

# vista

8-12

Chemistry in everyday life

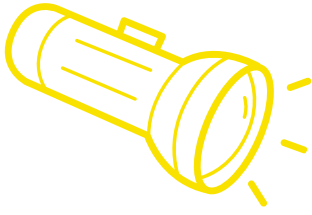
Experiment guide



## Underwater Lightshow

Did you know that animals and plants also need to protect themselves from too much sun? Fur, feathers, scales or even a mud bath offer protection to many animals. Plants have hair, scales or a layer of wax on their leaves to shield them from too much sunlight. A chemical substance in the bark of some tree species is especially interesting. Scientists are still inquiring if the function of these substances are to protect the tree from UV light. The exciting thing is, that it glows when you shine UV light (black light) on it.

# Make wood glow under water!



## How does it work?

There is a chemical substance in one tree species: aesculin. This substance can do something very special: it can glow! If you hold a twig or a piece of bark with aesculin into the water, you will see small, blue, luminous clouds. This is how it works: When invisible UV light is directed at the aesculin, energy is produced. This energy is released in the form of blue light. In your experiment, find out which of the tree species are suitable for making glowing fireworks.

### Fun Fact

Only in recent decades, chemists discovered that ripe bananas, like the bark of certain trees, glow blue under black light. This is due to the breakdown of chlorophyll as the banana ripens. Chlorophyll is the substance that makes plants green and helps them turn sunlight into sugar. Many animals can see UV light. Researchers therefore suspect that those animals that see particularly well in the UV range could have an advantage when foraging for food.

## Let it glow!

### You will need:

- Branches of beech, horse chestnut and maple
- Garden shears
- peeler
- three pieces of paper and a pencil
- three transparent glass with water
- UV lamp, black light lamp (do not shine directly into your eyes)
- A dark room



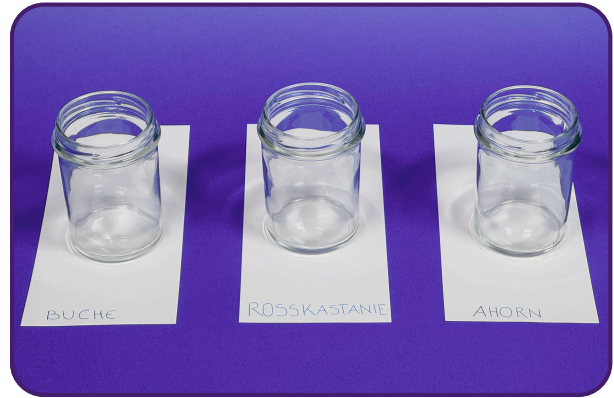


# Let's go!

## Step by step:



- 1 Go for a walk and collect twigs (as thick as your little finger) of beech, horse chestnut and maple. If you are not sure about the tree species, use an identification app.



- 2 Label three jars clearly with "beech", "horse chestnut" and "maple".



- 3 Using the peeler, carefully remove small pieces of bark from the branches of each tree species. Place the pieces in front of the corresponding jar.



- 4 Fill the jars more than half full with tap water.



- 5 Darken the room with your experimental set-up and switch on the black light lamp. Do not look directly into the light of the lamp.



- 6 Now start with the beech tree, sprinkle the bark into the glass of water and shine the UV light on the water. Observe for 30 seconds and watch for changes. Repeat the process with the horse chestnut and maple. Which of the tree species do you think contains aesculin?

# Keep experimenting!

- ➔ Are other parts of the plant, such as the leaves, fruit or roots of the three trees, suitable for producing a glow under water?
- ➔ What happens if you don't remove the bark from the branches, but just scratch them?
- ➔ Can you dip thin branches in water like a paintbrush and use them to write secret messages?
- ➔ Can you find other natural materials that have fluorescent (glowing) properties? For example, shine your black light on ripe apple and banana peels and observe whether the color changes!



## Background knowledge

There is a research group at ISTA that makes bacteria glow. To do that, scientists first insert the building instructions (gene) for a glowing substance (protein) into the bacterium. This makes it easy to tell the modified bacteria apart from others and examine them - some glow under UV light, others do not. Professor Calin Guet's research group uses this method on bacteria to find out how these tiny organisms function.