

Chapter 7- Lab #2
The Cell Membrane and Osmosis

Purpose: The purpose of the lab is to observe the permeability of dialysis tubing when placed in different solutions and to determine the effects of hypertonic and hypotonic solutions on plant cells.

Materials:

"Meal solution"	10% NaCl solution
Potato	Dialysis tubing
Triple Beam Balance	Beaker
distilled water dropper	Iodine dropper

Observation Notes

- 1 Permeability is the allowing of substances or molecules to pass through
- 2 Semi-permeable membrane is a membrane that selectively allows substances or molecules to pass through based on the size of the substance or molecule.
- 3 "Initial" means at the beginning
- 4 "Final" means at the end
- 5 Rigidity = stiffness

Procedure- Part 1- Observation of Osmosis

- 1 Obtain a piece of dialysis tubing (4 inches) from your teacher.
- 2 Twist and fold one end of the dialysis tubing and tie it tightly with a string to ensure no leakage.
- 3 Fill the bag 3/4 full with meal solution (10% Sucrose, 1% Starch)
- 4 Carefully squeeze out all of the air while twisting and folding the other end of the dialysis tubing. Tie the end tightly with a string. (The bag with meal solution should resemble a sausage)
- 5 Weigh the "sausage" and record the initial weight in Table 1.
- 6 Observe the "sausage" and record the initial color of the inside of the "sausage" in Table 2.
- 7 Place the "sausage" in a small beaker. Add enough distilled water to completely cover the "sausage."
- 8 Add 1 full dropper of Iodine indicator to the beaker. Observe the color of the solution in the beaker and record the color in Table 3.
- 9 Record the weight of the "sausage" every 5 minutes and record the weights in Table 1.
- 10 Begin answering the analysis questions while you are waiting.
- 11 At the end of 30 minutes record your final weight of the "sausage" in Table 1.
Also, record the final color of the "sausage" in Table 2.
Finally, record the final color of the solution in the beaker in Table 3.
- 12 Graph your results of the weight of the "sausage" over 30 minutes of time in Graph 1.

Procedure- Part 2- Observation of Osmosis Using Potato

- 1 Obtain 4 rectangular cut pieces of potato from the teacher.

Sample A

- 2 Weigh 2 "fries" together. Record the initial weight of both "fries" in Table 4.
- 3 Examine the 2 "fries" for rigidity and texture. Record your observations in Table 5.
- 4 Place the 2 "fries" in a beaker and pour enough distilled water to cover the "fries."
- 5 Record the weight of the 2 "fries" every 5 minutes and record the weights in Table 4.
- 6 Using a color, graph your results of the weight of "fries" in distilled water over 30 minutes of time in Graph 2.
- 7 At the end of 30 minutes record your final weight of the "fries" in distilled water in Table 4. Also, re-examine the 2 "fries" for rigidity and texture. Record your observation in Table 5.

Sample B

- 6 Weigh the next 2 "fries" together. Record the initial weight of both "fries" in Table 6.
- 7 Examine the 2 "fries" for rigidity and texture. Record your observations in Table 7.
- 9 Place the 2 "fries" in a beaker and pour enough 10% NaCl solution to cover the "fries."
- 10 Record the weight of the 2 "fries" every 5 minutes and record the weights in Table 6.
- 11 Using a different color, graph your results of the weight of "fries" in 10% NaCl solution over 30 minutes of time in Graph 2.
- 12 At the end of 30 minutes record your final weight of the "fries" in 10% NaCl solution in Table 6. Also, re-examine the 2 "fries" for rigidity and texture. Record your observation in Table 7.

Part 1- Tables and Graph

Table 1- Weights of "Sausage"

Time (min.)	Weight of "Sausage" (g)
Initial	
5	
10	
15	
20	
25	
Final 30	

Table- 2- Colors of "Sausage"

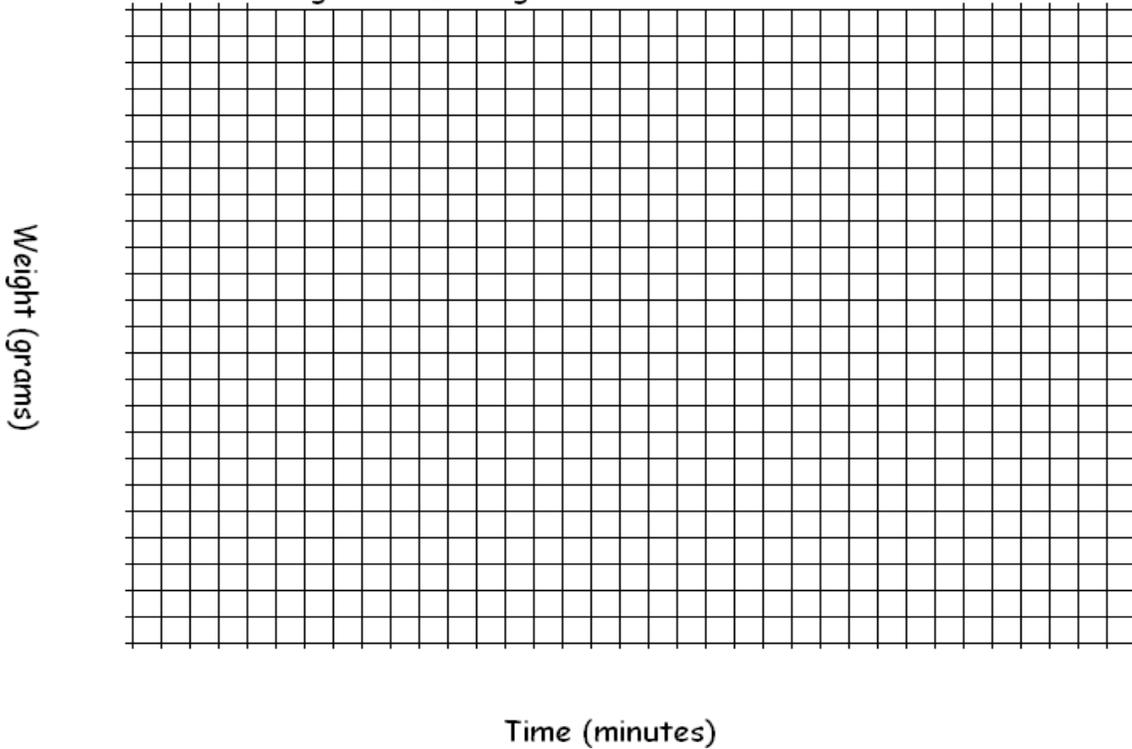
	Color of Sausage
Initial	
Final	

Table- 3- Colors of Solution in Beaker

	Color of Solution in Beaker
Initial	
Final	

Graph 1

Weight of "Sausage" over 30 minutes of Time



Part 2- Tables and Graphs

Sample A

Table 4- Weights of "Fries" in Distilled Water

Time (min.)	Weight of "Fries" (g)
Initial	
5	
10	
15	
20	
25	
Final 30	

Table- 5- Observations of "Fries" in Distilled Water

Observations of "Fries"	
Initial	
Final	

Sample A

Table 6- Weights of "Fries" in 10% NaCl Solution

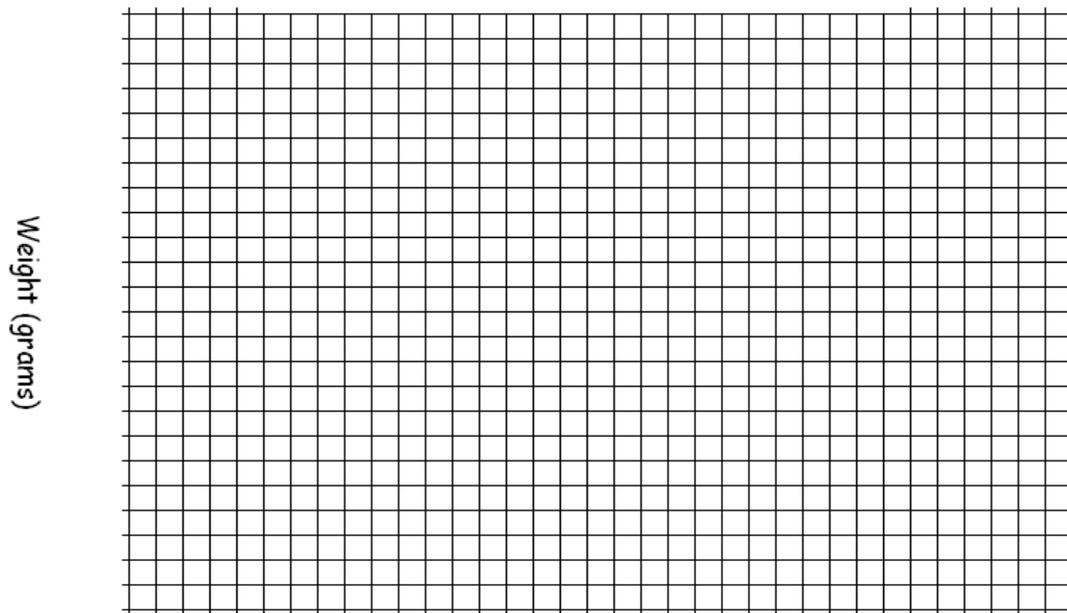
Time (min.)	Weight of "Fries" (g)
Initial	
5	
10	
15	
20	
25	
Final 30	

Table- 7- Observations of "Fries" in 10% NaCl Solution

Observations of "Fries"	
Initial	
Final	

Graph 2

Weight of "Fries" in Distilled Water or 10% NaCl Solution over a 30 minute of Time



Key

Time (minutes)

General Analysis Questions

- 1 Define osmosis.
- 2 Explain the difference between hypertonic and hypotonic solutions.

Part 1- Analysis Questions

- 3 Based on your graph, explain why the weight of the bag changed.
- 4 Based on your experiment, what do you know about the size of the pores of the semi-permeable dialysis tubing.
- 5 Which solution was hypertonic? Hypotonic?
 - A. The Meal Solution in the "Sausage": _____
 - B. The Solution in the Beaker: _____
- 6 Based on your experiment, did iodine move into the "sausage" or did the meal solution move out of the "sausage?" Give 2 reasons for your explanation.

Part 2- Analysis Questions

- 7 Which solution, distilled water or 10% NaCl solution, was hypertonic to the "fries?"
- 8 Based on your observations, explain the affect of the hypertonic solution on the potato.

Why did the hypertonic solution have this affect on the potato?
- 9 Which solution, distilled water or 10% NaCl solution, was hypotonic to the "fries?"
- 10 Based on your observations, explain the affect of the hypotonic solution on the potato.

Why did the hypotonic solution have this affect on the potato?
- 11 Explain what would happen if you placed an elodea leaf in a 10% NaCl solution.