**SAMPLE LAB REPORT**

Student Name Biology

Date Section #

**Osmosis through the Cell Membrane of an Egg**

**Introduction**

**Purpose**

The **purpose** of this experiment is to obtain a better understanding of the osmosis process and the different condition under which osmosis occurs.

**Background Information**

Osmosis is a process whereby water moves from an area of less concentration of dissolved particles to a region of high concentration of dissolved particles across a semi-permeable membrane. Due to difference in the concentration gradient, dissolved particles are able to move across a semi-permeable membrane from the area of high concentration to that of low concentration. To study the shifting of water across a membrane, we examined a demineralized egg. Immersing the eggs in vinegar for 2-4 days dissolved the egg shells, leaving a fragile, thin semi-permeable covering similar to that of a human body cell (Magloire, 2004)

Basically, there are three different types of concentrated solutions. A hypertonic solution is the one where the particle concentration in the outside solution is greater than the concentration of particles inside of a cell and therefore water moves out of the cell. For a hypotonic solution, water shifts into the body cell since the solution of particles outside of the cell is less concentrated as compared to the cell. Finally, an isotonic solution happens when the concentration of particles in the cells is the same as the concentration of particles in the outside solution and consequently no flow of water across the membrane is observed (Marieb, 2012)

The **independent variable** is the concentration of the solutions surrounding the eggs.

The **dependent variable** is the circumference of the eggs.

**Hypothesis**

**If** water moves from an area of high concentration to an area of low concentration, **then** the area of low concentration will swell with water and the area of high concentration will be depleted of water.

**Materials**

* Two chicken eggs
* Vinegar
* Distilled Water
* Corn Syrup,
* Sharpie,
* Masking Tape,
* Six glass cups (235 ml each)
* Measuring Tape

**Procedure**s

“*Refer to the lab sheet Osmosis through the Cell Membrane of an Egg for detailed procedures.”*

1. Two glass cups were labeled with the masking tape and sharpie as “#1 vinegar” and “#2 vinegar”.

2. The circumference of each egg was measured with the measuring tape.

3. Each egg was placed into the corresponding glasses (making sure to note which was #1 and #2) and covered with vinegar.

4. The eggs were left for 48 hours in the vinegar in order to remove the calcium shell. Each egg was carefully removed and its circumference measured.

5. Two new glasses were labeled “#1 distilled water” and “#2 distilled water” and each egg placed in its respective cup. The eggs were left for 24 hours.

6. Two new glasses were labeled as “#1 syrup” and “#2 syrup”. The circumference of each egg was measured.

7. Each egg was placed in its respective glass, and covered with corn syrup. The eggs were left for 24 hours. Finally, the eggs’ circumference was measured.

**Results**

|  |  |  |  |
| --- | --- | --- | --- |
| **Egg #1** | | | |
|  | Original measurement | Final measurement | Qualitative Data |
| Vinegar | 13.6 cm | 15.2 cm | Calcium shell was removed; swollen |
| Water | 15.2 cm | 15.6 cm | Swollen; membrane was tight |
| Syrup | 15.6 cm | 11.1 cm | Membrane was baggy and wrinkly |

|  |  |  |  |
| --- | --- | --- | --- |
| **Egg #2** | | | |
|  | Original measurement | Final measurement | Qualitative Data |
| Vinegar | 13.9 cm | 15.7 cm | Calcium shell was removed; swollen |
| Water | 15.7 cm | 15.9 cm | Swollen; membrane was tight |
| Syrup | 15.9 cm | 11.6 cm | Membrane was baggy and wrinkly; the syrup was more liquid than before |

**Egg #1**

**Circumference (cm)**

**Egg #2**

**Circumference (cm)**

**Questions**

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

**A:** The acetic acid reacted with the calcium in the shell, thus eating it away.

**2)** (a) What happened to the size of the egg after remaining in vinegar?

(b) Was there more or less liquid left in the cup?

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

**A:** (a) After remaining in the vinegar, the egg swelled.

(b) There was less liquid left in the cup.

(c) The vinegar moved into the egg because the solute was more concentrated in the egg.

**3)** (a) What happened to the size of the egg in distilled water?

(b) Was there more or less liquid left in the cup?

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

**A:** (a) The egg in the distilled water swelled.

(b) There was less liquid left in the cup.

(c) Water moved into the egg because the solute was more concentrated inside the egg.

**Conclusion**

The hypothesis for the experiment was: if water moves from an area of high concentration to an area of low concentration, then the area of low concentration will swell with water and the area of high concentration will be depleted of water. The hypothesis proved correct because the egg swelled when the water entered it and shrunk when the water left it.

**Analysis**

This lab investigated how osmosis occurs. In order to study this process, the membrane of an egg as the semi-permeable membrane and different substances to “push in” or “draw out” the water in the eggs were used. The results showed that because the concentration of solute was higher inside the egg, the water outside it was drawn into it through the process of osmosis. When the egg was placed in the corn syrup, the solute was more concentrated outside the egg than inside, so the water moved through the semi-permeable membrane to the outside, thus depleting the egg of its water, leaving it baggy and wrinkly.

**Questions**

1. Osmosis is the diffusion of water from a higher concentration to a lower concentration. In this lab, osmosis caused water to flow into the egg since the concentration of water was higher outside the egg than inside it (the concentration of solute was greater inside the egg than outside).

2. The independent variable in an experiment is part of the control that is unaffected by the experiment and the dependent variable is part of the experimental factors. In this lab, the independent variable is the concentration of the solutions surrounding the eggs and the dependent variable is the circumference of the eggs.

**Error**

An error might have occurred due to incorrect measurements of the circumference of the egg. Recording wrong measurements may lead to false reflection of what happened in the course of the experiment. Another error could have occurred if the eggs were not carefully handled which could have led to breakage. Once an egg has a crack, water or liquid molecules will flow across, and this will lead to either smaller or bigger size of the egg which will cause a false reflection of what happened. To minimize these errors, the eggs should be handled with care and flexible measuring devices should be used to obtain accurate data.

In order to further investigate osmosis, substances of varying concentrations would be used to see how that would affect the process. The more concentrated substances would be expected to become less concentrated as the water moves from the area of less concentration (inside the egg) to the area of higher concentration (outside the egg).

**Works Cited**

Hardin, Scott. *Science Shepherd Biology*. Pewaukee: Ohana Life Press, 2008. Print.

Magloire, Kim. *Cracking AP Biology Exam.* New York: Random House, 2004. Print.

Marieb, Elaine. *Essentials of Human Anatomy and Physiology*. Tenth ed. San Francisco: Pearson Education, 2012. Print.

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