

STARCH HYDROLYSIS BY AMYLASE

Starchy substances constitute the major part of the human diet for most of the people in the world, as well as many other animals. They are synthesized naturally in a variety of plants. Some plant examples with high starch content are corn, potato, rice, sorghum, wheat, and cassava. It is no surprise that all of these are part of what we consume to derive carbohydrates. Starch molecules are glucose polymers linked together. In order to make use of the carbon and energy stored in starch, the human digestive system, with the help of the enzyme amylase, must first break down the polymer to smaller sugars, which are eventually converted to the individual basic glucose units.

Amylase is commonly found in saliva and germinating seeds. It catalyzes the breakdown of starch. When amylase reacts with starch, it cuts off the disaccharide maltose (two glucose molecules linked together). As the reaction progresses, less starch will be present and more sugar (maltose) will be present. In this lab, the activity of amylase will be observed by using iodine. Iodine reacts with starch to form a dark brown/purple color. As amylase breaks down starch, less and less starch will be present and the color of the solution (if iodine is added) will become lighter and lighter.

PRE-LAB

Explain why we are doing this lab. How does it fit into the context of our course? What topics have we been learning to which this lab experiment relates?

PROCEDURE PART 1: Identification of starch

Starch will be identified by using IKI (Lugol's solution). Use three wells on the spot plate. Place one drop of IKI in each well. **CAUTION:** IKI can stain clothes. Add two drops of water to one well (negative control - one you know should give a negative result), then add two drops of starch solution to another well (positive control - one you know should give a positive reaction). Also, test the reaction of maltose to IKI by adding two drops of maltose solution to third well. Record your results in an IB quality data table. Using this test you should now be able to detect the presence or absence of starch. Wash out your spot plate.

PROCEDURE PART 2: Timing of starch break down by amylase.

1. Place two drops of starch solution into each spot plate well.
2. Label a paper cup with your name. Spit saliva into the cup. **CAUTION:** avoid other people's saliva. Handle only your cup.
3. Using a disposable plastic pipette, add two drops of saliva from your cup into all but one of the spot plate wells (this well will only include starch and will serve as the control group).
4. At two minute intervals, test each well plate for the presence of starch by adding a single drop of IKI solution and recording the presence or absence of starch.
5. Record your results in an IB quality data table.