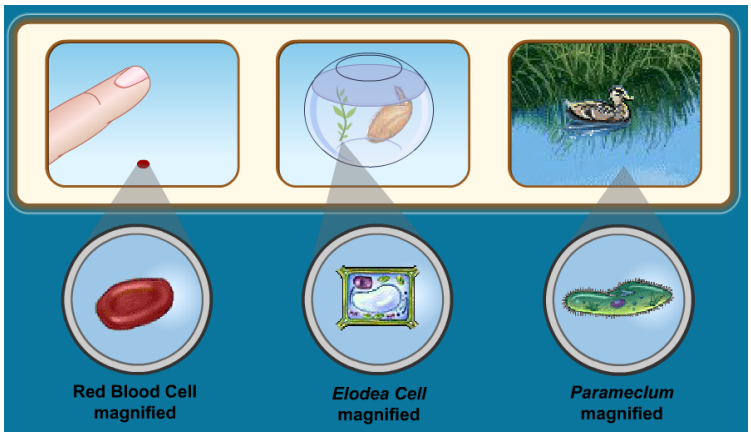
Name _____ Date _____ Period _____

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

I. Background information:

Directions: read and highlight the important information below. Use the presentations posted on the class website to help.



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.

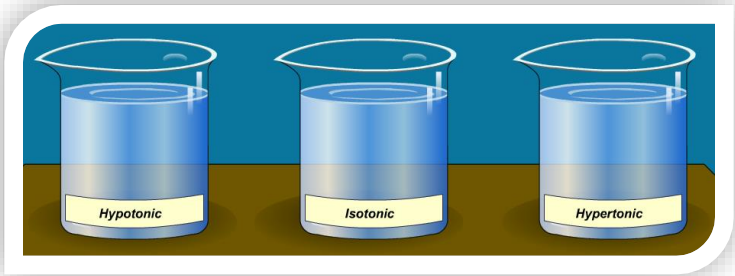
Suppose a living cell is placed in a solution that has a higher salt concentration than the cell has. Such a solution is hypertonic to the cell, because there are more salt ions and fewer water molecules per unit volume outside the cell than inside. Water will move from the area of higher water concentration (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.

Key terminology in this series of lessons:

Water	equilibrium	balance	homeostasis
Solute	solvent	cell membrane	permeable
Semi-permeable	impermeable	concentration	concentration gradient
Molecule	polar	non-polar	hypotonic
Isotonic	hypertonic	crenate	plasmolyze (plasmolysis)
Lysis	solution	net water movement	cell
Osmosis	diffusion	osmoregulation	vacuole
Tonicity			

II. Objectives:

- Describe the mechanics 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



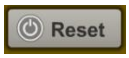
III. Procedure:

Red Blood Cell

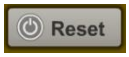
__1. Select the red blood cell at the top of the screen and drag it into the hypotonic beaker.

__2. Observe the process of osmosis. Determine whether water (represented as blue arrows) moves into, 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 

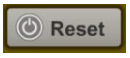
at the bottom. Now drag the red blood cell to the hypertonic beaker. Observe the process of osmosis again and record your observations in Data Table #1.

Elodea Cell

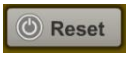
__1. Select the elodea cell at the top of the screen and drag it into the hypotonic beaker.

__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 

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 

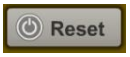
at the bottom. Now drag the elodea cell to the hypertonic beaker. Observe the process of osmosis again and record your observations in Data Table #1.

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 

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 

at the bottom. Now drag the paramecium cell to the hypertonic beaker. Observe the process of osmosis again and record your observations in Data Table #1.

IV. Results:

Data Table #1: Cell Response to Solutions with Different Levels of Dissolved Solutes

Solution type	Red Blood Cell: Net H20 movement (Does H2O move **In** or **Out**)	Red Blood Cell: Appearance of Cell (**Crenated**, **normal** or **lysed**)	Elodea: Net Water Movement (Does H2O move **In** or **Out**)	Elodea: Appearance of Cell (**Plasmolyzed**, **normal**, or **turgid**)	Paramecium: Net Water Movement (Does H2O move **In** or **Out**)	Paramecium: Appearance of Cell (**crenated**, **normal** or **lysed**)
Hypotonic *(fewer dissolved solutes outside than inside cell)*						
Isotonic *(same # of dissolved solutes as cell)*						
Hypertonic *(more dissolved solutes than cell*						

V. Analysis: Answer the questions below on the lab you just did.

1. Did water move into or out of the cell while surrounded by a hypotonic solution? Note 2 pieces of evidence.

2. Did water move into or out of the cell while surrounded by a hypertonic solution? Note 2 pieces of evidence.

3. Did water move into or out of the cell while surrounded by an isotonic solution? Note 2 pieces of evidence.

4. You have three cells that have helped you see both animal and plant cell behavior in different environments. What are two similarities and what are two differences between how animal and plant cells respond to the same external environment? A small T-chart is acceptable.

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.

9. Design your own scenario where there is a net water movement. Describe or draw.

Big Question! Explain how osmosis may maintain the balance of salt in the cells of an organism's body (a concept called homeostasis) after consuming a meal high in sodium (NaCl).