Digestion in the mouth (Item No.: P8012700)

Curricular Relevance

Area of Expertise: Biology
Education Level: Age 14-16
Topic: Nutrition and digestion
Subtopic: Digestion and excretion
Experiment: Digestion in the mouth

Difficulty	Preparation Time	Execution Time	Recommended Group Size
Difficult	10 Minutes	20 Minutes	2 Students

Additional Requirements:

- White bread

Experiment Variations:

Keywords:

Enzyme, Pytalin

Task and equipment

Information for teachers

Additional Information

Of the nutrients in our food only the sugars can be absorbed in the body without being previously transformed by the intestinal wall. Starch, fats and proteins must therefore be first broken down into their building constituents. This breaking-down process is called digestion. It takes place in various parts of our body – in the mouth, the stomach and the intestines.

All digestive processes are induced by enzymes which are contained in the digestive juices – the saliva, gastric juice and pancreatic juice.
In our mouth the food gets mechanically crushed and mixed with saliva. Saliva contains the enzyme ptyalin, an amylase. This enzyme cleaves starch into sugar; this is why starch containing foodstuffs taste slightly sweet when chewed for a longer time.


Hazards!

- Fehling’s solution is harmful to health when swallowed and can cause burns when it contacts skin.
- Use protective glasses!

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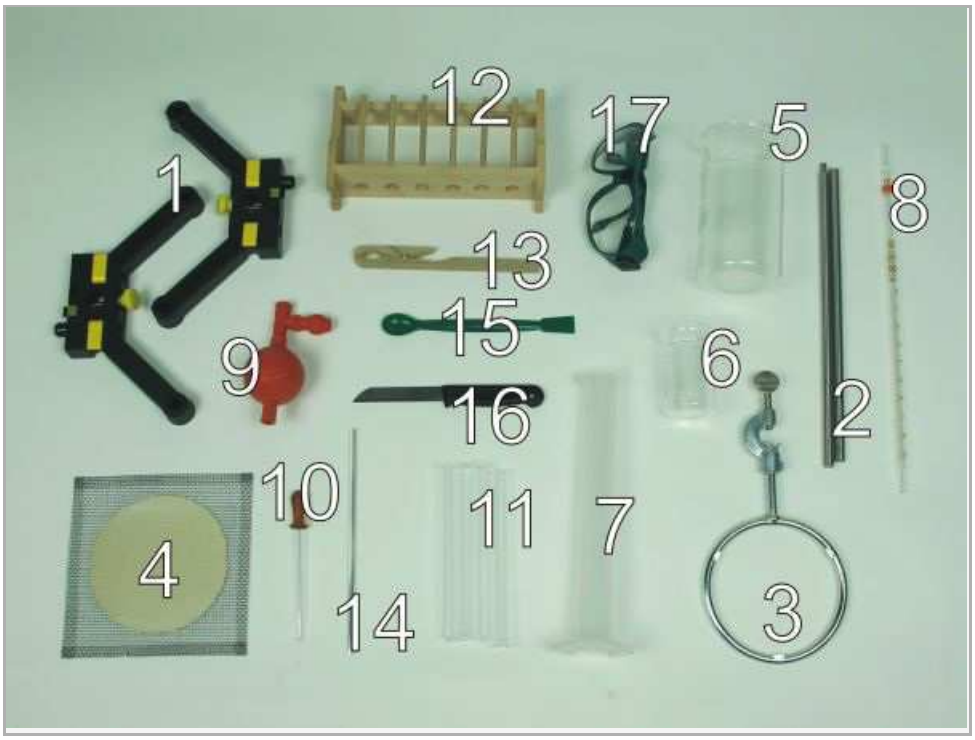
Task and equipment

Task

Begins the digestion of foods already in the mouth?

Examine the reaction of the enzyme ptyalin contained in the saliva.

Equipment



Position No.	Material	Order No.	Quantity
1	Support base, variable	02001-00	1
2	Support rod, l = 600 mm, d = 10 mm, split in 2 rods with	02035-00	1
3	Support ring, i.d. 130mm,w.boss	37722-03	1
4	Wire gauze with ceramic, 160 x 160 mm	33287-01	1
5	Glass beaker DURAN®, tall, 600 ml	36006-00	1
6	Glass beaker DURAN®, tall, 100 ml	36002-00	1
7	Graduated cylinder 100 ml, PP transparent	36629-01	1
8	Graduated pipette 10 ml	36600-00	1
9	Pipettor,bulb,3 valves, 10ml max.	47127-01	1
10	Pipette with rubber bulb	64701-00	1
11	Test tube 160x16 mm, 10 pcs	37656-03	(4)
12	Test tube rack f. 6 tubes, wood	37685-10	1
13	Test tube holder, up to d = 22 mm	38823-00	1
14	Glass rod,boro 3.3,l=200mm, d=5mm	40485-03	1
15	Spoon,w.spatula end,18 cm,plastic	38833-00	1
16	Knife, stainless	33476-00	1
17	Protecting glasses, clear glass	39316-00	1
	Butane burner, Labogaz 206 type	32178-00	1
	Butane cartridge C206, without valve	47535-01	1
	Portable Balance, OHAUS JE120	48895-00	1
	Water, distilled 5 l	31246-81	1
	Iodine potass.iodide sol., 250 ml	30094-25	1
	Starch,soluble 100 g	30227-10	1
	Fehling's solution I 250 ml	30079-25	1
	Fehling's solution II 250 ml	30080-25	1
Additional material			
	White bread		

Set-up and procedure

Hazards!

- Fehling’s solution is harmful to health when swallowed and can cause burns when it contacts skin.
- Use protective glasses!


Experiment 1

Cut the crust off a slice of white bread and divide the rest into two pieces (Fig. 1).

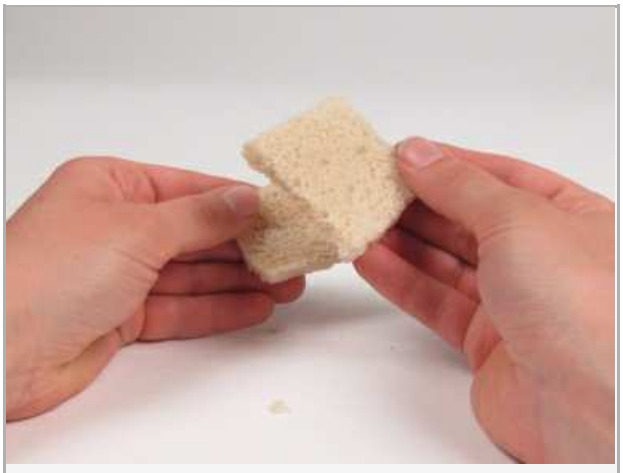


Fig. 1

Chew one piece until it is small enough to swallow comfortably and pay attention to the taste.

Chew the other piece for 3-5 minutes and pay again attention to the taste of the white bread.

Note your observations in the report.

Experiment 2

Let about 5ml salvia drop from your lower lip into a beaker. Don’t make any chewing motions while doing so, otherwise the saliva gets frothy. Dilute the saliva with an equal amount of water.

Set up a support stand with the support base and the support rod (Fig. 2 and Fig. 3), fix the support ring to the support rod and lay the wire gauze on it (Fig. 4).

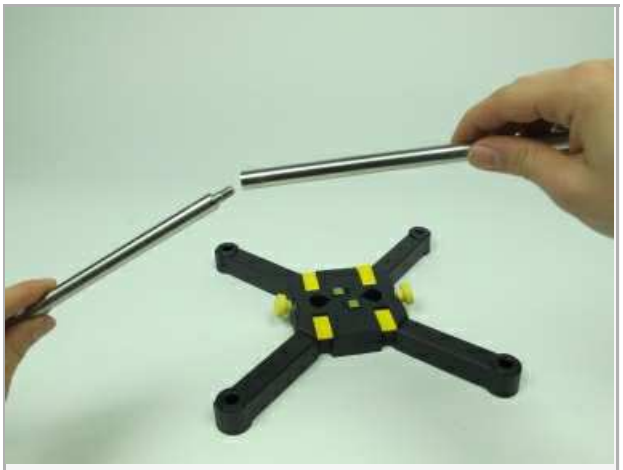


Fig. 2

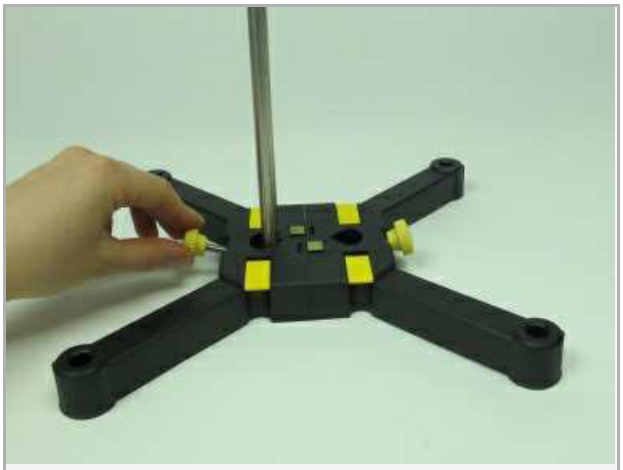


Fig. 3

Fig. 4

Attach the butane burner to the butane cartridge (Fig. 5-6).

Fig. 5

Fig. 6

Add in a glass beaker of 600ml capacity 1 g starch and 99 ml (99g) distilled water and place it on the wire gauze. Using matches light up the butane burner and place it underneath the wire gauze to heat the water until the starch has dissolved completely. Stirr regularly with the glass rod.

Fig. 7

Fill each of two test tubes with 10 ml of the before made 1% starch paste and add drops of Lugol’s iodine potassium-iodide solution until clear blue colouring appears (starch indication) (Fig. 8).
In addition put about 1 cm high diluted sliva into one of the test tubes and an equal amount of water in the other (Fig. 9).

Fig. 8

Fig. 9

Wait for a few minutes and note your observationsin the report.

Experiment 3

Transfer some of the contents (about 2 cm high) of the test tube with added saliva into another test tube and so carry out a test for sugar using Fehling’s solution.

Fig. 10

Therefore add an equal amount of a mixture of Fehling’s solution I and II and carefully heat the content of the test tube until boiling.

Be careful to ensure that no delay in boiling occurs, as the mixture of Fehling’s solution has a very strong caustic soda content and is accordingly very corrosive. On no account should it be allowed to spurt out of the test tube. Therefore don’t heat the test tube at the bottom, but a little below the surface of the liquid (Fig. 5). Move it gently to and fro while heating and hold it so that its mouth is away from people.

Then with Fehling’s solution test a sample from the test tube without added saliva for sugar. Proceed as described above.

Note your observations in the report.

Report: Digestion in the mouth

Result – Observations 1

Note down your observations on experiment 1.

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Result – Observations 2

Note down your observations on experiment 2.

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Result – Observations 3

Note down your observations on Experiment 3.

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Evaluation – Question 1

Describe the taste of the white bread in experiment 1 accurately and think of what could account for it.

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Evaluation – Question 2

What is digested through the ptyalin to what? How was this proofed in experiment 2 and 3?

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