

## Membrane Transport & Osmosis

*Due at the start of next lab*

1. The zigzag motion of particles resulting from collisions with smaller particles is called:

\_\_\_\_\_

2. What effect would *decreasing* temperature have on Brownian motion? \_\_\_\_\_

3. Define diffusion; include in your definition whether this process involves the movement of the solute or solvent.

\_\_\_\_\_

4. For molecules with a given amount of kinetic energy, small molecules move more rapidly than do large molecules. This difference is even more pronounced when diffusing through a semi-solid substance, such as agar, that can hinder the movement of molecules: small molecules can slip through the gaps more easily than large molecules.

- a. With this in mind, which solution, potassium permanganate (molecular weight = 158), methylene blue (mw = 320), or congo red (mw = 697) would you predict to move the fastest (and thus go furthest in a given time period) through the agar? \_\_\_\_\_

- b. How would temperature affect diffusion rates? \_\_\_\_\_

5. A \_\_\_\_\_ membrane acts as a barrier to the movement of some molecules but allows other molecules to pass through.

6. Define osmosis; include in your definition whether this process involves the movement of the solute or solvent. \_\_\_\_\_

7. Record the results from your instructor’s demonstration of osmosis in the table below:

Beaker	Sucrose Concentration in Dialysis Bag	Sucrose Concentration in Beaker	The bag solution is ___* to the beaker solution.	Weight at Start	Weight at End	Change in Weight
1	40%	0%				
2	0%	40%				
3	40%	40%				

\* isotonic, hypotonic, or hypertonic

8. Which bag(s) did you predict should gain weight and which should lose weight?

9. Do the observed results match your prediction? Regardless of whether the results matched or not. What are some possible reasons that they wouldn’t

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10 The two artificial cells shown below are separated by a selectively permeable membrane that is permeable to water but impermeable to sodium chloride (NaCl). The solution inside cell A contains a 30% NaCl solution, while cell B contains a 20% NaCl solution.

- a. Cell A is **hypotonic** / **hypertonic** / **isotonic** (circle one) compared to cell B.
- b. Draw an arrow on the diagram to indicate in which direction water would move.



11. If you were hospitalized and needed to be given fluids intravenously (IV), would you want that fluid to be hypertonic to your cells? Explain what would occur if you were to receive such a fluid.

12. Diffusion through a gel. Record data below:

Variables being measured include temperature, molecular weight, time.

	Original diameter	Diameter 30 minutes	Diameter 60 minutes	Diameter 90 minutes
Cold potassium permanganate				
Cold Methylene blue				
Warm potassium permanganate				
Warm Methylene Blue				

Answer the following questions

1. Was there a difference between the potassium permanganate and the methylene blue within each temperature range: \_\_\_\_\_
2. Why do you think this was? \_\_\_\_\_
3. Was there a difference between the warm substances and the cold substances? \_\_\_\_\_
4. Can you explain why this occurred?  
 \_\_\_\_\_  
 \_\_\_\_\_
5. Did you notice any change in the rate of expansion over time with these substances?  
 I.E. did substance A increase or decrease its rate of expansion over time?  
 \_\_\_\_\_
6. Why do you believe this occurred?  
 \_\_\_\_\_
7. Did these changes meet your expectations based on our in class discussions?  
 \_\_\_\_\_