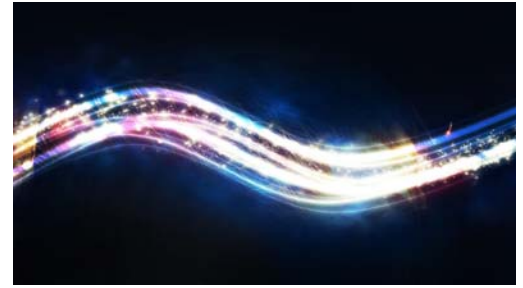


Student Worksheet for Ep. 11: Light

Overview: Different kinds of objects and events generate different kinds of light (also known as electromagnetic radiation). Different creatures, like humans, mice, and snakes as well as different scientific instruments like telescopes, car radios, and solar arrays can detect these different wavelengths.



What to Learn: Light is a form of energy. Different detectors can sense different colors. Our eyes are sensitive to optical light (think rainbows), and our skin is sensitive to infrared (think heat). Anything warm gives off infrared light. Things that are really hot (between 3500-7500 degrees) give off light that is optically visible, and even hotter things (over 10,000 degrees) can give you sunburns, because it's giving off light in ultraviolet wavelengths. Light that comes from radio stations is lower energy, longer wavelength than either of those, and I need a radio in my car to detect those kinds of wavelengths.

There are many different ways to produce light. **Chemiluminescence** is light formed by a chemical reaction, usually with little to no heat. It's the kind of light that glow sticks make. They are not hot, but they give off quite a lot of light over a period of time. On the atomic scale, the energy from the reaction bumps the electron to a higher shell, and when it relaxes back down it emits a photon of light.

Light bulbs use **incandescence**, meaning that the tungsten wire inside a light bulb gets so hot that it gives off light. Unfortunately, bulbs also give off a lot of heat, too. Incandescence happens when your electric stove glows cherry red-hot. Our sun gives off energy through incandescence also – a lot of it.

Phosphorescence light is the 'glow-in-the-dark' kind you have to 'charge up' with a light source. This delayed afterglow happens because the electron gets stuck in a higher energy state. Lots of toys and stick-on stars are coated with phosphorescent paints.

Triboluminescence is the spark you see when you smack two quartz crystals together in the dark. Other minerals spark when struck together, but you don't have to be a rock hound to see this one in action – just take a Wint-O-Green lifesaver in a dark closet with a mirror and you'll get your own spark show. The spark is basically light from friction.

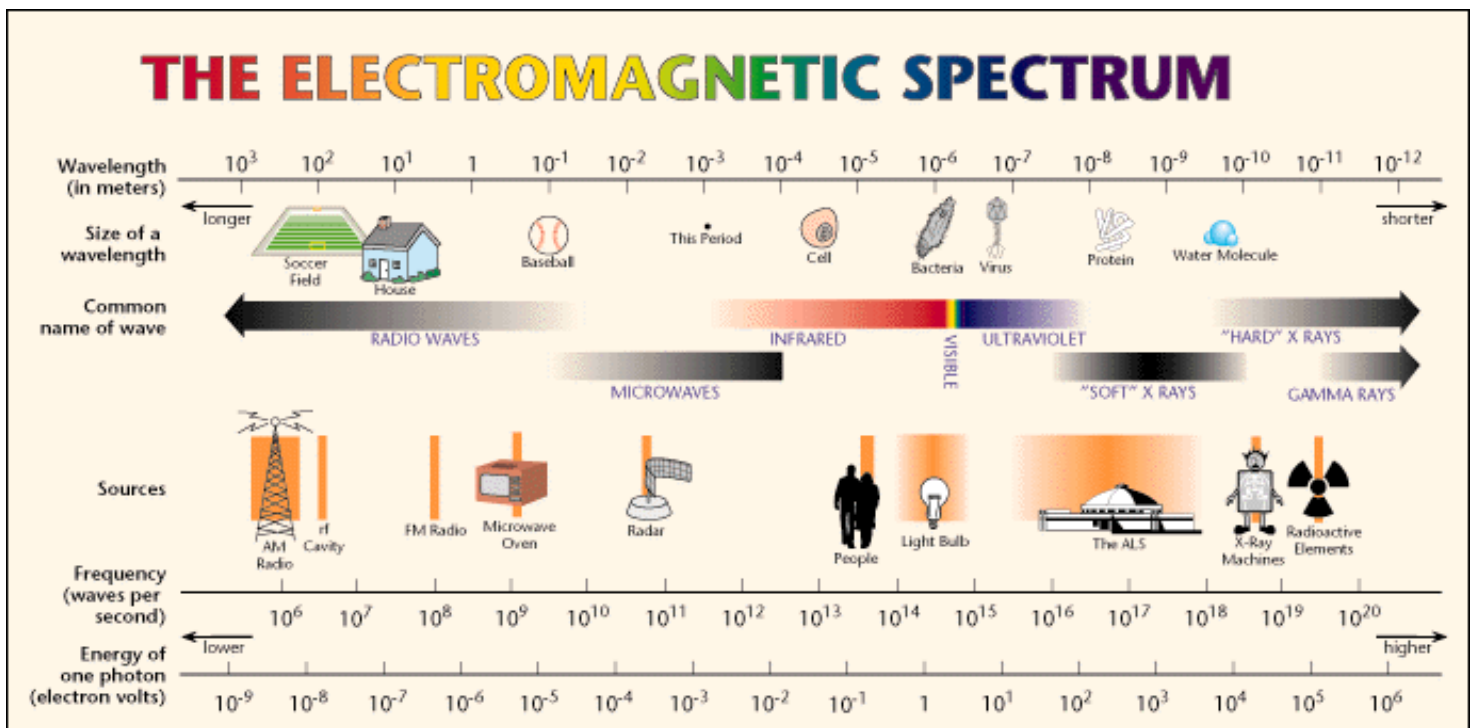
Fluorescence is what you see on those dark amusement-park rides that have UV lights all around to make objects glow. The object (like a rock) will absorb the UV light and reemit a completely different color. The light strikes the electron and bumps it up a level, and when the electron relaxed back down, emits a photon.

Lab Time:

1. Your job is to complete the data table and find not only the different wavelengths of light, but also different ways light is generated. Think hard about where you might find some of these on your light treasure hunt!

Light Treasure Hunt Part 1

Wavelength	Where would you find this type of light?
Radio	
Microwave	
Infrared	
Visible	
Ultraviolet	
X-rays	
Gamma rays	



Light Treasure Hunt Part 2

Light is produced by...	Where would you find this type of light?	Color of Light or Wavelength Name?
Fluorescence		
Phosphorescence		
Chemiluminescence		
		Infrared
	Gives you a sunburn	
Friction		
Incandescence		
	Dentist or doctor's office to look at bones or teeth	
	AM radio station	
Radar		
		Gamma rays