Production of gypsum plaster (Item No.: P7155700)

Curricular Relevance

Area of Expertise:	Education Level:	Topic:	Subtopic:	Experiment:
Biology	Age 11-14	Nature and technology	Substances, materials and devices of everyday	Production of gypsum plaster

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

Additional Requirements:

Experiment Variations:

Keywords:

gypsum

Task and equipment

Information for teachers

Learning objectives

- Gypsum plaster can be produced by burning calcium sulphate which contains water of crystallization.
- Gypsum plaster is anhydrous and amorphous calcium sulphate.

Notes on set-up and preparation

Remarks on the students' experiments
Make sure that heating is stopped immediately when the natural gypsum starts to decompose. When gypsum is burnt for too long, the result is dead-burnt gypsum which sets again in an extremely slow way.

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:	F 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.

Hazards

- Copper salts are hazardous to health. Do not swallow them!
- Wear protective glasses!

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Notes

When gypsum is heated up to 100 °C, water of crystallization is split off. The gypsum is thus transformed into the so-called "hemihydrate" $CaSO_4 * 1/2\ H_2O$. When water is added to it, it quickly absorbs water of crystallization again and hardens to gypsum crystals of fine fibres which felt together. Apart from this burnt gypsum (gypsum plaster) there are also other forms of amorphous gypsum like stucco, estrich plaster and dead-burnt gypsum which differ from each other in the burning temperature, the content of crystallization water and the time required for setting.

Remarks on the method

Of course it is possible to use already anhydrous copper sulphate. However, the order of experiments recommended here allows to take the already known result of the first part of the experiment as a basis for interpreting the decomposition of natural gypsum.
Draw the students' attention to the different types of gypsum plaster and their specific use due to the differences in time required for setting.

Waste disposal

- The burnt gypsum can be reused in the experiment "Processing of gypsum plaster".
- Put the anhydrous copper sulphate into a special reservoir which can be sealed tightly and use it for a test for water.

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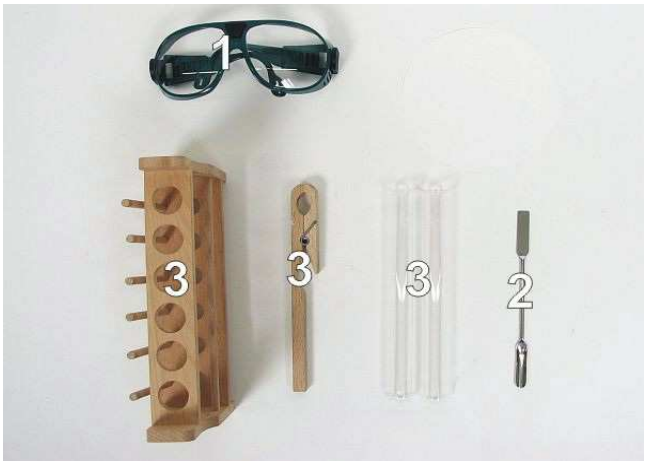
Task and equipment

Task

What can gypsum plaster be obtained from and how can it be produced?

Heat some natural gypsum and examine the resulting products.

Equipment



Position No.	Material	Order No.	Quantity
1	Protecting glasses, clear glass	39316-00	1
2	Spatula, powder, steel, l=150mm	47560-00	1
3	Test tube rack f. 6 tubes, wood	37685-10	1
3	Test tube, 18x188 mm, 10 pcs	37658-03	(2)
3	Test tube holder, up to d 22mm	38823-00	1
	Test tube brush w. wool tip,d25mm	38762-00	1
	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	
	Gypsum (calcium sulphate), 250 g	48273-25	

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Set-up and procedure

Set-up

Hazards

- Copper salts are hazardous to health. Do not swallow them!
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Procedure

Procedure

Fill a spatula-tipful of copper sulphate into a test tube (Fig. 1). Take the test tube with the test tube holder (Fig. 2). First heat the upper part of the test tube (Fig. 3) and then the copper sulphate until it just starts to lose its colour (Fig. 4). Drive out the condensing water by further heating the upper part of the test tube. Pour the copper sulphate onto a dry piece of filter paper (Fig. 5).

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Fig. 1

Fig. 2

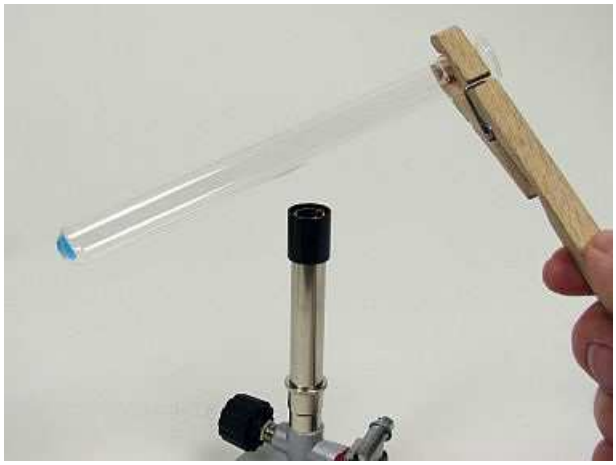

Fig. 3

Fig. 4

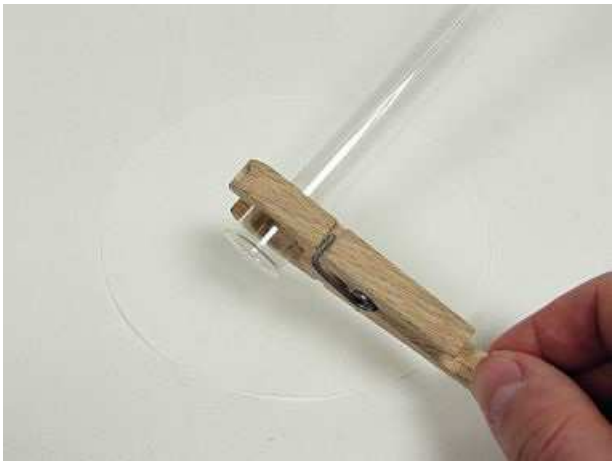

Fig. 5

Put a spatula-tipful of natural gypsum into the test tube (Fig. 6). Hold the test tube by means of the test tube holder and heat it slowly in the flame of the Bunsen burner while shaking it continuously (Fig. 7). Stop heating after about 3 minutes when the gypsum clearly starts to change its colour.

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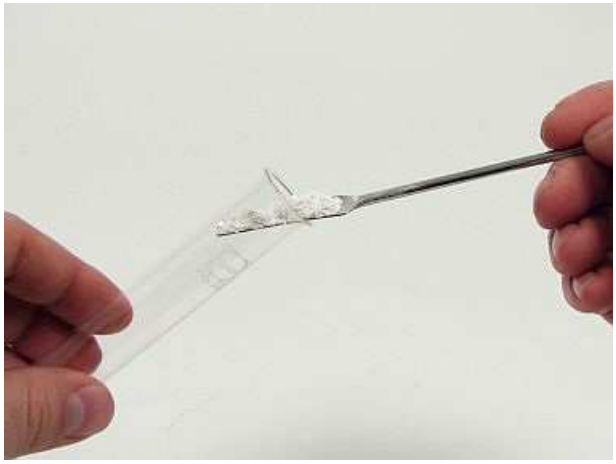

Fig. 6

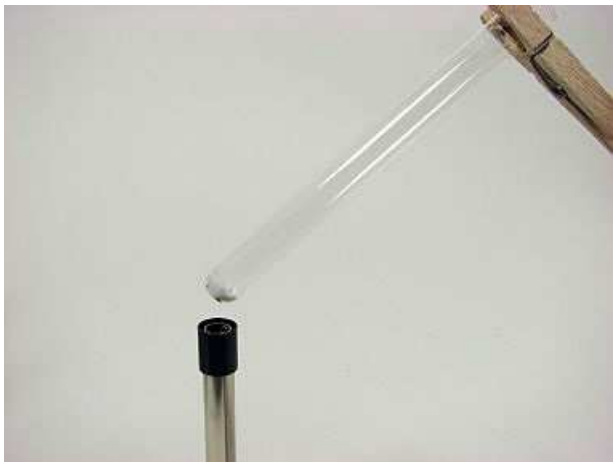

Fig. 7

Use the spatula to add some of the dehydrated copper sulphate to the liquid droplets on the upper part of the test tube (Fig. 8).

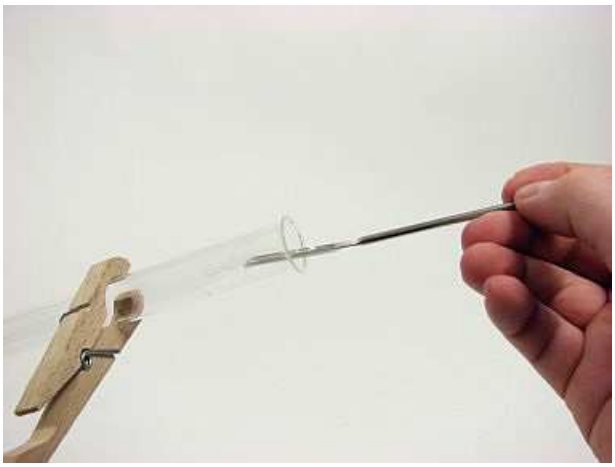

Fig. 8

Waste disposal

- Collect the burnt gypsum and reuse it in the following experiment.
- Put the anhydrous copper sulphate into a special reservoir marked accordingly.