Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Osmosis

**Purpose**

The purpose of this exercise is to observe the osmosis using eggs.[[1]](#endnote-1)

**Background**

Osmosis governs the uptake of water in plant cells. Wilting and the restoration of turgor in plants are due to osmotic processes. Osmosis allows germinating seeds to absorb moisture, a critical first step in the seed germination process. Current practices for extending the shelf life of cut flowers and fresh produce depend upon osmosis.

**Procedure:**

 **Materials**

1. 3 beakers, 400 ml or wide mouthed jars
2. Water
3. Graduated Cylinder
4. White Vinegar
5. Clear Corn Syrup
6. 4 Raw Eggs (in shell)
7. Balance

**Sequence of Steps**

1. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Label three jars as vinegar, syrup, and water.
2. Weigh the eggs and record in “observations”.
3. Put 250 ml of vinegar into the ‘vinegar’ jar and place two eggs in the vinegar. (Note: Eggs should be completely covered.)
4. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Cover the jar and leave undisturbed for two to three days.
5. After at least two days, remove the egg from the jar. Record the volume of the vinegar in a graduated cylinder, and weigh the eggs.
6. Put 250 ml of syrup in a second container and add one whole (weighed) egg.
7. Put 250 ml of water in the third jar and add one (weighed) egg.
8. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Cover both jar and leave undisturbed for one day.
9. After one day, remove the eggs from both the syrup and water. Measure the liquids and weigh the eggs.

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**Observations**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Liquid Tested | Weight of Eggs | Gain or  | Amount of Liquid | Gain or  |
| Beginning | Ending | Loss | Beginning | Ending | Loss |
| Vinegar |  |  |  |  |  |  |
| Syrup |  |  |  |  |  |  |
| Water |  |  |  |  |  |  |

**Table 1.**

**ANALYSIS**

**1. Vinegar**

Calcium carbonate in the shell reacts with vinegar (acetic acid) and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is formed. Calcium acetate is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ soluble, so the shell disappears leaving the membrane surrounding the egg intact. The egg contents become \_\_\_\_\_\_\_\_\_\_\_\_\_\_ because the acid denatures the protein.

**2. Syrup**

The egg placed in the syrup became \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ as the water moved \_\_\_\_\_\_\_\_\_ the egg into the sugar solution. This produced a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ volume of solution in the jar after the egg was immersed for one or more days.

**3. Water**

The egg placed in water has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, becoming \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ as the water diffuses through the membrane. This has left a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ volume of water in the jar after the egg was removed following one or two days of immersion.

**4. Define osmosis and how it was demonstrated in this lab:**

**5. Plants require osmosis for growth. Explain how osmosis plays a role in plant growth.**

# Teacher’s Notes

**Osmosis**

Background:

Osmosis governs the uptake of water in plant cells. Wilting and the restoration of turgor in plants are due to osmotic processes. Osmosis allows germinating seeds to absorb moisture, a critical first step in the seed germination process. Current practices for extending the shelf life of cut flowers and fresh produce depend upon osmosis.

**ANALYSIS**

Data obtained in these experiments are both qualitative and quantitative in nature. Thus, students should record their observations on the days indicated by simply describing the appearance of the eggs in each of the three jars. In addition, the amount of liquid should be measured at the beginning and end of the osmosis experiment. Each of the eggs should also be weighed before and after the experiment.

**ANTICIPATED FINDINGS**

Vinegar

Calcium carbonate in the shell reacts with vinegar (acetic acid) and calcium acetate is formed.

Calcium acetate is water soluble, so shell disappears leaving the membrane surrounding the egg intact.

The egg contents become hard because the acid denatures the protein.

*Please note: This experiment does not demonstrate the process of diffusion or osmosis, but rather serves as model for discussing cells and semi permeable membranes.*

Syrup

The egg placed in the syrup became smaller and lighter as the water moved from the egg into the sugar solution.

This produced a larger volume of solution in the jar after the egg was immersed for one or more days. *Please note: The egg can be examined as soon as 60 minutes following the immersion with obvious changes in the weight.*

Water

The egg placed in water swelled, becoming larger and heavier as the water diffused through the membrane.

This left a smaller volume of water in the jar after the egg was removed following one or two days of immersion.

1. Dickson, Chris (2008). Osmosis, Lab. *North High School, Bakersfield Agriculture Department*. [↑](#endnote-ref-1)