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Names _____ Date _____ Class _____

Osmosis & Diffusion Lab – Dialysis Tubing

Part I.

Background

The movement of molecules through a cell membrane is _____. The movement of the water molecules is from an area of _____ concentration to an area of _____ concentration. The similar movement of _____ molecules is called osmosis. Such movement is principally possible because water molecules are smaller than membrane macropores. If the molecules are too large, no molecular transfer, or diffusion occurs. The cell membrane is _____, which means some molecules will be able to pass through, but others cannot.

In the following experiment, dialysis tubing will represent the _____ membrane. The enclosed tube may, for the purpose of this experiment, be considered a single living cell in greatly enlarged form.

- A. In this experiment, the solvent = _____
the solute = _____
- B. How will you determine if a change has occurred in this experiment? (What will you look for?)
- C. What do you expect the results to be? (Think about the size of molecule.)

Hypothesis:

Materials

Glucose Solution, 5 Glucose Tablets (2 for testing and 3 as control), Dialysis Tubing, plastic cup, 10 ml. Graduated Cylinder, Water

Procedure

1. Obtain a piece of dialysis tubing.
2. Pour 50ml. of water into the plastic cup.
3. Place the tubing in the plastic cup. Make sure it is covered with water. Allow it to soak for about five minutes.
4. Remove the tubing from the water and rub one of the ends between your thumb and pointer finger to open the tube. Check again, submerge it in water again for about thirty seconds.
5. Take the tubing out of the water and tie one end of the tubing in an overhand knot.
6. Measure 5 ml of glucose solution using the 10 ml graduated cylinder and pour it into the tubing.
7. Tie the second end of the tubing in an overhand knot and raise it under the faucet. Set your "cell" on a clean surface.
8. Test the water in the beaker for the presence of glucose by dipping a glucose test strip into it. After 30 seconds, compare the color on the strip to the control strip. Complete the Initial Status information on your data table.
9. Place the artificial cell (the sealed tubing with solution) into the beaker of solution and allow it to remain undisturbed for 15-20 minutes. Watch for any changes in size or color.
10. Remove the tubing from the cup and record your observations in the data table for final status of the solution and the bag.
11. Test the solution in the cup with a new glucose test strip and record this data in your table.

Activity 201 Name _____

Investigating the Movement of Starch, Iodine, and Glucose Across a Selectively Permeable Membrane

Scientific Method

1. What information about the subject was?
2. An experiment was then designed.
3. The experimental procedure followed to explore observations.
4. The results of the experiment were compared to the hypothesis.
5. A conclusion was drawn from the experiment.

Procedures

Part 1: To explore the different molecules that can diffuse and osmosis through semi permeable membrane.

Part 2: To understand how different concentrations of solutes affect the movement of solutions through semi permeable membrane.

Part 3: To understand how the presence of glucose and osmosis through semi permeable membrane can be determined in a cup with a sugar solution.

Background & Key Terms

Diffusion is the movement of small molecules. These small molecules are semi permeable, permeable to some molecules, and not others, which are determined by molecule size and charge. The semi permeable membrane separates the inside and outside of the cell. The presence of glucose permeable tubing, dialysis tubing, and dialysis tubing are used to study the process of diffusion. Dialysis tubing, dialysis tubing, and dialysis tubing are used to study the process of diffusion. Dialysis tubing, dialysis tubing, and dialysis tubing are used to study the process of diffusion.

Questions

1. How does osmosis occur?
2. How does the movement of water occur across a semi permeable membrane?
3. How does the concentration of solute affect the rate of diffusion and osmosis?
4. What happens if one side can pass through the membrane, but another can't?

Diffusion Through Membranes

Background

Cell membranes are selectively permeable by nature and as such, exert some control over substances passing through them into and out of cells. In the presence of a concentration gradient, substances will diffuse from an area of high concentration to one of low concentration across a selectively permeable membrane. Water, too, will diffuse through membranes in a process called osmosis. The net movement of water is from an area of high [H₂O] (i.e., low [solute], like low [glucose]) to one of low [H₂O] (i.e., high [glucose]).

In this experiment you will measure diffusion of small molecules through dialysis tubing, a selectively permeable membrane. Small solute molecules and water molecules can move freely through a selectively permeable membrane, but larger molecules will pass through more slowly, or perhaps not at all. In medicine, the movement of a solute through a selectively permeable membrane is called dialysis. The size of the minute pores in the dialysis tubing determines which substances can pass through the membrane, acting much like a filter.

By detecting the presence of particular molecules on each side of the dialysis tubing, we can determine which molecules passed through the tubing and which did not. Starch molecules react with iodine to form a dark blue compound. The presence of starch will be tested with Lugol's solution, (Iodine Potassium-iodide or KI). For the Lugol test, a dark blue color is a positive result.

A. Diffusion

Procedure

1. Obtain a 10 cm piece of 2.5 cm dialysis tubing that has been soaking in water. Tied one end of the tubing and fold it over, then tie off that end with string to form a bag. To open the other end of the bag, rub the end between your thumb and forefinger until the sides separate.
2. Pour starch solution in the tube so that it is about 2/3 full.
3. Tied the top of the tube and tie it securely.
4. Place the tube in a 250 ml. beaker of water and label it 'A' and make sure the names of you and your partner are on it.
5. While sitting, add iodine solution to the water slowly (don't waste it) until the water is a FAINT yellow color.
6. Let stand 20 min. While you are waiting, draw a labeled picture of the setup and then draw a prediction of what you think will (or will not) happen.
7. Record your observations and explain your results in the final column of the table.

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