Biology: potato lab experiment

Science, Biology

\n[toc title="Table of Contents"]\n

\n \t

\n[/toc]\n \n

Table 1

Trial Number	The Concentration of Sucrose Solution (M) ±0. 2 ml	Initial Mass of Potato Core Slice(g) ±0. 1	Final Mass of Po Core Slices (g) ±
1	0. 0	7. 7	9. 3
2	-	6. 0	8. 1
3	-	6. 2	7. 4
4	-	10. 2	13. 2
5	-	8. 7	10. 3
6	-	4. 9	6. 0
7	-	9. 2	10. 4
1	0. 2	5. 8	6. 0

2	-	11. 6	12. 1
3	-	2. 5	3. 1
1	0. 4	14. 4	13. 9
2	-	2. 6	2. 8
3	-	8	6. 5
1	0. 6	7. 3	5. 3
2	-	10. 7	7. 3
3	-	9. 6	7. 4
4	-	2. 9	2. 8
1	0. 8	5. 6	3. 6
2	-	16. 0	13. 1
3	-	11. 5	5. 9
1	1.	7. 9	5. 4
2	-	10. 0	6. 7
3	-	9. 6	6. 2

4	-	4. 7	3. 2

Table 2

Calculations of Averages Concentration of Sucrose Solution (M) ±0. 2 ml	Average Initial Mass of Potato Core Slice(g) ±0. 1	Average Final Mass of Potato Core Slices (g) ±0. 1	Change in Mass (g) ±0. 1	Percentage Change in Mass (%)	Standard Deviation of Initial Mass	Sta De of Ma
0. 0	7. 6	9. 2	1. 6	22. 3	1. 9	2.
0. 2	6. 6	7. 1	0. 5	6. 5	4. 6	4.
0. 4	8. 3	7. 7	-0. 6	-7. 2	5. 9	5.
0. 6	7. 6	5. 7	-1. 9	-25. 2	3. 5	2.
0.	11. 0	7. 5	-3. 5	-31. 7	5. 2	5.
1. 0	8. 1	5. 4	-2. 7	-33. 2	2. 4	1.

Sample Calculations

To find average of initial mass of potato core with 0. 2M solution: # 1 + # 2 + # 3 / 3 5. 8 + 11. 6 +2. 5 / 3 = 6. 6 To find average of final mass of potato core with 1. 0M solution: # 1 + # 2 + # 3 + # 4 / 4 5. 4 + 6. 7 + 6. 2 + 3. 2 / 4 = 5. 4 To find change in mass in 0. 4M solution: Final mass – initial mass = change in mass 7. 7 – 8. 3 = -0. 6 To find percentage change in mass in 0.

6M solution: Final – initial / initial x 100 5. 7 – 7. 6 / 7. x 100 = -25. 2 Figure 1: The effect of sucrose solution on the mass of potato cores Figure 1: In the above graph, it's visible that with an increasing concentration of sucrose solution there is also a decrease in the percent change in mass. The r? value of 0. 9416 represents that there is a good relationship in the data between the concentration of sucrose solution and the percent change in mass. The relationship between the data can also be proven by the error bars, representing the standard deviation from the data points and the amount of uncertainty.

With the small error bars we know that the data is reliable; although as the last few points overlap this indicates that the data is similar.

Conclusion

I found that as the concentration of sucrose increased, the change in mass and percentage of the change in mass decreased. This data did support the hypothesis, as we knew from the term osmosis. Osmosis is the process of diffusion of water molecules from an area of higher concentration to lower concentration. The concentration gradient between the potato and the sucrose solution leads to the number of molecules coming in and out of the potato.

Therefore, the data support the hypothesis as to when the water concentration was lower in the potato than in the sucrose solution, the water molecules moved through the semi-permeable membrane into the potato which caused it to gain weight. With a higher concentration of water in the potato, the result would be the opposite. Hence the prediction that the lower

the concentration of sucrose, the higher the final weight of the potato was reinforced. The hypothesis is supported by the evidence of the graph. With a concentration of 0. M sucrose solution the increase in the change of mass was 1. 6g and a percentage change of 22. 3%. In comparison, the 0. 8M sucrose solution had a change in mass of -3. 5g and a loss of 31. 7%. Although in Figure 1 the r? value gives the impression that the data is very reliable, some of the error bars do overlap. While observing the data there are no outliers present, although when inspecting the change in mass the development between the 0. 8M concentration of sucrose and the 1. 0M numbers slightly increase; when accurately they would continue decreasing.

This may perhaps be the result of certain potential errors.

Evaluation

My results, while mostly concrete, had particular places where a few errors could have occurred; as they diff from the hypothesis that with a higher concentration of glucose there should be a decrease in the change of mass. As our class only had a certain amount of time to complete the lab, each group completed the lab with three different sucrose solutions. At the end of collecting our data, our classes' results were compiled together to compare.

An error is a fact that each group's statistics came from different potatoes. As different potatoes were used, the pores in the membrane of each potato are different, causing a different amount of water molecules to be able to pass through and into the solution. This could prove the overall data to be unreliable. To fix this deviation, with more time a group can complete their own lab with the full data with a single potato. Another error is the factor of

temperature. Temperature affects osmosis as with a higher temperature the molecules are moving faster, causing osmosis to increase.

As we left our beaker s with the potato cores inside the classroom overnight, the classroom temperature may have increased or decreased which would affect the rate of osmosis inside the beaker. Due to the fact that it's September, we can assume that the classroom temperature would decrease overnight; including the consequences that perhaps a window or door would have been left open. As the temperature in the classroom decreased, the rate of osmosis did as well. To fix this normal variation error, the temperature of the classroom could be recorded as we placed the beakers around the classroom to be left.

Overnight it would be made sure that no windows or doors are left open, and that the temperature stays the same throughout the experiment. A systematic error has to do with the scales that were used. The scales were a necessity for this lab; it's important that they're working correctly. While planning for this lab not at one point were the scales that we were using checked to make sure that they were fully functioning. This could establish the scale giving off false numbers that change our entire experiment. In the beginning, before proceeding with the lab it must be made sure that the equipment is regularly checked and operative.

To do so, we can take an object that we can identify the weight of, and test it on the scale to make sure it's correct. As an extension to this investigation, it could be completed again but testing osmosis with more of a variety of the amount of sucrose solution- it could exceed a concentration of 1M to extend

to 2M. This experiment could also be completed using different time frames; instead of letting the potatoes rest for one day they could be let stand for one hour, or two hours to test how osmosis works within this shorter time frame.

To fix our errors stated above, we must first make sure that all of our equipment is running properly and that the temperature of the room does not vary overnight.

Bibliography:

1. Diffusion and osmosis. (n. d.). Retrieved from http://hyperphysics. phy-astr. gsu. edu/hbase/kinetic/diffus. html McGraw-Hill. (2006).
2. How osmosis works. Retrieved from http://highered. mcgraw-hill. com/sites/0072495855/student_view0/chapter2/animation__how_osmosis_works. html