Test for water (Item No.: P7155300)

Curricular Relevance

Area of Expertise: Chemie
Education Level: Klasse 7-10
Topic: Anorganische Chemie
Subtopic: Wasser
Experiment: Wassernachweis

Difficulty	Preparation Time	Execution Time	Recommended Group Size
Easy	10 Minutes	10 Minutes	2 Students

Additional Requirements:

Experiment Variations:

Keywords:

water, tests for water

Task and equipment

Information for teachers

Learning objectives

- Many salts contain water of crystallization. Its removal or addition changes the colour of the salts.
- The colour alteration on adding the water of crystallization can be used as a test for water.

Notes on set-up and preparation

Preparation
Dry the table salt beforehand in a drying oven at approximaely 80 °C for a day, since table salt contains moisture and thus simulates the presence of water of crystallization.

Remarks on the students' experiments
Ensure that the salts are heated extremely cautiously. If they are heated too strongly, the dehydrated salts subsequently do not absorb water of crystallization any more. The condensed water of crystallization must be completely driven out of the test tube. While doing so, do not heat the salts any more.

Hazard and Precautionary statements

Copper sulphate:

H302:	Harmful if swallowed.
H315:	Causes skin irritation.
H319:	Causes serious eye irritation.
H410:	Very toxic to aquatic life with long lasting effects.
P273:	Avoid release to the environment.
P305 + P351 + P338:	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P302 + P352:	IF ON SKIN: Wash with plenty of soap and water.

Standard petrol:

H225:	Highly flammable liquid and vapour.
H304:	May be fatal if swallowed and enter airways.
H336:	May cause drowsiness or dizziness.
H411:	Toxic to aquatic life with long lasting effects.
EUH066:	Repeated exposure may cause skin dryness or cracking.
P210:	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P240:	Ground/bond container and receiving equipment.
P273:	Avoid release to the environment.
P301 + P310:	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P331:	Do NOT induce vomiting.
P403 + P235:	Store in a well ventilated place. Keep cool.

Hazards

- Copper sulphate is hazardous to health. Do not swallow it! Wash your hands thorougly after the experiment.
- Petrol is highly flammable. Extinguish all open flames!
- Wear protective glasses!

Notes

One mole of copper sulphate contains 5 moles of water of crystallization. Its release on heating is accompanied by a colour change.
Sodium chloride does not contain any water of crystallization and is also not hygroscopic. The humidification of table salt is due to the admixture of magnesium chloride, which is strongly hygroscopic.

Remarks on the method

This experiment can also be introduced in the scope of the simple test reacions and be picked up again in the treatment of the topic "Water".

Waste disposal

- The salts which are not used can be collected in appropriately labelled containers and reused.
- The salts used in the experiment should be precipitated in sulphidic or basic form and disposed of as heavy metal wastes.

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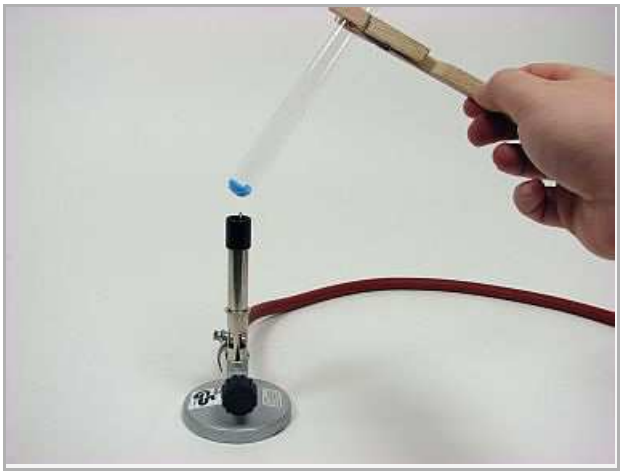
Task and equipment

Task

How can the presence of water in substances be detected?

Prepare an analytical reagent for water and test substances for the presence of water with it.



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
4	Test tube rack f. 6 tubes, wood	37685-10	1
4	Test tube, 18x188 mm, 10 pcs	37658-03	(2)
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	2
6	Pipette with rubber bulb	64701-00	2
	Butane burner f.cartridge 270+470	47536-00	1
	Butane catridge CV 300 Plus, 240 g	47538-01	1
	Copper-II sulphate,cryst. 250 g	30126-25	1
	Sodium chloride 250 g	30155-25	1
	Stand.petrol b.p.65-95 C 1000 ml	31311-70	1
Additional material			
	Vegetable, e.g. cucumber		
	Water		

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Set-up and procedure

Set-up

Hazards

- Copper sulphate is hazardous to health. Do not swallow it! Wash your hands thoroughly after the experiment!
- Petrol is highly flammable. Extinguish all open flames!
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Procedure

Procedure

Place all two test tubes into the test tube rack (Fig. 1). Put a spatulaful of sodium chloride into the first test tube (Fig. 2) and the same amount of copper sulphate into the second one (Fig. 3).


Fig. 1

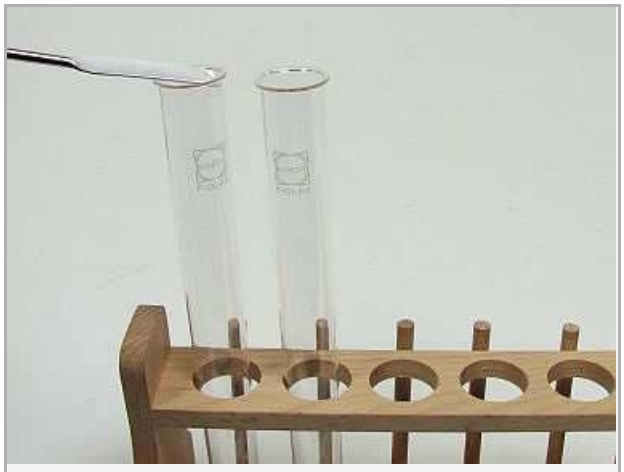
Fig. 2

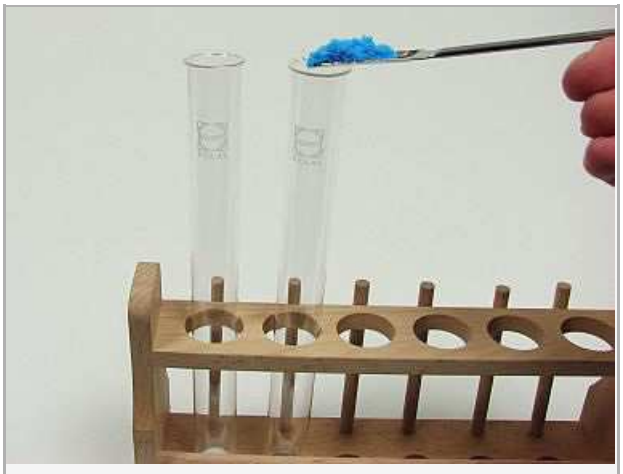
Fig. 3

Heat the test tubes successively over a small, non-luminous burner flame (Fig. 4 + Fig. 5). While doing so, shake the test tubes several times.

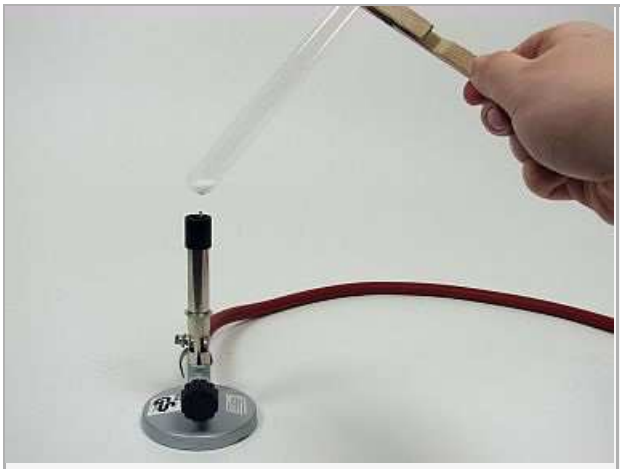

Fig. 4

Fig. 5

Remove the condensed water by heating the respective part of the test tube. (While doing so, do not heat the salts any more!).

Extinguish all flames! Put some dehydrated copper sulphate onto the first watch glass and some sodium chloride onto the second one (Fig. 6). With a pipette apply two drops of petrol to each of the salts on the watch glasses. Wait a short time and then put two drops of water onto each of the dehydrated salts (Fig. 7).

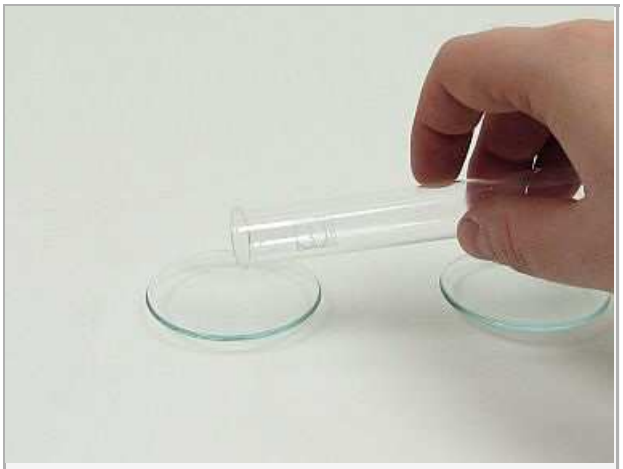

Fig. 6

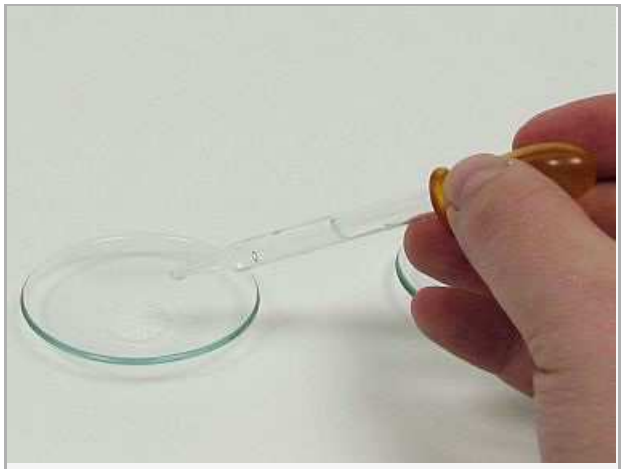

Fig. 7

Cut open the vegetable (cucumber) and put a spatula-tip full of dehydrated sodium chloride (Fig. 8) and copper sulphate (Fig. 9) onto different parts of the cucumber.

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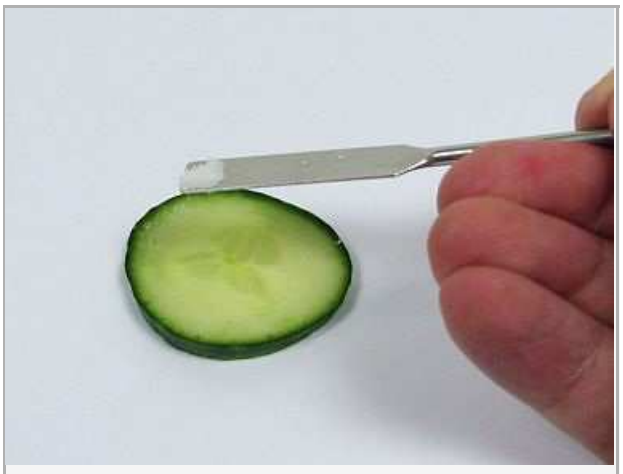

Fig. 8

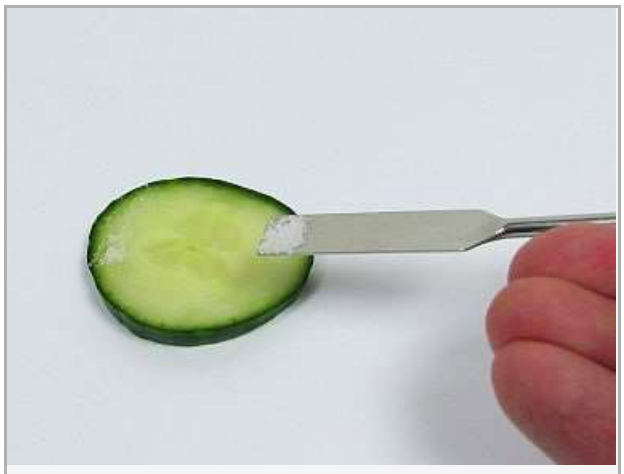

Fig. 9

Waste disposal

Either reuse the remaining salts or dispose them of as heavy metal wastes.

Report: Test for water

Result - Observations

Note your observations.

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Result - Table 1

Record the differences before and after heating in Table 1.

Salt	Colour before heating	Colour after heating	Escape of water on heating (yes/no)
Copper sulphate	1	1	1
Sodium chloride	1	1	1

Evaluation - Question 1

Draw conclusions from your observations.

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Evaluation - Question 2

Which salts are generally appropriate for the test of water, which are not?

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Evaluation - Question 3

Why are the salts appropriate for the test dehydrated shortly before the experiment?

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