Yazmin Beltran
9/23/23
Laboratory 2 Molecular Activity and Membrane Transport

Purpose

We investigated the basic properties of passive transport including, diffusion, osmosis, and differential permeability. The concept of filtration and the effects of toxicity on cells will also be explored and understand the mechanisms of Brownian motion.

Procedures

- 2-B Measurement of diffusion through liquid

1. Fill 3 Petri dishes with 40 ml. of 25°C water.
2. Drop one crystal of potassium permanganate into each dish placing the same amount for each dish. Recorded the time.
3. Measured the millimeters, and recorded the largest diameter of the colored spot after 5 minutes.
4. Repeated the steps 1-3 for water at 5°C and at 45°C.
5. Made a graph of ranges and means for each temperature.

- 2-C : Measurement of diffusion through agar

1. Filled Petri dishes with water. Made two holes into the agar. Placed two drops of methylene blue into one hole. Placed two drops of potassium permanganate. Recorded the time and immediate diameter of each spot. This is time zero measurement.
2. Measured the diameter of each spot in millimeters once every minute for fifteen minutes. Calculated the averages from the data collected by all groups doing this exercise. Summarize these data.
3. Created 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? Recorded results.
5. Looked up the molecular formula and structure of methylene blue and potassium permanganate in the Merck index.
6. Interpreted results with respect to the information obtained from the Merck index.

- 2-D: Demonstration of filtration

1. Folded three filter papers into cones and inserted them into three separate glass funnels. Wet the papers to make them stick to the glass.
2. Prepared three 100-milliliter solutions of charcoal and water. Made one thick, one medium thickness, and one thin. Recorded the mass of the charcoal used in each preparation.
3. Poured 50 ml of each solution, one at a time, into a funnel.
4. Repeated these steps with the remaining 50 ml. of solution

- 2-F: Measurement of osmosis

1. Attached dialysis bags filled with sucrose solutions securely to the bottom of two open, thin glass tubes. One bag filled with 25% sucrose solution and the other filled with 50% sucrose solution. Made sure the ends of the tubes were immersed in solution.
2. Inserted 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 suspended each by gently applying a ring stand clamp to the glass tubes. Checked for solution leaking out of the bags.
3. Allowed five minutes for the systems to equilibrate. Then, marked the fluid levels of each glass tube with a pen. Recorded the time.
4. Recorded the fluid level of the glass tubes in millimeters every 10 minutes for 50

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

1. Filled the dialysis bag with a 1% starch - 10% glucose solution.
2. Tied the bag to the glass rod and suspended it in a beaker of distilled water.
3. After 15 mins, I checked the water for starch and sugar.

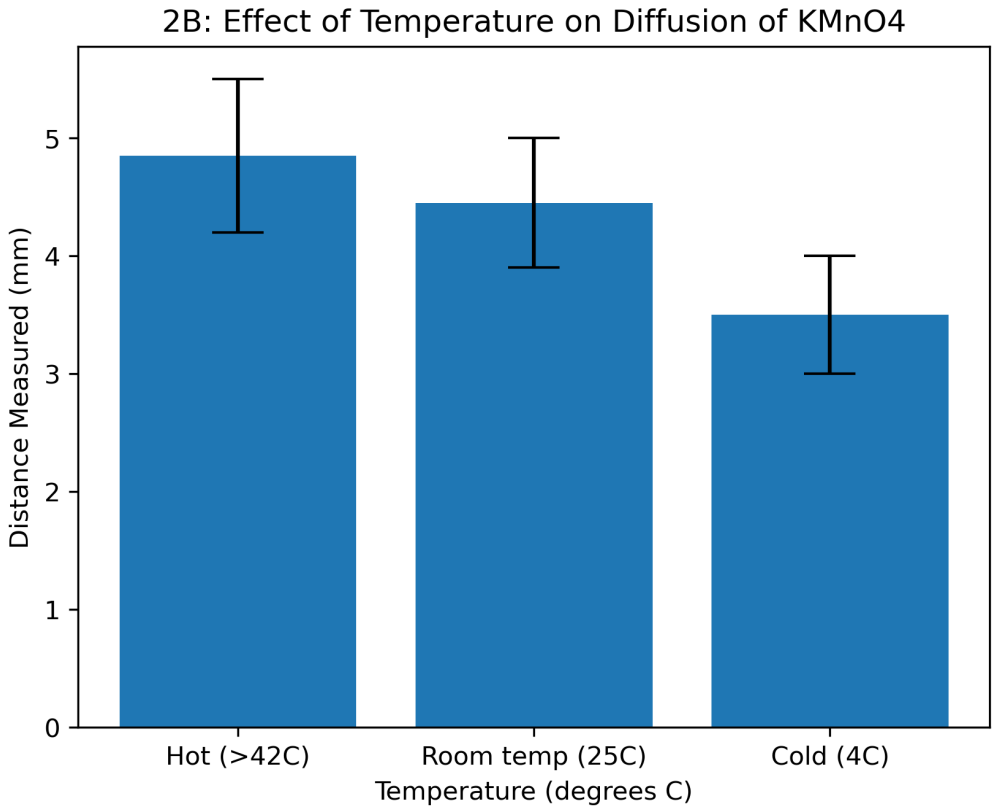
- Tested for starch:
  Added 10 drops of Lugol's solution to 5 ml of water obtained from the beaker.
  Reddish color= no starch
  Navy blue color= starch present
- Test for sugar:
  Added 3 ml of Benedict's solution to 5 ml of water obtained from the beaker. Simmered the solution at low to boil for 5 minutes.
  Blue color = no sugar
  Color change = sugar present

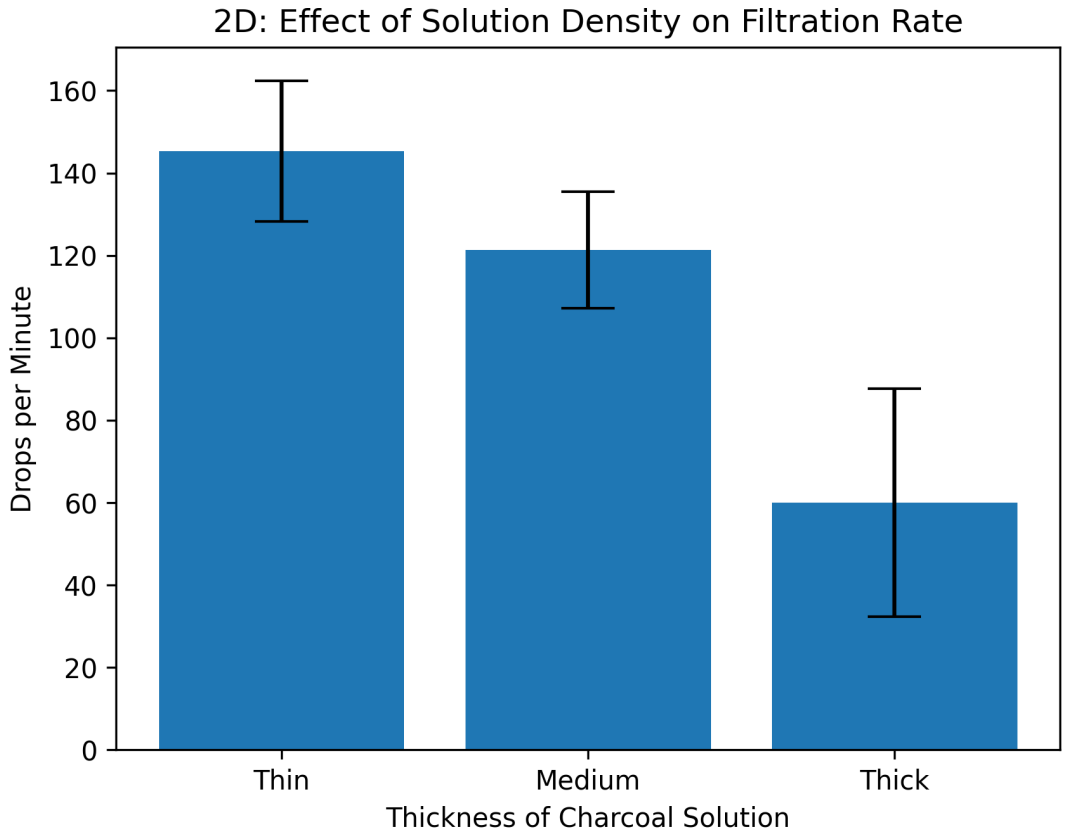
4. Tested the water in the beaker again at 30, 45, and 60 minutes.
5. Recorded the results.

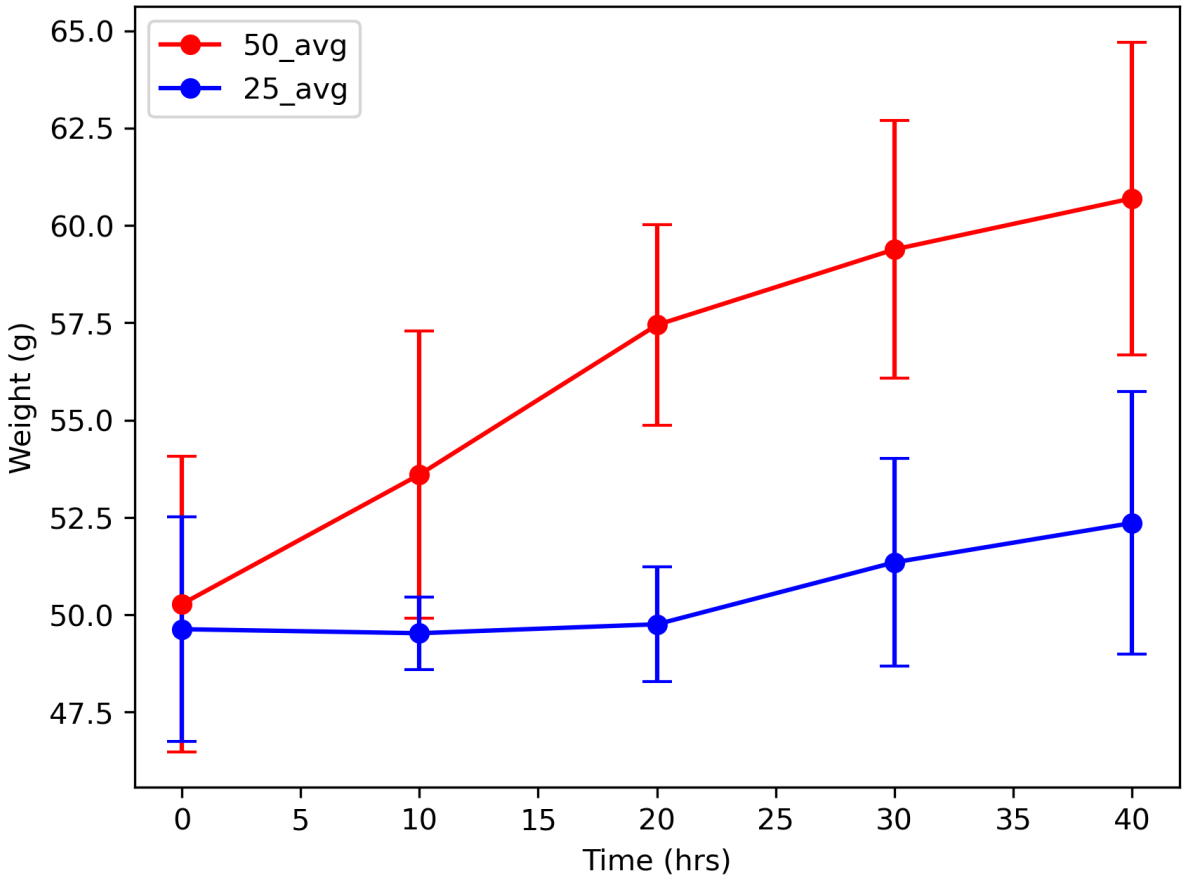
- 2-H: Effects of tonicity on the red blood cells

1. One millimeter of the following solutions was 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 was added to each tube and the contents were thoroughly mixed.
3. A wet mount slide was made of each solution.
4. Each slide was looked at under the high - dry lens of a compound microscope.

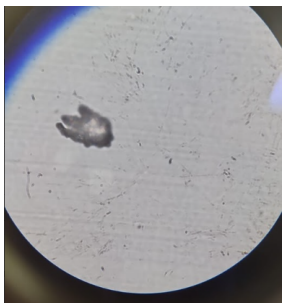
Results


2B: Effect of Temperature on Diffusion of KMnO4
Distance Measured (mm)
0
1
2
3
4
5
Hot (>42C)
Room temp (25C)
Cold (4C)
Temperature (degrees C)

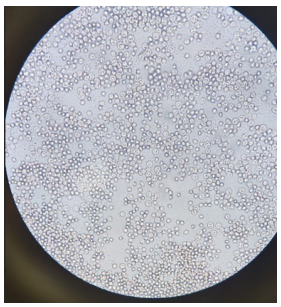

2D: Effect of Solution Density on Filtration Rate
Drops per Minute
0
20
40
60
80
100
120
140
160
Thin
Medium
Thick
Thickness of Charcoal Solution



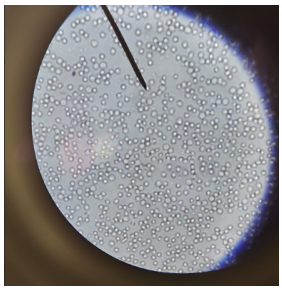
2H



Di Solution



2% Sodium Chloride



0.85% Sodium Chloride

Discussion

2-B:
Through the experiment it was clear that the temperature of the water makes a difference during diffusion. There was more diffusion with the Petri dish at 45°C than there was at 5°C.

2-D:
The thicker the solution, the slower the filtration. The results do not show a big difference between the medium and thick solution due to a slight leak of solution. When I poured the solution of the medium thick solution into the filter it leaked on the side. The thinnest solution was faster.

2-F:
The longer you left the dialysis bag filled with 25% sucrose solution and 50% sucrose solution the more distilled water got in. They both weighed more than when initially started.

2-G:
As time passes the amount of sugar in the water increases. This showed the permeability in the water. When mixed with sugar it becomes more blue in color. As sugar was escaping into the water it turned from a blue to a green, then a cloudy red. Sugar escaped from the dialysis bag while the starch did not.

2-H:
When the blood was mixed with the 25% sodium chloride you could see some movement of the blood vessels.

Conclusion

Diffusion is temperature and size dependent.
Filtration is dependent upon solution density.
Osmosis is concentration dependent.