



Lab: Egg Osmosis Lab

Lesson Title: Egg Osmosis Lab

Grade/Age Level: Middle school grades 6-8 (age 11-14)

Subject Area: Life Science

Number of Classes for Lesson Completion: (2) 45-Minute Class Sessions and (3) 20 minute class sessions

Lesson Description

Students will use an egg as a model of osmosis

Pennsylvania Standards for Science and Technology

The following Pennsylvania Standards will be addressed during the lesson

- 3.1.6.A4 Recognize that all organisms are composed of cells and that many organisms are unicellular and must carry out all life functions in one cell
- 3.1.6.A6 Identify examples of unicellular and multi-cellular organisms
- 3.1.7.A5 Explain how the cell is the basic structural and functional unit of living things
- 3.1.7.A7 Compare life processes (e.g. growth, digestion) at the organism level with life processes at the cellular level

Instructional Objectives

- To observe the effect of different liquids on a shell-less egg
- To develop an inquiry to test the effect of a liquid of choice on a shell-less egg
- To gain skill in measuring and using a triple beam balance
- To be able to graph results

Instructional Procedures

- **Lesson Set**

1. Introduce osmosis and diffusion using the following sites:
http://edtech2.boisestate.edu/pattymcginnis/506/Cell_Site/506_diffusion.html and
http://edtech2.boisestate.edu/pattymcginnis/506/Cell_Site/506_osmosis.html.
2. Use an interactive white board to show the animations of diffusion and osmosis (links are located on the bottom of the diffusion and osmosis pages).
3. Read over the first page of the egg osmosis lab with the students and guide them in filling out the pre-lab and hypothesis questions.

- **Techniques and Activities**

Assign students to groups of four. Provide each group with the proper lab supplies (egg, vinegar, triple beam balance, etc.) and explain how to collect data. Have student store egg for two days and continue with procedure part 2.

- **Lesson Closure**

Ask students to predict what would happen to a blood cell if placed in liquids similar to the ones in which the egg was submerged. Ask students to explain why salty foods make you thirsty

Adaptations for Learners with Special Needs

Have a demonstration egg at the teacher desk. Collect data for the students and project the data table onto a screen so that students can copy it. When graphing, provide students with labels for their x and y axis.

Extension and Remediation Activities

- **Extension**

Challenge students to conduct a similar activity at home using a liquid of their choice. Have students take digital photos to document their work

- **Remediation**

Find video clips to reinforce the concept and place a number of osmosis and diffusion examples around the room and have students explain what is happening in each. For example, tea flavor diffusing into water, powdered lemonade mix and water, and beans soaking in water.

Assessment

- Students will be assessed on their ability to correctly construct a graph that displays data from Table 2 of the lab. Students will also be assessed on their ability to answer analysis questions.

Learner Products

- Students will be evaluated on a graph that displays data from table 2 of their lab

Student Handout:

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** is 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

Pre lab Questions:

1. What do you think would happen to a shell-less egg if water passed into the egg through the membrane?
2. What do you think would happen to a shell-less egg if water passed out of the egg through the membrane?
3. What substance must pass through the shell and membrane in order for a chick to develop correctly?
4. What would happen to the developing chick if the egg membrane did not work correctly?

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, 300 ml vinegar, tap water, salt water, and a liquid of your choice, metric tape, balance, plastic container to hold egg, beaker, marker, masking tape

Hypothesis:

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

1. Vinegar:
2. Sugar Water:
3. Salt Water:
4. List some liquids that you would like to soak the egg in:

Procedure Step 1: Soaking egg in vinegar

1. Label your container with your section and table number.
2. In the data table, make a drawing and observation of the egg in the appropriate space
3. To Measure Your Egg, use a flexible tape measure, measure the circumference of the egg (along the "equator"). Record circumference to closest millimeter
4. Weigh the egg in grams. Record mass
5. Pour 300 ml of vinegar into the container.
6. Carefully place an egg into the container and allow it to soak 2 days. Loosely place lid on top; if placed too tight it may break!
7. Put your container in the designated space.
8. Clean up materials and wash your hands.

Procedure Step 2: Soaking egg in tap water

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 and mass 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
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. Repeat steps 1-7 above, using a liquid of your choice.

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Data Table 1

Name: _____

Date	Circum- ference in cm	Weight in grams	Liquid	Other Observations/Drawing	Percent Weight Change $\frac{\text{Ending Wt}}{\text{Beginning Wt}} \times 100$
			At start		
			Liquid of your choice		

Data Table 2: Egg Osmosis Data Summary

Column (A)	(B)	(C)	(D)
Liquid	Beginning Weight in grams	Weight in grams after soaking	Total amount of weight gained/lost in grams (after soaking)
Vinegar			
Distilled Water			
Salt Water			
Your Choice:			

Analysis Questions

1. What liquids caused the egg to swell?
2. What liquids caused the egg to shrink?
3. What process caused the egg to swell or shrink? Be SPECIFIC; discuss each liquid
4. Which column(s) will you use to create your graph?

Graph Preparation and Directions:

1. The name of your independent variable is _____ and will be placed on the _____ axis. The name of the dependent variable is _____ and will be placed on the _____ axis.

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2. The title of the graph should include the name of both the independent and dependent variables.

3. Write down a name for your graph:

4. What type of graph should you use to represent your data?

5. **Create a graph to represent your data.** Make sure to label both axis, to include a title, to fill as much of the graph paper as possible, evenly space the intervals, and to label each bar with the type of liquid that the egg soaked in.