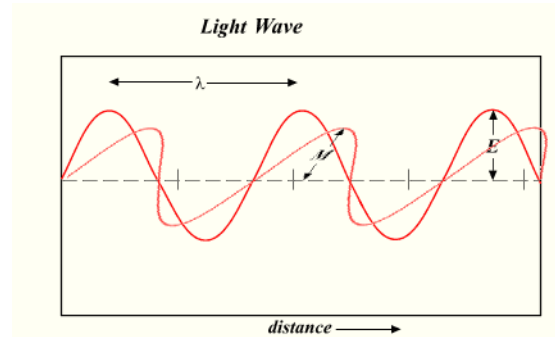


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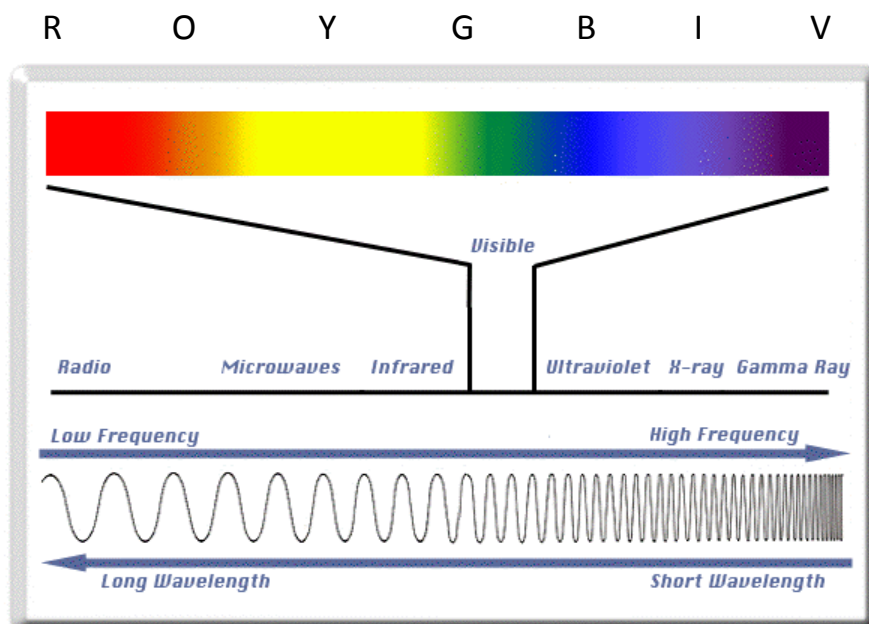
The Nature of Light

Visible light is composed of _____. These waves can move through empty space but can be absorbed by matter. Other forms of energy such as radio and TV signals, microwaves, ultraviolet waves and X-rays are transmitted in the same way.

Each type of electromagnetic wave has a distinct _____ (the distance from one peak to the next). It is the wavelength that determines the type electromagnetic wave or the colour of visible light.



When arranged by wavelength, these waves form the _____. The tiny part of the spectrum we can see is called the _____ spectrum. The different colours correspond to waves with different wavelengths, ranging from short wavelength blue light (4.0×10^{-7} m) to long wavelength red light (7.0×10^{-7} m). By comparison, radio waves are much longer (1 – 100 m) and X-rays are much shorter (1×10^{-9} m). The _____ the wavelength, the _____ the energy that a particular type of electromagnetic radiation. This explains why UV light is _____ damaging to the human body than the visible and infrared regions of the spectrum.



Production of Visible Light

INCANDESCENCE

Incandescence refers to light produced by _____ objects. The _____ is the source of all life on Earth and produces light in this way. Torches and candles were one of the first artificial sources light. Both produce incandescent light by a chemical reaction called _____, which releases heat and gases.



Traditional light bulbs are incandescent. They contain a metal wire called a _____. Electrons moving through the wire make it so hot that it _____. These bulbs are not very efficient since only _____% is used to produce light. The other _____% of the electricity they use is given off as _____ instead.

LUMINESCENCE

Luminescence is light given off by objects that have not been heated. Luminescence occurs in several ways.



Fluorescent Light

Fluorescent lights (long or compact) are similar to discharge tubes except they contain mercury vapour that emits _____ radiation. The tubes are coated by a substance called a _____ that remits the radiation as _____ light. These are much more _____ than incandescent bulbs since little energy is wasted as _____. However, CF (_____) bulbs still release up to _____% of their energy as _____.

Phosphorescence

In some substances, the _____ emits light very _____ over a longer period of time. These substances can _____ in the dark but will eventually _____. They can be easily reenergized by placing them near another _____ source.

Discharge Tubes

Gases such as _____ produce light in **discharge tubes**. In these tubes, the gas _____ are excited by an _____ and release their energy as characteristic wavelengths of light.

Light Emitting Diodes

Finally, *light emitting diodes* (or _____ lights) produce light by a process called - _____ . These are one of the most _____ light sources available. In these light sources, a _____ emits light when a very _____ electric current passes through it. They are also much more _____ than incandescent bulbs since they do not contain a _____ that can break. LED light flashlights are therefore both more _____ and _____ than old-fashioned incandescent ones.

Chemiluminescence

Chemiluminescence is light released during chemical reactions (e.g., in _____). Since this gives off very little _____, it is a cool form of light. When chemiluminescence occurs in organisms it is called _____.

Questions:

1. What type of light source do you think is safest? Why?
2. Some governments are considering banning incandescent light bulbs. Why do you think they are considering this?
3. Would you support a ban on incandescent light bulbs? Why or why not?
4. What is a possible risk that exists in using fluorescent lights versus incandescent lights?
5. Explain why glowsticks only glow for a certain amount of time. Is there any way of making them glow all over again?
6. Some wrist-watches will glow when they are exposed to light. Why does this happen? Describe the type of light source they contain.