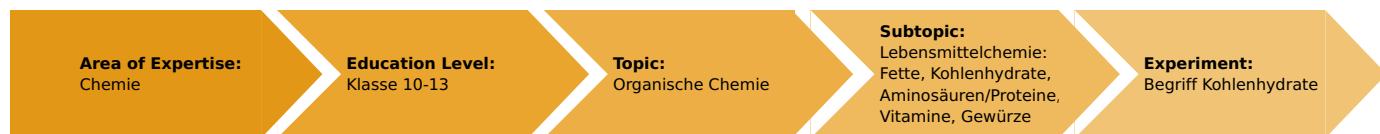


The term carbohydrate (Item No.: P7186600)

Curricular Relevance



Difficulty



Intermediate

Preparation Time



10 Minutes

Execution Time



20 Minutes

Recommended Group Size



2 Students

Additional Requirements:

Experiment Variations:

Keywords:

carbohydrate, structure of carbohydrates

Task and equipment

Information for teachers

Additional Information

The term carbohydrate is known. This experiment serves to explain it more exactly.

Notes on content and learning objectives

- Elementary carbon and water are formed on heating carbohydrates.
- Carbohydrates such as glucose, sucrose and starch are based on the elements carbon, hydrogen and oxygen.

Notes on the method

This experiment is suitable to start on the chemistry of the carbohydrates.
The terms hydration and condensation should be worked on in a classroom discussion.

Fundamentals and remarks

When carbohydrates are heated, various condensation products are formed, which partially escape as gases.
In this way, sugar changes to the intermediate products caramel and caramel colouring, and finally to charcoal from sugar.

Hints on going deeper

- A procedure for the production of starch from maize could be discussed to go into this subject more deeply.
- Importance of carbohydrates for our nutrition
- Information on the daily requirement of carbohydrates

Notes on set-up and procedure

Notes on the students experiments:

Carry out the heating in a fume cupboard, as unpleasantly smelling gases are evolved when carbohydrates decompose.



Hazards

- Wear protective glasses!

Waste disposal

Put the decomposition products into the normal waste container, after decanting off the water.

The term carbohydrate (Item No.: P7186600)

Task and equipment

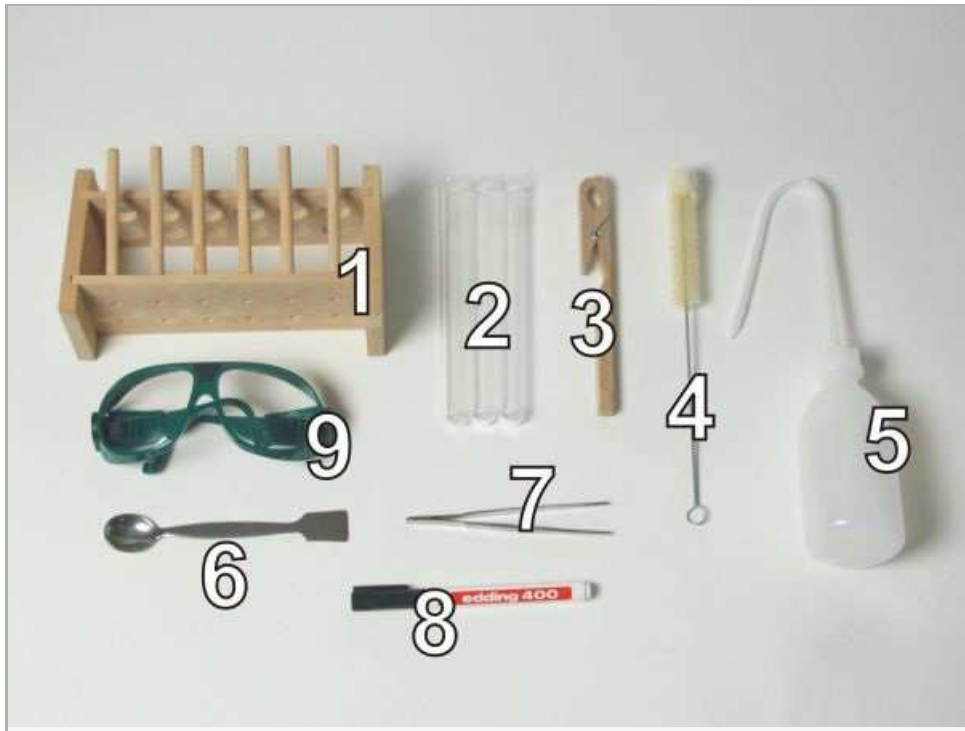
Task

Which elements are carbohydrates made up of?

Heat various carbohydrates and determine which substances are formed from them.



Equipment



Position No.	Material	Order No.	Quantity
1	Test tube rack for 12 tubes, holes d= 22 mm, wood	37686-10	1
2	Test tube, 180x18 mm,100pcs	37658-10	(3)
3	Test tube holder, up to d 22mm	38823-00	1
4	Test tube brush w. wool tip,d25mm	38762-00	1
5	Wash bottle, 250 ml, plastic	33930-00	1
6	Spoon, special steel	33398-00	1
7	Tweezers, l = 130 mm, straight, blunt	64610-00	1
8	Labor pencil, waterproof	38711-00	1
9	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
	D(+)-glucose 1000 g	30237-70	1
	Starch,soluble 250 g	30227-25	1
	Water, distilled 5 l	31246-81	1
	Indicator paper f.water roll 5m	47015-00	1
Additional material			
	Fume cupboard		
	Sugar (normal household sugar)		

Set-up and procedure

Set-up

Hazards

- Wear protective glasses



Set-up

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



Procedure

Put two spatula tips of glucose in test tube 1. Put the same quantity of sugar in test tube 2, and of starch in test tube 3 (Fig. 2).



Successively heat the test tubes carefully with a bunsen burner (Fig. 3), until drops condense on the walls of the test tube

(Fig. 4).



Fig. 3

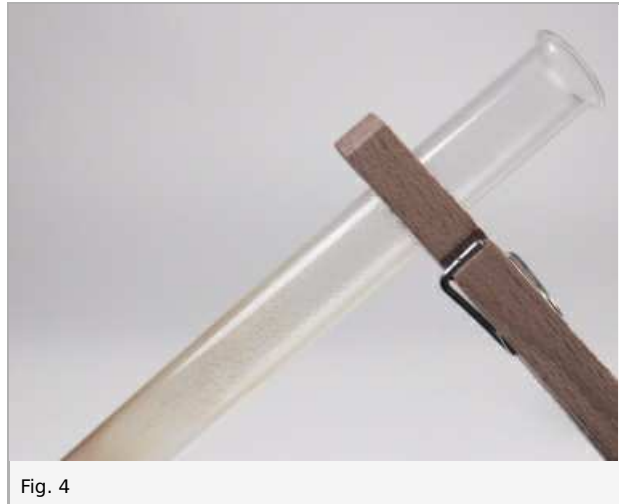


Fig. 4

Test the drops formed in the test tubes with strips of indicator paper for water. Use tweezers to hold the indicator paper (Fig. 5).

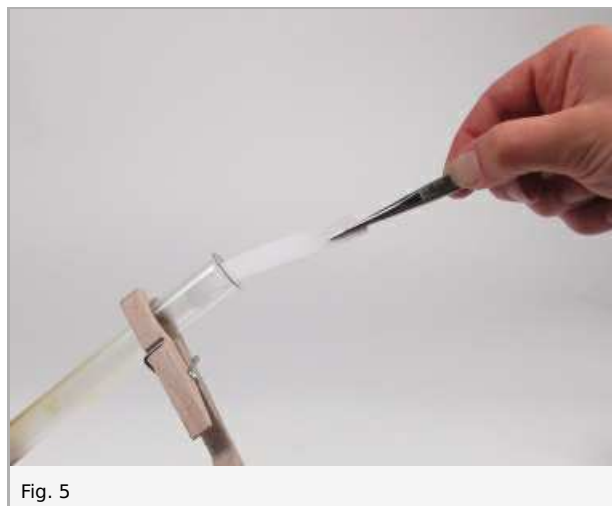


Fig. 5

When the test tubes have cooled, pour distilled water into each of them to a height of 4 cm. Try to dissolve the residues by gently shaking the tubes.

Waste disposal

Put the decomposition products into the normal waste container, after decanting off the water.

Report: The term carbohydrate

Result - Table 1

Describe your observations in the following succession.

Test tube	Substance	Change in colour	Detection of water	Solubility in water
1	Glucose	1	1	1
2	Sugar	1	1	1
3	Starch	1	1	1

Evaluation - Question 1

Draw conclusions from your observations.

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Evaluation - Question 2

Explain the term "carbohydrate".

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Evaluation - Question 3

Name foods which contain carbohydrates.

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Evaluation - Question 4

Complete the following statements.

1. Carbohydrates decompose on heating to, and
2. Hydrogen and oxygen react to form
3. Carbon is left as a residue.