

Lab: Chemical Nature of Enzymes

BIOLOGY

Background: Enzymes are a special group of chemicals that exist in all living systems. They speed up chemical changes that would take much longer to occur if the **enzyme** were not present. For example, starch does not change easily or quickly into smaller molecules unless the proper enzyme is present to speed up the reaction. An enzyme which can change starch into glucose is present in your saliva. It is called **salivary amylase**.

In this investigation, it is expected that you:

- (a) determine if starch can be changed to glucose by using an enzyme called **salivary amylase**
- (b) properly use the I-KI test to determine if a substance is starch or glucose
- (c) properly use the Benedict's test to determine if a substance is starch or glucose
- (d) use models to help support your observed results

Materials

hot plate
Beaker (Pyrex)

water
I-KI solution
(iodine)

oats
Benedict's solution

saliva
test tubes

Procedure

Part A. Testing the Properties of Starch

- Add two pieces of oats to each of two test tubes.

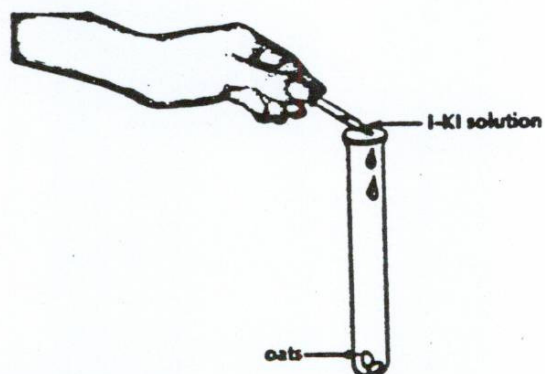


Figure 15-1

- Add a *squirt* of I-KI solution to one of the test tubes (Figure 15-1). Mix the solution by gently shaking the test tube.

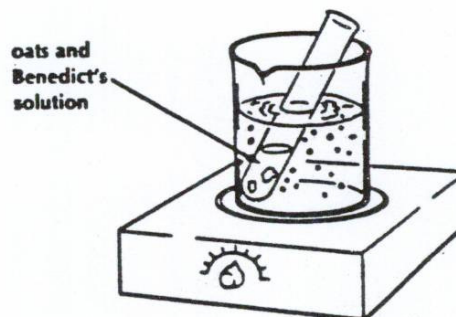


Figure 15-2

- Wait one minute and then record in Table 15-1 if the *oats* show a positive or negative test.
- Add 2 ml (about 2 droppers full) of Benedict's solution to the second test tube of oats. Mix the solution by gently shaking the test tube. Place this test tube in the hot water bath for five minutes (Figure 15-2).

- Note and record in Table 15-1 if the Benedict's solution is positive or negative.

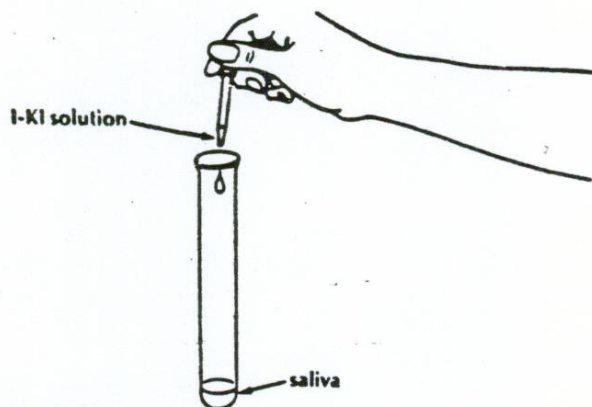


Figure 15-3

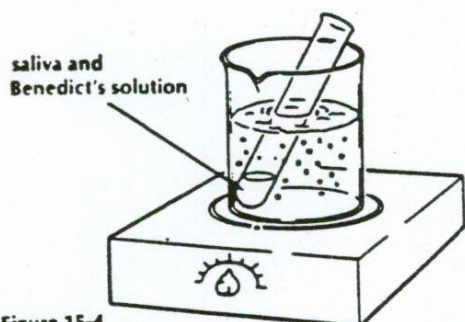


Figure 15-4

Part B. Testing the Properties of Amylase

- Add about 1 inch of *your* saliva to each of two test tubes.
- Add a *squirt* of I-KI solution to one tube (Figure 15-3). Mix the contents.
- Record in Table 15-1 if the test is positive or negative.
- Add 2 ml of Benedict's solution to the second test tube. Mix the contents and heat the test tube for five minutes in the hot water bath (Figure 15-4).
- Record in Table 15-1 if the results are positive or negative.

Part C. Testing the Properties of Oats Mixed with Amylase

- Chew a healthy pinch of oats with lots of saliva. Put about an inch into each of two different test tubes. Let them sit 5 minutes before proceeding with your tests

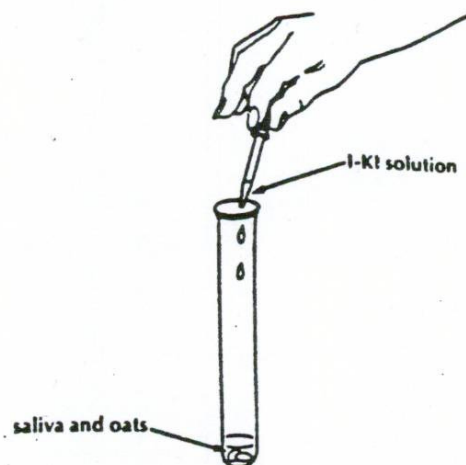


Figure 15-5

- Add _____ of I-KI solution to one of the test tubes (Figure 15-5).
- Record in Table 15-1 if the test is positive, negative, or *less positive* than in Part A.
- Add 2 ml of Benedict's solution to the second test tube. Mix the contents and heat the test tube in the hot water bath for five minutes (Figure 15-6).
- Record the results in Table 15-1.

Table 15-1. Results of Starch and Sugar Tests

	Oats	Amylase	Oats and Amylase
I-KI (+ or -)			
Benedict's (+ or -)			

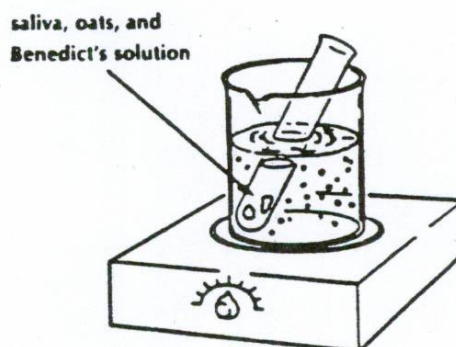


Figure 15-6

Conclusion and Analysis Questions:

1. Answer the following questions using the results in Table 15-1.
 - a. Was starch present in the oats by themselves?
 - b. Was **glucose** present in the oats by themselves?
 - c. Was **starch** present in the oats chewed with saliva (amylase)?
 - d. Was **glucose** present in the oats chewed with saliva (amylase)?
2. What new substance appears after **amylase** is added to the oats?
3. What actual experimental evidence/observation do you have that starch has started to change into another substance?
4. Why do you think it was important to test your saliva by itself for starch and sugar?

This part of the experiment is called a _____

5. Enzymes belong to a group of organic compounds called _____.
6. Enzymes speed up chemical reactions and belong to a group of chemicals known as biological _____.
7. Why do individual enzymes only act on specific chemicals?
8. What does the name of an enzyme tell us?
9. How are enzymes important to living things?
10. After completing this lab, where do you think chemical digestion begins in your body?