Osmosis Lab

Purpose:
To investigate the movements of materials into and out of cells and to demonstrate plasmolysis.

Introduction:
The cell is the “gate-keeper” for the cell; it controls what goes in and out. There are two ways in which material can get into a cell; passive and active transport. Passive transport does not require the cell to use energy and materials, it always moves from a higher concentration to a lower concentration.
The concentration of dissolved materials in and around the cell determines how much water inside the cell and thus greatly determines the shape of the cell. When a cell is full of water, it becomes rigid and is said to be “turgid” (normal state of a cell). When the cell is not full of water, it becomes rigid and is said to be “flacid”. Since water moves from an area of high concentration to an area of low concentration by osmosis, the amount of water surrounding the cell will determine if water flows into the cell to make it turgid or flows out of the cell to make it flacid. In pure water, the concentration of water outside the cell is greater than inside the cell and water flows in. In salt water, the amount of water inside the cell is greater and the water flows out of the cell. This causes the cytoplasm of the cell to shrink, this is called plasmolysis.

Materials Part 1:
Starch/glucose solution
Distilled water
Cellophane dialysis tubing (15 cm long)
250 ml beaker
String (two 15cm pieces per team)
Iodine solution

Pre-lab Questions:

1. Define Diffusion

2. Define Osmosis

3. Differences between Diffusion and Osmosis?

Procedure:

Part 1:

1. Soak a 20 cm section of cellophane dialysis tubing in water for a few moments.
2. Gently rub the ends between your thumb and index finger until ends separate.
3. Carefully push a pencil or glass rod through the opening to hold it open. Twist one end of the tubing and tie it tightly with a piece of string.
4. Remove the pencil or rod.
5. Fill the bag ¾ full with the starch/glucose solution. Tie the top of the bag with string. Leave a loose piece of string 15 cm in length.
6. Rinse the bag with distilled water. Why is this step necessary?
7. Place the bag in a beaker of distilled water. Leave the string outside the beaker so that you may remove the bag from the water. Now place sufficient iodine solution in the beaker's distilled water so to turn it a light orange color.
8. Place the beaker at the top of your team's table and wait 1 hour.

Data Table:

	Before (g)	**After (g)**	**Changes?**
"Cell" Mass			
"Cell" color			

Part 1 Questions:

1. Which had a higher solute (iodine) concentration? (hint cell or beaker)
2. Which had a higher water concentration?
3. Is there any change in the color of the starch solution?
4. What is the significance of your discovery in question 1?
5. Do you observe any changes of the fluid inside the "model cell"?
6. Did the water flow into the "cell" or out of the "cell"?
7. Did the solute (iodine) flow into the "cell" or out of the "cell"?

Conclusion Questions:

1. How has osmosis been observed in this lab activity?
2. How has diffusion been observed in the lab activity?
3. What is the substance used to test for starch?
4. What is the reaction observed when it comes in contact with starch?
5. What evidence, if any, did you find that indicated that the dialysis bags were selectively permeable?
6. What conclusions can you draw from this investigation concerning the action of living plasma membranes?