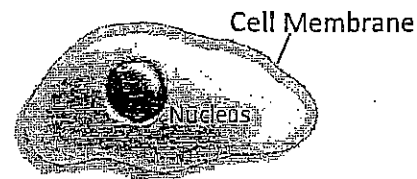


Name \_\_\_\_\_

Date \_\_\_\_\_ Per. \_\_\_\_\_

## Diffusion across a Selectively Permeable Membrane

Each cell is surrounded by a **selectively permeable cell membrane** which regulates what gets into and out of the cell. A selectively permeable membrane allows some types of molecules and ions to diffuse across the membrane and prevents other types of molecules and ions from crossing the membrane. For example, oxygen can cross the selectively permeable cell membrane, but large molecules like proteins and DNA cannot cross the cell membrane.



1. Why is it useful for each cell to be surrounded by a selectively permeable cell membrane?

Today you will investigate a synthetic selectively permeable membrane which provides a simplified model of the cell membrane. Specifically, you will test the hypothesis that smaller molecules and ions can cross this synthetic selectively permeable membrane, but larger molecules cannot.

2. Which of the following molecules do you think will diffuse across the selectively permeable membrane?

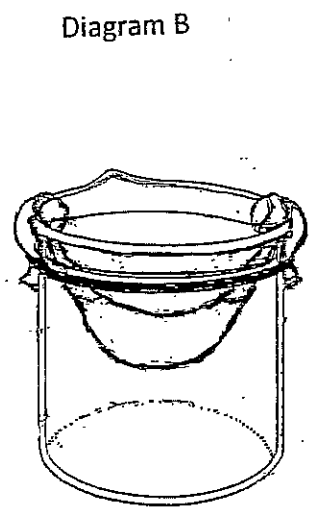
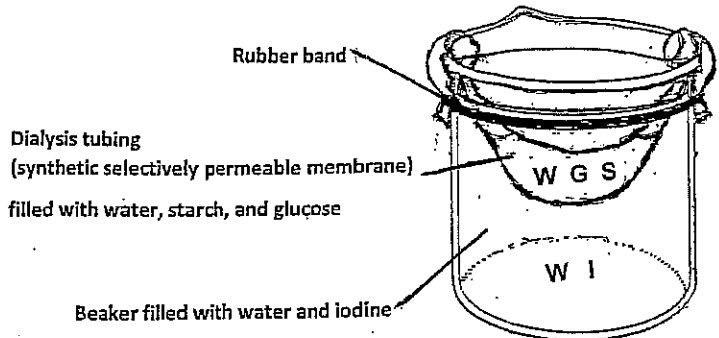
Molecule or Ion (Molecular Formula)	Will it cross the membrane?	Why or why not?
Iodine ( $I_2$ )		
Water ( $H_2O$ )		
Glucose ( $C_6H_{12}O_6$ )		
Starch (polysaccharide made up of many molecules of glucose)		

To test your predictions, you will put solutions of starch and glucose in a bag made of the synthetic membrane and put the bag in a beaker of iodine solution. You will allow time for the substances to diffuse across the membrane and then test which of the substances have crossed the membrane.

3. Diagram A shows the locations of each type of molecule or ion at the beginning of the experiment. Based on your answers to question 2, predict where each type of molecule or ion will be found after diffusion takes place. Show these predictions in Diagram B.

Key:

W = Water      I = Iodine  
G = Glucose    S = Starch



To test whether iodine or starch have crossed the synthetic membrane, you will look for a change in color. A solution of iodine is tan and a solution of starch is clear or milky white; when iodine and starch are together in the same solution, the solution is purple, dark blue or black.

To test whether glucose has crossed the synthetic membrane, you will use a glucose test strip to test for glucose in the solution in the beaker.

If water can cross the synthetic membrane, water could diffuse into the bag or out of the bag.

4. For each substance, indicate how you will know whether it crossed the synthetic membrane. What observation will be different, depending on whether or not each substance crossed the membrane?

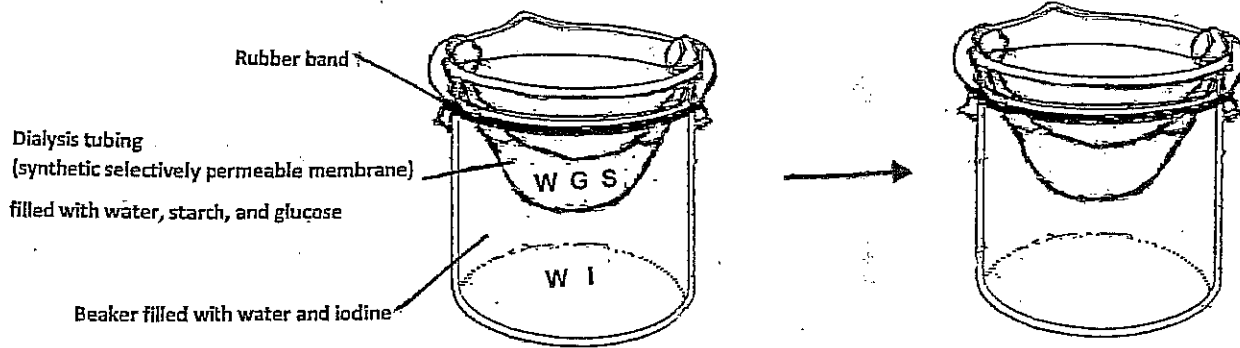
Substance	Expected Observation	
	If this substance crossed the membrane	If this substance did <u>not</u> cross the membrane
Iodine		
Starch		
Glucose		
Water		

5. The next day, record the final observations on Diagram C using colored pencils and fill out the table below.

Diagram C

Key:

W = Water      I = Iodine  
 G = Glucose    S = Starch



6. Complete this table.

Molecule or Ion (Molecular Formula)	Did this molecule or ion cross the membrane?	How do you know?
Iodine ( $I_2$ )		
Water ( $H_2O$ )		
Glucose ( $C_6H_{12}O_6$ )		
Starch (polysaccharide made up of many molecules of glucose)		

7. Did any of the results differ from the original predictions made in question 2 and 3? If so, what were the differences between the results and the original predictions?

8. Based on the results above, what characteristic of the different substances seems to determine which of those molecules and ions can cross the synthetic selectively permeable membrane?