

Gum & Matter Lab – A Look at the Conservation of Matter

INTRODUCTION

Most gum you chew is made of sweeteners (sugar, corn syrup, xylitol or sorbitol (an artificial sweetener)) and gum base. After chewing gum for a while the mass will change. This is due to the gum changing as it is being enjoyed by the person chewing. According to chemistry, matter cannot be created or destroyed. How can the mass of the gum change if this is true? This lab will explore why gum changes mass as it is chewed, the nature of matter, and how gum chewing has something to do with the chemistry of matter.

Lab Quote: “Everything matters because everything is made of matter and that is why, as matter, it matters.” *Author Unknown*

MATERIALS:

3 Different Types of Gum SUGAR CUBE (Bubble Yum), SUGAR FREE, SUGAR STICK, Balance, Timing Device, ruler (for drawing straight lines), and plastic circle (for drawing pie graphs).

CHEMICALS:

- Gum and saliva (water and digestive enzymes)

What You Need to Do (BEFORE you start chewing):

- **First**, write down a **HYPOTHESIS** on what you think will happen to the mass (*increase/decrease*) of each gum after being chewed for 5 minutes. **Write your reasoning below the three hypotheses.**
- **Second**, make a **DATA TABLE (Table. 1)** to record the mass of your gum before chewing and after chewing. You will be doing the experiment 3 times (5 minutes of chewing per gum type).
- **Third**, **COPY DOWN** the **first 3 ingredients** for each gum type on your paper. **You can include this in your data table if you like.**
- **Finally**, decide who will do each part of the experiment (experimental design). This means decide which gum you will try first, who will watch the time, who will measure the mass of the gum before and after chewing, cleanup, and any other actions required in the lab.

Table. 1: Data Table (copy into your science notebook using a ruler)

GUMS	NUMBER OF PIECES	WEIGHT (in grams) OF GUM & WRAPPER	WEIGHT (in grams) OF CHEWED GUM & WRAPPER	Ingredients
SUGAR CUBE				
SUGAR FREE				
SUGAR STICK				

What You Need to Do (AFTER you finish chewing):

- **Record your data** into your data table.
- **Clean up** and wash your hands after you have done the 3 experiments.
- **Calculate** the **% sweetener** and **% gum base** for each gum type (**show your work**).
- **Graph** your data for each of the 3 gum types (**make pie graphs**).
- **Answer post-lab** questions using **complete** sentences.
- **Write a conclusion** (6-8 sentences long).

PROCEDURES

1. Read **all** the procedures **BEFORE** starting the lab.
2. **Do not** eat or drink while doing the lab (it will mess up your data).
3. **First**, Zero the balance. Weigh all the pieces of **the Sugar Cube (place on wrappers, not on the pan)**.
4. Take wrappers off of the gum and leave the wrappers on the balance.
5. Record the **number of pieces** and the **total weight** in the data table.
6. **Start chewing the gum for 5 minutes.**
7. After 5 minutes, place the gum on the wrappers and record the weight (mass) of the **chewed gum.**
8. Throw away the gum and wrappers (**make sure you zero the balance again.**)
9. **Repeat** for the other two gums.
10. Throw away all wrappers and gum after you have collected and recorded your data.
11. **Clean your hands** and the tabletop with soap and water after you finish.
12. **SPIT OUT YOUR GUM INTO THE TRASHCAN BEFORE LEAVING THE ROOM. DO NOT EVEN THINK ABOUT LEAVING MY ROOM WITH GUM IN YOUR MOUTH.**

CALCULATIONS (For the calculations - gum is only made of **sugar/sweetener** and **gum base.**)

1. Calculate the **percent (%) gum base** for **EACH** of the 3 gums. Use the equation below:

$$\frac{\text{Weight after chewing}}{\text{Weight before chewing}} \times 100 = \text{ ______ } \% \text{ Gum Base}$$

2. Calculate the **percent sweetener** for **EACH** of the gums (subtract your answer in #1 from 100%). This is the percent sugar or sweetener that was in the gum.

GRAPH

1. Represent the data (by **% sweetener** and **% gum base**) in a pie graph for **each** type of gum (**3 graphs total**). Include the following for each pie graph:
1. **the gum type** 2. **a key**
3. **percentages shown** 4. **full color pie graphs** 5. **correct size (tape roll).**

POST LAB QUESTIONS (A notebook copy of these questions are in the COW (take one if you want))

1. What happened to the weight of the gum after it had been chewed? Is this what you had predicted in your hypothesis? Explain
2. Why did the mass of the gums change? What was removed from the gum?
3. Did a chemical reaction or a physical change take place while chewing the gum? (refer to textbook for help) Explain how you know which one it is.
4. Were any **new** substances created? Was any **matter** destroyed? Explain what happened to the matter that made up the gum.
5. How could you prove that the sugar/sweetener was not destroyed? Explain.

CONCLUSION (6-8 sentences long)

Describe **what happened** and **why**. The conclusion should include the **data you collect** and should explain the **significance of the data**. The **data should help support the conclusion**. This is the part of your lab where you demonstrate your understanding of the lab and the concepts that the lab helped to explore. The conclusion should also explain how this lab and the concepts involved **relate to the real world**. You should also include any **sources of error** that might have affected the data (*examples*: did not zero the balance, didn't chew gum for at least five minutes, swallowed part of the gum, dropped it on the floor, or anything else that could negatively affect your results).