

Christopher Mcewan

Project Report- Digestion Lab experiment

Class BIO2312 Lecture/Lab Summer - 2020

Introduction: the digestive system is one of the most complex systems of the body. We all know basically the digestive system is where food goes to once it is eaten, however you'd be surprised to learn that not everything is digested and broken down the same way. Everything that we eat is broken down based on the type of food that it is, and this is done without us knowing what is going on in stomachs, the only thing that we are concerned about is whether or not what we just ate tasted well. In this report I will give a short summary of the complex work that our body does once we're done eating that meal.

Objective: the purpose of this report is to review the effects of several different things on the digestion of food. We will be reviewing the effects of temperature, and enzymes. Due to the fact the fact that I was not able to personally complete the experiment myself, my main materials being used will be a video which includes "A starch test" , "Effects of temperature on amylase digestion of starch", "Lipid digestion" and "Pepsin digestion of protein".

Experiment # 1-

In this experiment a starch test was done to observe the digestion of starch, by the enzyme amylase. In order to find the presence of starch in the solution, iodine was used. The presence of starch is determined by the solution turning to a dark color when iodine is added. After using two test tubes that both contain starch, the enzyme amylase was added to one test tube. Both test tube were then heated in water to allow the process of enzyme move faster. Once the enzyme is able to breakdown the starch, the tube returns from a dark color to a light color. This is evident by the tube with the presence of amylase returning to a light color, while the tube without remaining dark. The final step of this experiment was to use Benedict solution to see if the enzyme was

broken down into simple sugars. As the tube was heated precipitates was form showing the presence of simple sugars.

Conclusion: The enzyme amylase is able to effectively breakdown down starch to the point that it becomes simple sugars

Experiment # 2-

The second experiment completed was “The effect of temperature on the digestion of starch by amylase”. There are several factors that determine how and food is going to be digested as well as how fast a fast would be digested. The purpose of this experiment was to observe what type of impact temperature would have. The equipment and process used in this experiment are as follows ;

Data/ Materials

5 Water baths (each at a different temperature); 20, 40, 50, 60, 80

5 tubes (each containing 5 ml of starch)

5 tubes (each containing 5 ml of amylase)

A tube containing starch and one containing amylase are put into each of the water baths(water paths were labeled by temperature to see the effect), all tubes were left in water baths for 5 minutes

Upon completion of 5 mins, the amylase is then mixed with the starch that is in the same water bath as it.

Every 30 seconds a sample of the amylase/starch solution is mixed with iodine to see how long it would take for it to stop changing color.

The results are as follows

20 degrees - 2 minutes and 30 seconds

40 degrees- 1minute and 30 seconds

50 degrees- 1 minute

60 degrees- 30 seconds

80 degrees - 30 seconds

Conclusion- this experiment shows that the higher the temperature is, the faster the effect amylase would have, leading to faster digestion.

Experiment # 3-

The third experiment was “The Lipid digestive experiment”. This experiment was completed with the following equipment ;

Data/ Materials

4 tubes with a lipid substance, that was at an alkaline pH represented by its pink color. Addition substances were then added to conduct the observation.

Tube # 1 (Water, bile salts)

Tube # 2 (lipase enzyme)

Tube # 3 (lipase enzyme, bile salts)

Tube # 4 (Amylase)

These tubes are then observed over certain amount of time to see if the lipid fats are digested. This can be indicated by the color of the solution being changed from pink to yellow or white due to change of the pH, as a result of the fatty acids that are produced once lipid fats are digested.

The results are as follows

Tube 1 and 4 - No change

Tube 2- some change

Tube 3- most change

Conclusion- water and amylase alone has no effect on the digestion of lipids as observed by the lack of change of color. Lipase alone does have an effect on the digestion as seen in tube 2, however lipase with bile salts has the biggest effect of digestion because the bile salts break the larger droplets to smaller droplets.

Experiment # 4 -

The fourth experiment that was completed was the “Pepsin digestion of protein experiment” .

During the experiment the following equipment were used to complete the observation

Data/ Materials

5 tubes (each contains a tube of egg white that are the same size)

Tube 1- 2 ml of water of water was added

Tube 2- 2 ml of pepsin solution, 2 drops of hydrochloric acids are added

Tube 3- 2 ml of pepsin solution was added

Tube 4 - 2 ml of pepsin solution, 2 drops of hydrochloric acid are added

Tube 5- 2 ml of amylase solution added.

The tubes are then incubated for 30 mins, with tube #2 at room temperature, while the remaining were kept at warm temperature .

The tubes are shaken to see if there are small specs of egg whites, which would implicate digestion.

The results are as follows

Tube 1 and 5 no change

Tube 2,3,4 showed small specs of egg whites, with 4 having the most

Conclusion- From this experiment it can be concluded that just water or amylase has no effect on the digestion of protein, as shown with there being no change in tube one or 5. It can be concluded that the biggest effect on the digestion of protein would be the presence of Pepsin and acid in at a warm temperature, because even though though tube number 2 contained both acid and pepsin it was at a colder temperature showing less change. This also shows the effect of temperature in digestion.

Discussion - By conducting these experiments, I have concluded that the enzyme Amylase has a tremendous effect in the digestion of most foods. However it seems to have no effect on the digestion of pepsin, as show with the lack of results by the amylase test tube in experiment # 4.

Aside from the presence of Amylase, there are several other factors that prove to have an effect on digestion which include temperature as indicated in experiment number 2, as well as the presence of other things such as bile salts as shown in experiment # 3.

References

Martini, F ., Prentice- Hall Pub. (2011). The Digestive System. Fundamentals of Anatomy & Physiology

Starch test:

<https://www.youtube.com/watch?v=ISf6ClTbg78> Effect of temperature on amylase digestion of starch:

https://www.youtube.com/watch?v=1Fa2sSl4_I

Lipid digestion:

<https://www.youtube.com/watch?v=qVgSm0lWmRw>

Pepsin digestion of protein:

<https://www.youtube.com/watch?v=OgMBQVt0mz4>