

## The Importance of Chemical Digestion

### Materials

10 cm length of dialysis tubing	silver nitrate solution
starch solution	depression slide
glucose solution	250 mL beaker
sodium chloride solution	string
distilled water	test tube and holder
iodine	Bunsen burner
Benedict's solution	medicine dropper

### Procedure

1. Obtain a 10 cm piece of 2.5-cm dialysis tubing that has been soaking in water. Twist one end of the tubing and fold it over, then tie off that end with string to form a bag. To open the other end of the bag, rub the end between your thumb and forefinger until the sides separate.
2. Add to the bag about 4 mL each of starch, glucose and salt solutions.
3. Twist the top of the tube and tie it securely. Be sure to leave a gap of about 1 cm between the top of the liquid and the thread. Rinse the outside of the bag with water.
4. Place the bag in a 250 mL beaker containing 150 mL of distilled water. Let the bag stand for 5 minutes.
5. Test for starch: Place one drop of the water in the depression slide and add one drop of iodine. Record the results.
6. Test for salt: Place one drop of the water in the depression slide and add one drop of silver nitrate. Record the results.
7. Test for glucose: Place 5 mL of the water in a test tube and 5 drops of Benedict's solution. Heat the mixture carefully to a boil. Record the results.
8. Repeat the tests again after 20 min and record the results.
9. While you are waiting, test the starch solution for the presence of starch, the sugar solution for the presence of sugar, and the salt solution for the presence of salt. Record your results.
10. Set the beaker aside for 24 hours and then perform the tests again. Record the results.

### Questions

1. a) Describe the test results which show the presence of starch.  
b) Can the starch molecules pass through a dialysis membrane? Which results support this conclusion?
2. a) Describe the test result that shows the presence of glucose.  
b) Can glucose molecules pass through the dialysis membrane? Which results support this conclusion?
3. a) Describe the test result that shows the presence of salt.  
b) Can salt molecules pass through the dialysis membrane? Which results support this conclusion?
4. Do some particles travel across the membrane faster than others? How do you know?
5. A single starch molecule may have thousands of atoms, a glucose molecule has 24, and the ions of dissolved salt are the size of single atoms. Using your knowledge of diffusion across

selectively permeable membranes, explain the observations of this experiment.

b) Why is the chemical digestion of starch necessary?

6. Does this investigation show that starch molecules cannot move across living membranes? Explain.

7. a) Why was the membrane rinsed off after being filled and tied?

b) Why was a 250 mL with 50 mL of water used instead of a 600 mL with 500 mL of water?

c) Why was warm water used?