Test for water

In this student experiment, a water detection reagent ("copper sulphate") is prepared. In the subsequent detection sample, one takes advantage of the fact that anhydrous copper sulphate is white, but turns blue when it comes into contact with water.

Chemistry > Inorganic chemistry > Water

Nature & technology > Substances in everyday use

Difficulty level	Group size	Preparation time	Execution time
easy	2	10 minutes	10 minutes

This content can also be found online at:

http://localhost:1337/c/63411dbadddc3a0003017b98

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Teacher information

Application

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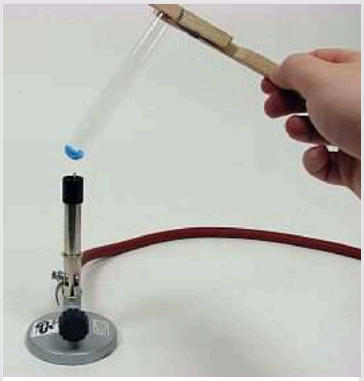

Experimental setup

In this experiment, the students observe the effects of removing / adding water for different salts.

They find that many salts contain water of crystallisation and the colour change associated with the addition / removal can be used as evidence of water.

This experiment can also be carried out as part of the simple detection reactions and be taken up again when dealing with the topic "Water".

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Other teacher information (1/2)

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Prior knowledge

Students have basic knowledge about the properties of water and are familiar with the principle of detection reactions.

You can independently and confidently handle experimental set-ups that include a burner.

Principle

The students experiment independently on the experimental set-up and test which of the salts provided can be used to detect water by heating and then moistening.

Other teacher information (2/2)

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Learning objective

Many salts contain water of crystallisation. Its removal or addition changes the colour of the salts.

The change in colour when the crystal water is added can be used as proof of water.

Tasks

- Students first heat some sodium chloride and copper sulphate each in a test tube over the burner, watching out for condensing water
- Then add a little petrol to one portion of the dehydrated salts and a little water to another portion and observe what happens.

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Safety instructions

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Copper sulphate is harmful to health. Do not swallow! Wash hands thoroughly after the experiment!

Petrol is highly flammable. Extinguish all open flames!

Wear protective goggles!

The general instructions for safe experimentation in science lessons apply to this experiment.

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Student information

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Motivation

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Detection reactions

Especially when you are examining mixtures that cannot be easily separated, for example mixtures of different liquids, to see whether they contain a certain substance, it is practical to have a so-called "indicator" or "detection".

A "proof" for water can, for example, be another substance that only changes colour when it comes into contact with water. Such a substance thus makes it easy to find out whether, for example, water is produced in a chemical reaction.

This is exactly the kind of proof we want to find for water in this experiment and understand how it works.

Tasks

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What should happen to a water detector only when it comes into contact with water?

It should change colour.

It should not change colour.

How can the presence of water in substances be detected?

- Heat each of the two salts in a test tube over the burner and observe what happens.
- Find out which of the two substances is suitable for detecting water
- Then use it to check samples for the presence of water.

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Equipment

Position	Material	Item No.	Quantity
1	Knife, stainless	33476-00	1
2	Watch glass, dia.60 mm	34570-00	2
3	Test tube, 180x18 mm,100pcs	37658-10	1
4	Test tube rack f. 6 tubes, wood	37685-10	1
5	Test tube brush w. wool tip,d20mm	38762-00	1
6	Protecting glasses, clear glass	39316-00	1
7	Spatula, powder, steel, l=150mm	47560-00	1
8	Pipette with rubber bulb	64701-00	2
9	Copper-II sulphate,cryst. 250 g	30126-25	1
10	Sodium chloride 250 g	30155-25	1
11	Test tube holder, up to d 22mm	38823-00	1
12	Butane burner with cartridge, 220 g	32180-00	1
13	Stand.petrol b.p.60-95 C 1000 ml	31311-70	1

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Procedure (1/4)

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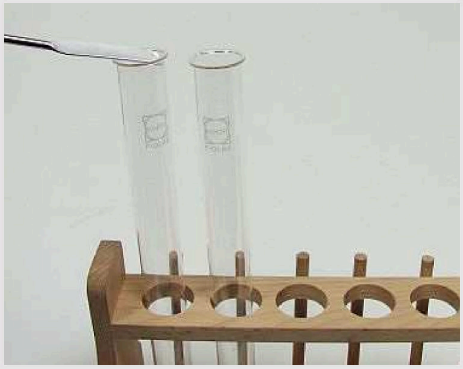
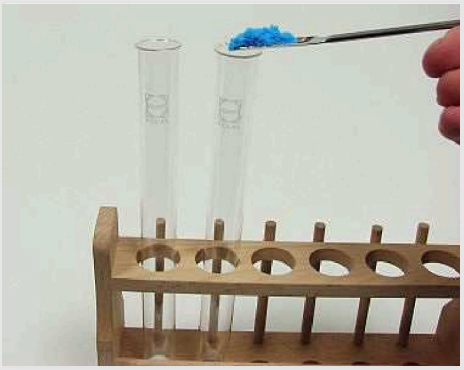
Place two test tubes in the rack (fig. left). Put a spatula of sodium chloride in the first test tube (fig. middle) and the same amount of copper sulphate in the second (fig. right).





Procedure (2/4)

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Place a gas burner on a stable and fireproof surface.

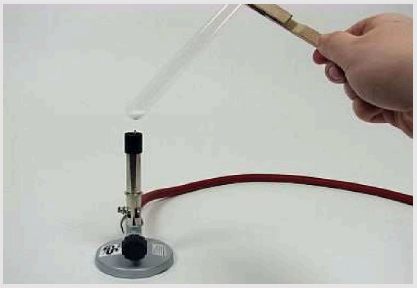
Heat the test tubes one after the other in the small, non-luminous burner flame as shown in the illustrations on the right.

Shake the test tube several times....

Remove condensed water by heating the respective test tube part.

Let the test tube cool down.

Make a note of your observations.



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Procedure (3/4)

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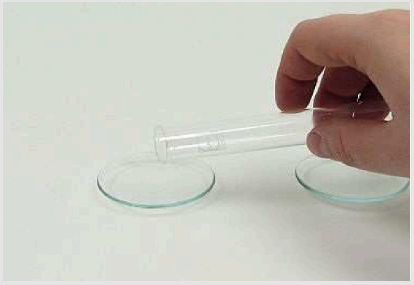
Turn off the gas burner and remove it.

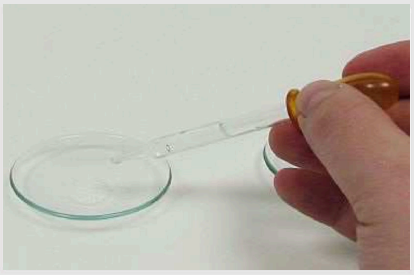
Put some dehydrated copper sulphate on a watch glass.

Put some sodium chloride onto the second watch glass (top illustration).

Using a pipette, add two drops of petrol to each of the salts in the watch glass bowls.

Wait a short time, then add two drops of water from the second pipette to each of the dehydrated salts, as shown in the figure below.





Procedure (4/4)

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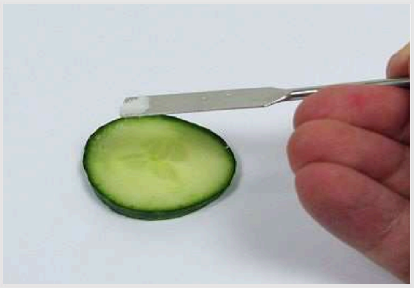
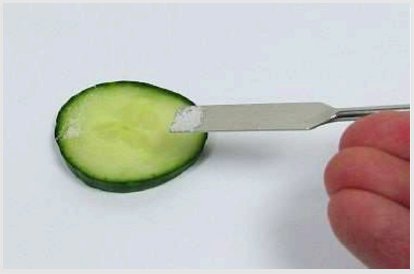
Cut open the vegetable (cucumber) and put a spatula tip of sodium chloride (upper picture) and copper sulphate (lower picture) on different spots.

Write down your observations!

Disposal:

Reuse remaining salts or dispose of as heavy metal waste.





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Report

Task 1

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If you heat the sodium chloride, you observe...

- that water escapes from the salt and condenses in the test tube.
- nothing at all.

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Task 2

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Summarise what you have learned in this experiment.

In this experiment you found out that dehydrated _____ can be used as evidence for water.
If it absorbs _____ from the environment into its crystal structure, it turns from _____.
If it releases the _____ again, for example when heated over the burner, it turns from _____.

copper sulphate
crystal water
water
white to blue
blue to white

Check

Slide	Score / Total
Slide 8: Water detection	0/1
Slide 15: Heating solids	0/5
Slide 16: Summary of the experiment	0/5

Total 0 / 11

Solutions Repeat

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