The candle flame

Chemistry > Inorganic chemistry > Air, Combustion & Gases

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/5f5664d1742d0c00034be275

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Teacher information

Application

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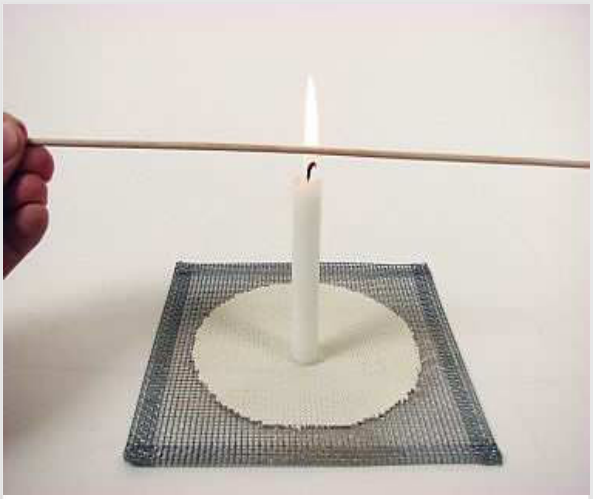

Experiment set-up

In this experiment, the principle of combustion reactions and the role of air is deepened. Here we will investigate how and why a candle burns.

A candle consists only of a wick and candle wax. Candle wax is a fuel and consists of carbon and hydrogen atoms.

When you light a candle, the wash becomes liquid due to the heat and rises in the wick and evaporates. Wax vapor is the substance that burns.

When burning wax vapor, carbon dioxide is formed from carbon atoms and atmospheric oxygen, and the combustion of the wax allows the candle to continue burning.

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Other teacher information (1/2)

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Prior knowledge

- A candle consists of a wick and candle wax.
- Candle wax often consists of paraffin or stearin.

Scientific principle

In this experiment the students learn that the candle flame is a combustion reaction. Atmospheric oxygen reacts with candle wax and allows the candle to continue burning.

Preparations

- It is best to use 1 to 2 cm thick and 5 to 10 cm high candles (Christmas candles).

Other teacher information (2/2)

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Learning objective

- The wax does not burn in a candle flame. Gases rise from the liquid wax through the wick and burn.
- Also with other combustible materials (e.g. ethanol) rising gases burn, not the materials themselves.

Tasks

- In this experiment the students study the candle flame and the processes that take place when the candle wax burns.
- Here the difference between flash point and ignition temperature is still being discussed.

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Safety instructions

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- Wear protective goggles!
- Hold the object to be examined at the flame-removed end.
- 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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Advent candles

Candles are constantly used in everyday life for various reasons such as lighting the four candles of the Advent wreath. But how is a candle constructed?

Actually very simple: A wick (cotton thread soaked with wax) and candle wax. The candle wax is the fuel, which consists of paraffin.

For a long time candles were the only source of light in everyday life. But they were not always made of paraffin. In the past, candles were made of tallow, or whale oil. Later, candles were made of paraffin.

This experiment investigates how a candle burns and which processes take place during this process.

Tasks

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What processes take place when a candle is burned?

- Examine the candle flame.
- Investigate the processes that take place when the candle wax burns.
- Then write down your observations in the protocol.
- Consider what the difference between flash point and ignition temperature can be.

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Equipment

Position	Material	Item No.	Quantity
1	Wire gauze with ceramic, 160 x 160 mm	33287-01	1
2	Crucible tongs, 200 mm, stainless steel	33600-00	1
3	Glass tubes,straight with tip, 10	36701-63	1
4	Protecting glasses, clear glass	39316-00	1
5	Wood splints, package of 100	39126-10	1

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Structure

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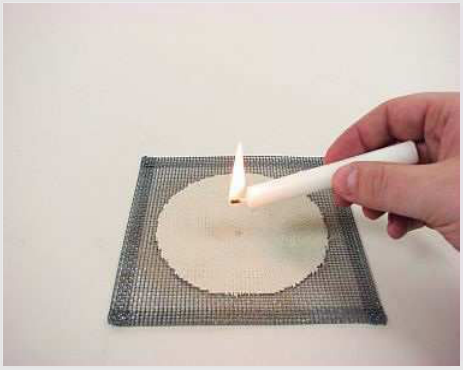
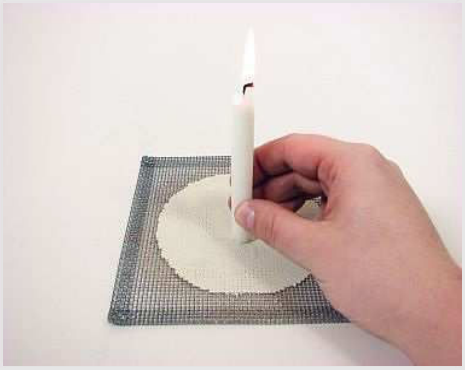
- Fix the candle to the ceramic plate with a few drops of wax. (the first two pictures)
- Place all equipment required for the experiment on the work surface, ready to hand. (last picture)





Procedure (1/2)

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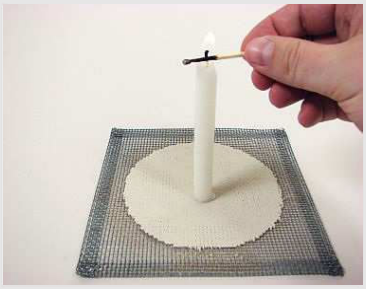

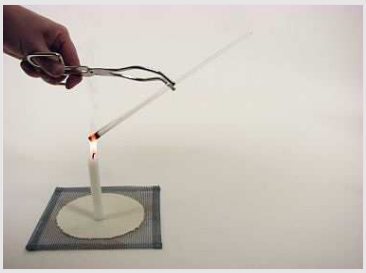

- Light the candle and wait until part of the wax has melted.
- Now light a match, blow out the candle and immediately approach the burning match to the wick without touching it.
- Grasp the glass tube with the crucible tongs and bring one end directly over the burning wick.
- After a short time, hold a burning match to the other end of the glass tube.

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Procedure (2/2)

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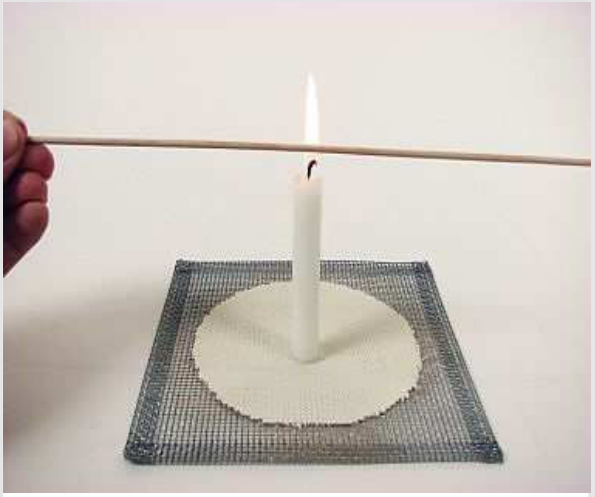

Experiment set-up

- Grasp a piece of wood at the end and hold it horizontally into the candle flame just above the wick.
- Repeat the process with a new chip in the middle and at the top of the flame.
- During all processes, only leave the wood shavings in the flame for about one second.

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Report

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Task 1

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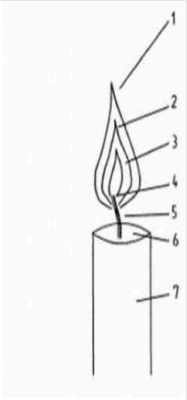

1. **Write down your observations on all three experiments.**
2. **Note in the sketch the processes of burning the candle and the structure of the candle flame.**

Task 2

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The wick of a candle is only an aid to combustion.

- wrong
- correct

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Task 3

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Diesel (heating oil) cannot be ignited by a match, unlike petrol. But if you heat diesel fuel, it is also _____.
Gasoline burns because it _____ easily and produces enough _____ to _____. Diesel has a higher _____, it evaporates _____ easily. Here, by _____ first enough gas must be _____ for combustion.

gas
less
burn
heating
vaporizes
boiling point
flammable
vaporized

Check

Slide	Score / Total
Slide 15: Wick of the candle	0/5
Slide 16: Processes in the candle flame of diesel and petrol	0/8

Total amount 0 / 13

Solutions Repeat Exporting text

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