Digestion in the intestine

Biology | Human Physiology | Nutrition, digestion, metabolism

Difficulty level	Group size	Preparation time	Execution time
easy	1	10 minutes	10 minutes

This content can also be found online at:

http://localhost:1337/c/64aec1e099f07d0002a08c82

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Teacher information

Application

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Experimental setup

In the intestine, the already predigested food is further digested and finally the nutrients are absorbed through the intestinal wall. The enzymes involved in the digestion of food in the intestine are produced by the pancreas and released into the duodenum as pancreatic juice. The pancreatic juice contains lipases (fat-splitting enzymes), amylases (starch-splitting enzymes) and proteases (protein-splitting enzymes).

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Other teacher information (1/3)

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Prior

Students should be familiar with general digestion and specifically the enzymes involved.

Principle

The pancreatin used in this experiment is a mixture of these enzymes, which is obtained from the pancreas of pigs.

Other teacher information (2/3)

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Learning

The pupils should recognise how digestion takes place in the intestine and what effect the enzymes of the pancreatic juice have on the food pulp.

Tasks

The students should investigate the effect of the enzymes of the pancreatic juice.

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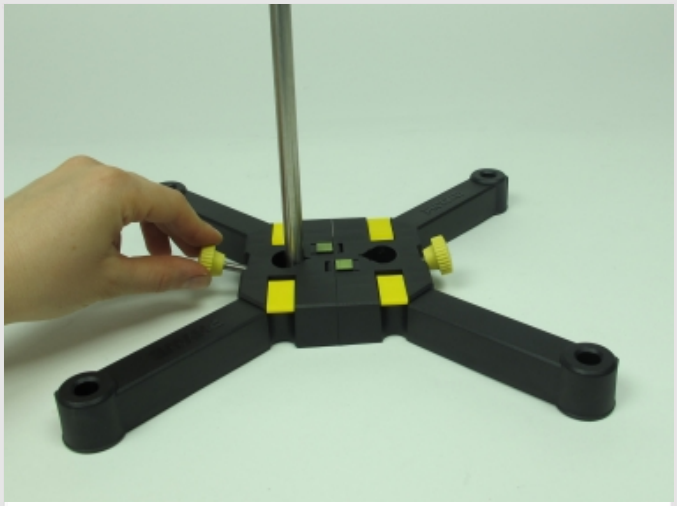
Other teacher information (3/3)

Notes on structure and implementation

- 2 days are needed to carry out the experiment because of the waiting times.
- The result of the test depends on the sample size and the reaction time, i.e. the duration of heating to 40 °C and the subsequent waiting time.



Careful construction is important

Safety instructions

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- The general instructions for safe experimentation in science lessons apply to this experiment.
- For the H- and P-phrases please refer to the corresponding safety data sheets.

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Student information

Motivation

Experimental setup

In the intestine, the already predigested food is further digested and finally the nutrients are absorbed through the intestinal wall. The enzymes involved in the digestion of food in the intestine are produced by the pancreas and released into the duodenum as pancreatic juice. The pancreatic juice contains lipases (fat-splitting enzymes), amylases (starch-splitting enzymes) and proteases (protein-splitting enzymes).

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Tasks

You will receive the butane burner from your teacher. Pay attention to your safety.

How does digestion work in the intestine?

Investigate the effect of the enzymes of the pancreatic juice.

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Equipment

Position	Equipment	Item no.	Quantity
1	PHYWE stand foot, divisible, for 2 rods, d ≤ 14 mm	02001-00	1
2	Stand rod, stainless steel, l = 600 mm, d = 10 mm, two-part, screwable	02035-00	1
3	Wire mesh with ceramic, 160 x 160 mm	33287-01	1
4	Knife	33476-00	1
5	Beaker, Boro, high form, 600 ml	46029-00	1
6	Graduated pipette, 10 ml, graduation 0.1 ml	36600-00	3
7	Measuring cylinder, plastic (PP), high form, 100 ml	36629-01	1
8	Test tube, d = 16 mm, l = 160 mm, 100 pieces	37656-10	5
9	Test tube rack, 6 holes, d = 22 mm, wood	37685-10	1
10	Tri w s d m		

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Setup - Experiment 1

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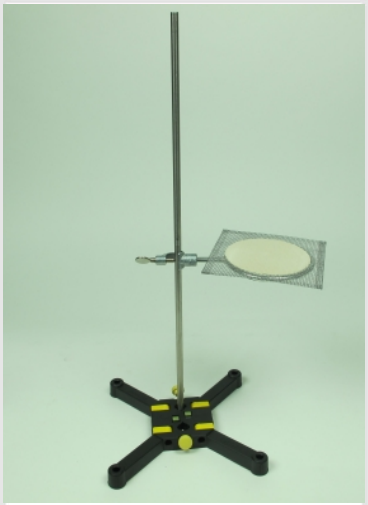

Finished tripod

- Set up the tripod with the tripod base and the tripod rod, attach the tripod ring to the tripod rod and place the wire net on the tripod ring.
- Attach the butane burner to the butane cartridge.
- Put 1 g of starch and 99 g (99 ml) of distilled water in a 600 ml beaker and place it on the wire net. Use matches to light the butane burner and place the burner under the wire net to heat the water so that the starch dissolves completely. Stir regularly with the glass rod.
- Prepare a 1% pancreatin suspension by suspending 0.5 g of pancreatin in 49.5 g (49.5 ml) of water in a steep-bottomed bottle.

Execution - Experiment 1

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Close the jars with your thumb

- Fill two test tubes each with 5 ml of the previously prepared 1% starch paste and add 2 drops of iodine-potassium iodide solution according to LUGOL in each case so that a clear blue-violet colouration is produced (starch detection).
- Add 5 ml of water to one test tube and 5 ml of 1% pancreatin suspension to the other.
- Close both test tubes with your thumb, invert them to mix their contents and place them in a test tube rack. Observe the changes in the two mixtures over the next few minutes.

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Set-up and execution - Experiment 2

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The water should be 35 to 40°C.

- Fill three test tubes each with 10 ml of 1% pancreatin suspension and put a cherry-sized piece of cooked fish meat into one test tube, a piece of cooked lean beef or pork of the same size into the second and a piece of cheese into the third.
- Fill a 600 ml beaker halfway with water and place it on the wire net. Use matches to light the butane burner and place it under the wire net to heat the water to about 35-40°C to mimic body temperature. Place the three test tubes inside and use a thermometer to constantly check the temperature of the water and keep it at about body temperature.
- Look at the condition of the different food samples after 24 hours. Use a glass stirring rod to check the consistency of the samples.

Report

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Task 1

Drag the words to the right place.

In the intestine, the already predigested food is further _____ and finally the nutrients are absorbed through the _____. The _____ involved in the digestion of the food in the intestine are produced by the pancreas and released into the duodenum as pancreatic juice. The pancreatic juice contains lipases (fat-splitting enzymes), amylases (starch-splitting enzymes) as well as _____ (protein-splitting enzymes).

enzymes
proteases
digested
intestinal wall

Check

Task 2

PHYWE

Choose the correct statements.

- [ ] All samples appear equally digested.
- [ ] The temperature at which this experiment takes place is ideally 35 to 40°C to imitate body heat.
- [ ] The consistency of the samples with pancreatin suspension appears significantly more "digested" than the consistency of the samples without pancreatin suspension.

Check

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Task 3

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Select the correct statements.

- ○ Pancreatin is a mixture of the various enzymes of the pancreas.
- ○ Pancreatin is a mixture of the various enzymes of the intestinal wall.
- ○ Pancreatin is a mixture of the various enzymes of the liver.
- ○ Pancreatin is a mixture of the various enzymes of the kidney.

Check

Slide	Score / Total
Slide 15: Pancreatic juice	0/4
Slide 16: Samples	0/2
Slide 17: Pancreatin	0/1
Total	**0 / 7**

Solutions Repeat

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