

Chemistry Lab Investigation: Density

Is Reynold's Wrap Really Heavy Duty?

(Adapted from the Aluminum Lab in Holt Chemistry: Visualizing Matter)

Introduction: Reynold's Wrap (R) Brand aluminum foil claims to be thicker and stronger than the generic brand.

The Task: Your job today is to use your knowledge of density to determine if this is true.

The guiding question of this investigation is: **Is Reynold's Wrap Really Heavy Duty?**

Materials. You may use any of the following materials during your investigation:

Consumables

- Reynold's Wrap Heavy Duty Aluminum Foil
- Generic Aluminum Foils

Ask if there is something else you may want to use.

Equipment

- Rulers
- Balances
- Devices (laptop, smartphone, tablet)

Time Frame: 1 class period

Safety Precautions: NONE

*******Investigation Proposal Required: You must fill out an Investigation Proposal and submit it to me for a signature before you begin.**

Getting Started. Before you can design and carry out your investigation, you must determine what type of data you will need to collect, how you will collect it, and how will you analyze it.

To determine **what type of data you need to collect** think about the following questions:

- What measurements are needed to calculate density?
- Thinking about the measurements needed for density, which of those relates to height of a solid?

To determine **how you will collect your data**, think about the following questions:

- What equipment is needed to get the required measurements?
- What do we do to make the measurements consistent?
- How do we need to label samples so they are not mixed up?
- How exact do we need to be on our measurements?
- What units should we use in our measurements?

In order to determine **how you will analyze your data** think about the following questions:

- How do we use our measurements for density to determine the thickness of a piece of aluminum foil?
- What is the density of aluminum?

Initial Argument. Once your group has finished collecting and analyzing your data, you will need to develop an initial argument. Your argument must include a **claim**. The claim is your answer to the guiding question. Your argument must also include evidence in support of your claim. The **evidence** is your analysis of the data and your interpretation of what the analysis means. Finally, you must include a **justification** of the evidence in your argument. You will therefore need to use a scientific concept or principle to explain why the evidence that you decided to use is relevant and important. You will create your initial argument in a Google Form or on a blank sheet of paper. You must include all the information shown in Figure 1.

The Guiding Question:	
Our Claim:	
Our Evidence:	Our Justification of the Evidence:

Figure 1. Argument Presentation on a Google Form/
Sheet of Paper

Argumentation Session. To share your argument with others, we will be using a **Round-Robin** format. This means that one member of your group will stay at your lab station to share your groups' argument while the other members of your group go to the other lab stations one at a time in order to listen to and critique the arguments developed by your classmates. **The goal of the argumentation session is not to convince others that your argument is the best one; rather the goal is to identify errors or instances of faulty reasoning in the initial arguments so these mistakes can be fixed.** You will therefore need to evaluate the content of the claim, the quality of the evidence used to support the claim, and the strength of the justification of the evidence included in each argument that you see. In order to critique an argument, you might need more information than what is included. You might, therefore, need to ask the presenter one or more follow up questions such as:

- How did you collect your data? Why did you decide to do it that way?
- What did you do to make sure the data you collected is reliable? What did you do to decrease measurement error?
- Is there other data that you would like to have? If so, what is it?
- What did you do to analyze your data? Why did you decide to do it that way?
- How do you know that your calculations are correct?

- What other ways of analyzing and interpreting your data did your group talk about?
- Why did your group decide to present your evidence in that manner?
- What other claims did your group discuss before you decided on that one? Why did your group abandon those alternative ideas?
- How confident are you that your claim is valid? What could you do to increase your confidence?

Once the argumentation session is complete, you will have a chance to meet with your group and revise your original argument. Your group might need to gather more data or design a way to test one or more alternative claims as part of this process. **(You will provide this information in your report—you will not be doing it again).**

This is an assignment in Google Classroom:

Type in Google Docs and submit

Report (INDIVIDUAL): Once you have completed your research, you will need to prepare an *investigation report* that consists of three sections. Each section should provide an answer for the following questions:

1. What question were you trying to answer and why?
2. What did you do during your investigation and why did you conduct your investigation in this way?
3. What errors did you have, and what would you have changed in your investigation?
4. What is your argument (claim, evidence, reasoning)?

Your report should answer these questions in 2 pages or less. This report must be typed, 12 point font, include date and title, and any diagrams, figures, or tables should be embedded into the document. Be sure to write in a persuasive style; you are trying to convince others that your claim is acceptable or valid!