Egg and Osmosis Lab

PURPOSE
To discover how water crosses a cell membrane (osmosis).

BACKGROUND INFORMATION
Cells have an outer covering called the cell membrane. The cell membrane controls what moves into and out of the cell. Food and oxygen move into the cell through the cell membrane. Waste molecules move out of the cell across the cell membrane. The movement of molecules from an area of large concentration to an area of small concentration is called diffusion.

Osmosis is a special kind of diffusion. Water will move across a membrane from a high concentration of water to a small concentration of water. The diffusion of water across a semi-permeable membrane is called osmosis.

MATERIALS

Egg	300 mL corn syrup
Large plastic cup	300 mL vinegar
300 mL distilled water	balance
aluminum foil	goggles
lab apron	

Day 1

Pre-lab Questions

A. What could the hard outer shell of the egg be compared to in a cell? _____
B. Where would I find the "plasma membrane" in our cells/eggs? _____
C. Based on what you learned yesterday what does the "cell membrane" of our egg need to be to allow water or other substances to pass through?_____
D. Do you think we need to remove the shell to be able to get water inside? Why or Why not?
_____
E. What does a graduated cylinder measure? _____
F. What does a balance measure?_____

PROCEDURE
You will take an egg and place it in 3 different solutions. The egg will be massed before and after each solution to see if there is a change in mass.

1. Label the cup with your group number and class period.
2. Mass the plastic cup. Record the data in the data table.
3. Mass the egg in the cup so that it does not roll off the balance. Record the data in the data table.
4. Subtract the mass of the cup from the mass of the egg and cup. Record the data in the data table.
4. Put 300 mL vinegar in the cup. Cover the cup with aluminum foil.
6. Place cups in an area designated by your teacher to store the overnight.

Day 2

BACKGROUND INFORMATION

Cells use their plasma membranes as selective "doors", allowing substances to pass through them by several different means. Cells can transport molecules passively without using any energy or ATP. This process is called diffusion. When water is driven in or out of the cell it is called osmosis. This occurs due to a difference in the concentration gradient between two substances. This concentration gradient is caused by a difference in solutes dissolved in the water. In an effort to make the concentration gradients equal water may through a permeable membrane since the solute particles are too big and the membrane is impermeable to these particles. Placing a cell in different substances can cause the cell to lose water gain water or have no change at all.

Type of Solution	Concentration of H20	Effect on cell
Hypertonic	Concentration outside < Concentration inside	Cell releases water and shrink
Hypotonic	Concentration outside > Concentration inside	Cells bloat and possibly burst
Isotonic	Concentration outside = Concentration inside	No change in cell shape

Lab Questions:

G. Do you think that there is a higher concentration of water in the cell/egg or in the vinegar?_____

H. Therefore do you think the water will enter the cell/egg or exit the cell/egg?_____

I. Based on your last answer is the cell/egg in a hypertonic, hypotonic or isotonic solution?_____

J. What do you think happened to the egg shell? _____

K. Based on what you see what can you tell about the concentration of water inside and outside of the egg? _____

L. Was the vinegar a hyper-, hypo-, or isotonic solution? _____

PROCEDURE

7. Carefully Pick up your cup and take it to your lab station.
8. Observe any changes that have occurred in the egg.
9. Gently remove the egg from the cup, rinse the egg with tap water and blot it dry with paper towels.
10. Mass the egg. Record the data in the data table.
11. Pour the remaining vinegar into the graduated cylinder and record the volume in the data table.
12. Clean the cup and graduated cylinder.
13. Add 300 mL of syrup into the cup.
14. Gently place the egg in the syrup. Cover the beaker with aluminum foil.
15. Place cups in an area designated by your teacher to store the overnight.

Day 3

Lab Questions:

M. In your own words, how has the egg changed?

_____

N. Based on what you see what can you tell about the concentration of water inside and outside of the egg? _____

O. Was the corn syrup a hyper-, hypo-, or isotonic solution?

_____

PROCEDURE

17. Carefully pick up your cup and take it to your lab station.
18. Observe any changes that have occurred in the egg.
19. Gently remove the egg from the cup, rinse the egg with tap water and blot it dry with paper towels.
20. Mass the egg. Record the data in the data table.
21. Pour the remaining syrup into the graduated cylinder and record the volume in the data table.
22. Clean the cup and graduated cylinder.
23. Add 300 mL of distilled water into the cup.
24. Gently place the egg in the distilled water. Cover the beaker with aluminum foil.
25. Place cups in an area designated by your teacher to store the overnight.

Day 4

Lab Questions:

P. In your own words, how has the egg changed? _____

Q. Based on what you see what can you tell about the concentration of water inside and outside of the egg? _____

R. Was the water a hyper-, hypo-, or isotonic solution? _____

PROCEDURE

26. Carefully pick up your cup and take it to your lab station.
27. Observe any changes that have occurred in the egg.
28. Gently remove the egg from the cup, rinse the egg with tap water and blot it dry with paper towels.
29. Mass the egg. Record the data in the data table.
30. Pour the remaining water into the graduated cylinder and record the volume in the data table.
31. Clean the cup and graduated cylinder.
32. Throw the egg away.

DATA:

Data Table:

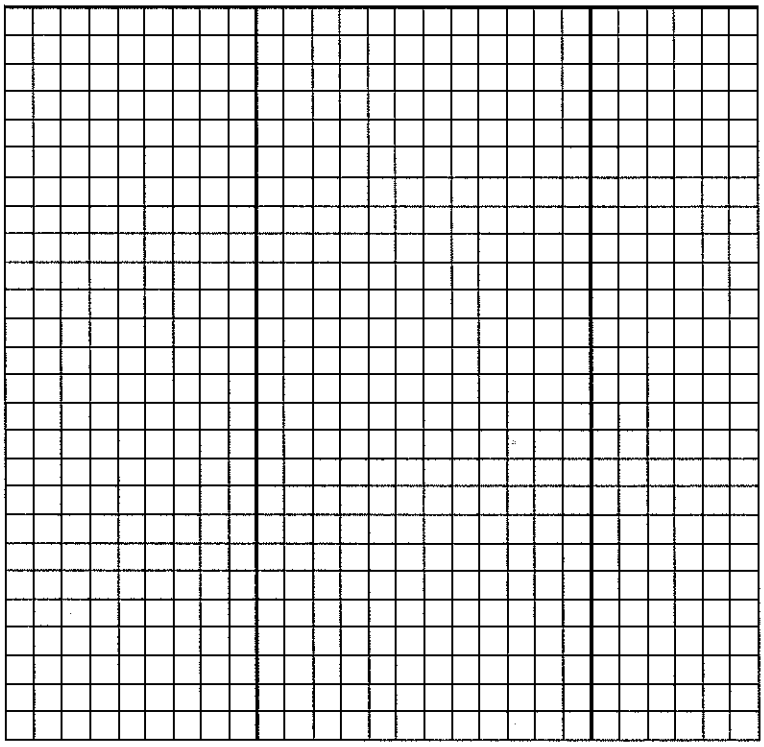
	Mass of cup (g)	Mass Cup and Egg (g)	Mass of Egg (g)	Original volume(ml)	Remaining liquid volume (ml)	Change in volume (ml)
Day One				Vinegar 300 ml		
Day Two				Vinegar 300 ml		
Day Three				Corn Syrup 300 ml		
Day Four				Water 300 ml		

Graph:

1. What was your independent variable in this experiment? (you controlled it)

2. What was the dependant variable in this experiment? (the own you measured)

Graph your results below: Don't forget to use a ruler, label your x-axis and y- axis, title, and units.



DATA ANALYSIS

1. Vinegar is made of 5% acetic acid and 95% water. When the egg was placed in the vinegar, what began to happen? What happened to the shell of the egg? Do you think this was a physical or chemical change?

2. After sitting in the vinegar, which way did the water molecules move? What is the proof? Draw a diagram and use arrows to show the movement of water.

3. When the egg was placed in the syrup, which way did the water move? What is the proof? Draw a diagram and use arrows to show the movement of water.

4. When the egg was placed in water after being removed from the syrup, which way did the water move?

5. What is the proof? Draw a diagram and use arrows to show the movement of water.

6. Which substances were hypertonic?

7. Which substances were hypotonic?

8. Why are fresh fruits and vegetables sprinkled with water at a market?

9. Roads are sometimes salted to melt ice. What does this salting do to the plants along the roadside? Explain.

10. If a lawn is fertilized and it doesn't rain, the grass often dies. Why?

11. Why do dried fruits and dried beans swell when they are cooked?