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Laboratory 2 – Molecular Activity and Membrane Transport
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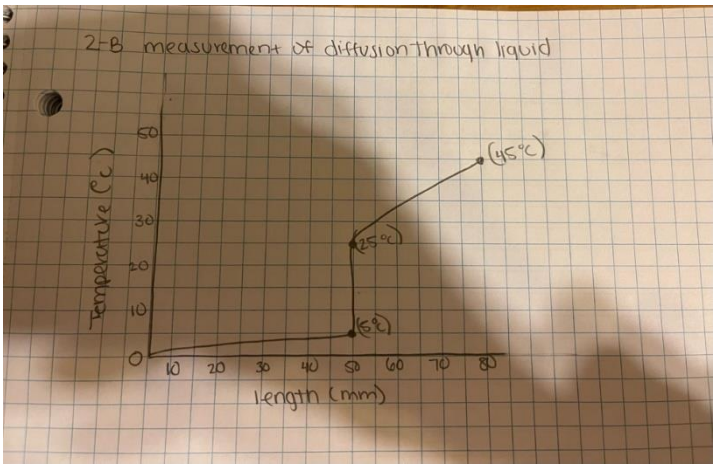
Purpose – For us to understand all experiments in this lab we must first understand the mechanism of passive transport, active transport, diffusion, and osmosis. Laboratory 2, the molecular activity and membrane transport introduces how diffusion and osmosis both act as a passive transport which is the constant movement of molecules, diffusion is the movement of molecules from high concentration to low concentration and osmosis is the movement of water from high to low water concentration. Active transport is the movement of molecules across a cell membrane with the use of ATP.

Procedures – There are many procedures and experiments that were done for lab two. The First procedure was to understand the mechanism of Brownian motion. The second procedure was to understand the differences between active and passive transport. For lab 2-B, measurements of diffusion through a liquid we had three petri dishes filled with forty ml of twenty-five Celsius water; we then dropped one crystal of potassium permanganate into all three of the petri dishes. Before dropping the potassium, we had to measure the same amount for all three and record the time we dropped it into the water. After the five minutes had passed, we had to measure how much the drop of potassium permanganate had grown in millimeters. After the first one was done, we dumped that water and added five Celsius water into all three dishes and added one drop of potassium permanganate into each dish; after five minutes we had to measure how much it had grown in millimeters. For the last one we added forty-five Celsius water into all three dishes and added a drop of potassium permanganate and after five minutes measure it in millimeters. For lab 2-C, measurement of diffusion through agar, we were given a petri dish filled with agar. The agar had two holes in it. In the first hole we placed two drops of methylene blue and into the second hole we placed two drops of potassium permanganate. Once the drops were placed you had to record the time and diameter of each spot and that will start with your time zero measurement. We had to measure the diameter of each spot in millimeters once every minute for fifteen minutes and construct a graph. For lab 2-D, demonstration of filtration we had three separate glass funnels and had to fold three filter papers in each and wet them so they can stick to the funnels. We had three beakers and had to fill them with one hundred millimeters of water. We added charcoal in all three beakers to make one thick, one medium thickness, and the third one thin in texture. After mixing the water and charcoal together we had to pour fifty ml of each solution into all three funnels from all three beakers. Once you poured them, we had to count the number of drops per minute for all three funnels. To make it easier we counted the number of drops for fifteen seconds and multiplied it by four to get the drops per minute. Once all three funnels were halfway empty and nearly empty, we counted the number of drops per minute for all three solutions. For lab 2-F, measurement of osmosis, we started off by securing two dialysis bags from one end. We then went to weigh the empty dialysis bags and recorded the weight. We filled one bag with a twenty-five percent sucrose solution (blue) and the second bag filled with fifty percent sucrose solution (red) and securing the other end, so they won't leak. We filled two beakers with distilled water and inserted both bags into the two beakers. Make sure the bottom of the bags is not touching the bottom of the beaker and let them sit in the beakers for five minutes for the system to equilibrate. We weighed the two bags every ten minutes for fifty minutes and made a table for our results. For lab 2-G, measurement of differential permeability

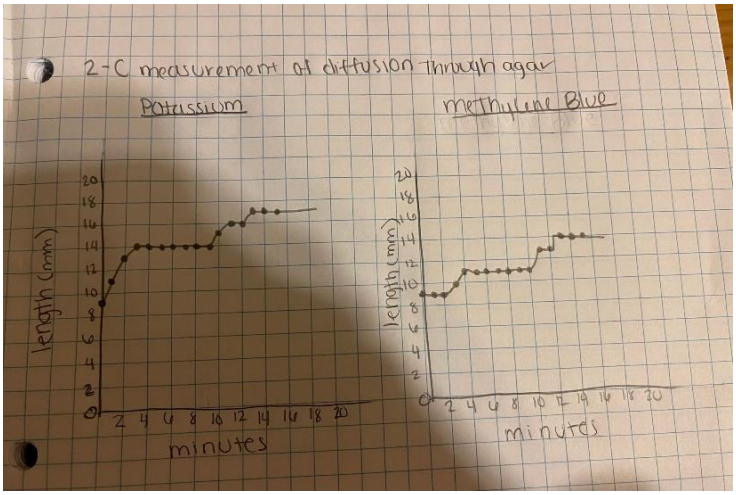
of sugar and starch. We filled and secured the end of one dialysis bag with one percent starch and ten percent glucose solution in the same bag. We then filled a glass beaker with distilled water and submerged the dialysis bag into the water. After fifteen minutes had passed, we tested the water in the beaker from there being starch and sugar. We tested for starch by adding ten drops of Lugol's solution in only five ml of water that was obtained from the beaker. If there was starch present the water would turn a navy-blue color and if no starch was present the water would be a reddish color. To test if there was sugar present in the water, we added three ml of Benedict's solution to the five ml of water that was obtained from the same beaker. We simmered the solution at low boil for five minutes; if there was no sugar the water would be a blue color and if there was sugar present there were many color changes. Little sugar in water, the water would turn green, moderate sugar the water would turn yellow, more sugar the water would turn orange, and lots of sugar the water will turn red. We tested the water in the beaker every fifteen minutes for one hour. For lab 2-H, the effects of tonicity on red blood cells we started off by having three different test tubes with three different solutions. The first tube had one millimeter of distilled water (hypotonic), the second tube had one millimeter of physiological saline 0.85% NaCl (isotonic), the third tube had one millimeter of salt water 2.0% NaCl (Hypertonic). Once all the solutions are in the test tube, we draw a small drop of blood from our finger and add it to each tube and mix it throughly. We must observe and draw the following, the maintenance of cell size in the isotonic solution and crenation of cells in the hypertonic solution.

Results –

2-B: Measurement of diffusion through a liquid



2-C: Measurement of diffusion through agar



2-D: Demonstration of filtration

	Thin	Med	Thick
1. 15 seconds	28 drops	25 drops	3 drops
2. 60 seconds	112 drops	100 drops	12 drops
3. Half filled	79 drops/ min	101 drops/ min	69 drops/ min
4. Nearly empty	55 drops/ min	37 drops/ min	34 drops/ min

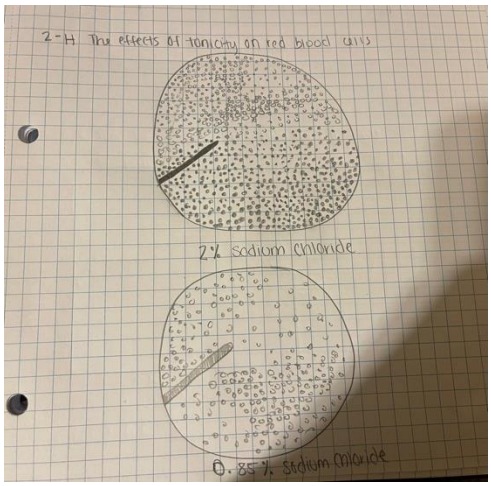
2-F: Measurement of Osmosis

Minutes	50% sucrose (red)	25% sucrose (blue)
0 min	1.40 g (empty bag)	1.40 (empty bag)
10 min	54.59 g	48.95 g
20 min	57.31 g	51.26 g
30 min	59.57	52.55 g
40 min	61.76	53. 75 g
50 min	62.81	54.52 g

2-G: Measurement of differential permeability

15 min	30 min	45 min	60 min
Starch = N/A	Starch = N/A	Starch = N/A	Starch = N/A
Sugar =N/A	Sugar = N/A	Sugar = Green/blue	Sugar = Green
		-Slight sugar in water	-Little sugar in water

2-H: The effects of tonicity on red blood cells – Demonstration



Discussion – For laboratory 2, molecular activity and measurement transport I understood five of the six experiments that were conducted. For lab B we had to record the time we started our experiment and measure the largest diameter of the colored spot in millimeters. The water was three different temperatures which had a lot to do with the colored spot growing. Based on my knowledge the colder the water got the less it would grow. On 25 Celsius and 5 Celsius water the colored spot grew 50 mm and with warmer water that was 45 Celsius it grew 80 mm. The warm water made the potassium permanganate grow. For lab C it was similar to lab B, but these Petri dishes had agar in them and one different solutions, one was methylene blue and potassium permanganate. We measured the colored spot in millimeters as well once every fifteen minutes. I had already done this experiment once last semester when I took physiology, so I was familiar with it. Potassium permanganate had the fastest diffusion rate in my results. For lab D, I found it a very fun experiment but a little messy. We had to count the drops coming down from the funnel for a minute and then when it was half full and nearly empty. The thin solution was the one that had the fastest rate of filtration. The driving force behind filtration is the water. The charcoal also influences the rate of filtration because it made the liquid thicken. For lab F, this lab was the one

I did and was easy and straight forward, the only hard part was opening the dialysis bag where we put out solution in. For this experiment are materials were two dialysis bags, 25% sucrose solution, 50% sucrose solution, and two tall beakers. We had to weigh our bags with solutions every ten minutes and record it to see if there was a change in the weight. The 50% sucrose solution had the fastest osmotic rate and the heaviest weight because it might not have been dissolving or coming out the bag. Lab G was a little like lab F, this experiment I have also done once, and it is very time consuming. For this experiment we only needed one of the dialysis bags and added 1% starch and 105 glucose and submerged the bag in distilled water. Every fifteen minutes we had to see if any of the distilled water had sugar or starch in it, and if it turned various colors. Lab H was the one I was a little confused on and did not really understand it or understand what we were looking for. I looked under the the lens and saw the two different tubes but wasn't quite sure what I was looking for or comparing so I think I need a little more explanation on that one. A couple of these labs remind me of when I took intro to chemistry, and we would mix different solutions to see the results. I honestly do enjoy doing these experiments because you just never know what two solutions do to each other mixed. In these six experiments there could have been a few errors made by us if we didn't follow the instructions. For lab B and C its its easy to mess it up just by moving them around or shaking them. For lab D if you didn't mix the water and the charcoal right and place the filter papers correctly you could have made an error and there would be no drops. Fortunately, we all did these labs correctly and carefully and got the correct results.

Conclusion – To conclude, laboratory one was very fun and interesting to work on. This lab showed us how Passive and Active transport work, which was a big help and refresher to continue with the rest of the labs. Passive transport is the movement of molecules without ATP and Active transport is the movement of molecules across a cell membrane but requires ATP. Both osmosis and diffusion are passive transports which is extremely important to understand. A

few of the experiments were similar in the way that they were conducted but had completely different answers. Lab B and C were similar and lab F and G were also similar, which was a little confusing but fun to do. I do believe that these experiments help a lot, especially similar, use I am a visual learner.