Osmosis in Potato Tubes Michael Zhao
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Introduction:

Osmosis is the transfer of a solute over a semi -permeable membrane in order to equalise the concentration of a solute over both sides. This practical aims to demonstrate the effect of osmosis on potatoes in sucrose solutions of varying concen trations. If the osmosis does occur, the potatoes in a high sucrose solution should lose weight as the water moves out of the potato into the solution to equalise the concentrations. In addition, the potatoes with little or no sucrose in their solution sho uld gain weight as the water moves into the potato to dilute the concentration of sucrose in an attempt to equalise the solutes.

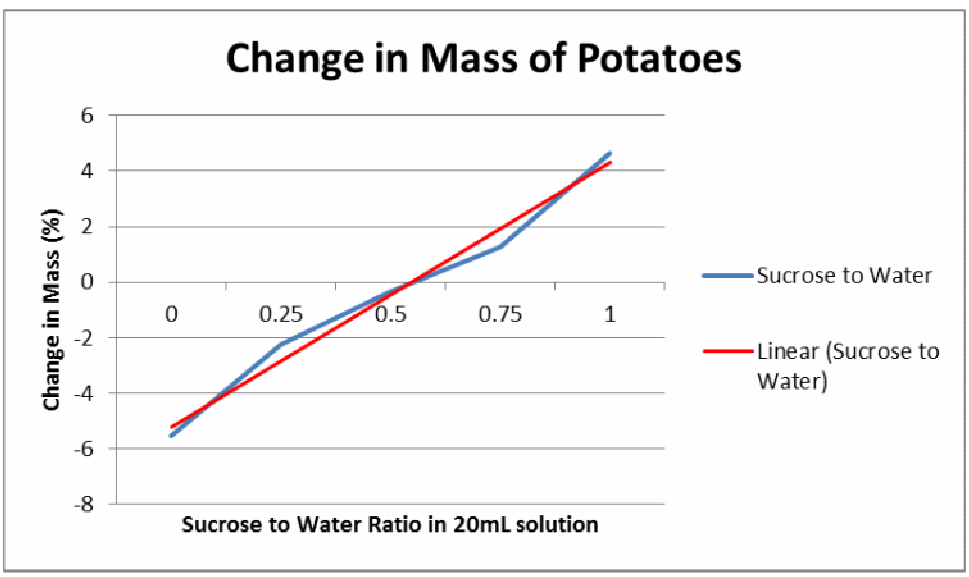
Data Collection and Processing:

Raw and processed data is shown below in a table including: the mass of each potato tube before and after the experiment and the percentage change in mass.

Figure 1: Initial and Final Mass of Potato tubes

Sucrose to Water	Initial potato tube mass(g)	Final potato tube mass (g)	Percentage change in mass
0mL:20mL	2.88	2.72	-5.56%
5mL:15mL	3.1	3.03	-2.26%
10mL:10mL	3.16	3.15	-0.32%
15mL:5mL	3.17	3.21	1.26%
20mL:0mL	2.8	2.93	4.64%

Figure 2: Graph depicting the percentage change in mass of the potato tubes in increasing concentration of a sucrose solution with the red line representing the line of best fit.



Conclusion:

The difference between the potato in the complete sucrose solution compared to potato in the distilled water is extremely high. It can be observed in the results that the potato in th e distilled water was considerably heavier than before the experiment whereas the potato in the sucrose solutions had decreased in mass when compared to its mass before the experiment. It can also be observed that the potatoes which had mixes of distilled water and sucrose solution had results inbetween the two extremes.

The data supports the model for osmosis where water moves through a semi -permeable membrane in order to equalise the solute concentrations on either side of the membrane. It showed that water moved into the potato tubes when the solution had a low concentration of sucrose to balance the concentrations. It also showed the opposite of that. The experiment also showed that smaller imbalances in concentration resulted in less osmosis and a smal ler change in mass evident in both Figure 1 and Figure 2.

Evaluation:

The lack of results create a situation where the data is not enough to make a defined statement as the evidence is not suffiecnt to do so. In addition, 5 results cannot support much more than a linear line of best fit and a rule cannot be determined for the rate of osmosis in relation to the solute's concentration. Random error also may have played a role, however, the singular test means that random error has not been substantially redu ced. Finally, Human error played a significant role as the measurements may have been off and the inaccuracy of the cuts resulted in different massed and shaped potatoes. This difference in shape and mass may have lead to variation in surface area which wo uld let more or less water in or out over an extended period of time. In addition, human error may occur in the measurement of the sucrose and distilled water solution. The ration may not have been exact leading to variation in the results.

Improving the Investigation:

The investigation may have been improved by firstly repeating experiment at least 3 times. The repetition of the investigation means that the effect random error has on the results is greatly reduced and makes results more accurate. Another s tep that could be taken is having more results per experiment. This would lead to a more accurate data pool and show more clearly the trend displayed in the experiment and would result in a more appropriate line of best fit. Finally, the elimination of hum an error would be ideal in improving the investigation. This could be done by mechanical means and would result in more concise results and less variation in factors such as surface area and weight. It would also mean that the results would be more evident if the initial weight of each potato was the same.