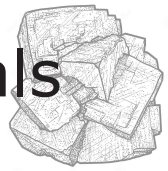
Fluorescent Minerals



What Is Fluorescence?

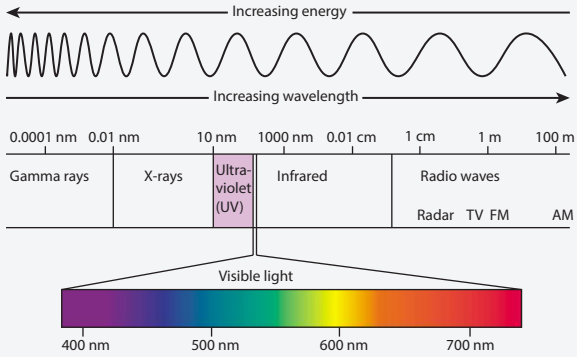
Fluorescence is when a substance absorbs the energy from UV light and then re-emits it as light visible to the human eye. This property was first observed in minerals!

What is UV light?

Light is the visible portion of the electromagnetic spectrum (see diagram right). Whether it is visible to the human eye depends on the wavelength of the radiation. UV, or Ultra-Violet 'light' is just outside of the part of the spectrum visible to humans, but it can be perceived by the eyes of other animals such as dogs and cats and also many insects.

UV light can cause cell damage – it's because of UV rays that we wear sunscreen! The most damaging UV rays are short-wave; UV-B and UV-C. Most of these are filtered out of sunlight before it reaches the ground by the ozone layer and other particles in the Earth's atmosphere. Most UV-A rays do reach the ground but they are the least damaging, composed of longer wavelengths closest to the visible spectrum. It is this part of the UV spectrum that is emitted by most black lights.

Electromagnetic Spectrum



redrawn from https://www.cyberphysics.co.uk/topics/radioact/Radio/EMSpectrumcolor.jpg

Which Minerals Are Fluorescent?

Over 500 different minerals exhibit some fluorescence (which is less than 10% of known minerals), including:

- Fluorite – the origin of the term fluorescence!
- Corundum – rubies and sapphires

What Else Fluoresces?

- Many things, including teeth!, and:
- The quinine (anti-malarial) in tonic water
- Vitamin B
- Some scorpions
- Car antifreeze

Many commercial light sources such as LEDs emit UV-A rays, too, so we can make our own black light by filtering out a lot of the non-UV spectrum using some common household items:

Activity: Make Your Own Black Light!

Black Light Flashlight

Materials:

- Flashlight (LED optimal)
- Elastic band, scissors
- Clear plastic cling wrap
- Blue Marker
- Purple Marker

1. cut a piece of plastic wrap a little larger than the head of the flashlight
2. with the blue marker colour one side of the entire piece of wrap and secure over the head of flashlight with the elastic band
3. repeat steps 1 and 2, colouring a second layer of wrap with the blue marker
4. make a third layer, this time using the purple marker so you now have three layers of coloured wrap secured over the light

Black Light Cellphone Flashlight

Materials:

- Cellphone with flashlight feature
- Cellophane (or "scotch") tape
- Blue Marker
- Purple Marker

1. cover the flashlight area of the phone with a piece of tape
2. with the blue marker colour on the part of the tape directly over the light source
3. put another layer of tape directly on top of the first, colour again with the blue marker
4. put a third layer of tape over the second, colour with the purple marker this time

*****You can test your new blacklight by drawing on some paper with a **highlighter** or something with fluorescent pigments like **"neon" crayons** and turning off the lights!

The Miller Museum of Geology

36 Union Street, Kingston; queensu.ca/millermuseumofgeology