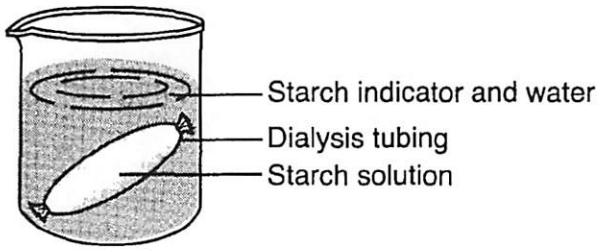
Name:

NY State Lab:
Diffusion Through A Membrane

Base your answers to questions **1** and **2** on the information and diagram below and on your knowledge of biology.

Starch turns blue black in the presence of a starch indicator. Dialysis tubing tied at both ends and containing starch solution is placed in a beaker of water. Yellowish brown starch indicator is then added to the water.

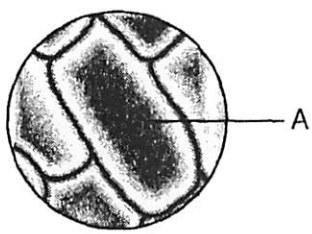


1. This laboratory setup would most likely be used to demonstrate the process of
   1) diffusion 2) active transport 3) replication 4) cellular respiration

2. What will the solutions in the beaker and the tubing look like after 20 minutes?
   1) The indicator solution in the beaker will be blue black and the starch solution in the tubing will not change color.
   2) The starch solution in the tubing will be blue black and the indicator solution in the beaker will not change color.
   3) Neither the indicator solution nor the starch solution will be blue black.
   4) Both the indicator solution and the starch solution will be blue black.

Base your answers to questions **3** through **5** on the information and diagram below and on your knowledge of biology.

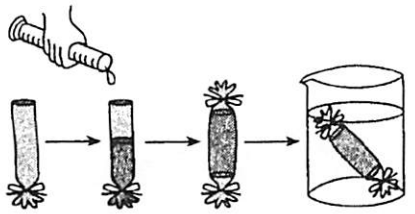
A wet mount of red onion cells as seen with a compound light microscope is shown below.



3. Which substance would most likely be used to return the cells to their original condition?
   1) starch indicator 2) dialysis tubing 3) glucose indicator solution 4) distilled water

4. Which diagram best illustrates the technique that would most likely be used to add salt to these cells?

1)



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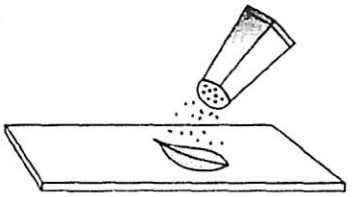

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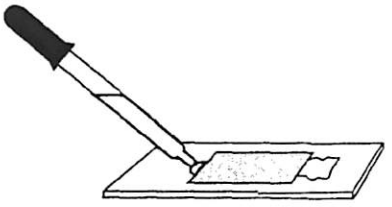
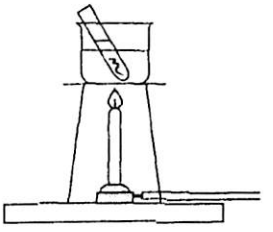
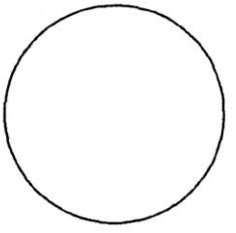


4)



5. In the space below, sketch what cell *A* would look like after the addition of the salt.

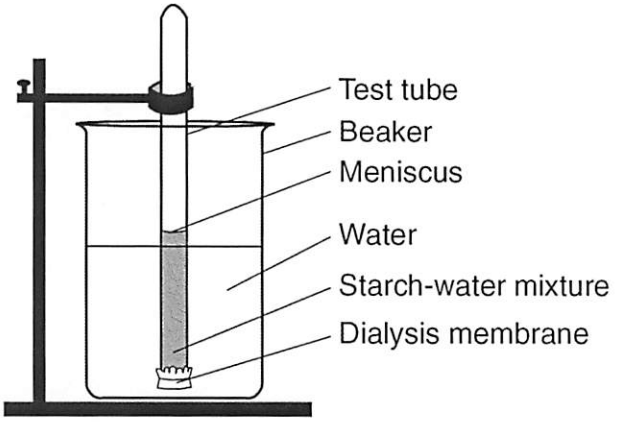


6. State *one* reason why some molecules can pass through a certain membrane, but other molecules can *not*.

7. A student fills a dialysis membrane bag with a mixture of red dye, yellow dye, and water. He soaks the bag in pure water for 24 hours and then observes that the water outside the bag turns yellow. Which statement best explains the results of this experiment?
   1) Water diffused into the membrane bag.
   2) The dialysis membrane actively transported yellow dye molecules.
   3) Only red dye diffused through the membrane.
   4) The yellow dye molecules are smaller than the red dye molecules

8. If frog eggs taken from a freshwater pond are placed in a saltwater aquarium, what will most likely happen?
   1) Water will leave the eggs.
   2) Salt will leave the eggs.
   3) Water will neither enter nor leave the eggs.
   4) The eggs will burst

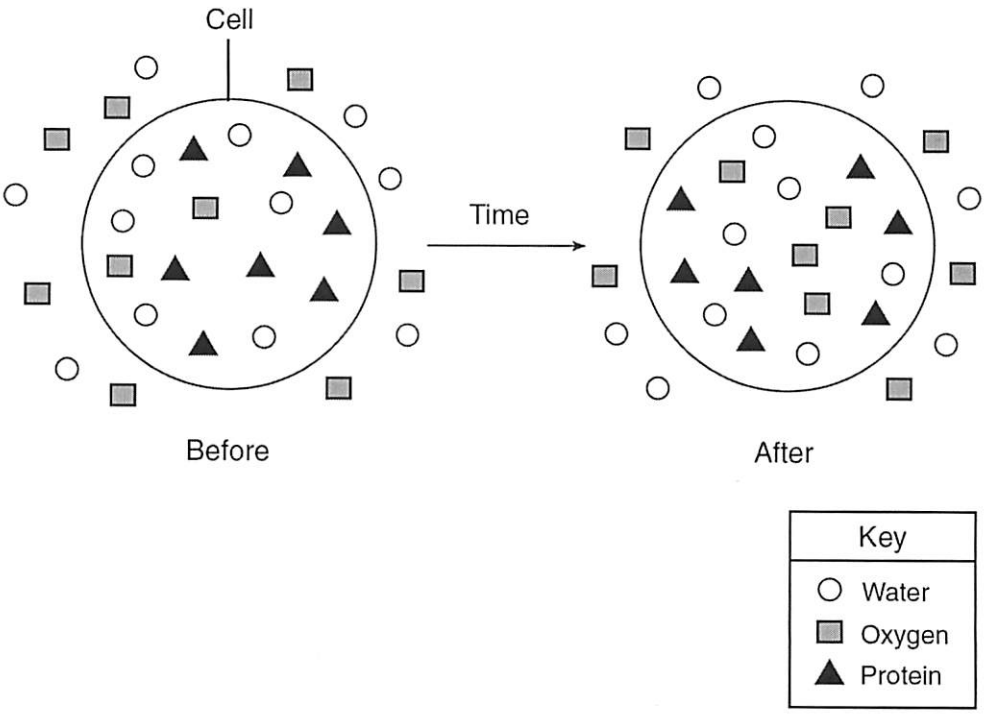
9. A laboratory setup for a demonstration is represented in the diagram below



Describe how an indicator can be used to determine if starch diffuses through the membrane into the beaker. In your answer, be sure to include:

- the procedure used
- how to interpret the results

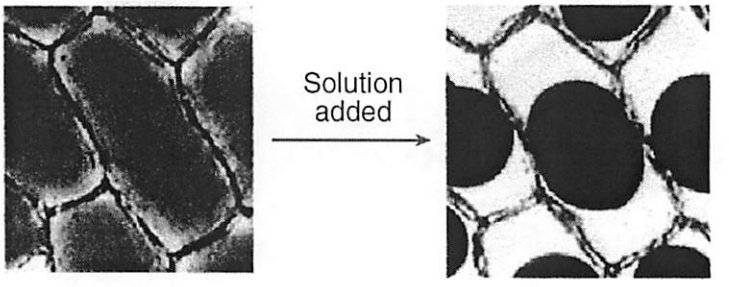
10. The diagram below represents the distribution of some molecules inside and outside of a cell over time.



Which factor prevented the protein molecules from moving out of the cell?

1) temperature 2) pH 3) molecule size 4) molecule concentration

Base your answers to questions **11** and **12** on the diagram below and on your knowledge of biology. The diagram illustrates what happens when a particular solution is added to a wet-mount slide containing red onion cells being observed using a compound light microscope.



11. To observe the cells on this slide it is best to start out using the
    1) high-power objective and focus using the coarse adjustment, only
    2) low-power objective and focus using the fine adjustment, only
    3) high-power objective and focus using the fine adjustment
    4) low-power objective and focus using the coarse adjustment

12. Identify a process that caused the change in the cells.

Base your answers to questions **13** and **14** on the information and data table below and on your knowledge of biology.

A student cut three identical slices from a potato. She determined the mass of each slice. She then placed them in labeled beakers and added a different solution to each beaker. After 30 minutes, she removed each potato slice from its solution, removed the excess liquid with a paper towel, and determined the mass of each slice. The change in mass was calculated and the results are shown in the data table below.

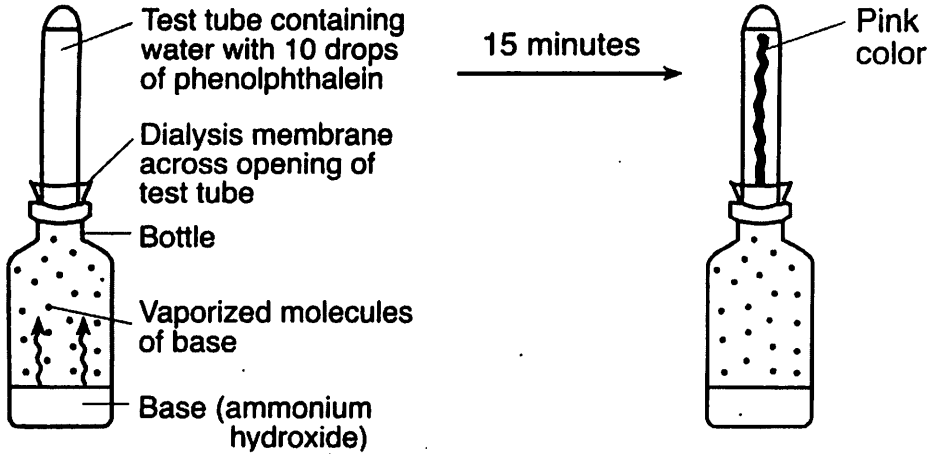
Change in Mass of Potato in Different Solutions

Beaker	Solution	Change in Mass
1	distilled water	gained 4.0 grams
2	6% salt solution	lost 0.4 gram
3	16% salt solution	lost 4.7 grams

13. Explain why the potato slice in beaker 1 increased in mass.

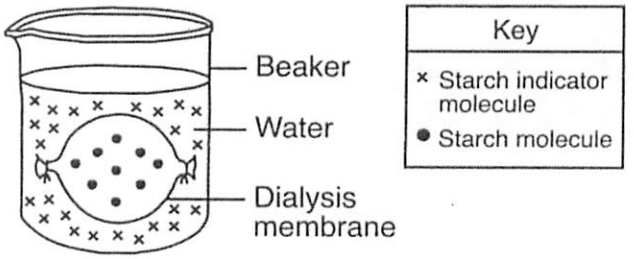
14. Identify the process that is responsible for the change in mass of each of the three slices.

15. Phenolphthalein is a chemical that turns pink in the presence of a base. A student set up the demonstration shown in the diagram below.



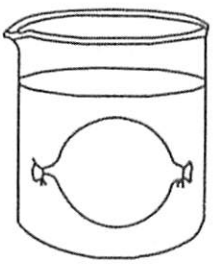
The appearance of the pink color was due to the movement of
1) phenolphthalein molecules from low concentration to high concentration
2) base molecules from high concentration through the membrane to low concentration
3) water molecules through the membrane from high concentration to low concentration
4) phenolphthalein molecules in the water from high concentration to low concentration

Base your answers to questions **16** and **17** on the experimental setup shown below.



16. When starch indicator is used, what observation would indicate the presence of starch?

17. On the diagram below, draw in the expected locations of the molecules after a period of one hour.

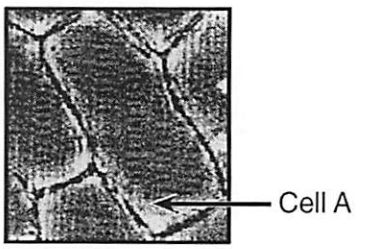


18. A red onion cell has undergone a change, as represented in the diagram below.

This change is most likely due to the cell being placed in

1) distilled water
2) light
3) salt water
4) darkness

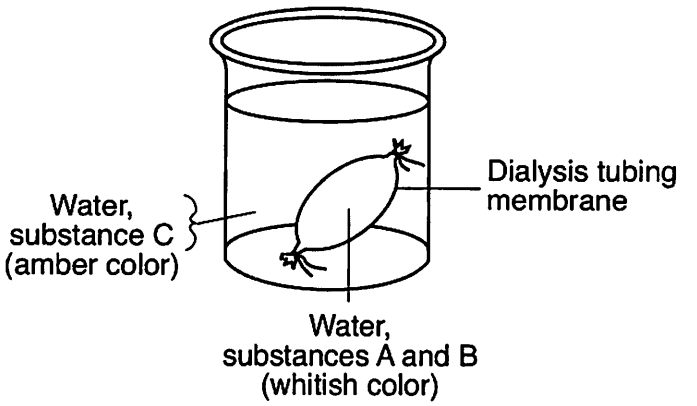
19. Cell A shown below is a typical red onion cell in water on a slide viewed with a compound light microscope.



Draw a diagram of how cell A would most likely look after salt water has been added to the slide and label the cell membrane in your diagram.

20. Base your answer to the following question on the following experiment.

A model of a cell is prepared and placed in a beaker of fluid as shown in the diagram below. The letters *A*, *B*, and *C* represent substances in the initial experimental setup.



The table below summarizes the content and appearance of the cell model and beaker after 20 minutes.

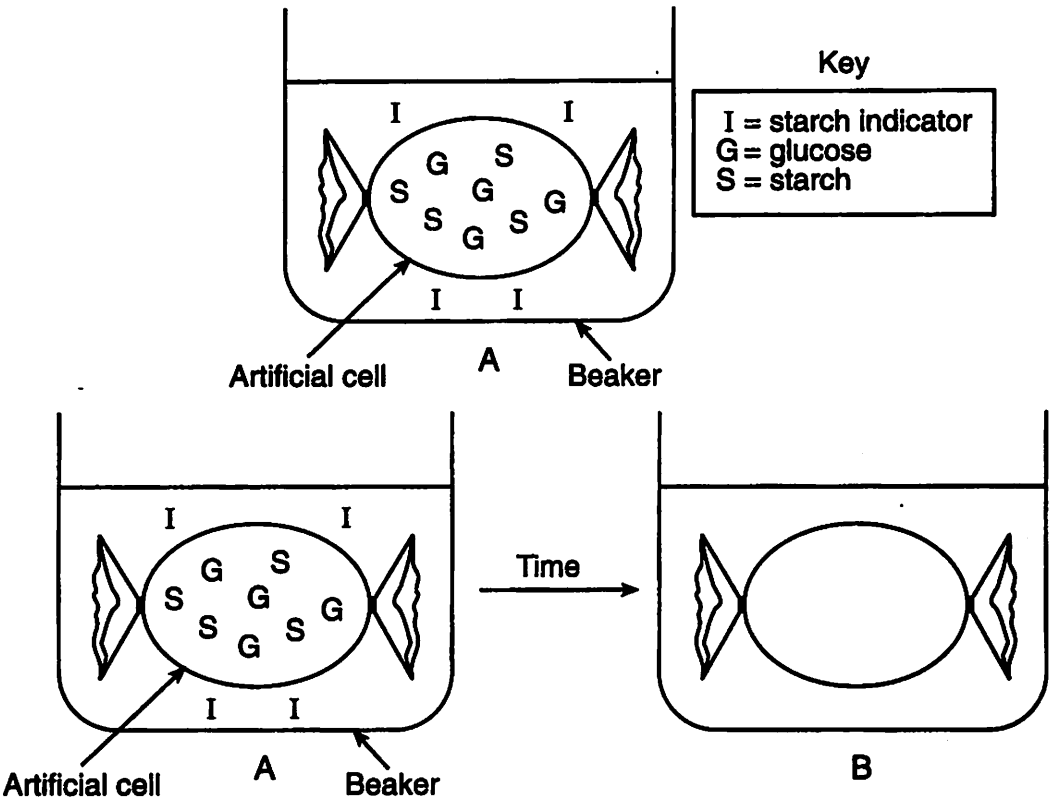
Results After 20 Minutes

	Outside of Cell Model	Inside of Cell Model
Substances	water, A, C	water, A, B, C
Color	amber	blue black

Complete the table below to summarize a change in location of substance *C* in the experimental setup.

Name of Substance C	Direction of Movement of Substance C	Reason for the Movement of Substance C

Base your answers to questions **21** through **23** on the information and diagram below and on your knowledge of biology. The diagram illustrates an investigation carried out in a laboratory activity on diffusion. The beaker and the artificial cell also contain water.



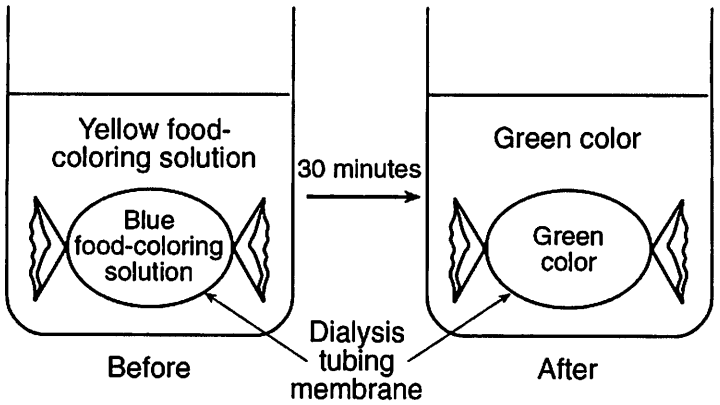
21. State what is observed when there is a positive test for starch using the starch indicator.

22. Predict what would happen over time by showing the location of molecules *I*, *G*, and *S* in diagram *B* above.

23. State what is observed when there is a positive test for starch using the starch indicator.

Base your answers to questions **24** and **25** on the diagram below and on your knowledge of biology.

The diagram shows the changes that occurred in a beaker after 30 minutes. The beaker contained water, food coloring, and a bag made from dialysis tubing membrane.

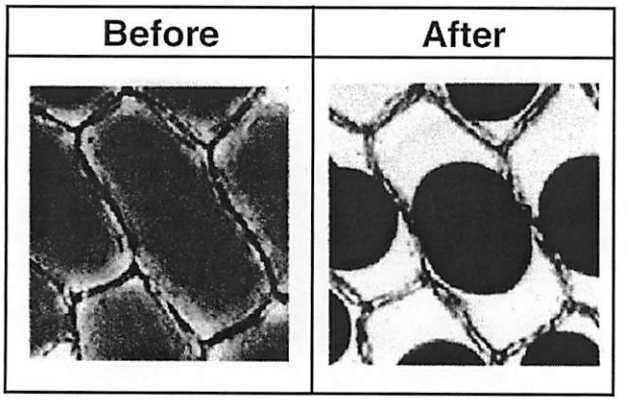


24. Which statement best explains the changes shown?
    1) Molecular movement was aided by the presence of specific carbohydrate molecules on the surface of the membrane.
    2) Molecular movement was aided by the presence of specific enzyme molecules on the surface of the membrane.
    3) Molecules moved across the membrane without additional energy being supplied.
    4) Molecules moved across the membrane only when additional energy was supplied.

25. When the colors yellow and blue are combined, they produce a green color. Which statement most likely describes the relative sizes of the yellow and blue food-coloring molecules in the diagram?
    1) The yellow food-coloring molecules are small, while the blue food-coloring molecules are large.
    2) The yellow food-coloring molecules are large, while the blue food-coloring molecules are small.
    3) Both the yellow food-coloring molecules and the blue food-coloring molecules are large.
    4) Both the yellow food-coloring molecules and the blue food-coloring molecules are small.

26. In the *Diffusion Through a Membrane* lab, the model cell membranes allowed certain substances to pass through based on which characteristic of the diffusing substance?
    1) size 2) shape 3) color 4) temperature

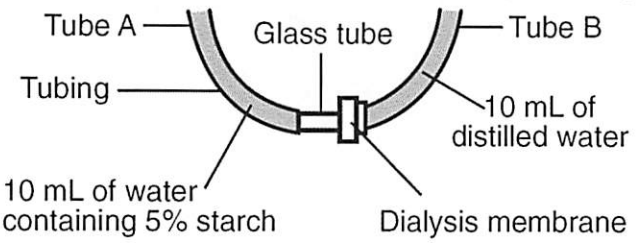
Base your answers to questions **27** and **28** on the information and diagram below and on your knowledge of biology. The diagram represents some cells on a microscope slide before and after a substance was added to the slide.



27. Describe a procedure that could be used to add this substance to the cells on the slide without removing the coverslip.

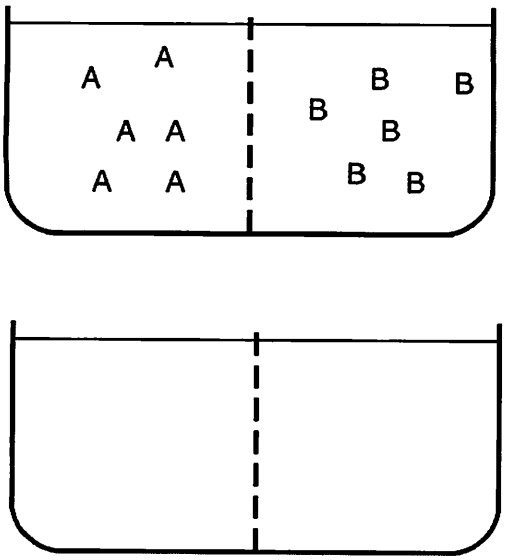
28. Identify a substance that was most likely added to the slide to cause the change observed.

29. The diagram below represents a laboratory setup used by a student during an investigation of diffusion.



Which statement best explains why the liquid in tube *A* will rise over a period of time?
1) The starch concentrations are equal on both sides of the membrane.
2) The water will pass from a region of lower starch concentration to one of higher starch concentration.
3) Water and starch volumes are the same in both tubes *A* and *B*.
4) The fluids in both tubes *A* and *B* will change from a higher temperature to a lower temperature.

30. The diagram below represents a container of water and two different kinds of molecules, *A* and *B*, separated into two chambers by a membrane through which only water and molecule *A* can pass.



On the diagram of the container above, indicate the distribution of molecules *A* and *B* after the net movement of these molecules stops.