

# Osmosis potato lab report biology assignment



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If the two solutions are of equal concentrations, they will be isotonic. If the concentrations are unequal, the solution with the higher concentration is hypersonic, and the solution with the lower concentration is hypotonic. What is the solute concentration of potatoes? We can determine this by conducting an experiment in which involves the process of osmosis. Potatoes are full of sucrose used for energy storage in plants. Sucrose is a carbohydrate found in food. It is a disaccharide, with a combination of fructose and glucose.

Consumers break sucrose down into two inconsistencies so they can be absorbed more easily onto the blood. Sucrose is too large of a molecule to diffuse through a semi- permeable membrane, and therefore needing to be broken down so they can move in and out of cells effectively. If potatoes are placed in a solute containing sucrose, then a concentration gradient would be present and the process of osmosis would naturally occur by moving water through the semi-permeable membranes. If the concentration of sucrose in the solution is less than the concentration of sucrose found in the potato, then the potato would decrease in mass.

The opposite would occur as well, if the concentration of sucrose in the elution is more than that of the potato, then the potato would expand and gain in mass. In conducting this as an experiment, we can determine what the solute concentration of potatoes is. Materials The materials used to conduct this experiment are as follows: \* Potato \* Test-tube Rack \* one loom Beaker \* One ml Beaker \* Distilled Water \* Paper Towels \* Marker for Test Tubes \* 1 mol/L Sucrose Solution \* 2 Pipettes \* 10 ml Graduated Cylinder \* Electronic Balance \* Test Tubes \* Razor Blade/Scalpel Figure 1. : Cutting of

potatoes, weighing of potatoes, and potatoes placed in sucrose solution. In figure 1. 0, we can see that the potatoes were cut with a scalpel into thin slices so they could fit the test tubes appropriately. Then their mass was recorded using the electronic scale. They were placed into the test tubes containing sucrose and were to be left on the test tube rack over a 24 hour radius. The next day, the potato slices were to be taken out and measured again. Safety Considerations It is important for one to be careful using sharp instruments.

When there were higher concentrations of sucrose solution, the potato decreased in weight. This is due to the fact that the potato was hypotonic in comparison to the potato. Through osmosis, sucrose from the potato moved along the concentration gradient out and into the test tube making the potato hypotonic. When the potato was distributed into 0. 2 mol/L of sucrose solution, there was no change in weight. This was due to the fact that both were isotonic, and with this, we can infer that the potato contains 0. 2 mol/L of sucrose solution.

Discussion and Analysis The percentage of change in mass if the sucrose solution had the same solute concentration as the potato section would be 0%. This is due to the fact that the change in mass occurs in osmosis. Osmosis occurs when an area of higher concentration is trying to get to an area of lower concentration in a semi- permeable solution. If the concentrations are the same, being isotonic, there would be no osmosis occurring, and therefore no change in mass. This occurred when there was a 0. 2 mol/L concentration of the sucrose solution, therefore we can justify that the potato had that same concentration.

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Figure 1. 4: Graph Results After OH in Solute Concentration With Labeled Hypotonic, Hypertonic, & Isotonic The above graph is similar to that of Figure 1. 3, but this has labeled which solutions were hypertonic to the potato cytoplasm, which were hypotonic, and which was isotonic. As the concentration of the sugar increases, the more mass the potatoes would lose. This would make the potato hypertonic. This is because when potatoes are in sugar solution that is of a higher concentration of sugar than the cell sap, (cytoplasm in a plant cell), the water moves out of the cell causing the reduction in mass.

Opposite of this, when the potatoes are in a lower sugar concentration than their cell sap, the concentration of water is higher outside the cell so the water moves in the cell causing the potatoes to gain mass through the process of osmosis. This would make the potato hypotonic. When the sucrose solution was at 0.2 mol/L however, the mass stayed the same because the concentrations were the same. This means that the potato and the sucrose solution were isotonic. Practical Application Fluids that are the same solute concentration as human blood are isotonic.

We want this so that cells in our body won't burst, or break. If the inside of the cell has less solutes and more solvent, the solvent inside, (water), would diffuse out of the cell by "going down the concentration gradient", which would make this hypertonic, causing the blood cells to shrivel and become insufficient. On the other hand, if the inside of the cell has more solutes and less solvent, the solvent outside would diffuse into the cell with the same process potentially causing the blood cell to burst due to it being hypotonic.

As mentioned earlier, we know that mass will not change if concentrations of a solute and a solvent are the same, or that are isotonic. If we were to prepare a solute with the same concentration as the potato, 0.2 mol/L, and to leave it in the solution for 24 hours, we could expect that there would be no change in mass. This being due to the fact that they have the same concentrations, and not needing to move along the concentration gradient because they are already of equal concentrations. Grass contains water and the salt does not.

When the grass comes into contact with salt, the water escapes and travels into the salt. This is because plant cells have a high concentration of water whereas the salt has low concentrations. Due to osmosis, the water solution in the grass of which is of higher concentration moves to the area of lower concentration in the salt to try to make their concentrations equal. This process in turn causes the grass to dry out and die. Sources of Error

Equipment errors include: 100 ml beaker:  $\pm 0.05$  ml 50 ml beaker:  $\pm 0.2$  ml 10 ml graduated cylinder:  $\pm 0.05\%$  10 ml pipette: 0.02 ml analytical balance:  $\pm 0.0001$  g Eggs Human error could include a variety of things. One could simply read a measurement wrong when filling the test tubes with solution. One could calculate incorrectly by typing in the wrong number. If one fails to put the potatoes into each test tube at the same time, the results could be off ever so slightly. Environmental factors could change results as well, if temperature is higher than room temperature, osmosis could occur faster than usual.

Conclusion In conclusion it was proven that on average, the potatoes that were in the test tube containing little to no sucrose solution gained in mass,

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and those that were in test tubes containing more or only sucrose had a decrease in mass. Results could have been more accurate if all of the potatoes were placed in each test tube and taken out of each at the exact same time. This would mean that the potatoes would have the same time contacting with the sugar solution. Another way results could have been more accurate would be if each potato was cut into the same shape and size.

If the potatoes all had the same mass, then results would be more specific and accurate. It also depends on how the thickness differentiates from potato to potato. If there was one potato thicker than the other, then it may make a difference in how long it takes for the osmosis to occur. If we were to do the experiment again and take the average of both sets of results then it may be more accurate as well. When a plant cell is placed in a solution containing a higher concentration of solute, the water in the cell would move towards the solution. The plant cell would shrink and the flower would wilt.