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Lab Report #3-Digestion of fat with pancreatic lipase and bile salts

Purpose

The purpose of this lab is to be able to define an enzyme and how it operates, and also realize the effects of pH and temperature on said enzyme. Also to understand the difference between emulsification and digestion. Finally to also understand how to use indicators and buffers to understand what is happening in the experiment.

Procedure

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. Pre-incubate 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 37C 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 a table

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

Results

<u>Tube</u>	<u>Color</u>	<u>pH</u>	<u>Odor</u>	<u>Time to change color</u>
#1	Lavender	7	Light cheese	20 Min
#2	Medium Blue	8.5/9	Light milky smell	30 Min
#3	Light Purple	7	Strong cheese	10 Min
#4	Light Blue	8	Menuer	30 Min

Discussion

In testube #1 we only had the litmus cream and pancreatin, this yielded a color

change(lavender) after around 20 minutes and produced a light smell off cheese, i

believe this shows that the pancreatin acted as a quick digestion enzyme but by itself is not as effective as opposed to when it has an emulsifying agent, it produced a pH of 7 which is close to the optimal pH of 7.8 for the pancreatic enzymes. Test tube #2 was mixed with cream and distilled water, with a color change (medium blue) at around 30 minutes and produced a weaker light milky smell compared to the others, I believe this is because the addition of the water, causes the digestion process to slow down, we can also see that it has a pH of around 9 causing it to be basic and non-acidic, meaning the digestion of the enzymes would slow down. Tube #3 had cream, pancreatin, and a pinch of bile salts, which yielded a light purple color after 10 minutes, and a strong cheese scent with an optimal digestion pH of 7, this tube went the fastest because it had both pancreatin and bile as an emulsifying agent, meaning that it was best fit to digest the cream because the bile salts break down the fat into smaller more manageable droplets so the pancreatin can more effectively digest the cream, making it the fastest. Finally, In test tube #4 we had cream, distilled water, and a pinch of bile salts. It yielded a light blue color after around 30 minutes and smelled of menthol with a pH of 8, this tube was the second slowest, and again I believe this is because the addition of the distilled water caused the pH to be more neutral and therefore slow down the digestion/emulsification process. I believe the addition of bile salts causes the cream to be better broken down and therefore produce a stronger smell as opposed to test tube 1 and 2 that smelled lightly.

Conclusion

In conclusion, we have learned that an enzyme is essentially a protein. We also learned the ideal digestion setting is cream, pancreatin, and a pinch of bile salts, this is because pancreatin on its own is not as effective when it comes to digesting fats in the cream, with the addition of bile salts works as an emulsification agent, this causes the fat to be

broken down into smaller more digestible pieces for the pancreatin to work effectively and give the ideal pH of 7.