

The importance of air for combustion processes



Chemistry

Inorganic chemistry

Air, Combustion & Gases



Difficulty level

easy



Group size

2



Preparation time

10 minutes



Execution time

10 minutes

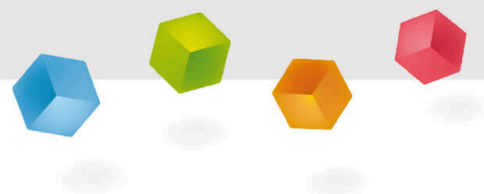
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PHYWE

Teacher information



Application

PHYWE



Experiment set-up

Combustion is a redox reaction that takes place exothermically. This means that energy in the form of heat is given off. Combustion can also be understood as the oxidation of a material with oxygen to form a flame. Three conditions must be met for a flame to be formed (heat):

- Combustible material present
- Air supply
- Reach inflammation temperature

This experiment thus shows how important it is for combustion processes that air is present.

Other teacher information (1/2)

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Prior knowledge



- Air is the gas mixture of the earth's atmosphere.
- Air consists mainly of nitrogen and oxygen.
- A redox reaction is a chemical reaction where electrons are transferred.
- When electrons are given off, the reactant is oxidized and when electrons are taken up, it is reduced.

Scientific principle



In this experiment the principle of combustion and the importance of air for combustion processes is explained with the help of a tea light and methylated spirits.

Both substances are ignited and the pupils observe the burning process. The pupils discover that oxygen is necessary for burns.

Other teacher information (2/2)

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Learning objective



- The students learn that the burning of compounds is a chemical reaction with air.
- Even very highly flammable substances such as methylated spirits only burn when air is supplied.

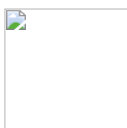
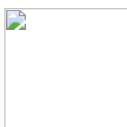
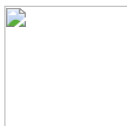
Tasks



- The students investigate the importance of air for combustion processes.
- They compare the results with the reaction of heated metals with air.

Safety instructions

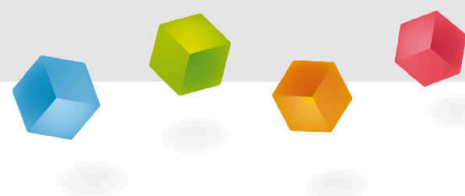
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- Methylated spirits are highly flammable. Extinguish all open flames when decanting!
- Use safety goggles and protective gloves!
- The general instructions for safe experimentation in science lessons apply to this experiment.
- For H- and P-phrases please consult the safety data sheet of the respective chemical.

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Student Information



Motivation

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Tealight

A burn reaction is one of the most common reactions observed in everyday life. Combustion generates heat, which is called energy conversion. For fire or a combustion reaction, a combustible substance and oxygen (air) are needed.

Air therefore plays a very important role in combustion processes. In this experiment this is proven with the help of a tea light and methylated spirits. Both are lit and it is observed how long the flame lasts and what role air plays in it.

Burns can be harmful to health because sometimes they do not fully heal. They can also have a negative impact on the environment, for example if a lot of carbon dioxide is released.

Tasks

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What role does air play in combustion?

- Light a tea light and methylated spirits.
- Watch the flame on both.
- Write down your experimental observations and answer the questions in the protocol.

Equipment

Position	Material	Item No.	Quantity
1	Beaker, Borosilicate, low form, 250 ml	46054-00	1
2	Crucible tongs, 200 mm, stainless steel	33600-00	1
3	Protecting glasses, clear glass	39316-00	1
4	Rubber gloves, size M (8), one pair	39323-00	1
5	Beaker, Borosilicate, tall form, 50 ml	46025-00	1
6	Wood splints, package of 100	39126-10	1
7	Denaturated alcohol (spirit for burning), 1000 ml	31150-70	1
8	Ceramic fibres, 50g	38754-06	1
9	Wire gauze with ceramic, 160 x 160 mm	33287-01	1
10	Butane burner with cartridge, 220 g	32180-00	1

Structure

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- Put a part of the ceramic fibre on the middle of the wire netting.
- Arrange them in such a way that the pouring opening in particular, but also the entire large beaker, is sealed against air supply when turned upside down.
- Place the small beaker in the middle of the ceramic fibre prepared in this way.
- Press it firmly so that it stands securely.

Procedure (1/2)

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- Fill the beaker with approx. 20 ml methylated spirits and place it back in the middle of the ceramic fibre.
- Light the wood shavings on the burner and use them to ignite the methylated spirits in the small beaker.
- Carefully put the large beaker over it (protective gloves) and press it firmly so that no air can enter from below.
- Let the beaker cool down. Then take it off carefully and remove the small beaker with the methylated spirits with the crucible tongs. (Do not place near the burner!)

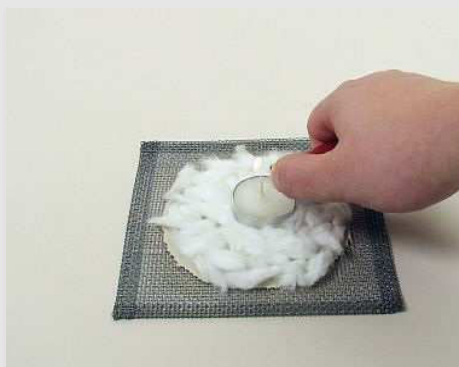


Procedure (2/2)

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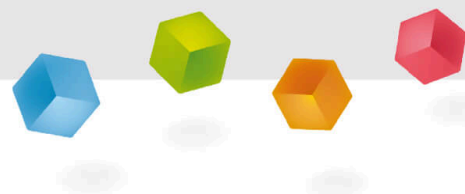
- Place a tea light in the middle of the ceramic fibre. Light it and put the large beaker over it, just like the one before.

Disposal Pour methylated spirits into a marked bottle and reuse for appropriate tests.



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Report



Monitoring

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Write down your observations.

Task 1

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Complete the cloze !

The presence of (or) is required for all combustion processes.

In the absence of air, the .

✓ Check

Task 2

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Burns without air supply are not possible.



Task 3

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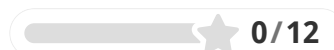


Compare the test result with the reaction of heated metals with air.

Heated metals require to produce a , as do metal powders and non-metals in . The same applies to the combustion of substances such as or .

Slide	Score / Total
Slide 15: Experimental observation	0/4
Slide 16: Air in combustion processes	0/2
Slide 17: Temperature of our body	0/6

Total amount



Solutions



Repeat



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