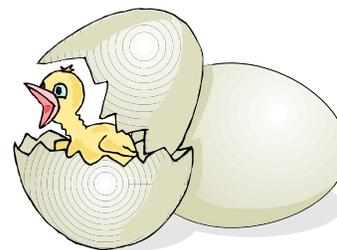




OSMOSIS LAB

An eggceptionally e g gciting and e g gucational e g gperiment
Sorry I didn't mean to e g g you on.... Please e g gcuse me.



Introduction: The goal of all cells is to maintain a water balance with their surrounding liquid environment. One way that cells are able to maintain this balance is by moving water molecules across their plasma membranes. You have learned that the plasma membrane is selectively permeable; which means it allows some substances to pass across it while other substances cannot. A membrane is said to be permeable to a substance if that substance can diffuse through the membrane. **Diffusion** is the movement of a substance from an area of high concentration to an area of lower concentration. [H] → [L]

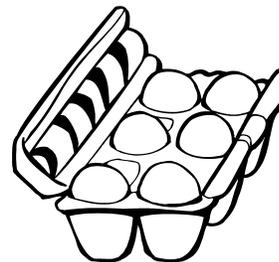
We use a special term to refer to the **diffusion of WATER** across a membrane:

Osmosis

Information: The purpose of this laboratory experiment is to study an example of osmosis in action. Chicken eggs are actually large single cells that have a plasma membrane found just inside the shell. In our laboratory experiment, we will first dissolve the shell of the egg. We will place the same egg in a series of three different liquids. Each time that we change the liquid that the egg is submerged in, we should be able to measure a **net osmosis of water** either into or out of the egg.

Materials:

chicken egg	vinegar
Graduated cylinder	corn syrup
Sharpie Pen	water
<u>Study</u> cup for egg (clear)	<u>holding</u> cup for egg transfer



DIRECTIONS:

PRE-LAB:

Form a **hypothesis** about the effect of three different liquids on the size of an egg. Specifically, decide whether each of the three liquids we will be using in the lab (vinegar, corn syrup, and water) will cause the egg to give off water or absorb water. Record your hypothesis in the appropriate place on the Report Page.

DAY 1:

1. Mark your study and holding cups with a team name or symbol using the sharpie pen.
2. Use graduated cylinder to precisely measure **200 mL** of **vinegar** and pour it into the study cup.
3. Use the sharpie to carefully mark the outside of your study cup at the top level of vinegar in the cup (200 mL)
4. Obtain a chicken egg. CAREFULLY set the egg into the study cup with the vinegar. (DO NOT DROP the egg: you do not want the shell to be cracked or broken.)
5. Place the study cup on the shelf assigned for your class period. Clean your graduated cylinder by rinsing several times with water.
6. Fill in your data table with the amount of vinegar in your study cup before the egg was added..

DAY 2:

7. Get your study cup from the shelf. Record an observation about your egg in the data table (larger, smaller, same)
8. **CAUTION:** carefully drain the vinegar out of the study cup and into a graduated cylinder without letting the egg come out of the study cup. **HINT:** use your fingers to keep the egg in the cup. Measure the amount of vinegar remaining in the study cup. Record this number in your data table → Vinegar remaining AFTER the egg is removed. Wash the vinegar down the drain with water when finished.
9. CAREFULLY transfer the egg into the holding cup.
GENTLY rinse the egg with water several times being careful not to break the membrane around the egg.
Rinse the study cup several times with water.
10. Use a graduated cylinder to precisely measure **200 mL** of **corn syrup** and pour it into the empty study cup. Make sure the corn syrup fills the cup up to the 200 mL line indicated on the cup. (Add a little more corn syrup if necessary.)
11. CAREFULLY transfer the egg from the holding cup back into the study cup.
12. Place the study cup on the shelf assigned to your class period. Clean your graduated cylinder with soap and warm water and then rinse it several times with water.
13. Fill in your data table with the amount of corn syrup in your study cup BEFORE the egg was added

DAY 3:

14. Get your study cup from the shelf. Record an observation about your egg in the data table (larger, smaller, same)
15. Using a graduated cylinder, CAREFULLY measure the amount of corn syrup remaining in the study cup and be sure to get as much corn syrup out of the cup as possible. **CAUTION:** keep the egg in the cup with your fingers.
Record this number in your data table; Corn syrup remaining AFTER the egg is removed.
Wash the corn syrup down the drain with water when finished.
16. CAREFULLY transfer the egg into the holding cup.
GENTLY rinse the egg with water several times being careful not to break the membrane around the egg.
Rinse the study cup several times with water and dry with a paper towel.
17. Use a graduated cylinder to precisely measure **200 mL of water** and pour it into the empty study cup.
18. CAREFULLY transfer the egg from the holding cup bask into the study cup.
19. Place the study cup on the shelf assigned to your class period. Clean your graduated cylinder with soap and water and then rinse it several times with water.
20. Fill in your data table with the amount of water in your study cup BEFORE the egg was added

DAY 4:

21. Get your study cup from the shelf. Record an observation about your egg in the data table (larger, smaller, same)
22. Using a graduated cylinder, CAREFULLY measure the amount of water remaining in the study cup.
Record this number in your data table: Water remaining AFTER the egg was removed.
Discard the water and egg as directed.
23. Complete the Report Page questions and graph.

Graphing Your Results

1. Use the lab results from the data table to make a **NET CHANGE** bar graph on the back of the Report Page
2. Label the X-axis (horizontal) with the independent variable and the Y-axis (vertical) with the dependent variable.
3. Include a graph TITLE, which indicates the key idea explored in this lab.
4. Be sure to pick and label a number scale that will allow you to spread your results out LARGE

POST-LAB QUESTIONS: (respond on the report page)

1. What was the independent (cause) variable in our experiment?
2. What was the dependent (result) variable in our experiment?
3. When the egg was placed in vinegar, did water diffuse into or out of the egg?
4. When the egg was placed in corn syrup, did water diffuse into or out of the egg?
5. When the egg was placed in water, did water diffuse into or out of the egg?
6. If you placed a liver cell (70% water) into corn syrup, would water diffuse into or out of the cell? EXPLAIN WHY!!
7. If you placed a muscle cell (50% water) into vinegar, would water diffuse into or out of the cell? EXPLAIN WHY!!
8. Supermarkets often mist fresh fruits and vegetables with water. PREDICT what happens to the produce when they receive this water and EXPLAIN how this is an application of the concept of OSMOSIS.
9. Circle on the Reports Page how ACCURATE you think your data numbers are and EXPLAIN at least **3** (three) **sources of error** which might have decreased the accuracy of your data.
10. Do the data results support your 3 hypothesis – Include specific lab evidence/numbers in your explanation for each hypothesis.
11. This lab experiment was NOT controlled. If you were to repeat this experiment, what steps would you take to make it a more controlled experiment. Explain how you would create a CONTROL GROUP for each lab day.

SELF-EVALUATION: Complete the Osmosis LAB SCORING GUIDE

REPORT PAGE

Name _____
 Partner _____
 Partner _____

PRE – LAB HYPOTHESES:

- 1) _____

- 2) _____

- 3) _____

Hypothesis Planning Pictures:

Vinegar	Corn Syrup	Water
<div style="border: 1px solid black; border-radius: 50%; width: 150px; height: 100px; margin: 0 auto; display: flex; flex-direction: column; justify-content: center; align-items: center;"> <div style="margin-bottom: 5px;">_____ % H₂O</div> <div style="margin-bottom: 5px;">_____ % Solutes</div> </div> <div style="margin-top: 20px; text-align: center;"> _____ % H₂O _____ % Solutes </div>	<div style="border: 1px solid black; border-radius: 50%; width: 150px; height: 100px; margin: 0 auto; display: flex; flex-direction: column; justify-content: center; align-items: center;"> <div style="margin-bottom: 5px;">_____ % H₂O</div> <div style="margin-bottom: 5px;">_____ % Solutes</div> </div> <div style="margin-top: 20px; text-align: center;"> _____ % H₂O _____ % Solutes </div>	<div style="border: 1px solid black; border-radius: 50%; width: 150px; height: 100px; margin: 0 auto; display: flex; flex-direction: column; justify-content: center; align-items: center;"> <div style="margin-bottom: 5px;">_____ % H₂O</div> <div style="margin-bottom: 5px;">_____ % Solutes</div> </div> <div style="margin-top: 20px; text-align: center;"> _____ % H₂O _____ % Solutes </div>

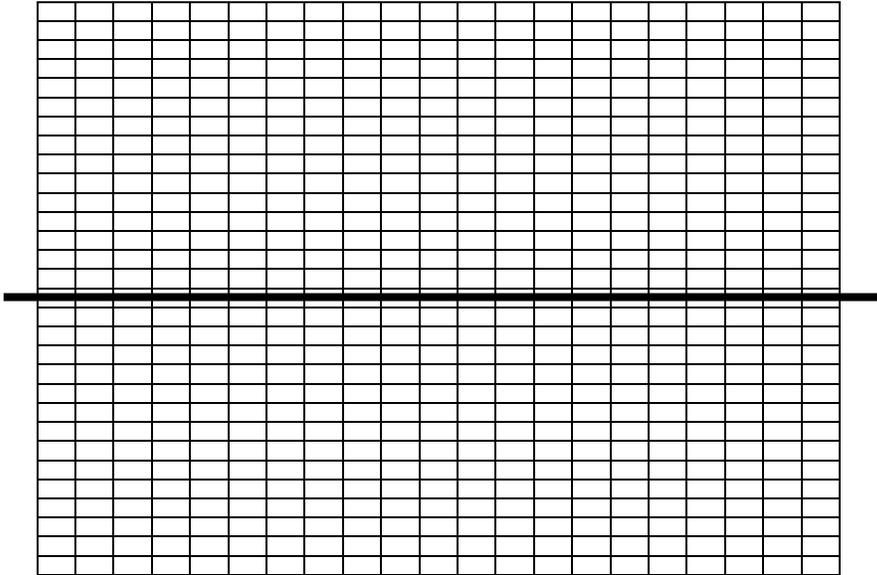
DATA TABLE:

	Liquid Volume in mL		
	Vinegar	Corn Syrup	Water
BEFORE			
AFTER			
NET CHANGE In Volume (+ or -)			

Daily Egg Observations: How has the egg changed ? (Larger, Smaller, About the Same)?

Vinegar	Corn Syrup	Water
Larger Smaller Same	Larger Smaller Same	Larger Smaller Same
Comments:	Comments:	Comments:

GRAPH of LAB RESULTS:



POST-LAB QUESTIONS:

1. _____
2. _____
3. _____
4. _____
5. _____

REPORT PAGE 2

6. _____

7. _____

8. _____

9. CIRCLE % accuracy of your data → 10% 25% 50% 75% 90% 100%

10. _____

11. _____

