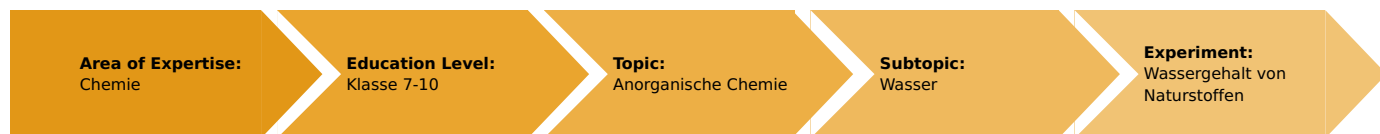


Water content of natural substances (Item No.: P7154500)

Curricular Relevance



Difficulty



Easy

Preparation Time



10 Minutes

Execution Time



10 Minutes

Recommended Group Size



2 Students

Additional Requirements:

Experiment Variations:

Keywords:

water, water content

Task and equipment

Information for teachers

Learning objectives

- Fruit and vegetables contain water, sometimes the fraction is very high.
- Even in most other foodstuffs, water is present to a greater or lesser degree.

Notes on set-up and procedure

Preparation

To save time, previously cut up and weighed substances can be used. Working in groups with subsequent information exchange is also possible in this experiment.

All types of fruit and vegetable can be used. Particularly appropriate are citrus fruits and cucumbers due to their high water contents.

Remarks on the students' experiments

Ensure that the students heat the natural products slowly and uniformly over a small flame. If the substances are charred, a reaction has occurred which falsifies the results. In addition the charred substances can only be removed from the test tube with difficulty.



Hazards

- On heating the substances, hot steam is generated. Wear protective glasses!

Note

The given tabular values are exemplary ones, which can vary up to 20% depending on the conduction of the experiment and the products used.

Remarks on the method

In principle, samples of meat whose water fraction is approximately 50% can also be used in this experiment. However, in this case, the malodour on heating must be considered.

A comparison of slightly (e.g. with compost) and heavily fertilised vegetables (otherwise the same) can be very interesting. In this case, it is demonstrated that growth increase achieved through the use of much fertilizer is primarily only an increase in the water content.

In this context the importance of water for the processes of life in general should be discussed.

Water content of natural substances (Item No.: P7154500)

Task and equipment

Task

Do natural products contain water?

Determine the water content of fruit and vegetables.



Equipment



Position No.	Material	Order No.	Quantity
1	Protecting glasses, clear glass	39316-00	1
2	Test tube brush w. wool tip,d25mm	38762-00	1
3	Spatula, powder, steel, l=150mm	47560-00	1
3	Labor pen, waterproof	38711-00	1
4	Test tube rack f. 6 tubes, wood	37685-10	1
4	Test tube, 18x188 mm, 10 pcs	37658-03	(6)
4	Test tube holder, up to d 22mm	38823-00	1
4	Knife, stainless	33476-00	1
5	Watch glass, dia.60 mm	34570-00	1
	Butane burner f.cartridge 270+470	47536-00	1
	Butane cartridge CV 300 Plus, 240 g	47538-01	1
Additional material			
	Fruit, three different types		
	Vegetables, three different types		

Set-up and procedure

Set-up

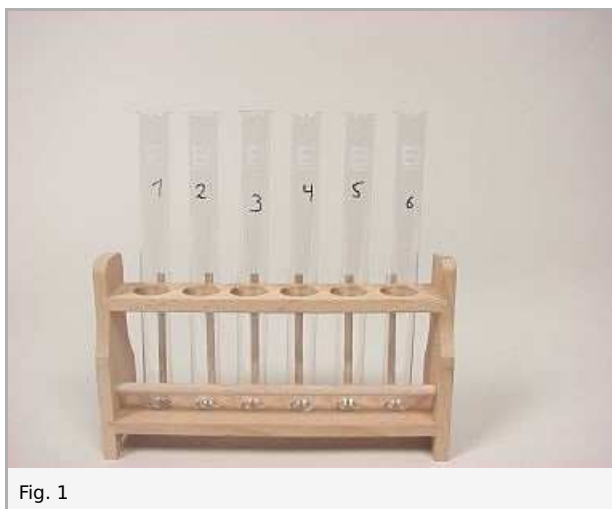
Hazards

- On heating the substances hot steam is generated. Wear protective glasses!



Set-up

Number the test tubes from 1 to 6 (Fig. 1).



Cut the fruits and the vegetables into small pieces with the knife. Open the balance (Fig. 2) and switch it on (Fig. 3). Place the watch glass onto the balance (Fig. 4), tare it out to zero (Fig. 5) and put pieces of one type of fruit or vegetable onto it until the balance indicates approximately 10 g (Fig. 6). Note the type of fruit or vegetable used and its exact weight.



Fig. 2



Fig. 3



Fig. 4



Fig. 5

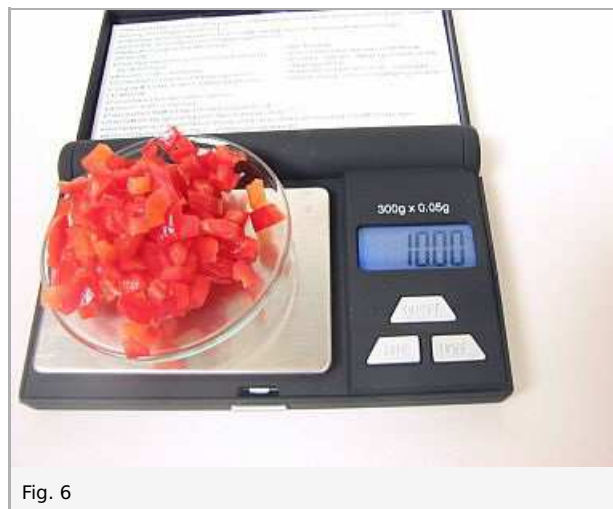


Fig. 6

Put the pieces from the watch glass into test tube 1 (Fig. 7) and place it into the rack. Clean the watch glass and dry it.

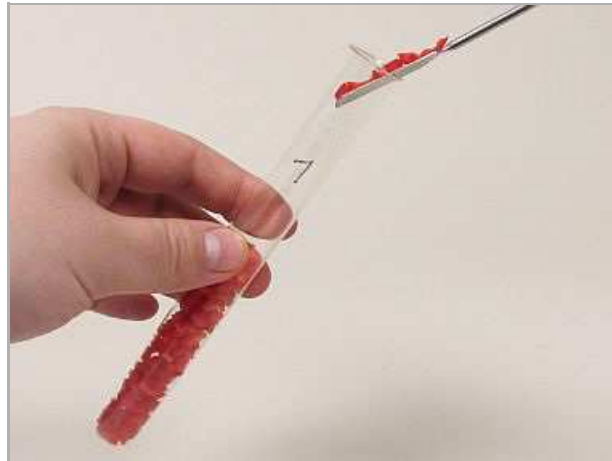


Fig. 7

Proceed in the same manner with the other types of fruits and vegetables (Fig. 8).



Fig. 8

Procedure

Procedure

Pick up test tube 1 with the test tube holder and heat the contents over a small burner flame (Fig. 9). Ensure that the samples do not completely decompose or char.



Fig. 9

Hold a cleaned and dried watch glass above the test tube's opening while heating (Fig. 10).

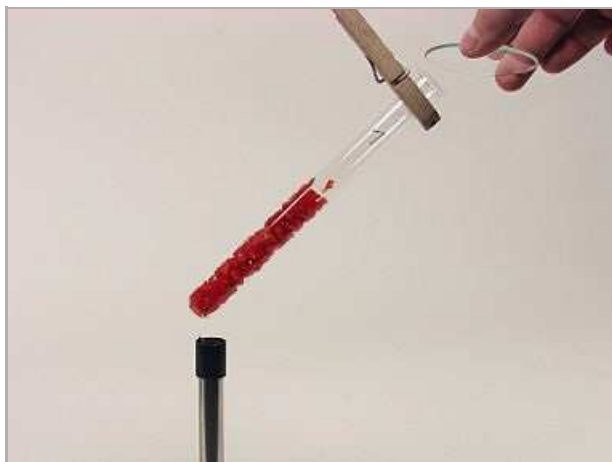


Fig. 10

After cooling, weigh the contents of the test tube and record the result in Table 1 (Fig. 11).



Fig. 11

Proceed in the same manner with the other substance samples.

Report: Water content of natural substances

Result - Observations

Note your observations.

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Evaluation - Table 1

Complete Table 1.

	Substance	Weight before heating (g)	Weight after heating (g)	Water fraction (g)
1	Peach	1 ±0	1 ±0	1 ±0
2	Apple	1 ±0	1 ±0	1 ±0
3	Orange	1 ±0	1 ±0	1 ±0
4	Potato	1 ±0	1 ±0	1 ±0
5	Cucumber	1 ±0	1 ±0	1 ±0
6	Green pepper	1 ±0	1 ±0	1 ±0

Evaluation - Table 2

Calculate the percental water fraction for each substance.

	1	2	3	4	5	6
Percental water fraction (%)	1	1	1	1	1	1

Evaluation - Question 1

Formulate the results of the experiment in a concise statement.

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