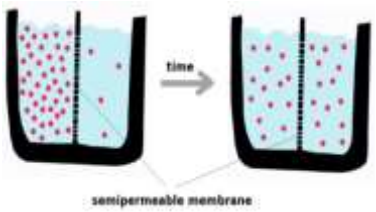
Name: _____ Date: _____



Gen Bio 1 Lab #5: Diffusion and Osmosis

Pre-lab Reading Assignment: Pages 115-121 (9th edition) Pages 114-120 (8th edition).

Pre-lab Vocabulary:

1. Diffusion-
2. Selective permeability-
3. Osmosis-
4. Hypotonic-
5. Hypertonic-
6. Isotonic-
7. Plasmolysis-
8. Crenated-

Procedure: Simple Diffusion

Materials

2-100 mL beakers
1-250 mL beaker
tap water
methylene blue
hot plate
ice

Procedure: Simple Diffusion

1. Turn on your hotplate to **80°C**.
2. Fill both 100 mL beakers with 80 mL of **tap water**.
3. Place one 100-mL beaker on the hot plate and warm to **80°C** (**do not heat to boiling**).
4. Fill your 250-mL beaker with about 50 ml of **ice**.
5. Place the other nearly full 100-mL beaker into the 250-mL beaker with ice.
6. **After 5 minutes**, add ***1 drop of methylene blue*** into each 100 mL beaker of water.
7. Check on amount of blue diffusion **every 5 min** (for a total of 20 minutes) and estimate the percentage of diffusion through the beaker in **Table 1 below**.

Table 1

Time	After 5 min	After 10 min	After 15 min	After 20 min
Hot				
Cold				

The results of this experiment tell you what about temperature & diffusion?

Procedure: Osmosis-Dialysis tubing as "cell"

Materials needed per group

Dialysis tubing (2 pieces about 10 cm in length)
String (4 pieces about 10 cm in length)
2- 100 mL beakers
tap water
syrup
starch solution
iodine

For procedures A and B, your lab instructor will tell you which version to do. You then need to find a group that did the other version, and record results from that group.

Procedure: Osmosis: Syrup and water-Version A

1. Take a piece of dialysis tubing (it looks like plastic tape). Hold it under running water several minutes to soften it and roll it between your fingers until it opens in the shape of a tube.
2. Twist one end tightly. Fold the twisted part over and tie it tightly with string.
3. Add about 4 cm of **tap water** to the "cell" you just made with dialysis tubing.
4. Twist the remaining end, fold it over, and tie it tightly with string.
5. The resulting "cell" should be **short, fat, and plump**… not long and skinny.
6. Let everyone in your group observe this "cell."
7. Put 50 mL of syrup in 100-mL beaker. ****recycle - keep for next lab****
8. Drop the "cell" in the syrup.
9. Wait 30 minutes and observe your "cell".

Questions

1.What happened to the "cell"?

2.Why did this happen?

Procedure: Osmosis: Syrup and water-Version B

1. Take a piece of dialysis tubing (it looks like plastic tape). Hold it under running water several minutes to soften it and roll it between your fingers until it opens in the shape of a tube.
2. Twist one end tightly. Fold the twisted part over and tie it tightly with string.
3. Add about 4 cm of **syrup** to the "cell" you just made with dialysis tubing.
4. Twist the remaining end, fold it over, and tie it tightly with string.
5. The resulting "cell" should be **long and skinny**… not short, fat and plump.
6. Let everyone in your group observe this "cell."
7. Put 50 mL of tap water in 100-mL beaker.
8. Drop the "cell" in the water.
9. **Wait 30 minutes** and observe your "cell".

Questions

1.What happened to the "cell"?

2.Why did this happen?

Procedure: Osmosis: Starch and Iodine

1. Take a piece of dialysis tubing (it looks like plastic tape). Hold it under running water several minutes to soften it and roll it between your fingers until it opens in the shape of a tube.
2. Twist one end tightly. Fold the twisted part over and tie it tightly with string.
3. Add about 4 cm of **starch solution** to the "cell" you just made with dialysis tubing.
4. Twist the remaining end, fold it over, and tie it tightly with string.
5. The resulting "cell" should be short, fat, and plump… not long and skinny.
6. Let everyone in your group observe this "cell."
7. Put 50 ml of tap water in 100ml beaker.
8. Put **15-30 drops of iodine** in the tap water. **It should look like tea**. If it doesn't then add more iodine, **stir to distribute**.
9. Put your "cell" full of starch solution in the iodine/water combination.
10. **Wait 30 minutes** and observe your cell.

Questions

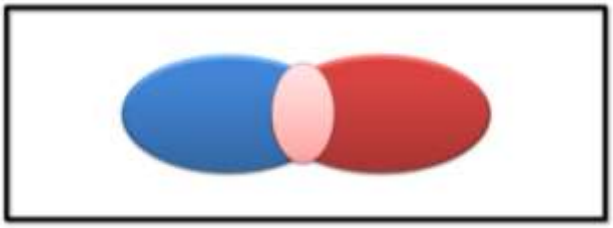
1.What happened to the "cell"?

2.Why did this happen?

Procedure: Osmosis: Sheep blood

Materials

Microscopes (2 per table)
3 slides and 3 coverslips
10% NaCl solution
0.9% NaCl solution
0% NaCl solution (pure water)
sheep's blood
pipette
wax pencil



Please refer to Figure 5-13 page 118 (8th and 9th editions) in your textbook for background reading.

Procedure: Osmosis: Sheep blood

1. Label three microscope slides (10%, 0.9%, and 0%) **with a wax pencil** to represent the three NaCl solutions.
2. For each slide, add NaCl solution drops and blood drops **as shown in the Figure above, placing the coverslip directly over the area of mixing**.
3. On the 10% slide, place a very small drop of sheep's blood.
    a. Right next to the blood place a large drop of 10% NaCl solution. Refer to the picture above
    b. Cover with a coverslip
4. On the 0.9% slide, place a very small drop of sheep's blood.
    a. Right next to the blood place a large drop of 0.9% NaCl solution. Refer to the picture above
    b. Cover with a coverslip
5. On the 0% slide, place a very small drop of sheep's blood.
    a. Right next to the blood place a large drop of 0% NaCl solution. Refer to the picture above
    b. Cover with a coverslip
6. Observe the shape of the red blood cells under the microscopes.
7. Fill in Table 2 below using the following terms:
    crenate, **lysis**, **normal**, **hypertonic**, **hypotonic**, **isotonic**

Table 2.

Concentration of NaCl	What do the cells look like?	What is their tonicity?
10% NaCl		
0.9% NaCl		
0% NaCl		

Procedure: Osmosis: Plant plasmolysis

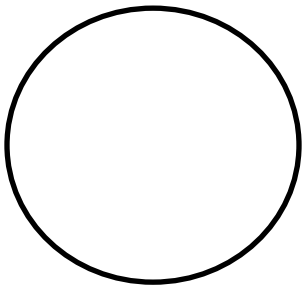
Materials

microscope
slide and coverslip
Anacharis water plant in a beaker of tap water (***change tap water at the end of each day***)
DI water
30% NaCl solution
pipette
scissors

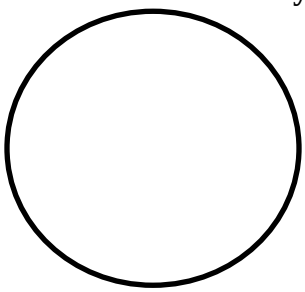
Procedure: Osmosis: Plant plasmolysis

1. Cut the tip off an *Anacharis* leaf.
2. Place a drop of water on a microscope slide.
3. Place the tip of *Anacharis* leaf in the water.
4. Place the coverslip on the leaf.
5. Observe the specimen under the microscope, remember to find under the lowest power 1st and then change powers.
6. Draw a few *Anacharis* cells below.
7. After you have drawn the cells, place 1 large drop of 30% NaCl on your specimen.
8. Wait 5 minutes and observe the specimen under the microscope, remember to find under the lowest power 1st and then change powers.
9. Draw a few *Anacharis* cells after high NaCl treatment.

Draw a picture of the *Anacharis* cells ***BEFORE* you put 30% NaCl on them.**



Draw a picture of the *Anacharis* cells AFTER you add 30% NaCl.



Questions

1. **Why did the *Anacharis* cells plasmolyze when immersed in the hypertonic solution?**

2. **What do the results of this experiment tell you about the permeability of these plants' cell membrane and cell wall?**

Questions to e x p a n d your mind.

1. What variables affect the rate of diffusion in biological systems?

2. Explain ***why*** a sailor lost at sea cannot drink saltwater.

3. If a medical technologist notes that many red blood cells are crenated, what could have caused this phenomenon?

4. ****Online Search Opportunity**** What is the difference between an osmoregulator and an osmoconformer? Give several examples of each.