**An Egg-cellent Osmosis Experiment**

***Synopsis:***

Students will conduct a simple experiment with eggs, vinegar, water, and corn syrup/sugar water in order to understand the principle of osmosis. Students will weigh eggs with the shells dissolved in order to tell whether liquid has moved across the eggs’ membranes. This experiment requires 1 day to prepare and then 2 days in the laboratory.

***Body:***

The membrane for this experiment will be that of a "pickled" egg. By soaking an uncooked egg in vinegar for about 24 hours the shell can be dissolved. What remains after the shell dissolves is a rubbery inner membrane. Treat the eggs gently!!! Water can move in and out of the egg membrane freely and it is elastic enough to swell and shrink without bursting. To conserve materials, you can leave one egg in vinegar the entire time as a control. You will form a hypothesis, identify variables, collect data, and graph/interpret that data in a formal lab report.

***\*Safety: Vinegar is the only material that could be considered a safety concern because it is a strong acid. Please wash your hands thoroughly after handling the egg initially.***

**About the Cell Membrane:**

For the cell to survive, it is essential that it allows materials to move in and out as needed. Some materials (molecules) are too big and need to be “pumped” through the cell membrane by “transport proteins”, something we call “active transport” through the membrane. For smaller molecules, passing through the cell membrane is much easier! This process of simple diffusion through the membrane WITHOUT the extra assistance of pumps is known as “passive transport”. In this experiment, we will witness this passive transport of molecules through the cell membrane based on the concentration differences of solutes (sugars) in the cell versus out of the cell.

The type of passive transport through the membrane we will be witnessing is a WATER-SPECIFIC process called “Osmosis”. Osmosis is the movement of water across the membrane. Usually, cells are in an environment where there is one concentration of ions outside and one inside. Because concentrations like to be the same, the cell can pump ions in an out to stay alive.

For a cell to survive, ion concentrations need to be the same on both sides of the cell membrane. If the cell does not pump out all of its extra ions to even out the concentrations, the water is going to move in. This can be very bad. The cell can swell up and explode. The classic example of this type of swelling happens when red blood cells are placed in water. The water rushes in to the cells, they expand and eventually rupture (POP!).

**Materials Needed:**

1. 2 eggs

2. 2 cups

3. Tap water

4. Vinegar (the egg fully submerged)

4. Corn syrup (the egg submerged)

5. Labeling tape/pen

**LAB PROCEDURES!**

**DAY ONE**

1. Retrieve 2 eggs, 2 cups.

2. Fill each cup about half way with vinegar.

3. Gently place each egg into a cup, making sure it is fully submerged.

4. Set on countertop (it will sit overnight).

5. Wash your hands and record your observations!

**DAY TWO**

1. Gently get your egg (which has been soaking in vinegar to remove the shell) with your spoon and a paper towel. Gently pat the egg dry with the paper towel. BE CAREFUL NOT TO BREAK THE EGG!!!

2. Record the observations of the egg.

3. Place one egg into each cup. Pour approximately ½ cup of corn syrup (enough to cover the egg) into one of your egg cups. Label the cup “syrup/sugar mixture”.

5. Pour approximately ½ cup of tap water into cup number 2 (again, enough to cover the egg). Label the beaker with “water”.

6. Set on the counter to sit overnight.

**DAY THREE**

1. Gently get your eggs from the cup with your spoon and a paper towel. Gently pat the eggs dry with the paper towel. Place eggs in a tray to keep area clean.

2. Penetrate the membrane with a toothpick/needle. Observe what happened to the appearance of each egg and write your observations.

3. Record all observations and formulate your data analysis/conclusion! (Re-state your hypothesis- were you correct?)

Cell Membrane – video notes

During the video, take notes in the space below. When the video ends, use your notes to answer the questions below.

Video Link:

<https://www.youtube.com/watch?v=Ptmlvtei8hw>

Notes:

Questions:

1. What is “passive transport” through the cell?
2. What is diffusion?
3. What is Osmosis?
4. What is a “solute”?
5. The cell membrane is “semi-permeable”. What does this mean?
6. Describe how items move through the cell membrane.