Saltines, Saliva, and the Starch Reaction

**Question:** Does saliva turn a compound carbohydrate into a complex carbohydrate?

**Introduction:** The purpose of this experiment is to determine how temperature and saliva affect the structure of a carbohydrate.

**Background:** Starch is a long polymer of glucose molecules. . Plants store the glucose used during photosynthesis in the form of starch to be used later. There are three forms of starch -amylose, amylopectin, and "animal" starch or glycogen .Amylose is the form found in crackers

Iodine molecules fit tightly inside the helix, and consequent changes in the

electron configuration of the iodine molecules cause the starch/iodine complex

to turn the diagnostic blue-black color. This color reaction is reversible and is

specific to the helical forms of glucose polymers found in starch.

Amylase, an enzyme found in saliva, breaks down amylose into, ultimately, it's

individual glucose subunits. As amylose is broken apart and the remaining

sections grow shorter, at some point they can no longer accommodate the iodine

molecules. The color reaction does not occur and iodine remains its normal

brownish color (or the color reverses, if the reaction has already occurred).

As the cracker is chewed, salivary amylase starts breaking down the amylase into

shorter glucose polymers. Some will be converted into individual glucose

molecules that may impart a sweetish taste. (Of note: Glucose is not particularly

sweet; fructose very similar in structure to glucose, and is much sweeter. Table

sugar - sucrose - is a disaccharide of glucose and fructose

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**Pre-Lab Questions:**

1. What is your hypothesis?
2. Identify the independent and dependent variable?
3. What is the control group?
4. Which ingredient represents the carbohydrate?
5. What type of compound is the enzyme amylase?

**Procedure:**

1. Obtain 4 test tubes. Break off four pieces of cracker approximately the same size -- about the size of a small pea. Place the cracker pieces in separate squares of waxed paper. Fold the waxed paper over the cracker and crush each piece of cracker. Place each crushed cracker bit into separate test tubes.

2. To one tube add 5 ml of water.

3. To the second tube add 5 ml of saliva .Mix *For gross factor have students chew the cracker and spit it in the test tube*.

3. Place a third test tube with 10ml of saliva and mix.

4. Place a fourth test tube with 20 ml of saliva and mix.

5. Add one drop of iodine to each tube. Mix. Use the color chart to assign a numerical number.

**Analysis:**

On a piece of graph paper, graph your data.

**Questions:**

1. What type of carbohydrate does the cracker not chewed contain?
2. What type of carbohydrate does the chewed up cracker contain?
3. How did this change occur?
4. How did temperature affect the change?
5. Write a conclusion to this experiment. Be sure to follow the proper format.