



Name: _____ Period: _____

Assigned on Friday, August 22, 2025

1.5 Lab: Determination of the Thickness of Aluminum Foil**Due Monday, August 25, 2025****Introduction**

Determining the thickness of a thin sheet of a substance can be difficult. If one has access to a micrometer, and if the material is not too thin, the thickness can be measured directly with this instrument. If a micrometer is not available, thickness must be determined by indirect means. For example, one way of finding the thickness of a sheet of paper is to measure the thickness of a ream (500 sheets) of paper with a ruler and divide that value by 500.

Most indirect methods of measurement involve another measurement of some type. The result is used in one or more mathematical formulas to arrive at the answer to the problem. For example, we can determine the volume of a spherical object such as a marble directly by measuring the water displaced when a marble is dropped into a container of water. But we could determine the volume of the marble indirectly by measuring the diameter of the marble and using the formula for the volume of a sphere, $V = \frac{4}{3}\pi r^3$. Since this formula involves the radius (r) of the marble, we use another equation, $r = \frac{d}{2}$ (d = diameter), to convert the measured diameter to the unmeasurable. Which method you use, direct or indirect, depends on your available equipment and background knowledge.

Your Assignment

Your group is to develop a detailed plan for determining the thickness of aluminum foil by an indirect means. Members of the group should discuss the problem and work out a plan together. All members of the group must understand the plan in detail. Any member may be asked to explain it.

Your materials include a sheet of aluminum foil, a piece of aluminum, a metric ruler, a graduated cylinder, an electronic balance, and water.

Your report (typed or hand-written) should include the following:

- **The objective:** This is a statement of the purpose of the lab.
- **Materials list:** This is literally just list of materials that were used in the lab.
- **Procedure:** A step-by-step procedure of how you determined the thickness of the aluminum foil that is detailed enough for an 8th grader to follow.
- **Data Table:** Data with labels and units organized in a NEAT data table (be sure that all measurements are made to the **correct precision** for the devices you are using and use a ruler to make your data table). The data table should only include values that you measured during the experiment, not values you calculated using that data.
- **Calculations:** Any calculations that you need to make to complete the objective should be shown here. All calculations should be well organized and your calculated values should be rounded to the **correct significant figures** and **include units**
- **Conclusion:** Write a concise conclusion paragraph that a) reports your results, b) states any assumptions you had to make, and c) includes at least three sources of experimental error. (Important note: Never, ever say "human error." Be specific! What was the measurement technique, assumption, etc. that specifically caused error.)

Hints to give over time:

- 1) $D = M/V$
- 2) $V = L \times W \times H$
- 3) the density of the piece of Al is the same as the density of the foil
- 4) $1 \text{ mL} = 1 \text{ cm}^3$