

Lab Report: Potato Osmosis and Diffusion

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Lab Report: Potato Osmosis and Diffusion

The process of osmosis through the membrane is very important for living organisms. A membrane is the outer layer of a cell. Water can pass freely through the membrane through osmosis. Osmosis is the process of water moving through the membrane through diffusion. Diffusion is the simplest form of movement, solutes move from an area of high concentration to an area of low concentration. Isotonic is when the solution has no change it stays the same ("Potato Osmosis", n.d.).

The researcher investigated the relationship between solute concentration, and the movement of water through a membrane by the process of osmosis. The researcher hypothesized that a potato sliced in hypertonic sucrose solutions will lose mass. The researcher thought that potato slices placed in a hypotonic sucrose solution will gain mass. The final thing the researcher predicted was that potato slices placed in an isotonic sucrose solution will have no change in mass.

Materials and Methods

Materials

- Potato slices
- Metric Ruler
- Digital Scale or Triple Beam Balance
- Parafilm wrap
- Paper towel
- 6 x 100mL beakers

- 50mL Distilled Water (DI H₂O)
- 50mL 0.2M Sucrose solution
- 50mL 0.4M Sucrose solution
- 50mL 0.6M Sucrose solution
- 50mL 0.8M Sucrose solution
- 50mL 1.0M Sucrose solution

Methods

This experiment was conducted with 6 researchers in total. Each member first labeled the six beakers DI H₂O, 0.2M Sucrose, 0.4 M Sucrose, 0.6M Sucrose, 0.8M Sucrose, and 1.0M Sucrose. Then each filled 1 of the 6 beakers with 50 mL Distilled Water (DI H₂O). After the researchers created the following solutions: 0.2M Sucrose, 0.4 M Sucrose, 0.6M Sucrose, 0.8M Sucrose, and 1.0M Sucrose using the remaining 5 beakers. They each received a equally sized potato. The members next determined the mass of each potato slice and recorded the initial mass in Data Table 1: Osmosis Results. Next the researchers weighed each potato slice at a time and place it directly next to the appropriate beaker before massing the next potato slice. The researchers then squeezed each potato slice and recorded the qualitative observations about its flexibility in Data Table 2: Qualitative Observations. The researchers added each potato slice to the corresponding beaker. Then covered the beaker with parafilm to prevent evaporation and put it to set overnight. The next day the members removed the potato slices from each cup, and weighed each potato slice at a time then returned it to their cups. The researchers then calculated the percent change. Each one of them squeezed each potato slice and recorded the qualitative observations about its flexibility in Data Table 2: Qualitative Observations.

Results

Data Table 1: Osmosis Results

Solute (mg/ml)	Initial mass (mg)	Final Mass (mg)	Percent (%)Change in mass	Class Average % Change
DI H ₂ O (0.00 mg/ml)	3800.0 mg	4000 mg	5.26%	8.27%
0.2 M Sucrose (0.068 mg/ml)	4100.0 mg	4400 mg	7.31%	6.60%
0.4 M Sucrose (0.137 mg/ml)	3600 mg	3600 mg	0%	-4.54%
0.6 M Sucrose (0.210 mg/ml)	6200 mg	5200 mg	-16.12%	-14.48%
0.8M Sucrose (0.274 mg/ml)	5100 mg	4500 mg	-11.76%	-22.50%
1.0M Sucrose (0.342 mg/ml)	2700 mg	2300 mg	-14.81%	-20.52%

In the table above you can see the original mass of the potato sliced. You can see the mass of the potato sliced after they were in the solution. Along with the class average percent change.

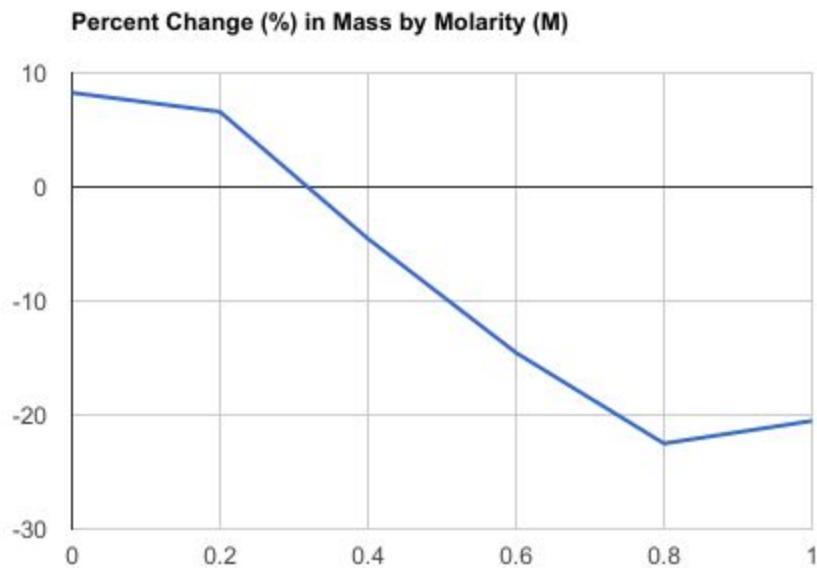
Data Table 2: Qualitative Observations

Solute (mg/ml)	Initial Observations	Final Observations
DI H ₂ O (0.00 mg/ml)	The potato is mostly thin which means there is more flexibility	Mostly thick
0.2 M Sucrose (0.068 mg/ml)	Rectangular shape Moist Flexible but firm	Slightly bigger More firm
0.4 M Sucrose (0.137 mg/ml)	Rectangle Flexible Smooth Moist Medium - thin	Smooth Flimsy
0.6 M Sucrose (0.210 mg/ml)	It's a little flexible Smooth Thick Rectangular shape	More flexible and flimsy Very moist Brown
0.8M Sucrose (0.274 mg/ml)	It's very flexible Smooth Thin- thick Rectangular shape	Moist Very Flexible brown

1.0M Sucrose (0.342 mg/ml)	It's wet, smooth, rectangular shape. It's uneven and has a slope	Slimy Flimsy Flexible Dark brown
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In the table above you can see the initial observation of the potato sliced, and the final observations.

Graph 1 Percent Change in Mass



In the graph above you can see the percent change in mass. The graph goes by twos.

Question and Answer

1. What effect did each solution have on the potato? Using your knowledge of osmosis and diffusion explain these results.

DI H₂O, 0.2 M solution gained mass. The solutes from the beaker went into the slices of the potato making the potato hypotonic. In 0.4 M, 0.6 M, 0.8 M, and 1.0 M the solutes left the potato into the water in the beaker. That made the water hypertonic.

2. Which of these solutions is hypertonic? Hypotonic? Isotonic? How do you know?

3. A shipwrecked sailor is stranded on a small desert island with no fresh water to drink.

She knows she could last without food for up to a month, but if she didn't have water to drink she would be dead within a week. Hoping to postpone the inevitable, her thirst drove her to drink the salty seawater. She was dead in two days. Why do you think drinking seawater killed the sailor faster than not drinking any water at all? What happened to the sailor? Use the results of your lab to explain your answer.

The salt from the sea sucked up the water in her body. She dehydrated herself.

Discussion

The purpose of this laboratory investigation was to examine the relationship between solute concentration and the movement of water through a selectively permeable membrane by the process of osmosis. In the experiment the researcher put six different potato slices in separate beakers of water. Each beaker had a different amount of sugar. They were left to set overnight and the next day the researcher weighed them, and compared their original mass. The researcher hypothesized that a potato slice placed in a hypertonic sucrose solution will lose mass

Reference

“Potato Osmosis and Diffusion lab”. (n.d.) *Potato osmosis and diffusion*. Retrieved from https://docs.google.com/document/d/1znbQtuk2e-H-zmlgrCWv46k9_twmDypWy01UNBS4nbM/edit

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0.6 M Sucrose (0.210 mg/ml)				
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1.0M Sucrose (0.342 mg/ml)				