

Lab 3-Properties of Enzyme Action

Purpose

This experiment helped examine some aspects of the action of pancreatic lipase and bile salts on lipids.

Procedures

1. Add just enough litmus powder to a container of dairy cream to produce a medium blue color. Pour 3 ml of the litmus cream into 4 separate test tubes. Into two additional test tubes pour 3 ml of 2% pancreatin. Preincubate the litmus cream and the pancreatin separately in a 37 C water bath for 5 minutes. Then prepare four test tubes as follows:

Tube #1: 3 ml cream + 3 ml pancreatin

Tube #2: 3 ml cream + 3 ml distilled water

Tube #3: 3 ml cream + 3 ml pancreatin + pinch of bile salts

Tube #4: 3 ml cream + 3 ml distilled water + pinch bile salts

2. Gently shake each tube for 30 seconds to mix in the bile salts. Incubate all four tubes in a 37 C water bath for 1 hour, checking every minute for the first 5 minutes or until the first tube changes color, then every 15 minutes for the rest of the hour. Record the time and number of the tube. Continue checking for the remainder of the hour.

3. Remove the tubes from the water bath. Test the pH of each tube using pH paper and note the odor and color of each tube. NOTE: Blue litmus will turn pink in an acid environment.

4. Summarize the results in the following table

5. Explain how the digestion of fat affects the pH of the solution and how bile affects the rate of digestion.

Results

Tube	Color	pH	Odor	Time to change color
1	Purple on top, pink in middle with brown at the bottom	7	Rotten eggs	30 min mark
2	Grayish purple/purple residue	8	Creamy, powdery milk	30 min mark
3	Grayish purple on top, pink bottom with black residue	6	Rotten eggs	30 min mark
4	Brown residue on top, grayish purple in middle, dark purple on bottom with black residue at the bottom	8	Rotten eggs	30 min mark

Discussion

In this experiment, my lab partner and I used four test tubes with test tube one had 3 mil cream mixed with 3 mill pancreatin, test tube 2 had 3 mil cream mixed with 3 mil distilled water, test tube 3 was like test tube 1 and test tube 4 was like test tube 2 however they were mixed in with a pinch of bile salts. From what we observed, it appeared that there was a change in color, odor and later on it appeared that there were two substances that had different densities that had different colors. We also noticed that there would be some kind of brownish or blackish substance that appeared on the very bottom of the test tubes. The colors that we had observed from this experiment were the colors purple, pink, some blue found in the third test tube towards the hour mark along with some brown or black located on the very bottom of the test tubes. When it comes to the odor of each of the substances, test tube 2 was the only one that actually smelled pleasant while the others had a really bad odor to them. The digestion of fat affects the pH of the solution by transitioning it from the acidic environment of the stomach to the alkaline environment of the small intestine. Bile plays a critical role in this process by emulsifying fats, optimizing enzyme efficiency, and facilitating the absorption of digested fats. This coordinated system ensures the efficient breakdown and absorption of dietary fats, providing the body with essential nutrients and energy.

Conclusion

In conclusion, this experiment helped examine some aspects of the action of pancreatic lipase and bile salts on lipids. It provided valuable insights into the process of fat digestion, focusing on the role of pancreatic lipase and bile salts. Through careful observation and analysis, we gained a better understanding of how these essential components work together to break down dietary fats and facilitate their absorption in the digestive system. Pancreatic lipase has a major role in fat digestion, but by itself, lipase is ineffective because it is a water-soluble enzyme trying to act on large lipid droplets, which are water insoluble. Bile salts help overcome this problem by acting as emulsifying agents, which break the fat into smaller droplets so that lipase has a larger surface area for its hydrolysis of fats. Overall, this experiment contributes to our knowledge of the digestive system's functioning and highlights the significance of enzymes and bile salts in the efficient digestion of dietary fats. These insights are

relevant not only for understanding human physiology but also for practical applications in nutrition and healthcare.