The purpose of this lab was to familiarize ourselves with the various processes that move materials in and out of cells like osmosis and diffusion.

2C procedure

1. Petri dishes have been filled with agar. Two holes have been made in the agar. Into one hole, place two drops of methylene blue. Into the other hole, place two drops of potassium permanganate. Record the time and immediate diameter of each spot. This will be your time zero measurement.

2. Measure the diameter of each spot in millimeters once every minute for fifteen minutes. Calculate the averages from the data collected by all groups doing this exercise. Summarize these data.

3. Construct a graph of average diffusion diameter versus time for both chemicals.

4. Determine the diffusion rate of each chemical. Which has the fastest diffusion rate, methylene blue or potassium permanganate? Record these results.

5. Look up the molecular formula and structure of methylene blue and potassium permanganate in a Merck Index. Make note of this information.

6. Interpret your result with respect to the information obtained from the Merck Index.

2D Procedure

1. Fold three filter papers into cones and insert them into three separate glass funnels. Wet the papers to make them stick to the glass.

2. Prepare three 100-milliliter solutions of charcoal and water. Make one thick, one medium thickness, and one thin. Record the mass of the charcoal used in each preparation.
NOTE: if your “thin” solution continually runs through the filter, making it impossible to count drops, it is too thin; you will need to make all your solutions proportionally thicker.

3. Pour 50 ml of each solution, one at a time, into a funnel.

4. Immediately count the number of drops produced per minute.
NOTE: it may be easier to count the drops for 15 seconds then multiply by four to obtain drops per minute.

5. Count the number of drops per minute when the funnel is half-filled.

6. Count the number of drops per minute when the funnel is nearly empty.

7. Did the charcoal pass into the filtrate? Which solution had the fastest rate of filtration? What is the driving force behind filtration? What other factors influence the rate of filtration? Do your results illustrate these influencing factors?

8. Repeat these procedures with the remaining 50 ml. of solution.

2F Procedure

1. Attach dialysis bags filled as much as possible with sucrose solutions securely to the bottom of two open, thin glass tubes. One bag should be filled with a 25% sucrose solution and the other should be filled with a 50% sucrose solution. Make sure ends of the tubes are immersed in the solutions.
NOTE: reliable results depend on your ability to tightly seal the dialysis bags.

2. Insert both bags into separate beakers of distilled water making sure the dialysis bags are fully submersed 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.

3. Allow five minutes for the systems to equilibrate. Then, mark the fluid levels of each glass tube with a felt pen. Record the time.

4. Record the fluid level of the glass tubes in millimeters every 10 minutes for 50 minutes.

5. If the fluid level rises to the top of the glass tube sooner than 50 minutes, record the time it took to get there, measure the length in millimeters from the equilibration line to the top of glass tube. Divide that length by the number of minutes to get your rate in mm/min.

6. Determine the rate of osmosis for each system. Which system had the fastest osmotic rate, the 25% or 50% sucrose solution? Explain these results.

2G Procedure

1. Fill a dialysis bag with a 1% starch – 10% glucose solution. Reliable results depend on your ability to tightly seal the dialysis bag.

2. Tie the bag to a glass rod and suspend it in a beaker of distilled water.
NOTE: Test the water from the bottom of the beaker to ensure that it is free of starch and/or sugar.

3. After 15 minutes has passed check the water again for starch and sugar in the following way:

Test for starch:
a. Add 10 drops of Lugol's solution to 5 ml of water obtained from the beaker.

Reddish color = No starch
Navy blue color = Starch present

Test for sugar:
a. Add 3 ml of Benedict's solution to 5 ml of water obtained from the beaker.

Simmer the solution at a low boil for 5 minutes.
Blue color = No sugar
Color change = Sugar present (green = little sugar; yellow = moderate sugar; orange = more sugar; red = lots of sugar) 4. Test the water in the beaker again at 30, 45 and 60 minutes.

5. Record these results. Explain the significance of these findings in relation to the permeability of the dialysis bag.

2H Procedure

1. One milliliter of each of the following solutions will be in three separate test tubes.

a. Distilled water (hypotonic)
b. Physiological saline – 0.85% NaCl (isotonic) c. Salt water – 2.0% NaCl (hypertonic)

2. A small drop of blood will be added to each tube and the contents thoroughly mixed.

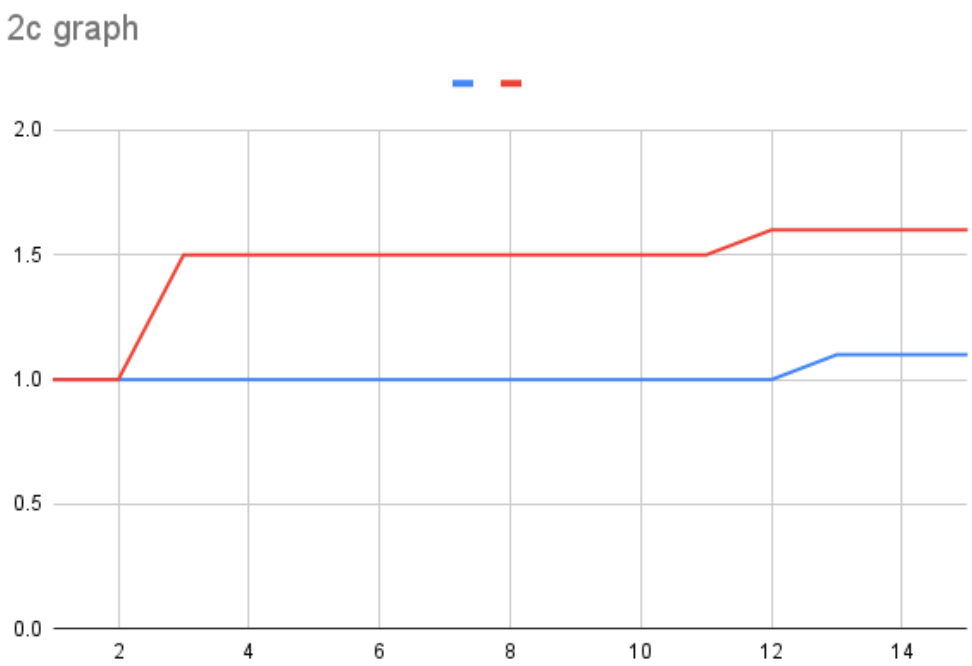
3. A wet mount slide will be made of each solution.

4. Examine each slide under the high-dry lens of a compound microscope.

5. Observe the following:
a. Hemolysis of cells in the hypotonic solution. (Note the transparent solution.) b. Maintenance of cell size in the isotonic solution.
c. Crenation of cells in the hypertonic solution.

6. Make a drawing of each observation and provide an explanation for each.

2c results

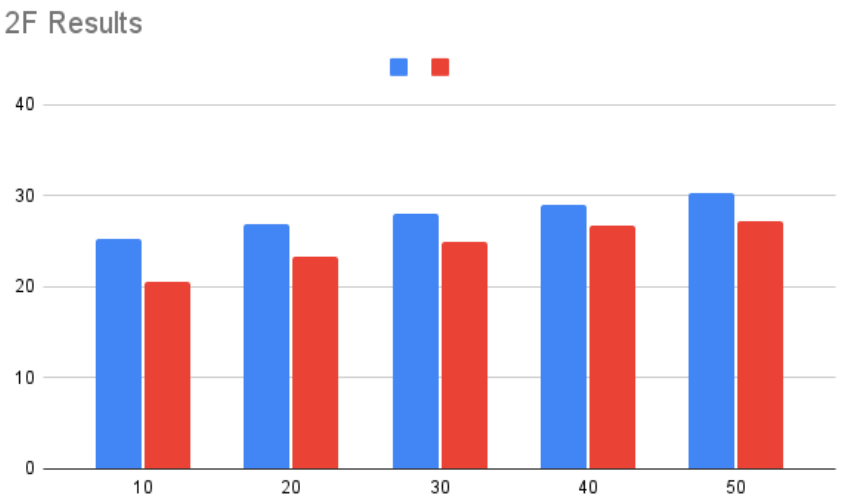


2D results	**First test**	
Thin solution 14.40g	Medium Solution 16.53g	Thick 20.04g
1 minute- 176 dpm	160 dpm	160 dpm
Half full- 40 dpm	44 dpm	32 dpm
Nearly empty- 12 dpm	20 dpm	24 dpm
	Second test	
Thin solution 14.40g	Medium Solution 16.53g	Thick 20.04g
1 minute 168 dpm	112 dpm	160 dpm
Half full 40 dpm	44 dpm	24 dpm
Nearly empty 12 dpm	20dpm	16 dpm

Conclusion: the thicker solution filters slower than the thinner solution

2F Results

X Axis time (minutes) Y axis Weight (grams)



2G Results

15 minutes No starch or sugar indicated

30 minutes no starch, moderate sugar (yellow)

45 minutes no starch, increase in sugar (orange)

60 minutes no starch, same amount of sugar (orange)

With an increase in time the sugar content increased in the beaker but not the starch. This indicates that starch was too big to pass through the dialysis bags however sugar could pass through the membrane.

2H Results

Hypotonic - cell appeared bloated and enlarged

Isotonic - No change noticed

Hypertonic- Cell appeared smaller and shriveled

Discussion

I do not believe there is much to discuss in these lab experiments, all of our data appeared to be normal and within reasonable limits. The labs were not difficult to complete and the instructions were straightforward and easy to understand.

Conclusion

The labs conducted did a good job of showing us the properties of molecular activity and membrane transport. We were able to actively measure the aforementioned properties by observing membrane transport through dialysis bags, filtration of various viscosity liquids, osmosis, the effects of tonicity on red blood cells, and diffusion through agar. All of the labs left us with workable data that was easily understood and left no unanswered questions.