

Name:	Date:
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Experiment: Carbohydrates in Food

A. Breakdown of Starch by Saliva



Equipment

2 beakers, test tubes, test tube racks, hotplate, pipette

Materials

Food products:

diluted potato starch dispersion ($\frac{1}{2}$ teaspoon in 100 mL water), bring to boil briefly, leave to cool and dilute 10 mL of that solution with 100 mL water (ratio 1:10)

Reagents: Iodine solution ($I_2 \cdot KI$ solution in water)

Safety and disposal guidelines

For all experiments:

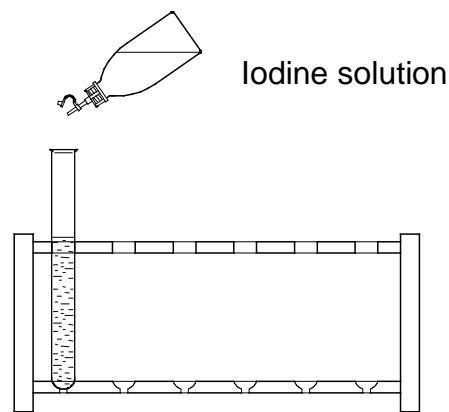
Do not eat or drink during the experiments. After finishing the experiments put used gloves into the waste and always wash your hands thoroughly.

Introduction

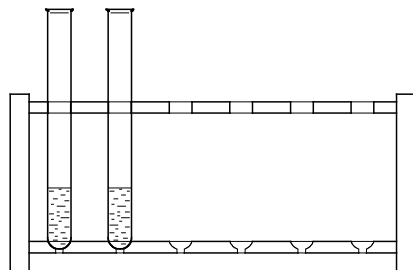
In the experiment "Evidence of Starch" you have found that potatoes contain starch. Our body digests the starch, i.e. large starch molecules are broken down into their individual components which are then used to supply energy. Digestion of food starts in the mouth with the help of saliva. You can watch the saliva work during the following experiment.

Since starch is not well soluble in water, we call starch finely distributed in water a dispersion. Heating of the dispersion will improve the solution state and make the starch better accessible for the following experiment.

Experiment



- Pour starch dispersed in water into a test tube until two-thirds of it are filled.
- Then add 1 to 2 drops of iodine solution.
- Take two clean test tubes.
- Spit heartily into one of the clean test tubes.
- Now divide the starch dispersion that was coloured with iodine between the two test tubes and shake the test tube that contains the saliva.



- All you have to do now is wait and observe what happens.

Sample	Observation
Starch solution with saliva	
Starch solution without saliva	

B. What does saliva do to starch?

Equipment

Heating plate, beakers, test tubes, test tube rack, spatula.

Materials

Food products: glucose (dextrose), diluted potato starch solution ($\frac{1}{2}$ tea-spoon/100 mL water): boil up briefly and leave to cool.

Reagents: Fehling's solution A: copper sulfate solution
Fehling's solution B: alkaline potassium-sodium tartrate solution

Safety and disposal guidelines

Copper sulfate solution: environmentally hazardous, R 52/53, S 61

Alkaline potassium-sodium tartrate solution: caustic (C) R 35, S 26-36/37/39-45

Diluted hydrochloric acid: irritant, Xi, R 36/37/38, S 26

Do not dispose of copper sulfate solutions through the drain, but collect them in a waste bottle.

Caution! During some parts of the experiment, caustic Fehling's reagent, caustic soda and hydrochloric acid are heated. Always use safety precautions (Wear goggles. Beware of splashes!)

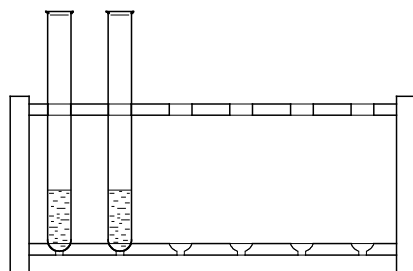
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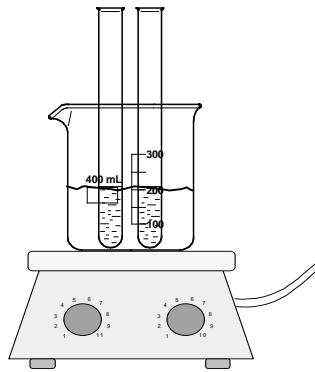
In part A of the experiment you detected that starch can disappear when saliva is added. In this experiment you will see what becomes of the starch and which components the starch consists of. This experiment also gives an explanation why bread becomes sweet when you chew it for a longer time.

Experiment



- Turn the heating plate to 200 °C and put a beaker with water on it.

- Pour 2 cm of starch solution into two test tubes and spit heartily into one of the test tubes.
- Now shake the test tube and wait for 5 minutes.
- Add to a third test tube a spatula tip-full of glucose and dissolve it in a small amount of water.
- Add to all test tubes a big splash of Fehling solutions A and B and put the test tube carefully in the water-filled beaker on the heating plate (caution: hot).
- Watch closely what happens!



Sample	Observation
Glucose	
Starch solution with saliva	
Starch solution "pure"	

What conclusions can you draw from these results? What components is starch made of?
