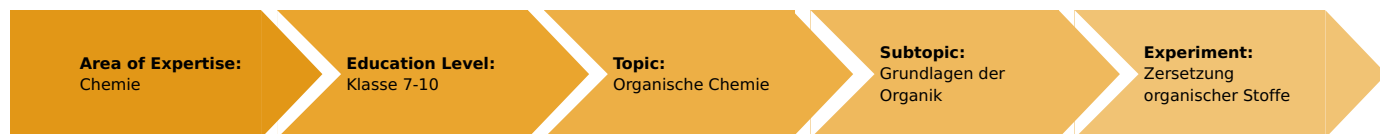


The decomposition of organic substances (Item No.: P7170000)

Curricular Relevance



Difficulty



Easy

Preparation Time



10 Minutes

Execution Time



10 Minutes

Recommended Group Size



2 Students

Additional Requirements:

Experiment Variations:

Keywords:

organic compounds, decomposition of organic compounds

Task and equipment

Information for teachers

Learning objectives

- All organic substances contain carbon as a common element.
- Organic chemistry is therefore the chemistry of carbon compounds.

Notes on setup and procedure

Preparation:

Normal sugar and salt from food stores can be used instead of glucose and sodium chloride.

Notes on the students experiments:

Unpleasantly smelling products result from the decomposition of the organic substances. Carry out the experiment in a fume hood if possible. The experiments can also be carried out with work-sharing in the groups and an exchange of results.



Hazard and precautionary statements

Aluminium sulphate:

- H319: Causes serious eye irritation.
 P309 + P310: IF exposed or you feel unwell: Call a POISON CENTER or doctor/physician.
 P305 + P351 + P338: IF IN EYES: Rinse continuously with water for several minutes. Remove contact lenses if present and easy to do continue rinsing.
 P501: Dispose of contents/ containers to be collected by a licensed contractor in accordance with national and local regulations.

Hazards

- Gases with an unpleasant smell are evolved on heating, do not inhale them. Wear protective glasses!

- Carry out the experiment in a fume hood if possible, if this is not possible air the room well after the experiment!

Notes

The customary differentiation between organic and inorganic substances, which was made prior to Wöhler's synthesis of urea, is not academically compelling but has been so useful after the rejection of the "vis vitalis" theory that it is still in use today. The continued appropriateness of such a differentiation can be shown by comparing the number of organic compounds (40 million) with the number of inorganic compounds (ca. 500,000).

Remarks on the method

This experiment serves as the first introduction to the chemistry of organic substances, and at the same time to the detection of the element carbon. Right at the start of the teaching unit "Organic chemistry", illustrate the historical predecessors of "Organic chemistry" and the development of the field.

Waste disposal

- Use the heated copper sulphate for the detection of water.
- Collect the salts in appropriately labelled containers und re-use them for similar experiments.
- Decomposition products can be disposed in the normal house waste.

The decomposition of organic substances (Item No.: P7170000)

Task and equipment

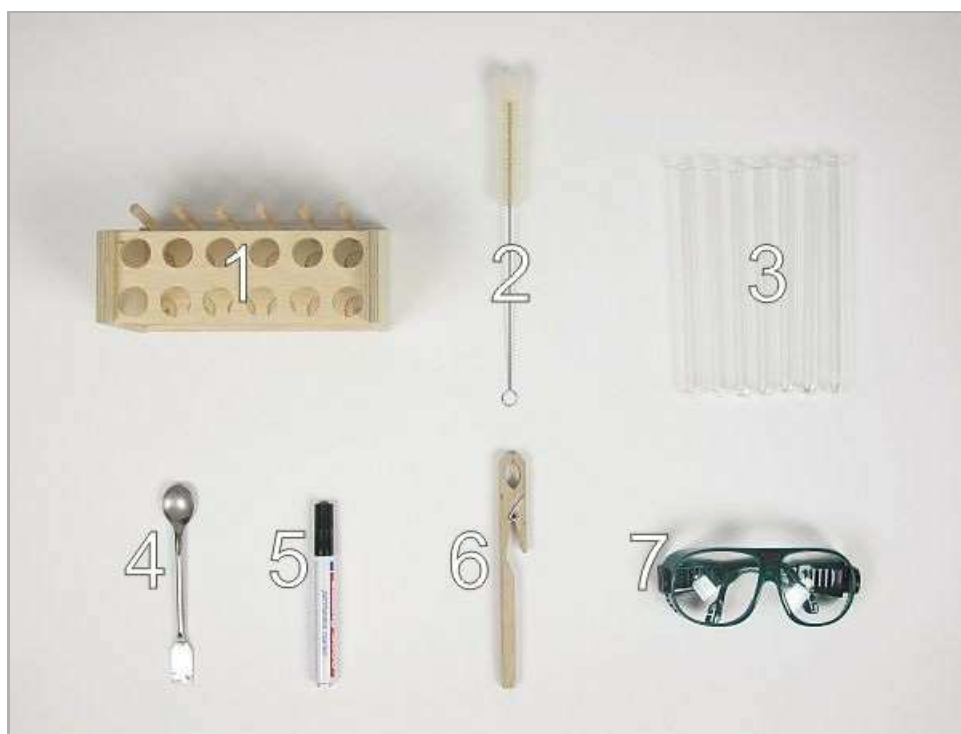
Task

What do all organic compounds have in common?

Examine the processes which occur when organic substances are heated.



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 brush w. wool tip,d25mm	38762-00	1
3	Test tube, 180x18 mm,100pcs	37658-10	(7)
4	Spoon, special steel	33398-00	1
5	Labor pencil, waterproof	38711-00	1
6	Test tube holder, up to d 22mm	38823-00	1
7	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
	Copper-II sulphate,cryst. 250 g	30126-25	1
	Sodium chloride 1000 g	30155-70	1
	Starch,soluble 100 g	30227-10	1
	D(+)-glucose 1000 g	30237-70	1
	Aluminium sulphate 500 g	31022-50	1
	Wood splints, package of 100	39126-10	1

Set-up and procedure

Set-up

Hazards

- Gases with an unpleasant smell are evolved on heating, do not inhale them.
- Carry out the experiment in a fume hood if possible, if this is not possible air the room well after the experiment!
- Wear protective glasses!



Setup

Number the test tubes from 1 to 7 and put them in this order in the test tube rack (Fig. 1).

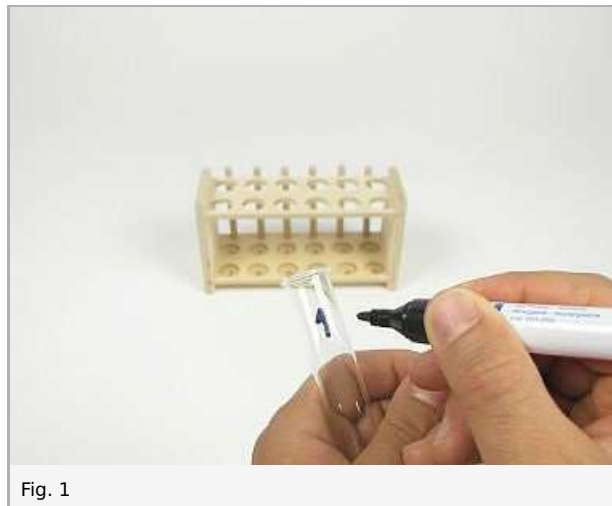


Fig. 1

Procedure

Break a wood splint to bits and put three pieces of it into test tube 1 (Fig. 2).

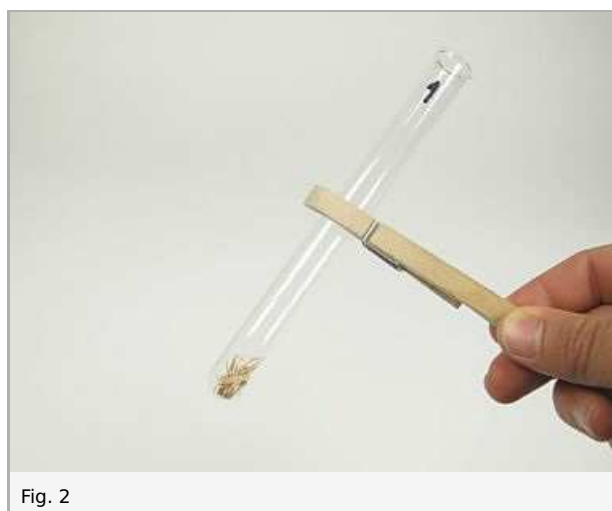


Fig. 2

Put into each of the test tubes 2 to 7 a spoonful of one of the other chemicals in the following order: glucose, starch, pieces of plastic, aluminium sulphate, copper sulphate, sodium chloride (Fig. 3).



Fig. 3

Heat the test tubes one after the other, each for about 3 minutes, in the non-luminous flame (Fig. 4).



Fig. 4

Waste disposal

- Use the heated copper sulphate for the detection of water.
- Collect the salts in appropriately labelled containers and re-use them for similar experiments.
- Decomposition products can be disposed in the normal house waste.

Report: The decomposition of organic substances

Result - Table 1

Note your observations in the table.

Test tube	Content	Observation
1	Wood	Decomposes, gases evolve, they partly condense to a liquid. The wood turns black.
2	Glucose	Decomposes, unpleasant smelling gases evolve. The sugar changes colour through yellow and brown to black.
3	Starch	Decomposes, unpleasant smelling gases evolve. The starch changes colour through brown to black.
4	Plastic	Decomposes, an unpleasant smell is noticeable. Turns black.
5	Aluminium sulphate	No visible change. Remains colourless to white.
6	Copper(II)-sulphat	The colour changes from blue to white. A watery liquid condenses on the cold part of the test tube.
7	Sodium chloride	No visible change. Remains colourless to white.

Evaluation - Question 1

Draw conclusions from your observations and thereby answer the question in the header.

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Evaluation - Question 2

To which type of substances do the materials in test tubes 5-7 belong to and why do they exhibit a different behaviour.

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Evaluation - Question 3

Separate the materials tested into inorganic and organic substances.

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Evaluation - Question 4

Name some well-known organic substances or classes of substances.

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