NAME _____ DATE _____ HOUR _____ BIOLOGY

Hypotonic, Hypertonic and Isotonic Solution Virtual Lab Activity

Purpose: To determine under what conditions do cells gain or lose water.

Objectives:

- The student will describe the process of osmosis.
- The student will observe the movement of water through cell membranes during the process of osmosis.
- The student will compare and contrast three osmotic states: hypotonic, hypertonic and isotonic.

Background:

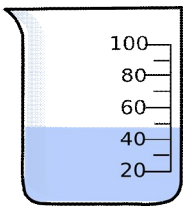
A cell membrane permits some materials to pass through while keeping other materials out. Such a membrane is called **selectively permeable membrane**. Under normal conditions, water constantly passes in and out of this membrane. This diffusion of water through a selectively permeable membrane is called **osmosis**. Like other substances, water diffuses from a region of higher concentration to a region of lower concentration. When the transfer 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 grater 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 an fewer water molecules per unit volume outside the cell than inside. Water will move from the region of higher water concentration (inside the cell) to the region of lower water concertation (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.

In this Virtual Lab you will place a red blood cell (animal cell), an Elodea cell (plant cell) and a Paramecium (a single celled organism) in hypotonic, isotonic and hypertonic solutions. You will examine how and why these cells gain or lose water in the different solutions.



Procedures:

1. Type in Osmosis Virtual Lab Glencoe or click on the link below.

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

2. Select one of the three cells pictured at the top of the screen and drag it into one of the beakers.

3. Observe the process of osmosis. Determine whether water, represented by animated blue arrows, moves into, stays in equilibrium or moves out of the cell.

4. Observe what happens to the shape and size of the cell.

5. Record your observations in the data table.

6. Move the cell to a different beaker or choose a different cell.

7. Observe the process of osmosis again and record your observations in the data table.

8. Repeat these procedures with all three cells and all three solutions.

9. Answer virtual lab activity questions on student lab report.

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Lab Report

Data Table

Molecules	Hypotonic Solution Observations	Isotonic Solution Observations	Hypertonic Solution Observations
Red Blood Cell: (animal cell) Net Water Movement In/Out			
Red Blood Cell: (animal cell) Appearance of Cell			
Elodea Cell: (plant cell) Net Water Movement In/Out			
Elodea Cell: (plant cell) Appearance of Cell			
Paramecium Cell: (single cell organism) Net Water Movement In/Out			
Paramecium Cell: (single cell organism) Appearance of Cell			

Lab Activity Questions

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

2. In which direction did the water move through the cell membrane when the cell was surrounded by the hypertonic solution?

More questions on the back ☺

Lab Activity Questions (continued)

3. Compare and contrast what happens to an animal, a plant and a paramecium cell in a hypotonic, an isotonic and hypertonic solution. (hint – create a word web or diagram)

4. Could Elodea or Paramecium from a freshwater lake be expected to survive if transplanted into the ocean. **Explain** – in complete sentences.

5. If you were to grill a steak or corn on the cob, would it be better to put salt on it before or after your cooked its? **Explain** why, in terms of osmosis.

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

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