Diffusion Virtual Lab

http://www.glencoe.com/sites/common_assets/science/virtual_labs/LS03/LS03.html

I. Background information: A **cell membrane** permits some materials to pass through while keeping other materials out. Such a membrane is called **selectively permeable**. Under normal conditions, water constantly passes in and out of this membrane. This **diffusion** of water through a selectively permeable membrane is called **osmosis**. Like other substances, water diffuses **from an area of higher concentration to an area of lower concentration**.

When the movement of water molecules in and out of a cell reaches the same rate, a state of **equilibrium** is reached. If the concentration of water molecules is greater outside a cell, then the solution is **hypotonic** to the cell. Water will move into the cell by osmosis. The pressure against the inside of the cell membrane will steadily increase. If the pressure becomes great enough, the cell membrane will burst. A solution is **isotonic** to the inside of the cell when there is the same concentration of water molecules on the inside and outside of the cell membrane. To maintain equilibrium, water molecules move into and out of the cell at the same rate. Suppose a living cell is placed in a solution that has a higher salt concentration than the cell has. Such a solution is **hypertonic** to the cell, because there are more salt ions and fewer water molecules per unit volume outside the cell than inside.

Water will move from the area of higher water concentration (inside the cell) to the area of lower water concentration (outside the cell). The selectively permeable membrane does not allow salt ions to pass into the cell. The cell shrinks as the cell loses water.

II. Objectives:

- Describe the process of osmosis
- Observe the movement of water through cell membranes during the process of osmosis
- Compare and contrast three osmotic states: hypotonic, isotonic, and hypertonic

III. Procedure:

Part 1: Red Blood Cell

__1. Select the red blood cell at the top of the screen and drag it into the hypotonic beaker.

__2. Observe the process of osmosis. Determine whether water (represented as blue arrows) moves into the cell, stays in equilibrium, or moves out of the cell. Observe what happens to the shape and size of the cell.

__3. Record your observations in the Data Table.

__4. Click 

at the bottom. Now drag the red blood cell to the isotonic beaker. Observe the process of osmosis again and record your observations in the Data Table.

__5. Click 

at the bottom. Now drag the red blood cell to the hypertonic beaker. Observe the process of osmosis again and record your observations in the Data Table.

Part 2: Elodea Cell

__1. Select the elodea cell at the top of the screen and drag it into the hypotonic beaker.

___2. Observe the process of osmosis. Determine whether water (represented as blue arrows) moves into, stays in equilibrium, or moves out of the cell. Observe what happens to the shape and size of the cell.

___3. Record your observations in the Data Table.

___4. Click Reset at the bottom. Now drag the elodea cell to the isotonic beaker. Observe the process of osmosis again and record your observations in the Data Table.

___5. Click Reset at the bottom. Now drag the elodea cell to the hypertonic beaker. Observe the process of osmosis again and record your observations in the Data Table.

Part 3: Paramecium Cell

___1. Select the paramecium cell at the top of the screen and drag it into the hypotonic beaker.

___2. Observe the process of osmosis. Determine whether water (represented as blue arrows) moves into, stays in equilibrium, or moves out of the cell. Observe what happens to the shape and size of the cell.

___3. Record your observations in the Data Table.

___4. Click Reset at the bottom. Now drag the paramecium cell to the isotonic beaker. Observe the process of osmosis again and record your observations in the Data Table.

___5. Click Reset at the bottom. Now drag the paramecium cell to the hypertonic beaker. Observe the process of osmosis again and record your observations in the Data Table.

IV. Results:

Data Table Title: ____

Molecules Name	Red Blood Cell: Net Water Movement In or Out?	Red Blood Cell: Appearance of Cell	Elodea: Net Water Movement In or Out?	Elodea: Appearance of Cell	Paramecium: Net Water Movement In or Out?	Paramecium: Appearance of Cell
Hypotonic Solution						
Isotonic Solution						
Hypertonic Solution						

V. Analysis: Answer the following questions

1. Did water move **into** or **out of** the cell while it was surrounded by a hypotonic solution? _________

2. Did water move **into** or **out of** the cell while it was surrounded by a hypertonic solution? ________

3. Did water move **into** or **out of** the cell while it was surrounded by an isotonic solution? _________

4. Compare and contrast what happens to an animal, a plant, and a paramecium cell in a hypotonic, hypertonic, and isotonic solution. ____

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5. Could elodea or paramecium from a freshwater lake be expected to survive if transplanted into the ocean? **Explain.**

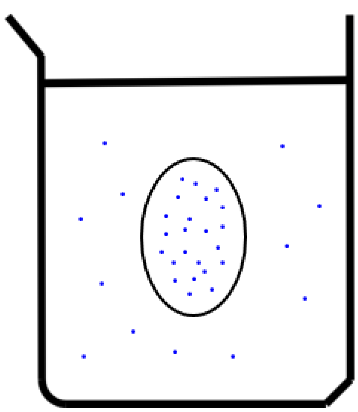
6. If you grill a steak, would it be better to put salt on it before or after you cooked it? Explain in terms of osmosis.

7. Why does salad become soggy and wilted when the dressing has been on it for a while? Explain in terms of osmosis.

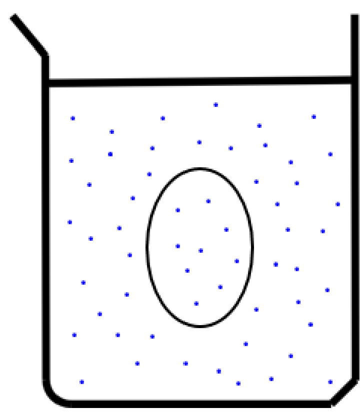
8. An effective way to kill weeds is to pour salt water on the ground around the plants. Explain why the weeds die, using the principles discovered in the virtual lab.

Model what you saw:

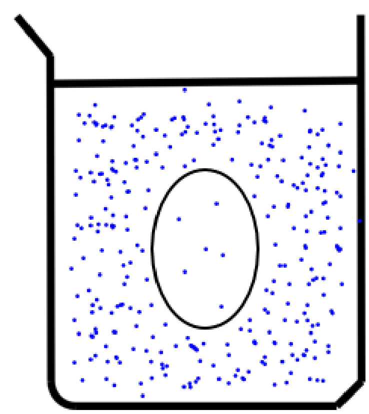
Directions: Draw an arrows into, out of, or in both directions to model how an animal cell would behave in the three types of solutions below. On the line below the beaker write "swells", "shrinks", or "no change" to predict the water movement over time.



Cell in hypotonic solution



Cell in isotonic solution



Cell in hypertonic solution