Name _____ **Period** _____

AP Biology **Date** _____

LAB _____. OSMOSIS THROUGH A MEMBRANE

INTRODUCTION

Since all life takes place in water—either external waters or internal waters—we must also address the special case of the movement of water across cell membranes in our study of diffusion. The diffusion of water through a selectively permeable membrane is referred to as **osmosis**. As with the diffusion of solutes, water moves from a region of higher concentration of water to a region of lower concentration of water. This is often also stated as movement from a region of higher **water potential** to a region of lower water potential. Distilled water (pure water) has the highest concentration of water or the highest water potential. The concentration of water decreases as solutes—like sugars and salts— are dissolved in the water.

Using the principles you learned in the first exercise on diffusion, we will now investigate the movement of **water** in and out of a model cell using sucrose as our solute.

PROCEDURE: DAY 1

1. Cut a 30cm piece of 2.5cm dialysis tubing and soak it in water until it is soft enough to work with. Tie off one end of the tubing (like a balloon) to form a bag. This will be our model "cell." To open the other end, rub the end between your fingers until the edges separate.

2. Measure out 15mL of concentrated (1.0 molar) sucrose solution and pour it into the dialysis bag using a funnel. Tie off the other end of the bag, leaving space for expansion of the contents in the bag.

3. In case any solution spilled on the outside, rinse off the model "cell" you just made by holding it under running water.

4. Carefully blot the outside of the "cell" with a paper towel. Mass the sucrose solution "cell" (in grams) on a scale and record the Day 1 Initial Mass in **Table 1** (**Osmosis Individual Data**).

5. Place the "cell" in an empty 250mL beaker. Now fill the beaker with water so that the sucrose "cell" is submerged. Label the beaker with tape (contents of beaker and contents of cell).

6. Cut a second 30cm piece of 2.5cm dialysis tubing and soak it in water until it is soft enough to work with. Tie off this tubing to make another "cell". However, this time fill the bag with 15mL of water.

7. Carefully blot the outside of the bag with a paper towel. Mass the water "cell" (in grams) on a scale and record the Day 1 Initial Mass in **Table 1**.

8. Place the "cell" in an empty 250mL beaker. Now fill the beaker with sucrose solution so that the "water cell" is submerged. Label the beaker with tape (contents of beaker and contents of cell).

9. Cover the beakers and allow the experiment to stand undisturbed overnight.

10. Complete the Prediction column in **Table 1**.

PROCEDURE: DAY 2

1. Retrieve your Osmosis beakers with the "sucrose solution cell" and "water cell".

2. Carefully remove each cell from its beaker. Gently blot the outside of the "cell" with a paper towel. Mass each "cell" (in grams) on a scale and record the **Day 2 Final Mass** in Table 1.

3. Calculate the **Change in Mass** for each "cell". Record in Table 1.

Change in Mass = Final Mass – Initial Mass

   a. What does it mean if the **Change in Mass** is a positive number?

_____

_____

   b. What does it mean if the **Change in Mass** is a negative number?

_____

_____

4. Obtain data from the other lab groups in your class to complete **Table 2** (**Osmosis Class Data**). Calculate the class average.

5. Complete the diagrams in **Figure 1**. Be sure to indicate the movement of water with an arrow in each diagram.

6. Complete the **Summary Questions**.

TABLE 1: OSMOSIS INDIVIDUAL DATA

Set Up		Mass of Cell			
		Day 1 Initial Mass	Day 2 Final Mass	Change in Mass	Predicted Change in Mass (+ or –)
A	Sucrose solution in cell; Water in beaker				
B	Water in cell; Sucrose solution in beaker				

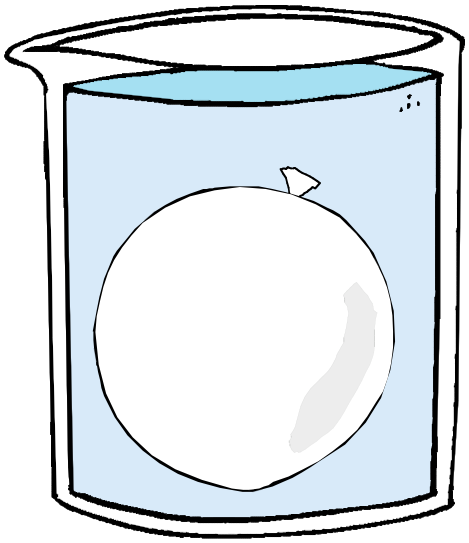
OSMOSIS DATA TABLE

TABLE 2: OSMOSIS CLASS DATA

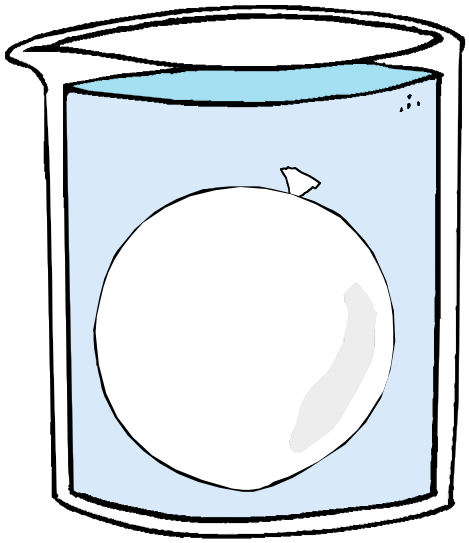
Set Up	Change in Mass of Model Cells							
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Total	Class Average
Sucrose solution in cell; Water in beaker								
Water in cell; Sucrose solution in beaker								

FIGURE 1. MOVEMENT OF WATER ACROSS A MEMBRANE

Label the diagrams below to identify the contents of the "cell" and the beaker. Clearly draw an **arrow** in each diagram to indicate the movement of **water** during the experiment.



SUCROSE SOLUTION IN CELL;
WATER IN BEAKER



WATER IN CELL;
SUCROSE SOLUTION IN BEAKER

SUMMARY QUESTIONS

1. Describe what happened to the water cell in the 1.0 Molar sucrose solution.

_____

_____

_____

2. Explain why this result occurred.

_____

_____

_____

3. Describe what happened to the sucrose cell in the distilled water.

_____

_____

_____

4. Explain why this result occurred.

_____

_____

_____

5. Summarize the process of osmosis.

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