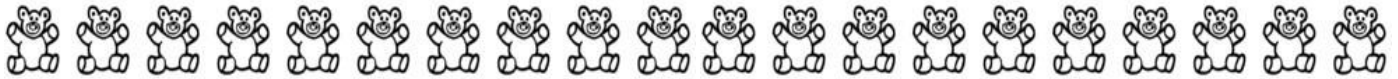


NAME _____ PERIOD _____ DATE _____



LAB: OBSERVING OSMOSIS IN GUMMI BEARS

Purpose:

To investigate the movement of water into and out of a Gummi Bear.

Problem:

Where is the concentration of H_2O molecules highest, tap water, distilled water, salt water or gummi bears?



Background Information:

Gummy Bears are made of gelatin, starch, and sugar. Gelatin is a polymer (huge molecule made of many repeating units) that forms large three-dimensional matrices which give structural support to jellies and jams, and lots of other things that you use every day.

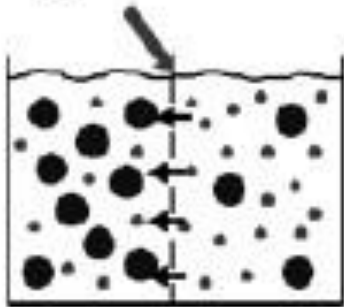
Molecules are in constant motion, and tend to move from areas of higher concentrations to lesser concentrations. Diffusion is defined as the movement of molecules from an area of high concentration to an area of low concentration.

The diffusion of water molecules through a selectively permeable membrane is known as OSMOSIS. Selectively permeable means that some molecules can move through a membrane while others cannot.

Movement through membranes is called transport. Diffusion and osmosis are forms of PASSIVE TRANSPORT; this means that they do not need energy to move from areas of high concentration to areas of low concentration. ACTIVE TRANSPORT requires energy to transport molecules from low concentration to high concentration.



Selectively Permeable Membrane



OSMOSIS is the movement (transport) of water (small dots) through a selectively permeable membrane from an area of high concentration to an area of low concentration.

Hypotheses:

Circle your choices to create your hypotheses

1. If the H₂O concentration in tap water is **(higher , lower)** than the H₂O concentration in a Gummi Bear, then Gummy Bears placed in tap water will **(increase, decrease, remain the same)** size. Circle your answer.
2. If the H₂O concentration in distilled water is **(higher , lower)** than the H₂O concentration in a Gummi Bear, then Gummy Bears placed in distilled water will **(increase, decrease, remain the same)** size. Circle your answer.

Materials: for pairs of students

- 2 50 or 100 ml. beakers
- Masking tape
- Permanent marker
- Plastic forks or spoon
- Waxed paper or paper plates
- 2 Gummy Bears (different colors)
- Distilled water tap water saturated
- Salt solution (6 oz per cup)
- Centimeter rulers

Safety Considerations:

There are no safety hazards with materials used in this experiment. The filters may become moldy after storage for several days or more. If that occurs, they should be disposed of in the trash.

Procedure:

DAY ONE

1. Obtain two beakers, two different colored Gummy Bears and a ruler.
2. Label your beaker with a piece of masking tape
3. Write your name and class period using a permanent marker.
4. Label one Beaker "TAP WATER" and the other "DISTILLED WATER".
5. Measure your bear (in cm) from top to bottom (length) and from side to side (width) and from front to back (height).
6. Record the dimensions in centimeters in the data table. Use decimals.
7. Find the mass of each bear. Record the mass in the data table in grams. Again, use decimals.
8. Place the bears in the beakers.
9. Cover one with distilled water. The bear should be completely covered – cup about half full.
10. Cover the other tap water. The bear should be completely covered – cup about half full.
11. Place the beakers on the counter away from direct sunlight.
12. Let them sit overnight.

DAY TWO

13. On the next lab day, gently pour the water over a screen into a sink.
14. Catch each bear using a sieve, plastic fork or screen. Place on paper towel or waxed paper.
15. Measure the length, width, and height. Record.
16. Blot dry by placing bear on a paper towel.
17. BE CAREFUL not to break the bears, they are very fragile.
18. Find the mass of wax paper or screen used. Then place the dried bear on the paper or screen.
19. Carefully find the mass of the bears. Record
20. Place the bears back into their correct cups.
21. Cover the bears with SATURATED SALT SOLUTION. The bear should be completely covered – cup about half full. Let them sit overnight.

DAY THREE

22. The following day, find the dimensions of the bears and record. Find the mass of the bears and record.
23. Calculate the volumes ($L \times W \times H$).

Data Table for Volume:

Dimensions	Gummi Bear 1 (color: _____)			Gummi Bear 2 (color: _____)		
	Initial Before Soaking (day 1)	Final After tap water (day 2)	Final After salt water (day 3)	Initial Before soaking (day 1)	Final After distilled water (day 2)	Final After salt water (day3)
Length (cm)						
Width (cm)						
Height (cm)						
Volume (cm³) L×W×H = _cm³						

Note: How many decimal places should you use for volume? _____

Data Table for Mass:

(2 points)

Mass (grams)	Gummi Bear 1 (color: _____)			Gummi Bear 2 (color: _____)		
	Initial Before Soaking (day 1)	Final After tap water (day 2)	Final After salt water (day 3)	Initial Before soaking (day 1)	Final After distilled water (day 2)	Final After salt water (day3)
Gummi Bear mass						

Note: How many decimal places should you use for mass? _____

Analysis:

Calculate the percent changes in volume after each step of the experiment.

Our scales are accurate to 0.1 gram, therefore your calculations using mass should be **rounded to the nearest tenth or 0.1 gram**

% Change in mass =

$$(\text{Final mass} - \text{Initial mass}) / \text{Initial mass} \times 100 = \underline{\hspace{2cm}} \%$$

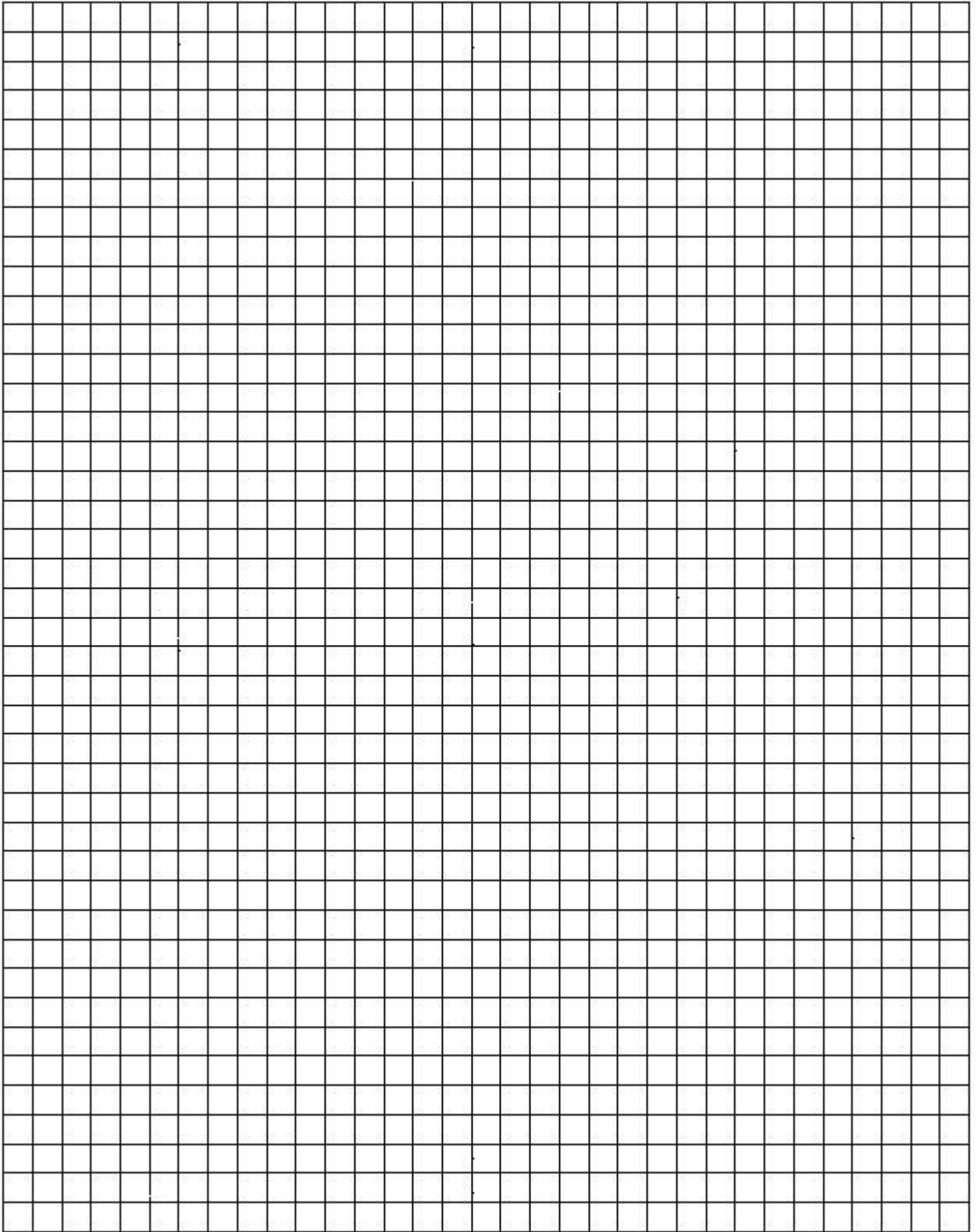
$$(\underline{\hspace{1cm}} - \underline{\hspace{1cm}} / \underline{\hspace{1cm}}) \times 100 = \underline{\hspace{2cm}} \%$$

Data Table C: Place the percentages in the table below:

Gummi Bears	% Change in Water	% Change in Salt Water
Tap Water Bear		
Distilled Water Bear		

Make a BAR graph of the percent of change in mass.

- Title the graph (what is being compared?) Label the axis.
- Place a scale on the vertical axis for percent change.
- Place the data for both bears on the same graph.
- Include a Key if needed.
- If you have a negative value for a percent change, start the vertical axis at a negative number.



Analysis questions:

Answer the following using complete sentences. Be sure to **restate** the question in your answer!

1. What happened to the bears when placed in distilled water? Why?

2. What happened to the bears when placed in tap water? Why?

3. What happened to the bears when placed in salt water? Why?

4. What do you think would have happened to the bears if, after the last day, they were again placed in distilled water?
