WLHS / Chem / Monson

Name_____
Date_____Per_____

ACTIVITY: Determining the Thickness of Aluminum Foil

Ordinary laboratory tools are not suitable for the direct measurement of the thickness of a piece of aluminum foil. Often known properties (such as density) are used to **indirectly** measure other quantities.

The formulas that will enable you to find the thickness of the foil are familiar to you:

Volume of a rectangular object: **V = L x W x H** **L = length; W = width; H = height**
Area of a rectangle: **A = L x W**
Density of an object: **D = m/V** **m = mass V = volume**
Height of a rectangular object = the "**thickness**" = **T**

Specifically manipulating the equations for the purpose of this lab gives us:

1. Area of a square: **A = L x W**
2. The volume of the foil will be indirectly determined by using density, D=m/V rearranged to **V = m/D.** The density of aluminum is **2.70 g/cm^3**.
3. Since the purpose of this activity is to find the thickness of the aluminum foil, and V=L x W x T and A=L x W; these equations can be substituted to give: **T = V/A.**

OBJECTIVES:

1) Correctly apply the principles of significant figures in calculating the thickness of aluminum foil.

2) Correctly use scientific notation in expressing the results of the thickness calculation.

PROCEDURE:

1) Obtain four rectangular pieces of aluminum foil. Be sure that the dimensions are at least 10 cm on each side.

2) Using a ruler, carefully measure the length and width of each piece of foil. Record the measurements in the data table. **Be as precise as possible.**

3) Using a balance, find the mass of each piece of aluminum foil. Record the measurements in the data table. **Be precise.**

4) Put materials away and begin the calculations.

DATA TABLE

Sheet	Length (cm)	Width (cm)	Mass (g)
1			
2			
3			
4			

CALCULATIONS

Refer to the beginning of this activity for the formulas to be used.

Density of Al = 2.70 g/cm^3.

Show EQUATION / SUB / ANSWER for each calculation.

Be sure to use the correct number of significant figures, units, and exponential / scientific notation where appropriate.

Sheet	Area (cm^2)	Volume (cm^3)	Thickness (cm)
1			
2			
3			
4			

Show work for all calculations in the space below!

AREA VOLUME THICKNESS

SHEET 1:

SHEET 2:

SHEET 3:

SHEET 4:

POST-ACTIVITY QUESTIONS:

Answer each question using EQN / SUB / ANS. Use the correct number of significant figures and units.

1) What is the volume of a block that has the dimensions: L = 8.20 cm, W = 2.25 cm, and H = 1.00 cm?

2) If the density of a substance is 0.525 g/cm^3 and the volume of a sample of this substance is 18.25 cm^3, what is the mass of this sample?

3) A piece of paper is known to have an area of 30.2 cm^2 and has a volume of 5.2 x10^{-1} cm^3. What is the thickness of the paper?

4) Could this method be used to determine the thickness of an oil spill? What information would be needed?

5) A very thin layer of gold plating was placed on a metal tray that measured 25.22 cm by 13.22 cm. The gold plating increased the mass of the plate by 0.0512 g. Calculate the thickness of the plating. The density of gold is 19.32 g/cm^3.