

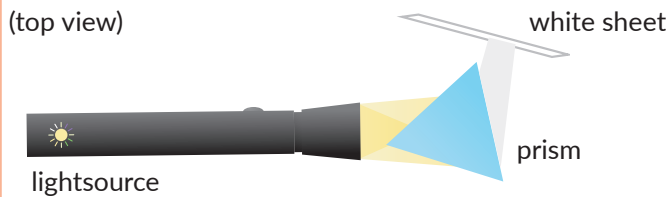
Sek. I Colour is (not) a characteristic material property

required previous knowledge

Introduction and part one: none

Part two: basic particle model

Introduction: Colour – a form of energy



Experiment

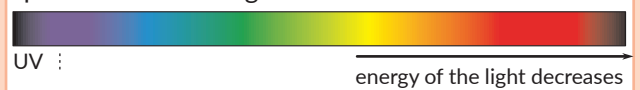
Observe four different beams of light after they have passed a prism: a) a beam from sun light, b) a light beam from a torch with a typical light bulb, c) a light beam from a torch with a green LED (light emitting diode), and d) a light beam from a UV-LED torch. Write down your observations.

A1 Fill in the gaps with the following words:

colours, form of energy, green (2x), higher, lower, perceive(s), prism, rainbow, red, spectral colour(s), spectrum, UV-LED torch, violet, white light

..... can be split with a into all of the The diagram on the right shows which white light consists of. Light is a

spectrum of white light



Violet light is in energy than light and light.

spectrum of the UV-LED torch



Red light is in energy than light.

The radiates light whose

..... lacks all colours except (cf. the diagram on the right).

Colour - part one

Experiment: There are two solutions: The first one is an extract from green leaves, the second one is a β -carotene solution. Observe and write down the colours of the solutions a) in daylight, b) when being irradiated in the dark with a UV-LED torch, and c) when being irradiated in the dark with a green LED torch.

Observed colours:

light source	daylight	green light	UV light
green leaves			
β -carotene			

Further Experiments online:

"Crying chestnut twig" and "Glowing marker pen".



A2 Decide whether the statements are true or false. Give reasons based on your observations in A1:

- The colour of an object does not depend on the light colour the object is irradiated with.
- When being irradiated with sunlight, objects **absorb** light. Accordingly, these objects can only show a **colour** that is contained in the sunlight spectrum.
- When being irradiated with light from the UV-LED torch, objects produce a **luminous colour (fluorescence)** by **emitting** light. This emitted light is contained in the light spectrum of the UV-LED torch light.
- A luminous colour is produced when substances transform high-energy light into low-energy light

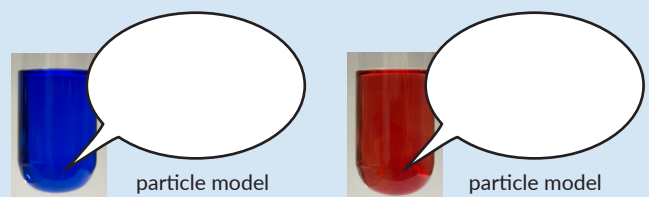
Colour - part two

Experiment: Irradiate each of the test tubes, which all contain the same substance in different solvents, with a UV-LED torch for one minute. Write down the resulting colours immediately after the irradiation.

Colour of the irradiated solutions:

xylene-solution	acetone-solution	ethanol-solution

A3 After the irradiation, all three solutions contain the same dissolved substance called **merocyanine**. This substance has been produced by supplying light energy. Draw particle models for the two solutions. Use a circle for each particle and label each circle with a letter (x, a, e, m) for the respective substance (xylene, acetone, ethanol, merocyanine).



A4 Observe the colour of the two solutions three minutes after you have switched off the lamps. Name the differences and then make suggestions how to explain these differences.

A5 "The colour of a substance is a characteristic property of this substance." Assess this statement by taking into consideration all experiments and analyses from this worksheet.