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Bio Lab Report

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OBJECTIVE:

The objective of this lab was to determine if LACTAID really works to digest milk sugar, lactose. If lactaid is added to milk, glucose will be detected because lactaid contains lactase, which breaks down the lactose in milk. The dependent variable in this lab was the type of reaction (positive or negative) and the independent variable was the type of liquid, which included lactaid, glucose, milk, water, and lactaid and milk combined.

INTRODUCTION:

Lactaid is a product that you can purchase in a regular store and it contains lactase. Therefore people who are lactose intolerant can have milk products. Regular dairy products contain lactose. In order for lactose to be broken down, our bodies contain an enzyme called lactase. Enzymes are biomolecules that catalyze chemical reactions. An enzyme doesn't supply activation energy to the reacting molecules, but instead lowers the energy requirement barrier so that the reaction can proceed at normal cell temperatures.

(1)

Almost all enzymes are proteins. Like all catalysts, enzymes work by lowering the activation energy for a reaction, thus dramatically increasing the rate of the reaction.

(1, 2) A substrate is a specific reactant acted upon by an enzyme. The enzyme breaks the

bond of the molecule substrate. In this lab experiment the substrate was lactose. Lactase broke apart the substrate lactose into two different sugar molecules called glucose and galactose. An enzyme substrate complex is a non-covalent complex composed of a substrate bound to the active site of the enzyme. The enzyme takes in substrates to the active zone of the enzyme.(2) The substrates then interact with each other and form new products, and they are released. The following factors influence an enzyme's activity: temperature, pH, enzyme and substrate concentration, enzyme inhibitors and co-factors.

(1)

EXPERIMENTAL DESIGN:

This lab involved the following procedure:

Open a packet containing the Lactaid tablet. Place the tablet into the large tube labeled LACTAID. Then add enough water to fill 3 large tubes (labeled "LACTAID," "Glucose," "Powdered Milk") to approximately 5 milliliters. Cap and shake each tube vigorously for three minutes to dissolve the materials in the tubes. Next fill the small tube labeled "water" with tap water. Then take out the part 2 test strip from the kit. Use information in the boxes on the left of part two-test strip to mix materials from the tubes in the appropriate circles on the right of the test strip. Be sure to use the appropriately labeled droppers. After that stir the contents in each of the test strip circles using a clean toothpick. Make sure you use a different toothpick for each circle and discard the used toothpicks. Then wait 5 minutes before going to the next step. After waiting remember that when the lactose is digested glucose is produced. Follow the direction below to test the contents of each of the circles for the presence of glucose. Then record the results in

columns 2 and 3 of the data table.

Things to remember:

- Use a clean and dry piece of glucose indicator paper for each test.
- Drop 1 piece of glucose indicator paper into the liquid in each circle.
- Wait 60 seconds for the color to develop
- If a light or dark brown color develops, glucose is present
- If the paper stays light green, glucose is not present

The materials used in this lab were glucose indicator, droppers, toothpicks and scientific tubes.

RESULTS:

This experiment produced a variety of results. For the first result the test for glucose was negative in 4 drops of water. The test for glucose however was positive in 4 drops of glucose. In 4 drops of milk, glucose was not present. In 4 drops of LACTAID, glucose was also not present. In the combined 2 drops of milk and 2 drops of LACTAID, glucose was found. The results can be found on page 4 as it indicates if the test for glucose was positive or negative.

DATA:

Test strip circle	Put in Labeled circles of test strip	Results: color of paper	Glucose positive+ Negative -
1	4 drops of water	Light green	Negative

2	4 drops of glucose	Brown	Positive
3	4 drops of milk	Light green	Negative
4	4 drops of LACTAID	Light green	Negative
5	2 drops milk + 2 drops Lactaid	Brown	Positive

Discussion:

The purpose of this lab experiment was to determine if lactaid can digest lactose. The results of this lab experiment proved that lactaid was able to break down the sugar lactose. The table above shows that when two drops of milk and two drops of lactaid were added together, glucose was detected. Glucose was detected in this test because lactaid contains lactase, which broke the lactose in the milk into the byproducts of galactose and glucose. The other test results showed that glucose was present when glucose was added to the circle by itself. Also, glucose was not detected in the four drops of water because water does not contain sugar molecules. The four drops of milk also gave a negative result for glucose, which is correct. Milk contains the sugar lactose, but this will not show a positive test for glucose because without the lactase (enzyme), lactose in milk will not be broken down into glucose and galactose. Two drops of lactaid and two drops of milk together were able to test positive for glucose because lactaid contains the enzyme lactase. This enzyme then digested lactose into glucose and galactose, which turned the glucose indicator paper to a brown color showing that glucose, was present.

Glucose is absorbed across the wall of the digestive tract and delivered by the bloodstream to all the body's cells for energy. Thus, lactose break down is an important reaction in humans. Therefore, Lactaid is a good product for those people who are lactose intolerant since they are unable to produce enough lactase to break down lactose in dairy products.

To improve this lab it would be best to pay extra attention to the color changes on the test strips. Also, this lab can be improved by making sure all drops were added the right way and in the correct amounts. This would help avoid any error in test results.

Conclusion:

This lab experiment proved that lactaid does break down lactose. People who are lactose intolerant (cannot digest lactose) can choose to have lactaid products as a substitute to milk products.

References:

1. Campbell, Neil A., and Jane B. Reece. Biology. 6th ed. San Francisco: Benjamin Cummings, 2002. Print.
2. "Enzymes." Boston, MA High-Speed Internet, Digital Cable TV, and Home Phone Service - RCN. N.p., n.d. Web. 19 Nov. 2012.
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