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Intro to Biology Lab

Lab Report

Rate of Starch Digestion by Amylase

**Introduction**

Enzymes are biological catalysts, compounds that speed up a chemical reaction without being used up or altered in the reaction. The specific enzyme investigated during this experiment is amylase. This enzyme is found in the saliva of multiple mammals including humans. It is responsible for the preliminary digestion of starch. The substrate of amylase is starch, which it will break up in the maltose. After the starch’s glucose is broken up by the amylase the end product is called maltose which is important for digestion.

The main question of the experiment is: will the concentration of amylase affect the rate of disappearance in starch? The experiment we designed to answer the question was focused on the fact that starch and not maltose, changes color over a specific time when a solution called I2KI is added to the reaction. The group measured the time it took for the rate of disappearance of starch. For every 15 seconds a new drop of I2KI was added to the reaction to see if the starch had been digested. If the starch had been digested than the color of the solution will be amber, if it isn’t digested than the solution will be purple. After a period of testing, the time it took for the solution to change color is the final rate of disappearance. The hypothesis is as follows: If the concentration of the amylase is higher than the rate of disappearance of the starch is faster, if its concentration is lower than the rate of disappearance is slower. The prediction is as follows: What I expect to see is that with higher concentration amylase, the starch’s purple presence will disappear faster, if there’s a lower concentration of amylase than I will see the starch’s purple presence disappear at a slower rate.

**Materials**

Test-tube rack 1 calibrated 1-mL pipette

10 standard test tubes 2 calibrated 5-mL pipettes

wax pencil disposable Pasteur pipettes

test plate pipette bulb

flask of distilled or DI water buffer solution (pH = 6.8)

beaker of distilled or DI rinse water I2KI solution

5-mL graduated 1% starch solution

1% amylase solution

**Methods**

For the experiment three test tubes were prepared. Each had 5mL of distilled water which was used to dilute the amylase. Each tube received different percentages of amylase. Tube 1 received 0.5% and a dilution of 1:1, which was added to Tube 2 which received 0.25% and a dilution of 1:3, which was added to Tube 3 which received 0.125% and a dilution of 1:7.

A second set of test tubes is then prepared numbered 1-3. Take 2mL of diluted solution from the first set and transfer to the second set of perspective tubes. We then added 40 drops of pH 6.8 buffer solution to each of the tubes in the second set. The tubes were then mixed only using our palms to roll the tubes. 3 test plates are then prepared which have 12 holes each and will be holding 2 drops of I2KI each to test for the rate of disappearance as mentioned before. Using a 1mL pipette that is clean, we added 1 mL of the 1% starch solution to tube 3 of the second set of test tubes. Another team member recorded the time as 0. Then we immediately added a drop of the solution to the first hole of the test plate containing the I2KI and called it 0. We continued to add a single drop of the solution every 15 seconds to the first test plate until the color changed from purple to clear amber. Once the desired color was reached we counted how long it took for each test plate to disappear. It is important to note that each test plate has a different type of dilution. Test plate 1 has 0.5%, test plate 2 has 0.25%, and test plate 3 has 0.125%.

**Results:**

**Tube 1:** 0.5% amylase is breaking down starch at 40 mg per minute

**Tube 2:** 0.25% amylase is breaking down starch at 8 mg per minute

**Tube 3:** 0.125% amylase is breaking down starch at 4.444 mg per minute

**Time (sec)**

**Concentration of amylase (%)**

**Discussion**

With the percentage of amylase being 0.5%, a time of starch disappearance being 15 seconds, and the time of starch disappearance is .25 minutes, then the rate of reaction for test-tube 1 is 10 mg/0.25 min. With the percentage of amylase being 0.25%, a time of starch disappearance being 75 seconds, and the time of starch disappearance is 1.25 minutes, then the rate of reaction for test-tube 2 is 10 mg/1.25 min. With the percentage of amylase being 0.125%, a time of starch disappearance being 135 seconds, and the time of starch disappearance is 2.25 minutes, then the rate of reaction for test-tube 3 is 10mg/2.25 min.

**Sources Cited**

*Symbiosis: the Pearson custom library for the biological sciences,* Pearson Learning Solutions, 2010.