Molecular Activity and Membrane Transport- Lab Report 2

Purpose: These experiments all had one common thing: they showed in real life how passive transport worked. The purpose of these experiments were to show how movement of particles moved from high to low and how with semi-permeable membranes they still moved from high to low and both of these (diffusion and osmosis) are types of passive transport.

Procedures:

2-B: Measurement of diffusion through a liquid

Procedure

1. Working in groups, fill three Petri dishes with 40 ml. of 25C water.

2. Drop one crystal of potassium permanganate into each dish. Be sure to use the same amount of potassium permanganate for each dish. Record the time.

3. Measure, in millimeters, and record the largest diameter of the colored spot after 5 minutes.

4. Repeat steps 1-3 for water at 5C and at 45C.

5. Construct a graph of ranges and means for each temperature.6. Based on your knowledge of diffusion, what is an explanation for these results?

2-C: Measurement of diffusion through agar

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 MerckIndex.Make note of this information.6.Interpret your result with respect to the information obtained from the Merck Index.

2-D: Demonstration of filtration

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? Whatother factors influence the rate of filtration? Do your results illustrate these influencing factors?

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

2-F: Measurement of osmosis

Procedure

1. Attach dialysis bags filledasmuchaspossiblewith 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 the 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 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 solutions 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 the 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.

2-G: Measurement of differential permeability of sugar and starch

NOTE: In this experiment, chemical indicators will be used to determine the presence of starch and sugar. Lugol's solution, an amber iodine-containing reagent, will turn dark navy blue in the presence of starch. Benedict's solution, a blue cupric (Cu+2) solution, when heated in the presence of a reducing sugar, will be reduced to form a reddish precipitate of cuprous oxide (Cu2O). Benedict's solution will change different colors, ranging from green to red, depending upon the amount of sugar present.

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 have 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 starchNavy blue color = Starch presentTest 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 sugarColor 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.

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

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.

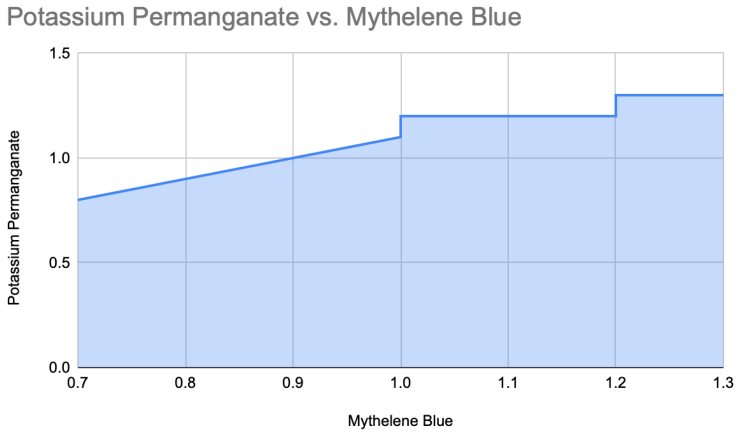
6. Make a drawing of each observation and provide an explanation for each.

Results:

2B:

Petri Dishes		
Hot	Room temp	Cold
4.2mm	3.9mm	3.0mm

2C:



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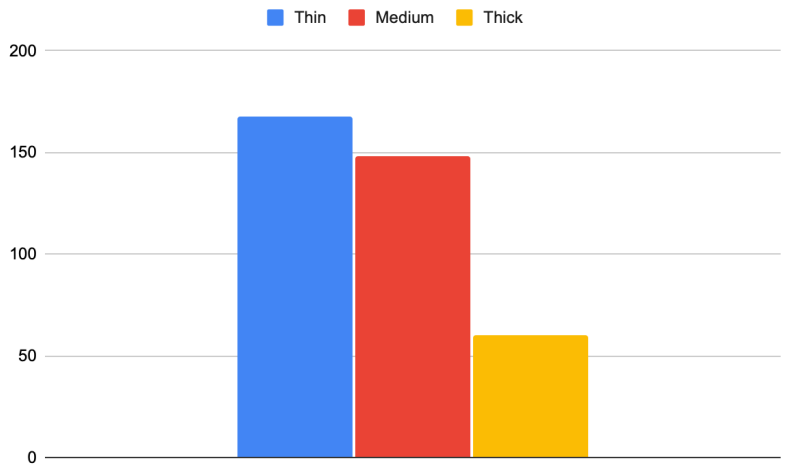
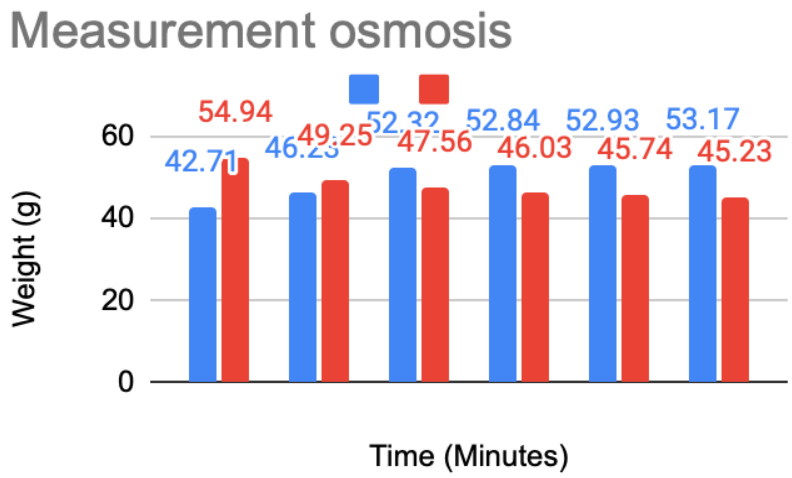


2F:



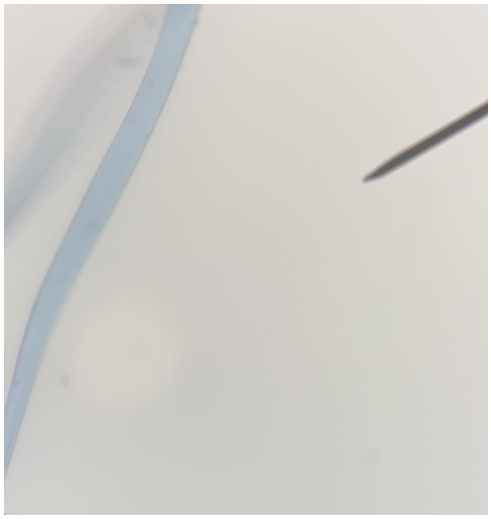
Blue: 50% Red: 25%

2G:

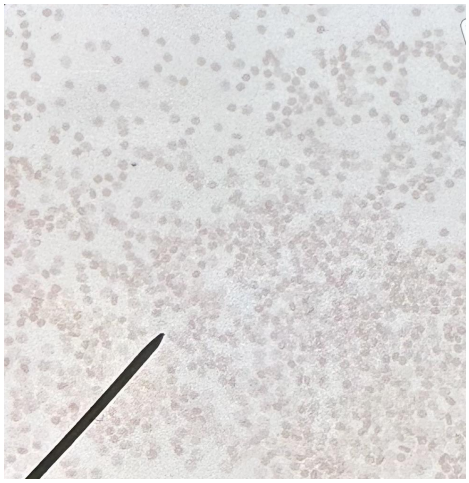
Time	15	30	45	60
A	no starch	no starch	no starch	no starch
B	little suar	moderate sugar	more to lot of sugar	a lot of sugar present

2H:

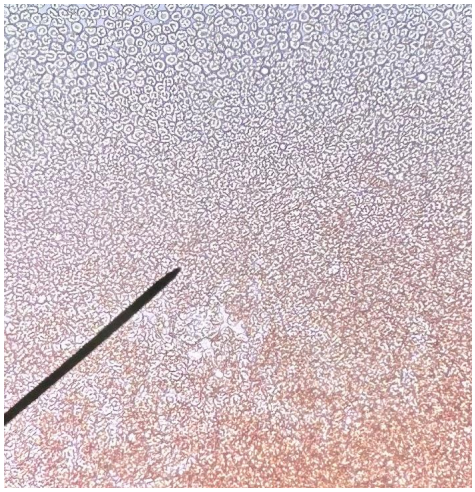
Hypotonic:



Isotonic:



Hypertonic:



Discussion:

For the Measurement of osmosis experiment the results were affected because the 25% solution was leaking out from the beginning due to not being tied correctly. This made the results for this dialysis bag decrease rather than increase.

Conclusion:

While some of our results were affected by accidental incorrect methods, when compared to other people's results, we were able to see what should have happened. Additionally, using what we learned and what we experimented on, we were able to explain and understand that what should have happened was that the weight should have increased at a faster rate than the other one. In conclusion, all the experiments showed us the effects of passive transport.