

A CELL MEMBRANE MODEL

12

Do all chemical substances pass in and out of a cell through the cell membrane with equal ease? Do chemical substances move from areas of high concentration to areas of low concentration as they pass in and out of a cell? These questions may seem difficult to answer. Sometimes scientists use models to help answer difficult questions. This investigation will use a model. A plastic bag will be used in place of a living cell membrane. The plastic bag model will allow you to observe changes that in a living cell are controlled by the cell membrane.

In this investigation, you will

- use a plastic bag model for a living cell membrane.
- determine if starch and iodine can pass across the plastic "membrane."
- determine if the plastic "membrane" is permeable to starch and iodine.

Materials

plastic lunch bag	100-mL beaker	starch solution	graduated cylinder
rubber bands or twist ties	test tubes—2	iodine solution	glass marking pencil (wax)

Procedure

- Fill a plastic lunch bag with 40 mL of starch solution. Seal the top of the bag by twisting the bag and attaching a rubber band or twist tie. The plastic bag filled with starch solution represents a cell.
- Note and record in Table 12-1 the exact color of the starch inside the plastic bag cell. Use the "Before" column to record your observation.

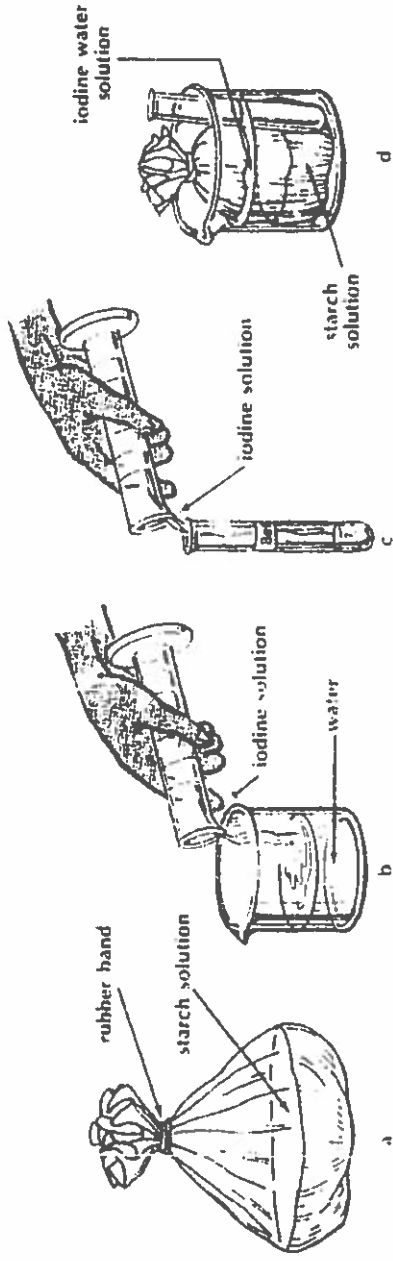


FIGURE 12-1

• Place the bag into the beaker of water-iodine solution. Allow the "cell" to stand overnight.

• Using the "After" column, record in Table 12-1 the color of the starch inside the cell.

Table 12-1. Color Changes

	Before	After (next day)
Color of starch inside bag (cell)		
Color of iodine outside bag (cell)		

• The next day, remove the plastic bag and test tube and put them aside. Pour 5 mL of the liquid in the beaker into a test tube and label this tube "after." Decide which tube, before or after, is the darker and lighter of the two. Record in Table 12-1.

Analysis

1. The plastic bag represents what part of an actual cell? _____

2. Recall from an earlier investigation that iodine solution plus starch (or polysaccharide) forms a blue color when mixed together.

(a) What color was the starch at the start of the experiment? _____

(b) What color was the starch on the next day? _____

(c) Did iodine move into the bag? _____

(d) What evidence do you see to support your answer? _____

3. (a) Did starch move out of the bag? _____

(b) What evidence do you see to support your answer? _____

4. (a) Was iodine on the outside lighter in color before or after the experiment? _____

(b) If iodine moved into the bag, would its color on the outside become lighter? _____

5. A membrane is permeable to a substance if that substance can move through the membrane. It is impermeable if that substance cannot move through the membrane. Is the plastic bag

(a) permeable to iodine (yes or no)? _____ (c) impermeable to iodine (yes or no)? _____

(b) permeable to starch (yes or no)? _____ (d) impermeable to starch (yes or no)? _____

6. Diffusion is the name given to a process that describes movement of chemicals through a permeable cell membrane from areas of high amount or concentration toward areas of low amount or concentration.

(a) At the start, was iodine in high or low concentration outside of the bag? _____

(b) At the start, was iodine in high or low concentration inside the bag? _____

(c) Did iodine move by diffusion? _____

7. Some scientists believe that membranes contain very small pores. Pore size may determine why some chemicals can or cannot pass through a cell membrane. How might the size of the membrane pore compare to the size of

(a) the iodine molecules? _____ (b) the starch molecules? _____

8. O.T.S the solution in the beaker hypotonic or hypertonic? _____
D How can this be determined? Design an experiment to prove this. _____