Diffusion and Osmosis

Introduction:

Osmosis is related to many things in life such as diffusion. Osmosis is movement of water from high concentration to low concentration of water. This can result to hypertonic, isotonic or hypotonic. If the cell was to be place in hypertonic the cell would shrink due to high concentration. If the cell was to stay the same, this would mean that the concentration is same meaning it is isotonic. If the cell was to expand this would mean there is a low concentration meaning it is hypotonic. Diffusion also goes from high concentration to low concentration however molecules get passed through as well. We conducted an experiment with methylene blue to see if the high concentration or the low concentration of methylene blue diffusion faster. We also conducted another experiment to see if osmosis would take place whether if it will go from high concentration to low concentration or from high concentration to low concentration and what would happen to the plant cell when NaCl (salt water) is added.

Hypothesis:

We conducted two labs, one to prove diffusion and one to prove osmosis. Our hypothesis for diffusion was that the high concentration of methylene blue would spread to low concentration of methylene blue in the agar plate faster. This is because the high concentration has more solutes in it,

therefore can diffuse more than the one with low concentration. The second lab we conducted an experiment on was to check osmosis and the effects that the salt water would have when we put a drop of it on the plant cell. Our hypothesis was that the plant cell would have a hypertonic reaction and it would shrink when placed in salt water.

Methods:

For both of the experiments we took specific steps so that we can get accurate results. For the diffusion lab we took two agar plates and poked holes in the plate 2mm wide. Then we placed two drops of methylene blue in each agar plate. We added two drops of methylene with high concentration of 2.5% inside the hole in one of the agar plate then we added two drops of methylene blue with low concentration of .25% inside the hole of the other agar plates. We the agar plates, and then checked them every 15 minute till 45 minute. We recorded the data to see which concentration would move into the agar plate. For the osmosis lab we took three pieces of elodea plant and placed a piece of it on each slide. We then took the slides and added three different types of water to them in order to see what would happen to the plant cell. For one of the slides with the plant we added a drop of 10% NaCl (salt water), with the other we added distilled water and with the last slide we added pond water. Then we looked at each slide under the microscope to see what had happened to the cell of the elodea plant in each different type of water.

Results:

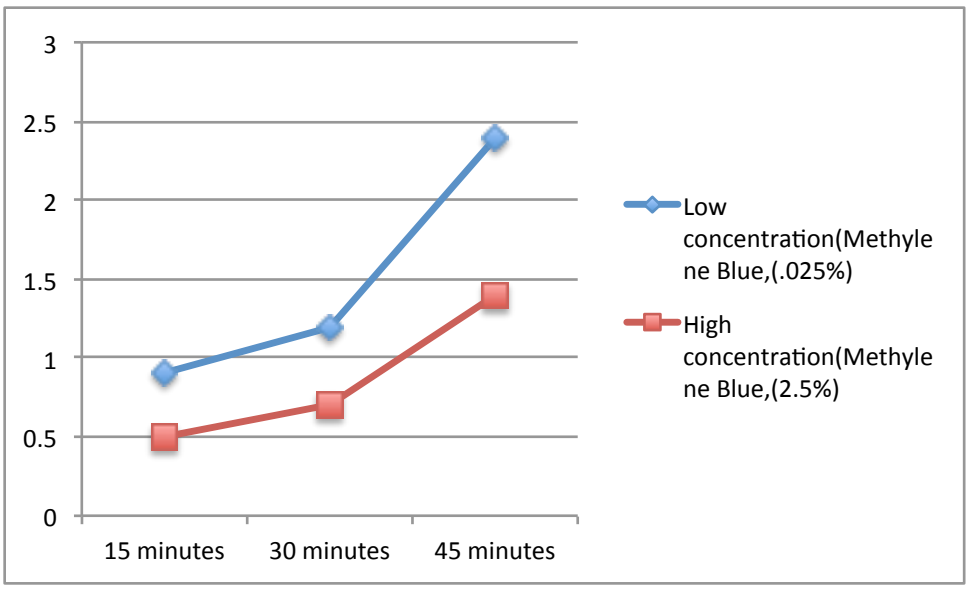
My initial hypothesis about osmosis and diffusion was proved to be corrected by the lab experiments that my group and I coordinated. The results that were seen from the diffusion experiment proved my hypothesis right. We checked the agar plate every 15 minutes, at the first

15 minutes the results for low concentration (25%) of methylene blue were .4 then at 30 minutes it was .5 and finally at 45 minute it was 1. The results of high concentration (2.5%) of methylene blue at the first 15 minutes were .5, at 30 minutes it was .7 then at 45 minutes it was 1.4. This proves that methylene from high concentration diffuse faster than a low concentration of methylene blue. For the osmosis experiment we saw that when a drop of NaCl was added to the elodea plant cells the cells shrank showing a hypotonic result. And in the pond water the elodea plant stayed the same, showing an isonic result. This proved my hypothesis to be accurate.

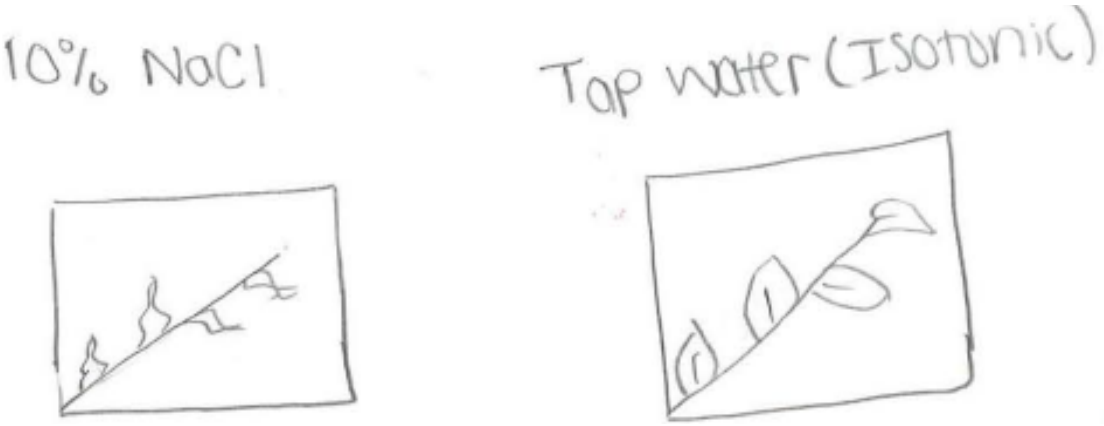
Conclusion:

Osmosis and diffusion are both essential part of life. They both have an impact on all living organisms one way or another. My hypothesis was proved to be accurate in both experiments that we conducted. For the osmosis laboratory my group and I stated that the plant cell would shrink when a drop of NaCl was added to the plant cell. Our theory was proven to be correct. This is because when we placed a drop of NaCl on the plant cell, we looked at the plant cell under the microscope and noticed that the plant cells were all shriveled up and had shrunken as well as they (the cell) had lost their original shapes. My hypothesis for the diffusion lab was also proven to be right, this is because once we started recording the data every 15 minute to see if the high or low concentration spread faster. My group noticed that the methylene blue with the high concentration moved faster into the low concentration inside the agar plate, than the methylene blue with the low concentration.

1


3
2.5
2
1.5
1
0.5
0
15 minutes
30 minutes
45 minutes
Low concentration(Methylene Blue,(.025%)
High concentration(Methylene Blue,(2.5%)

2


10% NaCl
Tap water (Isotonic)
Pond water

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Work Sample Evaluation

Subject Area: Biology
Task Title: Water Works: Cells & Osmosis
Student Work Sample Title: Diffusion and Osmosis

The document was scored using the *CCR Task Bank Rubric for Scientific Research Plans and Reports.* The final scores are indicated in the following chart.

Scoring Criteria	Insufficient Evidence	Developing	Progressing	Accomplished	Exceeds
Hypothesis Development		**X**			
Research Plan			**X**		
Results and Interpretation		**X**			
Communication			**X**		
Organization			**X**		
Accuracy		**X**			

Annotations: The following evidence from the work sample and the reviewer's comments support the scores above. Page and line numbers refer to the original work sample.

Scoring Criteria	Page #	Line #	Commentary about the work sample
Hypothesis Development: *Locating resources in order to develop a thesis or hypothesis*			The work sample does not include actual references to outside research.
	1	3-9	The work sample shows some understanding and explanation of the concepts, however it does not state that it "solute molecules" create the concentrations. It is difficult to discern if the student knows which are hypotonic and hypertonic solutions.
Research Plan: *Planning, conducting, and describing an experiment or study*	2	6-17	The student work sample demonstrates an understanding of how to design the experiment in order to answer the questions.
Results and Interpretation: *Describing and interpreting results in relation to the hypothesis*	3	1-7	The work sample lacks a discussion that demonstrates an understanding of how and why the results turned out as they did.
	4	2	The drawings provided in the work sample need more written explanations in order to understand the points being made.
Communication: *Using subject appropriate language and considering audience*	All		In general, the student uses appropriate scientific terms in the correct way.
Organization: *Structuring main ideas and incorporating supporting information*			The student refers back to the introduction in order to makes their points in the conclusion.
	3	11-15	At times, the student gets confused as to which solution is hyper-, hypo- or isotonic and WHY they are comparing the cells' contents.
			Though it may have been clearer to to take each experiment in turn and explain them separately, the work sample does follow a basic structure of hypothesis, methods, and results.
Accuracy: *Attending to detail, grammar, spelling, conventions, citations, and formatting*	1	15-17	While referring to solutes in the form of concentrations, the student's use of the terms "spread to low" makes the statement confusing.
	All		Most of the requirements for the assignment were present in the work sample. However, the sketches would have benefited from an introduction and explanation of the information.
	1	2-13	Some of the writing in the work sample was confusing. (See Introduction for examples.)