

Diffusion of Water with Gummy Bears

Name _____ Period _____

Purpose: To investigate the movement of water into and out of a gummy bear.

Background: Gummy bears are made of gelatin and sugar. Gelatin is a protein that adds structural support to jellies, jams, and many other things you use everyday. Diffusion is the movement of materials from an area of high concentration to an area of low concentration. In this lab you will measure the movement of water by measuring the change in size of a gummy bear.

Procedure:

Initial Day (Day 0)

1. Obtain 2 plastic cups, 2 gummy bears (the same color), and a ruler.
2. Label each cup with your name and class period using a permanent marker. Then label them #1 and #2.
3. Measure your bear (in cm) from top to bottom (length), from side to side (width), and from front to back (height). Record these measurements in your data table.
4. Place a bear in each cup and fill the cups half way with water.
5. Place the cups in the designated area for 24 hours.
6. Calculate the volume of each bear (l x w x h).

Day 1

7. Use a plastic spoon to gently scoop out each bear. BE CAREFUL not to break the bears, they are very fragile.
8. Measure the length, width, and height and record in your data table.
9. Make any observations about the color of the bears and/or the water.
10. Empty the water out of the cups and label the #1 cup "water" and the #2 cup "salt."
11. Return the bears to the cups and cover them with the correct solution and return them to the designated area for another 24 hours.
12. Calculate the volume of each bear for Day 1.

Day 2

13. Use the spoon to gently scoop out each bear and take its measurements.
14. Make any observations about the color of the bears and/or the water.
15. Calculate the volume of each bear on Day 2.

Data: Gummy Bear Measurements

Initial - Day 0	Length	Width	Height	Volume
Cup #1 water				
Cup #2 water				

Day 1	Length	Width	Height	Volume
Cup #1 water				
Cup #2 water				

Day 2	Length	Width	Height	Volume
Cup #1 water				
Cup #2 salt				

Analysis

Calculate the percent change in volume from Day 0 to Day 1 and from Day 1 to Day 2.

	% change Day 0 to Day 1 $\left(\frac{Day1vol - Day0vol}{Day0vol} \times 100\% \right)$	% change Day 1 to Day 2 $\left(\frac{Day2vol - Day1vol}{Day1vol} \times 100\% \right)$
Cup #1 water-water		
Cup #2 water-salt		

Conclusions

1. What happened to the bears after being initially placed in water? (Look at your Day 1 results.) Explain the direction of water movement. **After being placed in water, the gummy bear will have enlarged in size. Water moves to dilute, and since the gummy bear is more sugar than water, water will enter the gummy bear, causing it to swell.**
2. What happened to the bear that was placed in the salt water? Explain the direction of water movement. **Now the gummy bear is full of water and it is placed in salt water. Again, water moves to dilute, so water will leave the gummy bear and move out into the cup of salt water, causing the gummy bear to shrink.**
3. Explain any change in color in the bears or their solutions. Describe the movement of water that produced the results. **As the gummy bear sits in the solutions, dye from the bear will leak out into the solution. Again, this is due to diffusion. As the water moves, some of the small dye molecules will move with it.**

Name _____ Period _____

4. What happened from Day 1 to Day 2 to the bear that stayed in water? What would eventually happen if it was left in the water for a few more days? **The gummy bear almost doubled in size. If left in the water for a longer period of time, the gummy bear would begin to dissolve and fall apart.**

5. After comparing class data, did color appear to be a factor in the lab? If so, which color(s) changed the most in size from Day 0 to Day 1? From Day 1 to Day 2? **We found that color did not cause any difference.**