Ap bio lab one: osmosis and diffusion

Meghann Kiphart AP Biology Lab Report Number One Mrs. Irvine Introduction: Because all molecules have kinetic energy and are constantly in motion cells go through a process called diffusion. Diffusion is the movement if molecules from an area of higher concentration to and area of lower concentration. This process with continue to occur until an equilibrium is reached. Osmosisis a different and unique kind of diffusion. Osmosis is the diffusion of water through a permeable membrane. The phrase “ permeable membrane” means that the membrane will only allow specific molecules through such a water or oxygen.

In Osmosis water will travel from an area of higher water potential or an area of lower water potential. Hypothesis: I think that in this lab, osmosis and diffusion will occur between the solutions of different concentrations until a equilibrium is reached and there is no movement of water. Materials: EXERCISE 1A: Diffusion The materials include a 30-cm piece of 2. 5-cm dialysis tubing, 15-mL of the 15% glucose/1% starch solution, 250-mL beaker, distilled water, 4-mL Lugol’s solution, and string. EXERCISE 1B: Osmosis The materials used include 25-mL of these solutions: distilled water, 0. M sucrose, 0. 4M sucrose, 0. 6M sucrose, 0. 8M sucrose, and 1. 0M sucrose, scissors, string, a balance, six 250-mL cups, and six 30cm strips of dialysis tubing. EXERCISE 1C: Water Potential The materials that were used included 50mL of distilled water, 0. 2M sucrose, 0. 4M sucrose, 0. 6M sucrose, 0. 8M sucrose, and 1. 0M sucrose, six 250mL cups with lids, 4 potato cores for each cup, a balance, and paper towel. EXERCISE 1D: Calculation of Water Potential from Experimental Data This exercise required a calculator and a pencil. Procedure: EXERCISE 1A:

Soak the dialysis tubing in water before you start the experiment. Tie off one end of the tubing to form a bag like structure. Through the open end of the bad, place the starch solution in to the bag. Tie off the other end of the bag to secure the substance inside. Make sure to record the color of the solution in Table 1. 1. Next you're going to text the starch solution for the presence of glucose. Record the results in Table 1. 1. Fill a 250ml cup about 2/3 of the way full with distilled water. Add 4ml of Lugol's solution into the distilled water. Record the color of the solution in the Table 1. . Put the bag in the cup full of the solution. Allow the bag and cup to stand over night. The next day record the final color of the solution in Table 1. 1. Finally test the liquid in the cup and in the bag for the presence of glucose. Record the final results in Table 1. 1. EXERCISE 1B: Get six strips of presoaked dialysis tubing and create a bag like was shown in exercise 1A. Pour 25mL of the six solutions into each of the six bags. Tie off the other end of the bags. Rinse each bag gently with distilled water and dry the outside of the bag with a paper towel.

Weigh each bag and record the results in Table 1. 2. Put each of the six bags into the cups with the six different solutions. Let stand over night. The next day remove the bags from the water and carefully dry the bags with paper towel. Weigh each bag and record them in Table 1. 2. Gather the other lab group's data to be able to complete Table 1. 3. EXERCISE 1C: Pour 50mL of the solutions into a labeled 250mL cups. Using a cork borer, cut the potato into 24 cylinders. (4 potato cores x 6 cups = 24 potato cores altogether) weigh the mass of each set of 4 potato cores.

Record the data in Table 1. 4. Put 4 potato cores into each solution cup. Cover the cup with a lid to prevent evaporation. Let stand overnight. Remove cores from the cup and dry them with a paper towel. Then determine there combined weigh in groups of 4 (from the same cup). Record the results in Table 1. 4. Calculate the percentages changes in mass. Collect the class data and determine the class change in mass. EXPERIMENT 1D: Determine the solute, pressure, and the water potential of the sucrose solution. Then, graph the information that is given about the zucchini cores. Questions:

EXPERIMENT 1A: 1. Which substances are entering the bag and which are leaving the bag? What evidence supports the answer? Distilled water and IKI are leaving and entering. Glucose is able to leave the bag. 2. Explain the results that were obtained. Include the concentration differences and membrane pore size in the discussion. Glucose and small molecules were able to move through the pores. Water and IKI moved from high to low concentration. 3. How could this experiment be modified so that quantitative data could be collected to show that water diffused into the dialysis bag?

You could mass the bag before and after it is placed into the solution. 4. Based on your observations, rank the following by relative size, beginning with the smallest: glucose molecules, water molecules, IKI molecules, membrane pores, and starch molecules. Water molecules, IKI molecules, Glucose molecules, membrane pores, and starch molecules. 5. what results would you expect if the experiment started with a glucose and IKI solution inside the bag and only starch and water outside? The glucose and IKI would move out of the bag and turn the starch and water solution purple/ blue.

The starch couldn’t move inside the bag because its molecules are too big to pass through the membrane of the tubing. EXERCISE 1B: 1. Explain the relationship between the change in mass and the molarity of sucrose within the dialysis bags. The solute in hypertonic and water will move into the bag. As the molarity increases the water moves into the bag. 2. Predict what would happen to the mass of each bag in the experiment of all the bags were places in a 0. 4M sucrose solution instead of distilled water. With the 0. 2M bag, the water would move out. With the 0. M bag, there will be no net movement of water because the solutions reach equilibrium. With the 0. 6M-1. 0M bags the water would move into the bags. 3. Why did you calculate the percent change in mass rather then simply using the change in mass? This was calculated because each group began with different initial masses and we would have different data. All the groups need consistent data. 4. A dialysis bag is filled with distilled water and then places in a sucrose solution. The bag's initial mass is 20g and its final mass is 18g. Calculate the percent change of mass, showing your calculations. 18-20)/20) x 100 = 10% 5. The sucrose solution in the cup would have been hypotonic to the distilled water in the bag. EXPERIMENT 1D 1. If the potato core is allowed to dehydrate by sitting in the open air, would the water potential of the potato cells decrease or increase? Why? It would decrease because the water would leave the cells and cause the water potential to go down. 2. If a plant cell has a lower water potential then its surroundingenvironmentand if pressure is equal to zero, is the cell hypertonic or hypotonic to its environment?

Will the cell gain water or lose water? It is hypotonic and it will gain water. 3. The cup is open to the atmosphere, what is the pressure potential of the system? The pressure potential is zero. 4. Where is the greatest water potential? In the dialysis bag. 5. Water will diffuse out of the bag. Why? It is because the water moves from the area of high water potential to an area of lower water potential. 6. What effect does adding solute have on the solute potential component of the solution? Why? It makes it more negative 7.

Consider what would happen to a red blood sell placed in distilled water: A) which would have the higher concentration of water molecules? Distilled Water B) which would have the higher water potential? Distilled Water C) what would happen to the red blood cell? Why? It would leak, because it would take to much water. Conclusion: In Exercise 1A the data collected helped tell which molecules can and can not move across a cell membrane. IKI, we know because of its color change, was able to move across a membrane. Starch, although, is too large to move across a membrane.

Glucose was able to move freely, along with the water, across the cell membrane. In 1B, it was proven that water moves faster across the cell membrane then sucrose. The water moved to help reach equilibrium between the 2 solutions. The sucrose molecules are too big to move across the membrane as fast as water can. In experiment 1C showed that the potatoes contained sucrose. The sucrose in the potato raised the solute potential, which lowered the water potential. The cup of distilled water had a high water potential water moves down the concentration gradient, causing the potato cores to take on water.