Name _____ Date _____

EGG OSMOSIS LAB

Introduction:

Cells have an outer covering called the cell membrane. This membrane is selectively permeable; it has tiny pores or holes that allow objects to move across it. The cell membrane controls what moves in and out of the cell. Food and oxygen move into cells across the cell membrane through the process of **diffusion**. Diffusion is movement of a substance from an area of high concentration to an area of low concentration. **Osmosis i**s a special type of diffusion; it is the diffusion of water across a selectively permeable membrane. Osmosis occurs when water moves from an area where it is more concentrated to an area where it is less concentrated.

In this lab you will be using an egg with the shell removed. The shell-less egg will represent a cell and its selectively permeable membrane. You will remove the shell of the egg by soaking the egg in vinegar. The egg shell is made up of the mineral calcium carbonate. Calcium carbonate dissolves in acids such as vinegar. During this process it releases the gas carbon dioxide. After the shell has been dissolved, only the membrane will remain around the egg.

Safety notes:

1. Raw eggs can carry salmonella (harmful bacteria). Be sure to wash your hands after handling the eggs.
2. Handle your egg very carefully so that it does not break.
3. As soon as you get your egg, observe its features and measure its circumference. Record your observations and measurements.

Purpose:

To soak an egg in various liquids and observe how the size of the egg changes as it gains or loses water through the membrane.

Materials:

- raw egg
- vinegar
- tap water
- salt water
- sugar water
- metric ruler
- plastic container to hold egg
- marker
- paper towel
- piece of string
- wax paper
- rubber band

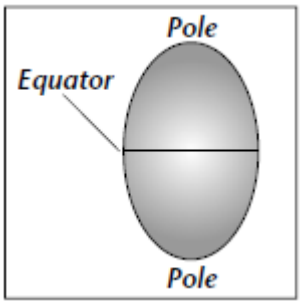
Hypothesis:

Predict how the egg will respond when it is soaked in:

1. Vinegar: _____

2. Sugar Water: _____

3. Salt Water: _____



Activity Hints:

- For best results in this project, it is important to measure your egg carefully each day. This is because changes in the circumference of the egg may be slight, and measurements that are not precise may mask changes that have occurred.
- The drawing shows how to measure your egg's circumference.
- Follow these steps when measuring the egg each day:

1. Carefully take the egg out of the liquid and pour the liquid down the drain.
2. Rinse off the egg in cold water over the sink and blot it dry with a paper towel.
3. Using a flexible tape measure or piece of string, measure the circumference of the egg. If you are measuring your egg with a piece of string, follow these steps:
   - **a.** Wrap the string snugly around the egg at the equator (but be careful not to cut into the egg's membrane with the string).
   - **b.** Grasp the string between your thumb and finger exactly at the point where the end of the string meets the rest of the string after circling the egg.
   - **c.** Keeping your thumb and finger in place, lay the string straight on a flat surface.
   - **d.** Use a metric ruler to measure the distance from the end of the string to the point at which you are holding it.
4. Record your measurements and any other observations about the egg in the data table on Worksheet 1.
5. Return your egg to the container and cover it with the same or another liquid, according to the instructions in the procedure below.

Procedure Step 1:

1. Label your plastic container with your name and group number.
2. In the data table, make a drawing and observation of the egg in the appropriate space
3. To Measure Your Egg, follow the 'Activity Hints' above, measure the circumference of the egg (along the "equator"). Record circumference to closest millimeter.
4. Carefully place your egg inside the plastic container and pour vinegar into the container enough to cover the egg.
5. Allow the egg to soak 2 days. Loosely place wax paper on top and secure with a rubber band; if placed too tight it may break!
6. Put your container in the designated space.
7. Clean up materials and wash your hands.

Procedure Step 2:

1. Carefully remove egg from the container of vinegar.
2. Remove any remaining bits of shell by gently running egg under water. Blot it dry with a paper towel.
3. Measure the circumference of your egg and record observations in data table.
4. Pour used vinegar down the drain. Rinse container.
5. Refill container with 300 ml of liquid that you have been assigned.
   Liquid assigned _____
6. Carefully place an egg into the container and allow it to soak 2 days.
7. Put container in designated space, clean up materials and wash your hands.
8. Use the data from the other members of the group to complete the table.

Data Table

Day	***Liquid***	***Circumference (in millimeters)***	***Drawing***	***Other Observations***
1				
1				
1				
2				
2				
2				
3				
3				
3				

After you have collected the data and completed the table, use the data to create a bar graph showing changes in the circumference of the egg. Label the horizontal axis of your graph "Date" and the vertical axis "Circumference (mm)." Also indicate on the graph what liquid the egg was soaking in each day. Remember to write down the title of your graph.

Data Analysis:

1. What liquids caused the egg to swell?

2. What liquids caused the egg to shrink?

3. Vinegar is made of acetic acid and water. Explain how it was able to remove the calcium shell.

4. Questions about the **vinegar**:
   a. What happened to the size of the egg after remaining in vinegar?

   b. Was there more or less liquid left in the jar?

   c. Did water move into or out of the egg? Why?

   d. Was the vinegar a hypotonic, hypertonic or isotonic solution? _____

5. Questions about the **salt water**:
   a. What happened to the size of the egg after remaining in salt water?

   b. Was there more or less liquid left in the jar?

   c. Did water move into or out of the egg? Why?

   d. Was the salt water a hypotonic, hypertonic or isotonic solution? _____

6. Questions about the **sugar water**:
   a. What happened to the size of the egg after remaining in sugar water?

   b. Was there more or less liquid left in the jar?

   c. Did water move into or out of the egg? Why?

   d. Was the sugar water a hypotonic, hypertonic or isotonic solution? _____

7. Questions about the **tap water**:
   a. What happened to the size of the egg after remaining in tap water?

   b. Was there more or less liquid left in the jar?

   c. Did water move into or out of the egg? Why?

   d. Was the tap water a hypotonic, hypertonic or isotonic solution? _____

Go to the last page and graph your results.

Graph:

Title: _____