

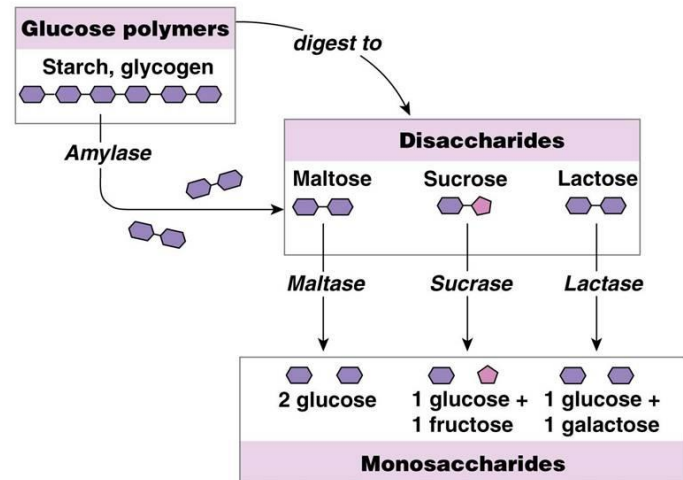
# LAB: Enzyme Action on Starch

## H O N O R S B I O L O G Y : U N I T 1

**INTRODUCTION:** In this experiment you will observe the action of the enzyme **amylase** on starch. Amylase changes starch into a simpler form: the sugar **maltose**, which is soluble in water. Amylase is present in our saliva, and begins to act on the starch in our food while still in the mouth.

Exposure to heat or extreme pH (acid or base) will **denature** proteins. Enzymes, including amylase, are proteins. If denatured, an enzyme can no longer act as a catalyst for the reaction. Benedict's solution is a test reagent that reacts positively with simple reducing sugars like

maltose, but will not react with starch. A positive test is observed as the formation of a brownish-red cuprous oxide precipitate. A weaker positive test will be yellow to orange. (Taken and modified from: [http://www.biologyjunction.com/amylase\\_on\\_starch\\_lab.htm](http://www.biologyjunction.com/amylase_on_starch_lab.htm) )



### MATERIALS:

- Cornstarch in solution
- Distilled water
- Saliva
- Vinegar
- Benedict's qualitative solution
- 3 graduated cylinders (10mL)
- 250-ml beaker
- Stirring rod
- 3 test tubes (16 x 125mm)
- Test tube rack
- Wax pencil/pencil
- Hot plate

### PROCEDURE:

1. Fill the 250-mL beaker about  $\frac{3}{4}$  full of water and place on the hot plate for a boiling water bath. Keep the water **JUST AT BOILING**.
2. Mark 3 test tubes **A**, **B** and **C**. "Spit" between **1** and **2 mL** of saliva into each test tube.
3. Into tube **A**, add **2 mL** of vinegar. Into tubes **B** and **C**, add **2 mL** of distilled water. Thump the tubes to mix.
4. Place tube **B** into the boiling water bath for **5 minutes**. After the five minutes, remove from the bath, and place back into the test tube rack.
5. Add **5 mL** of the starch solution to each tube and thump to mix. Allow the tubes to sit for **10 minutes**, occasionally thumping the tubes to mix.
6. Add **5 mL** of Benedict's solution to each tube and thump to mix. Place the tubes in the hot water bath. The reaction takes several minutes to begin.

**OBSERVATIONS:**

Tube A: Starch + saliva treated with vinegar (acid)

Was the test positive or negative?

What does this indicate?

Tube B: Starch + saliva and water, treated in a boiling water bath

Was the test positive or negative?

What does this indicate?

Tube C: Starch + saliva

Was the test positive or negative?

What does this indicate?

**Data:**

**Construct a chart of your observation:**


## **Data Analysis: Answer using complete sentences**

1. What is the function of an enzyme?
2. Where does the substrate attach to an enzyme?
3. What is the common suffix found at the end of most biological enzymes?
4. What is the common suffix found at the end of most sugars?
5. Most enzymes are what type of macromolecule?
6. Define denaturation of proteins:
7. Name three things that can denature or unfold an enzyme:
8. What acid was used to denature the protein?
9. What was the purpose of placing one test tube in the hot water bath?
10. What happens to enzymes in your body whenever you have a fever?

## **Conclusion:**

- A. Explain what the enzyme we used in this lab works on and how it was made inactive

B. Did you get the predicted results based on your hypothesis? Why or why not?

C. Explain how enzymes work to maintain homeostasis.