General Certificate of Education
Advanced Subsidiary Examination
June 2010

Biology BIO3T/P10/task

Unit 3T AS Investigative Skills Assignment
Task Sheet

The effect of bile salts and lipase on the digestion of triglycerides in milk

Introduction

Lipase is an enzyme. It catalyses the hydrolysis of triglycerides to glycerol and fatty acids. In the digestive system bile is also important in the digestion of triglycerides. Bile salts are found in bile. They break large drops of triglycerides down into smaller droplets.

In this investigation you will use phenolphthalein. Phenophthalein is a pH indicator. Above pH 10 it is pink. Below pH 10 the pink colour gradually disappears and it becomes colourless at pH 8.3. You will use full-fat milk as a source of triglycerides.

Materials

You are provided with

- large beaker for use as a water bath
- tripod, gauze and heat-proof mat
- Bunsen burner
- thermometer
- graduated pipettes or syringes
- boiling tubes
- boiling tube rack or beaker to hold tubes
- water
- full-fat milk
- sodium carbonate solution
- 5% lipase solution
- 5% boiled lipase solution
- 5% bile salts solution
- 5% boiled bile salts solution
- phenolphthalein indicator
- beakers
- a stopwatch or timer
- permanent marker pen or labels

You may ask your teacher for any other apparatus you require.

Outline Method

Read these instructions carefully before you start work.

1. Set up a large beaker to act as a water bath. Use a suitable temperature for an investigation of an enzyme from a mammal. Record the temperature on your Candidate Results Sheet: Stage 1.
2. Take five boiling tubes and label them **1** to **5**.
3. Add 5 cm^3 of milk and 7 cm^3 of sodium carbonate solution to each of the five tubes. Shake the tubes to mix the contents.
4. To tube **1** add 5 drops of phenolphthalein solution, a drop at a time, shaking the solution after adding each drop. The solution should now be pink. If the solution does not turn pink ask your teacher for help. Do the same to each of the other four tubes.
5. Place all five tubes in the water bath and leave them for 5 minutes.
6. Add 1 cm^3 of water and 1 cm^3 of lipase solution to tube **1.** Shake the tube to mix the contents and put the tube back in the water bath.
7. Time how long it takes for the pink colour to disappear in tube **1**. Make a note of your results.
8. Use the information from **Table 1** to add the required solutions to tubes **2**, **3**, **4** and **5**. Shake each tube to mix its contents. Place all four tubes back in the water bath.
9. Repeat step 7 with tubes **2**, **3**, **4** and **5**. If the contents of a tube have not decolorised after 15 minutes, remove the tube from the water bath and make a note of this.
10. Draw a table on the Candidate Results Sheet: Stage 1 and record your results in this table.

Table 1

Solution added to tubes	Boiling tube number				
	1	**2**	**3**	**4**	**5**
Water / cm^3	1	1			
Lipase / cm^3	1		1		1
Bile salts / cm^3		1	1	1	
Boiled lipase / cm^3				1	
Boiled bile salts / cm^3					1

ISA BIO3T/P10 Candidate Results Sheet: Stage 1

The effect of bile salts and lipase on the digestion of triglycerides in milk.

Centre Number | | | | | | Candidate number | | | | |

Candidate Name .....

Record your data in a table in the space below.

Hand in this sheet at the end of each practical session. *(3 marks)*

Temperature of the water bath ..... °C

ISA BIO3T/P10 Candidate Results Sheet: Stage 2

The effect of bile salts and lipase on the digestion of triglycerides in milk

Centre Number | | | | | | Candidate number | | | | |

Candidate Name.....

Use the space below to calculate the rate of each reaction in each of the five tubes using the data you recorded in practical sessions.

Use the graph paper to plot a graph of your processed data. *(6 marks)*

Hand in this sheet at the end of each practical session.

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