Isabel Ramos-Cervantes
BIOL 125 - 20895
Lab Day: Thurs
08/24/2023

Physiology Lab Report #2 - Molecular Activity & Membrane Transport

Purpose

Experiments were created to show how active and passive transport occurs and how membranes allow some molecules or cells in. We learned about selective permeability, osmosis, and diffusion. Also, now tonicity can affect cells.

Procedures

2-B measurement of diffusion through a liquid

- fill 3 PETRI DISHES with 40 ml of 25-degree Celsius WATER
- drop 1 CRYSTAL of POTASSIUM PERMANGANATE into each dish
- record time measure in ml and record the largest diameter of the colored spot after 5 minutes
- repeat steps 1-3 for water at 5 degrees Celsius and 45 degrees Celsius
- construct a graph of ranges and means for each temperature

2-C measurement of diffusion through agar

- PETRI DISHES have been filled with AGAR with 2 holes in them. in one hole place 2 drops of METHYLENE BLUE. in the other hole place 2 drops POTASSIUM PERMANGANATE. record time and immediate diameter of each spot
- measure the diameter of each spot in ml once every minute for 15 minutes
- construct a graph of average diffusion diameter versus time for both chemicals
- determine the diffusion rate for each chemical. Which has the fastest diffusion rate? [potassium permanganate]
- look up the molecular formula and structure of methylene blue and potassium permanganate in Merck Index Molecular formula for methylene blue C16H18ClN3S molecular weight 319.85 Molecular formula for potassium permanganate KMnO4 Molecular weight 158.03

2-D demonstration of filtration

- fold 3 FILTER PAPERS into cones and insert them into 3 separate GLASS FUNNELS. wet the papers to make them stick to the glass
- prepare 3 100-ml solutions of CHARCOAL and WATER. make one thick, one, medium thickness, and one thin. record mass of charcoal used in each preparation
- pour 50 ml of each solution, one at a time, into a funnel
- immediately count the number of drops produced per minute
- count the number of drops per minute when the funnel is half-filled
- count the number of drops per minute when the funnel is nearly empty

- did the charcoal pass into the filtrate? [no] which solution had the fastest rate of filtration? [light] what is the driving force behind filtration? [amount of charcoal] What other factors influence the rate of filtration? [how the filter paper is folded] do your results illustrate these influencing factors? [yes]
- repeat these procedures with the remaining 50 ml of solution

2-F measurement of osmosis

- attach DIALYSIS BAGS filled as much as possible with SUCROSE SOLUTIONS securely to the bottom of 2 open, thin glass tubes. one bag should be filled with a 25% SUCROSE solution and the other filled with 50% SUCROSE solution
- insert both bags into separate BEAKERS of DISTILLED WATER making sure the dialysis bags are fully submerged but not touching the bottom of the beakers and suspend each by gently applying a RING STAND CLAMP to the glass tubes. check for solution leaking out of the bags
- allow 5 minutes for the systems to equilibrium then mark the fluid levels of each glass tube with a felt pen. record the time
- record the fluid level of the glass tubes in ml every 10 minutes for 50 minutes
- If the fluid level rises to the top of the glass tube sooner than 50 mins, record the time it took to get there, measure the length in ml from the equilibration line to the top of the glass tube. divide that length by the number of minutes to get your rate in mm / min
- determine the rate of osmosis for each system. Which system had the fastest osmotic rate, the 25% or the 50% sucrose solution?

2-G measurement of differential permeability of sugar and starch

- fill a DIALYSIS BAG w/ a 1% starch - 10% glucose solution
- tie the bag to a glass rod and suspend it in a beaker of DISTILLED WATER
- after 15 check water for starch and sugar
- test the water in the beaker again at 30,45,60 mins
- record results

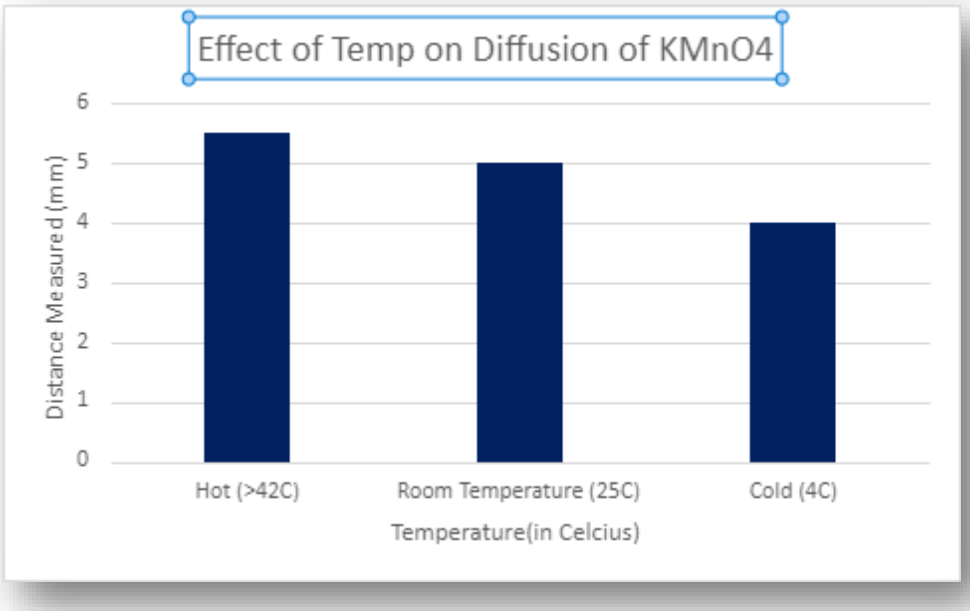
2-H the effects of tonicity on red blood cell- demonstration

- one ml of each of the following solutions will be in 3 test tubes a. distilled water (hypotonic) b. physiological saline- .85% NaCl (isotonic) c. salt water- 2.0% NaCl (hypertonic)
- a small drop of BLOOD will be added to each tube and the contents thoroughly mixed
- a wet mount slide will be made of each solution
- examine each slide under the high-dry lens of a COMPOUND MICROSCOPE
- Observe a hemolysis of cells in the hypotonic solution b. maintenance of cell size in the isotonic solution c. crenation of cells in the hypertonic solution
- make a drawing of each observation and provide an explanation for each

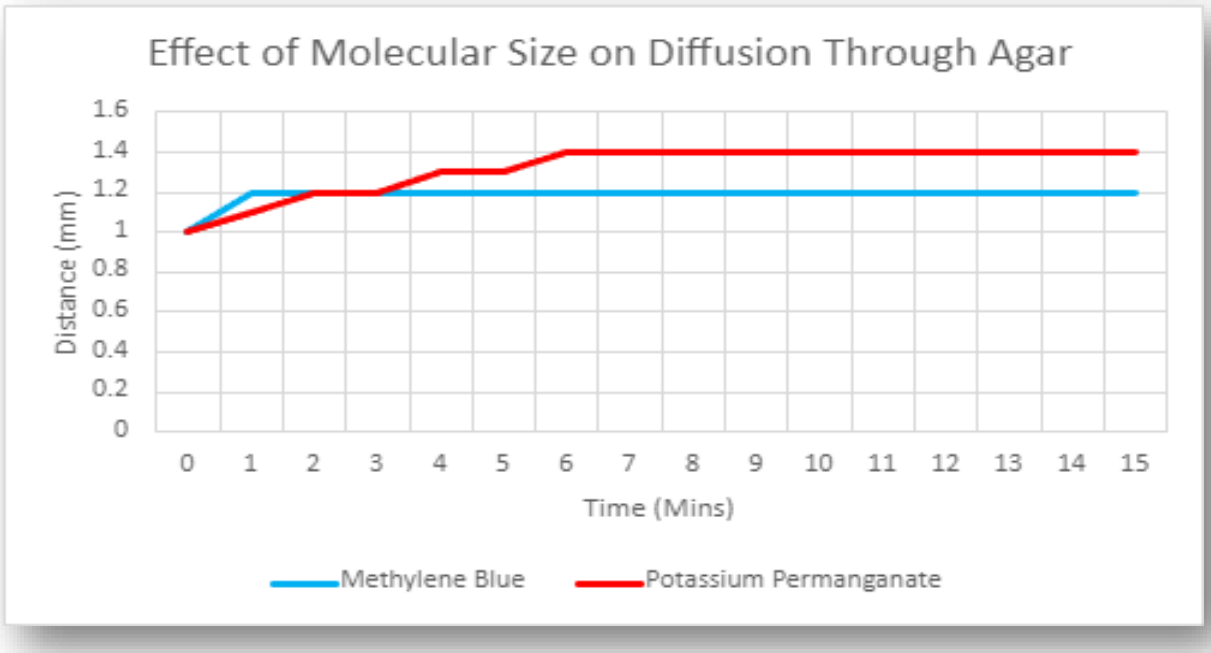
Results

- In this lab we conducted a series of 6 experiments. This is where I will share my results:

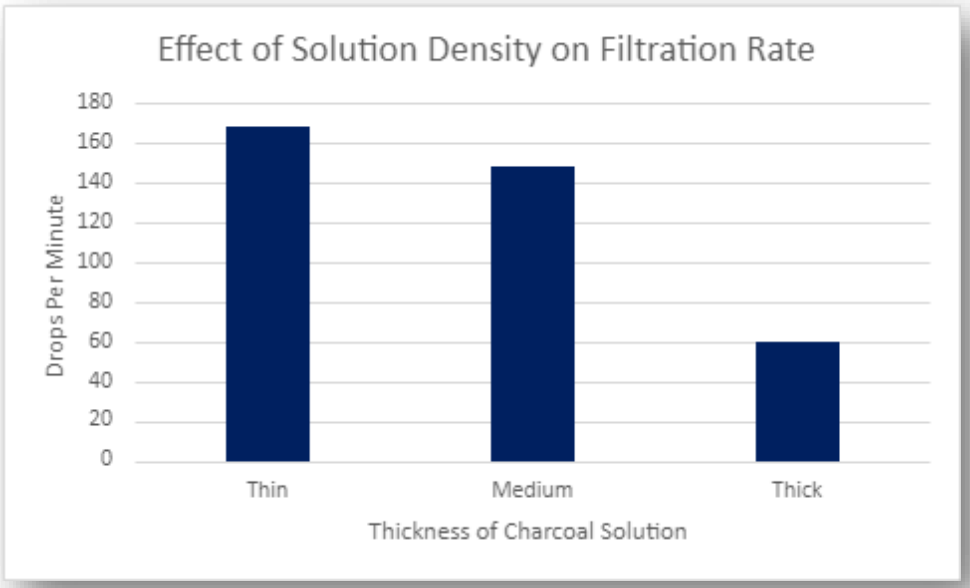
2-B measurement of diffusion through a liquid



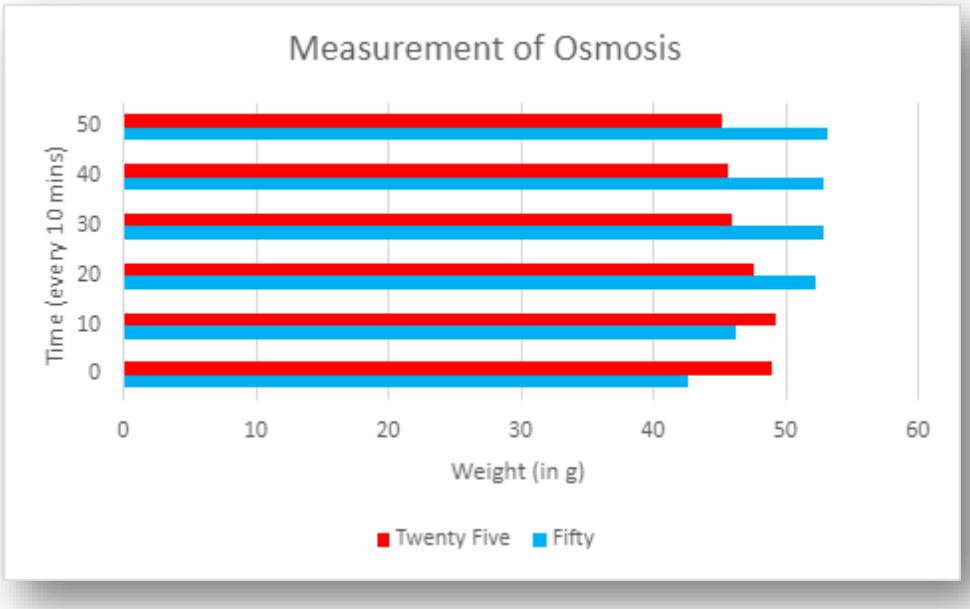
2-C measurement of diffusion through agar



2-D demonstration of filtration



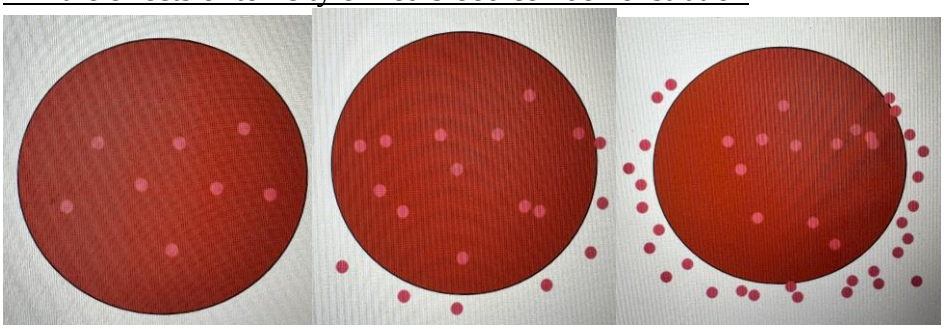
2-F measurement of osmosis



2-G measurement of differential permeability of sugar and starch

Time (every 15 mins)	Starch Present	Sugar Present
15 mins	No	No
30 mins	No	Yes, a little
45 mins	No	Yes, a little more
60 mins	No	YES, A LOT

2-H the effects of tonicity on red blood cell demonstration



hypotonic isotonic hypertonic

Discussion

- In this lab my partner and I did 2C the first day. In this lab we were able to see how both the methylene blue and potassium diffused. This means that both went from an area of high concentration which was the buildup off the drops in the petri dish to completely spreading out and becoming bigger. We also did 2G and that one was very interesting. I took it as an example of selective permeability of a membrane. For example, a membrane will allow some cells to enter and exit, but some are not allowed to pass. In this case the glucose was permeable, but the water was not. I also was not able to explain 2H very well but it was my idea of the microscope as the several types of examples you could see how it was more spread out depending on the concentration. Overall, this lab was interesting and fun. I am not really a visual learner, more of a hands-on learner and this allowed me to gain a better understanding of the material.

Conclusion

- The basis of these experiments was to show us how diffusion occurs and how it all depends on the temperature and size of the cell or in this case the different solutions and amounts. It was also to show us that osmosis is dependent on the concentration whether it be low or high. Finally, filtration is dependent on the density of a solution.