



DIY Science – Build a Blacklight

Find and test fluorescent materials using a makeshift UV light.

Safety

An adult must assist with finding safe fluorescent materials. For Option 2, an adult must supervise the use of the smartphone and ensure the permanent markers are only used on the sticky tape and not directly on the smartphone torch.

What you need

Option 1: Bright LED torch, blue and purple cellophane, scissors, and a rubber band.

Option 2: Smartphone with a torch, clear sticky tape, blue and purple permanent markers

You will also need: a darkened room and fluorescent or glow-in-the-dark materials to test.

What to do

Option 1: LED torch and cellophane

1. Cut 3 pieces of cellophane big enough to cover the light end of the LED torch. You will need 2 pieces of purple cellophane and one piece of blue cellophane.
2. Cover the light end of the torch with the 3 layers of cellophane and use the rubber band to hold them in place.



Option 2: Smartphone and sticky tape

1. Cover the smartphone torch with a piece of sticky tape.
2. Use the blue permanent marker to colour the area of tape over the torch.
3. Add another piece of sticky tape over the first piece and colour it with the purple permanent marker.
4. Repeat Step 3 to add a third piece of sticky tape and colour it purple.



Collect some objects that you think might be fluorescent or made from a glow-in-the-dark material. For example, write a message on paper using a highlighter pen. Other fluorescent items include glow-in-the-dark stickers or toys, fluorescent paints and cosmetics, tonic water, B vitamins, and the area around black spots on bananas. Take the objects to a darkened room. Test whether or not each object glows under the light from the DIY blacklight. Use the table on the next page to record the results.

Try changing the DIY blacklight. Does changing the order of the colours of cellophane or the colours on the sticky tape affect how it works?



What's happening?

White light is made up of the rainbow of colours in the visible light spectrum: red, orange, yellow, green, blue, indigo, and violet. Ultraviolet light is just beyond the violet colour in this range and it is invisible to our eyes. Usually, when we look at an object, we are seeing light that has reflected off the object. For example, if you are looking at a blue ball, most of the colours of light are absorbed by the ball. Only blue light is reflected and some of the blue light is detected by your eyes.

The coloured cellophane or sticky tape in the DIY blacklight absorb most of the colours of light from the torch and only allow the blue and purple colours to pass through. If a fluorescent material glows under the DIY blacklight, the material is absorbing some of the blue or purple light energy and then 're-emitting' this energy as a different colour of light. It turns the rather dull looking light from the blacklight into a more visible colour of light.

White light from the Sun is made up of visible light, as well as invisible ultraviolet light and infrared light. It is the ultraviolet light (UV) that causes sunburn. The ultraviolet light from the DIY blacklight, or from other UV blacklights and torches, does not have enough energy to cause sunburn. The DIY blacklight works because white LEDs produce a small amount of invisible ultraviolet light.

Results

Object/item	Does it glow (yes/no)

Did you know?

Platypus look brown under normal light but they glow a greenish-blue colour under ultraviolet light. This is called 'biofluorescence' and it has also been found in wombats and in mammals in other parts of the world. Platypus fur absorbs UV light and then re-emits a different colour of light. Scientists are still not sure whether this bioluminescence is important for platypus finding each other, hiding from predators, or some other reason

Find out more

- Discover more about glowing animals: <https://museums victoria.com.au/article/glowing-animals-understanding-bioluminescence-and-biofluorescence/>
- Watch an explanation of how glow-in-the-dark toys and glow sticks work: https://youtu.be/PkO9xFd_BqM?si=SV4VFmhYmrVYlv5
- Learn about the fluorescent ink used in Australian bank notes as one of many security features: <https://banknotes.rba.gov.au/counterfeit-detection/list-of-security-features/>