

Gummy Bear Lab Protocol

Communication, Collaboration, and Skepticism

GB Discovery Lab

Improving the quality of life with polymers

Welcome to your new job as a scientist for GB Discovery Laboratory. We are dedicated to designing polymer solutions to problems in biology and medicine. Polymers are large thread-like molecules made of smaller repeating chemical subunits. The specialty of your department is quantifying the effectiveness of liquid-absorbing polymers. Your department has previously studied and published their experimental findings on liquid-absorbing polymers used in soft contact lenses, dressings for burns, tissue engineering, and oil spill containment.



As members of the scientific community, we value and expect your full participation in our department lab meetings. Working with others is critical to improving the quality of science done by our group. Our lab meetings will focus on:

- Communication – sharing your information with others.
- Collaboration – working together with others toward a goal.
- Skepticism – evaluating information critically and looking for evidence and reasoning behind claims.

Your department has been divided into lab teams to investigate the ability of gummy bear polymers to hold water. Our goal is to determine the best procedure for measuring changes in gummy bear volume. Your team will design a plan, conduct an experiment, and then share your findings with the entire department during our next lab meeting. Following our own internal peer review, GB Discovery Laboratory plans to submit your findings for publication in the Journal of Applied Polymer Confections for broader peer review by the scientific community.

Day One Protocol

1. Record your descriptive observations about the gummy bear, including color and shape.
2. The question “How much does the volume of a gummy bear increase after soaking in water?” has been recorded for you.
3. Collaborate with your lab team to determine a way to measure the volume of the gummy bears. [Note: There are many ways possible.]
4. Once you have agreed on a method, record your planned procedure.
5. Record the volume data of each team member’s gummy bear. There is a column for “Initial volume before soaking” and “Volume after 24 hours” (or however long you soaked your bears).
6. Measure your bear using the team method, record the measurement in your data table, and communicate your findings so each team member includes all bear volume data in their table.
7. Soak the bears overnight in a beaker of water.

Day Two Protocol

8. Gently remove gummy bears from the beakers and pat them dry. Be very careful because the candy is now extremely breakable.
9. Using the same method your team used before soaking, measure the volume of the bears and record the data in your table.
10. Calculate the percent change for each measurement for each bear using the formula provided below and record the percentages in the data table. Share your answer with your team members.

$$\text{Percent change} = \frac{\text{FINAL} - \text{INITIAL}}{\text{INITIAL}} \times 100$$

FINAL = VOLUME *after* 24 hrs

INITIAL = VOLUME *before* soaking

11. Your teacher will have a Class Frequency Distribution Table. Choose one member of your team to record your team's data on the table. You will need to round the percentage change for each bear to the nearest 50 before recording your data.
12. Throw the bears away in the trash and clean out your beakers. Follow your teacher's instructions on putting away the lab equipment.

Data Table:

Student Name	Volume Before Soaking	Volume After 24 Hours

Results:

Student Name	Percent Change

Questions

1. What was your method?

2. What can you conclude about the effectiveness of how you measured the volume? (**Claim**)

***Do you think your method accurately measured the change in volume? Explain.*

3. What did you find to be the percentage increase of the gummy bears in soaked water?

4. Does the data (*Group and Class percentages*) and your experiences support your conclusion (*the percentage you wrote in number 3*) and why? (**Evidence and reasoning**)

5. What worked with your method? What did not?
