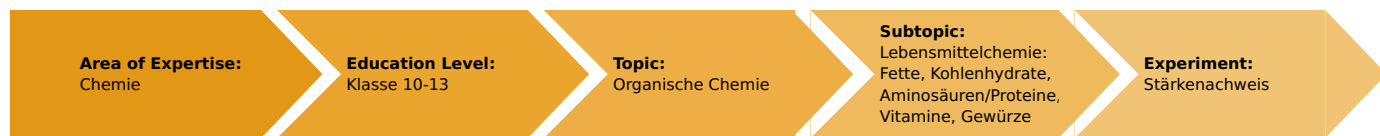


Detection of starch (Item No.: P7187200)

Curricular Relevance



Difficulty



Intermediate

Preparation Time



10 Minutes

Execution Time



20 Minutes

Recommended Group Size



2 Students

Additional Requirements:

Experiment Variations:

Keywords:

carbohydrates, starch, detection of starch

Task and equipment

Information for teachers

Additional Information

Carbohydrate requirements are almost exclusively met by vegetable products. The possible formulation of the question is, which plants and parts of plants contain starch.

Notes on content and learning objectives

- Starch can be qualitatively detected with iodine potassium iodide solution.
- Potato, grain and fruits of leguminous plants are foods which contain starch.

Notes on the method

The detection of starch can also be carried out on processed foods such as bread, cakes, pastries, sauce and pudding powders. If a microscope is available, the blue-stained starch cells from various parts of the plant preparation can be examined.

Fundamentals and remarks

The polysaccharide starch is not a chemically uniform compound, but consists of the components amylose and amylopectin. Both are built up from D-glucose molecules, forming a helical molecular framework. With iodine, a characteristically coloured inclusion compound is formed, in which one iodine molecule is held within each spiral of the molecular framework.

Hints on going deeper

- Examination of various fruits, parts of plants and seeds for starch.



Hazards

- Wear protective glasses!

Notes on set-up and procedure

Preparation:

Instead of dried beans also other dried fruits of leguminous plants can be used. The fruits of leguminous plants can be chopped up easier after allowing them to swell in water. Instead of a mortar a knife can then be used.

As an alternative the detection of starch can be carried out on a cut up potato.

Notes on the students experiment:

As this detection method for starch is very sensitive (0,002 mg starch/ml), only small amounts of the samples are required.

Waste disposal

Pour the solutions to drain.

Detection of starch (Item No.: P7187200)

Task and equipment

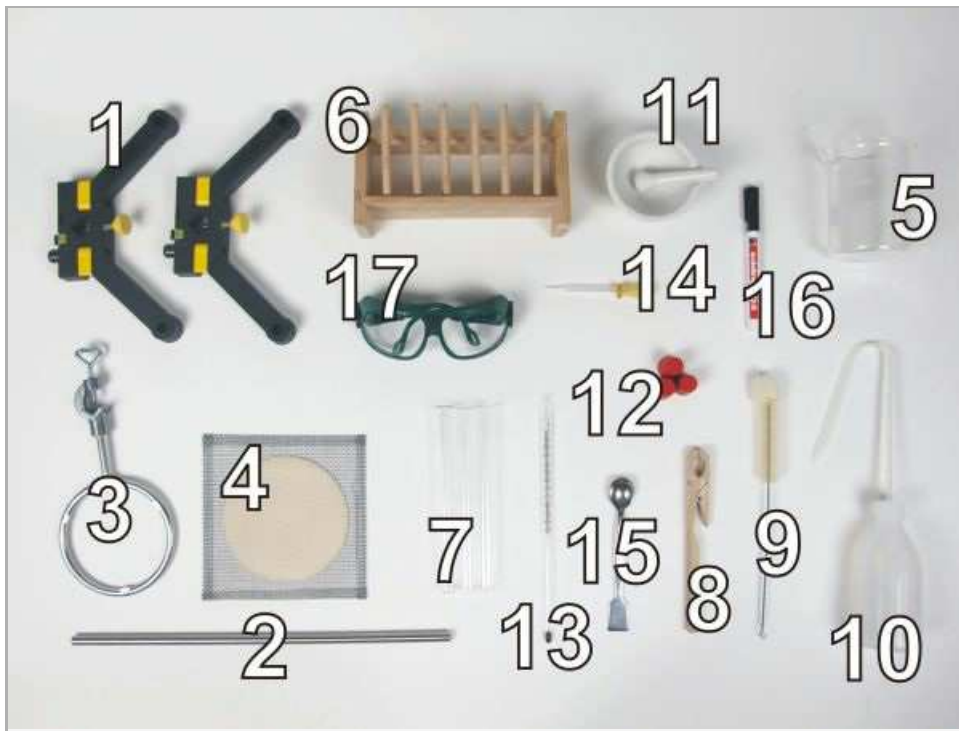
Task

How is starch qualitatively detected in foods?

Test various foods for starch.



Equipment



Position No.	Material	Order No.	Quantity
1	Support base, variable	02001-00	1
2	Support rod, stainless steel, l=370 mm, d=10 mm	02059-00	1
3	Ring with boss head, i. d. = 10 cm	37701-01	1
4	Wire gauze with ceramic, 160 x 160 mm	33287-01	1
5	Glass beaker DURAN®, short, 400 ml	36014-00	1
6	Test tube rack for 12 tubes, holes d= 22 mm, wood	37686-10	1
7	Test tube, 180x18 mm,100pcs	37658-10	(3)
8	Test tube holder, up to d 22mm	38823-00	1
9	Test tube brush w. wool tip,d25mm	38762-00	1
10	Wash bottle, 250 ml, plastic	33930-00	1
11	Mortar w. pestle, 70ml, porcelain	32603-00	1
12	Rubber stopper, d=22/17 mm, without hole	39255-00	3
13	Students thermometer,-10...+110°C, l = 180 mm	38005-02	1
14	Pipette with rubber bulb	64701-00	1
15	Spoon, special steel	33398-00	1
16	Labor pencil, waterproof	38711-00	1
17	Protecting glasses, clear glass	39316-00	1
	Butane burner f.cartridge 270+470	47536-00	1
	Butane cartridge CV 300 Plus, 240 g	47538-01	1
	Iodine potass.iodide sol., 250 ml	30094-25	1
	Starch,soluble 250 g	30227-25	1
	Water, distilled 5 l	31246-81	1
	Boiling beads, 200 g	36937-20	1
Additional material			
	Cereal grains		
	Dried beans		

Set-up and procedure

Set-up

Hazards

- Wear protective glasses!



Set-up

Number three test tubes from 1 to 3 and stand them next to each other in the test tube rack (Fig. 1).



Fig. 1

Crush the dried beans using a pestle in the mortar. (Fig. 2).

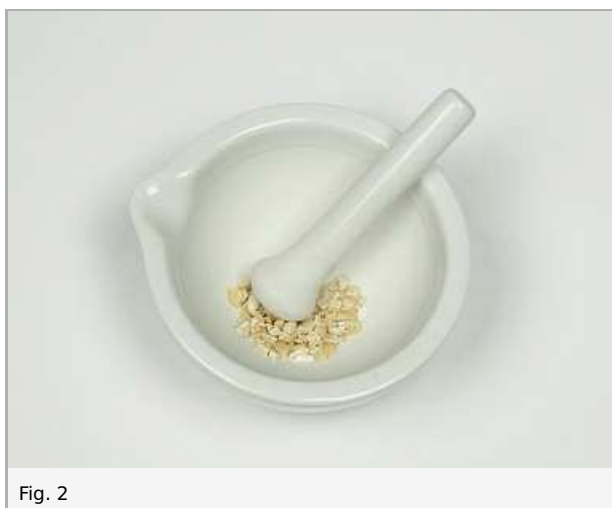


Fig. 2

Assemble the stand as shown in figures 3 to 7. Fasten the support ring to the support rod and place the wire gauze on it. Adjust the height of the support ring so that the flame of the burner just reaches the wire gauze.



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7

Half-fill a 400 ml beaker with water and add a few boiling stones (Fig. 8). Heat it to boiling, then put it aside. Extinguish the bunsen burner flame!



Fig. 8

Procedure

Put a spatula tip of fresh potato starch into test tube 1. Pipette distilled water into the test tube to a height of 4 cm. Vigorously shake the test tube. Check if the starch has been dissolved. Place the test tube in the hot water bath for a few minutes.

Allow the starch solution to cool. Then pipette two drops of iodine potassium iodide solution into the cold starch solution. Place the test tube with the coloured solution in the approx. 80 °C hot water bath. When the solution has become decolourized, allow it to cool again.

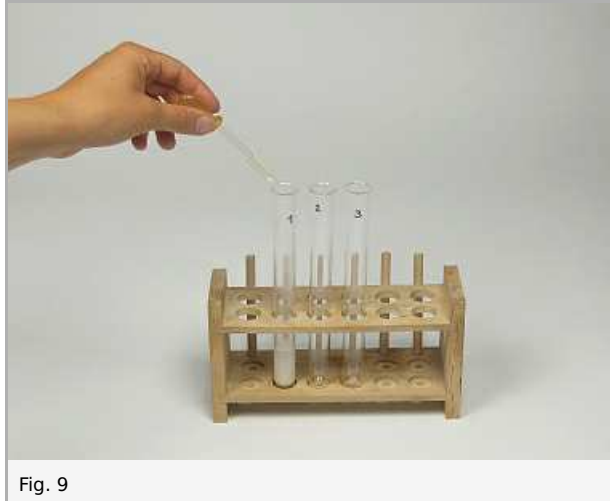


Fig. 9

Put grain flour in test tube 2 and crushed beans in test tube 3. Add distilled water and test if the foods contain starch with iodine potassium iodide solution (Fig. 10).

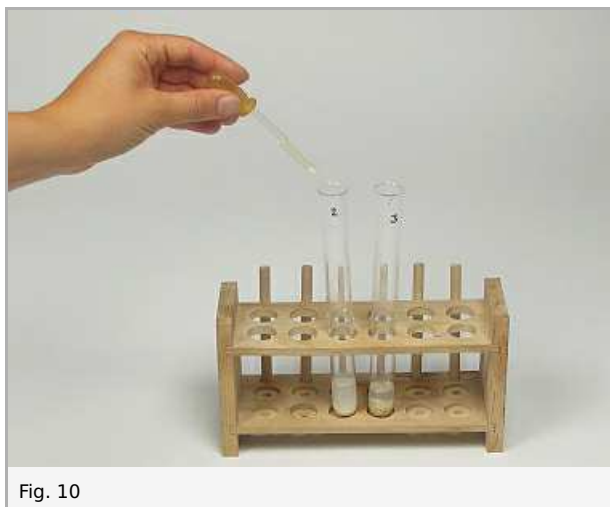


Fig. 10

Waste disposal

Pour the solutions to drain.

Report: Detection of starch

Result - Table 1

Note your observations.

Test tube	Substance	Reaction
1	1	1
2	1	1
3	1	1

Evaluation - Question 1

Draw conclusions from your observations.

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Evaluation - Question 2

In which parts of plants is starch stored?

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Evaluation - Question 3

Complete the following statements.

1. Starch is soluble in cold water.
2. Starch at a temperature above 55 °C, whereby it takes up to its weight in water up.
3. With, starch solution forms a heat labile inclusion compound, which is again formed on cooling.

Evaluation - Question 4

How is starch formed?

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