure the correct number of significant figures are reported in the table for area, volume, and thickness

Sample Calculations

*Use the template below as a guide for the good copy. Remember, only show one sample for each type of calculation and use correct significant figures

For sheet # _____

$A = L \times W = \text{_____} cm \times \text{_____} cm = \text{_____} cm^2$

$V = \frac{m}{d} = \frac{\text{_____} g}{2.70 g/cm^3} = \text{_____} cm^3$

$T = \frac{V}{A} = \frac{\text{_____} cm^3}{\text{_____} cm^2} = \text{_____} cm$

*For the thickness calculation, report V and A with correct significant figures even though the unrounded values were used in the calculation

Questions:

- 1) Were proper significant figures employed for the length and width measurements? Explain why or why not, including the precision of the ruler in the explanation.
- 2) Should the four results calculated for area be precise (clustered)? Explain why or why not, using results for support.
- 3) Are the four thickness results precise (clustered)? Explain why or why not referring to results as support.
- 4) A very thin layer of gold plating was placed on a tray that measured 25.22 *cm* by 13.22 *cm*. The gold plating had a mass of 0.0512 *g*. Calculate the thickness of the plating with correct significant figures. The density of gold is 19.32 *g/cm*³. Show all calculations.
- 5) Suppose a nano-layer (one molecule thickness) of spherical shaped molecules of the same compound were spread on a surface. Explain in detail how the method from this lab could be used to find an approximate radius of the molecule.

Conclusion:

Restate (without using the word 'objectives') and express if objectives 2 and 3 have been fulfilled, and where in the write-up one could view the fulfilled objectives.