PART 5

DIGESTION

ENZYMES AND

BIOLOGY

MY TARGET GRADE IS
Fats, proteins and carbohydrates are LARGE, INSOLUBLE molecules. They are BROKEN DOWN by physical and chemical means so that they can be ABSORBED into the bloodstream and used by the body.

Outline of the Alimentary Canal

Copy the flow chart.
Label fully the diagram below.
Complete worksheets 1 and 2.

Using look and key hypotheses diagrams.

1. They are PROTEIN in nature.
2. They are BIOLOGICAL CATALYSTS - i.e., they speed up the rate of reaction.
3. They are SUBSTRATE SPECIFIC - i.e., they only work on one kind of substance.
4. They work best at SPECIFIC pH and TEMPERATURES.
5. Easily DENATURED by changes in pH and HIGH TEMPERATURES.

Properties of Enzymes

Proteins → Amino Acids

Proteases

Glycerol

Lipases

(Fatty Acids and Fats)

(Amylases)

Carbohydrases → Starch, Glucose, etc.

Enzymes: Breakdown processes are catalyzed by ENZYMES.

Glucose

Fatty Acids and Glycerol

Broken down into

Carbohydrates

Fats

Protein

Broken down into

Fatty Acids and Glycerol

Amino Acids
DIGESTION IN THE MOUTH

- Food is chewed by the teeth and mixed with SALIVA. The tongue helps mix food and saliva.

- Saliva contains AMYLASE which begins starch digestion.

- Food is then swallowed and PERISTALSIS ensures that food moves constantly through the gut. Peristalsis consists of waves of muscular contractions. Circular muscles contract just behind where the food is and squeeze it forward.

DIGESTION IN THE STOMACH

- The stomach physically churns and pounds the food.

- The cells lining the stomach produce ENZYMES and ACID, which mix with the food.

- ENZYMES - a PROTEASE enzyme begins protein digestion.

- ACID - dissolves food, dissolves small bones, AND PROVIDES THE CORRECT pH FOR PROTEASE ENZYME TO WORK.
Place digestion flow chart here

Pancreatic juice contains amylases, proteases, and lipases which complete for enzymes to work.

Emulsifies fats (Makes fat droplets smaller - increases surface area

Intestinal enzymes.

Neutralizes acidic food and provides the best pH for

Alkaline salts.

Bile is made in the liver and stored in the gall bladder. It contains

Food is mixed with bile and pancreatic juice.

Food leaves the stomach and enters the duodenum.
5. Record whether starch is present or not.

6. Repeat this testing of solutions every 2 minutes for 10 minutes.

2. Leave for 5 minutes.

3. Add the contents of Tube A1 to Tube A2 and the contents of Tube B2 to Tube B1. Shake well and return to the water bath for 5 minutes.

4. Using a clean pipette, remove three drops of solution from each Tube A and place in a spotting tile. Repeat for Tube B. Add a drop of iodine to each.

NB Make sure all test tubes are labelled correctly.

I. Set up apparatus as in diagram below.

METHOD

EXPERIMENT TO INVESTIGATE THE EFFECT OF SALIVARY AMYLASE ON STARCH
COMPLETE WORKSHEET 4-Lipase Activity

COMPLETE WORKSHEET 3-Enzymes and pH

5. Give TWO ways in which the rate of this reaction could be increased.

4. What was the purpose of Tube B in the experiment?

3. Why were the test tubes kept at 37°C in Tube A and B?

2. Describe how you could prove what happened to the starch in Tube A.

I. Explain what you think happened to the starch.

CONCLUSIONS

X = starch absent
KEY I = starch present

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SAMPLE NUMBER

TUBE
Place diagram here.

- Presence of blood vessels in each villus.
- Lining epithelium is moist and thin.
- Presence of villi which increase the surface area for absorption.
- Very long.

**How the Small Intestine is Adapted for Absorption**

Nearly all absorption takes place here. The small intestine consists of the duodenum and the ileum.

**Absorption**

- Water is reabsorbed and other solid material-faeces is stored in the rectum.
- Any undigested food (roughage/fibre), bacteria and bile pass into the colon.
- Any digested food is absorbed through the villi.
I. Set up apparatus as shown below. Leave for 5 minutes.

METHOD

THE MODEL GUT EXPERIMENT-ABSORPTION OF DIGESTED FOODS
10. What are some of the limitations of this gut model?

9. What is the name of the process whereby particles move through the

8. What is the end-product of starch digestion?

7. What group of nutrients does starch belong to?

6. Would glucose be able to pass through the villi of the small intestine? Give reasons for your answer.

5. Would starch contained in a piece of bread you have eaten be able to pass

4. Which part of the human digestive system could be represented by the

3. Viewing tubing is said to act as a selectively permeable membrane. What

2. Show clearly the results you obtained in each case.

1. Describe how you tested for the presence of starch and glucose.