

Make a UV Detector

How can a clear liquid glow blue in sunlight?

Description

On a bright, sunny day, use tonic water to detect ultraviolet (UV) light from the Sun.

Age Level: 7 and up



Materials

- two clear cups (plastic or glass)
- tonic water
- tap water
- flashlight
- black piece of paper
- pen
- two index cards
- tape
- hardcover book



Time

Preparation: 5 minutes

Activity: 5 minutes

Cleanup: 5 minutes

Step 1

Use your pen and paper to make two signs: “Tonic Water” and “Tap Water.” Tape these signs next to each other at the top of the sheet of black paper, and tape the black paper to a hardcover book. Place one cup under each sign.



Step 2

Fill each cup to the brim with the kind of water noted on the label. While you're indoors, shine a bright flashlight at both full cups. Do you see any color difference between the cups?



Step 3

Bring your black piece of paper outside, in full sunlight. Prop up the book so that the paper is vertical. Place the two cups in front of the paper. Now what colors are the two liquids?



What's Going on?

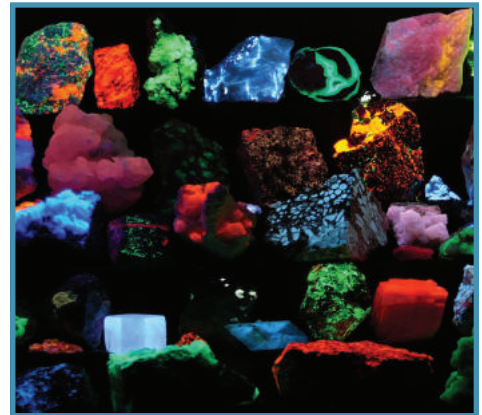
We can see visible light emitted by the Sun. The Sun also emits light we can't see, including ultraviolet light. Quinine is a substance found in tonic water that is sensitive to ultraviolet light and can absorb ultraviolet light we can't see and then re-emit visible blue light we can see. This process of converting ultraviolet into visible light is called fluorescence.

When you shined a flashlight at the cups of water indoors, the tonic water did not fluoresce and glow blue. That's because flashlights and everyday household lights do not emit a significant amount of ultraviolet light.

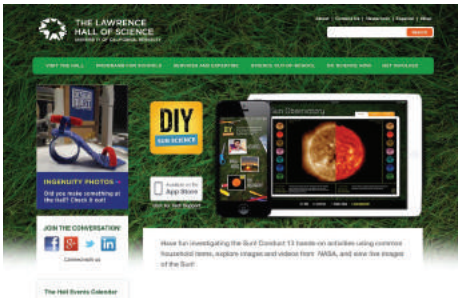


Examples of fluorescence

Fluorescence is also common in rocks and minerals. This image shows mineral specimens that are fluorescing. Some minerals appear a different color than others because of the different fluorescent elements present in each mineral.



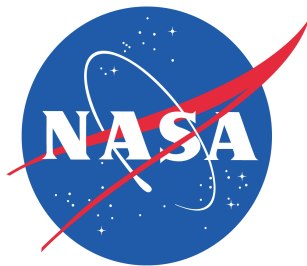
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Credits



This project was supported by NASA under award number NNX10AE05G. Any opinions, findings, conclusions or recommendations expressed in this program are those of the author and do not reflect the views of NASA.



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The DIY Sun Science app allows families and educators to investigate and learn about the Sun at home, at school, or anywhere you go! The app features thirteen hands-on investigations, as well as images and videos.

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Image 7, Hannes Grobe.