

# Types of Light Sources

Light refers to electromagnetic radiation of any wavelength, whether it is visible or not.

Electromagnetic radiation in terms of wavelengths can be organised as radio, microwave, infrared, the visible region that we perceive as light, ultraviolet, X-rays and gamma rays. The way electromagnetic radiation functions is based on its wavelength. Higher frequencies tend to have shorter wavelength whereas lower frequencies tend to have longer wavelengths.

Atoms release and absorb light at their own optimum energies and therefore produce emission lines in the spectrum for each atom. Emissions can occur at any time as light emitting diodes or gas discharge lamps such as neon lamps etc. However emissions may also be stimulated for example in a laser.

There are two basic types of light sources: **Incandescence and Luminescence**.

## Incandescence

Incandescence involves the vibration of entire atoms, for example when atoms are heated to high optimum temperatures the thermal vibration is released as electromagnetic radiation. Incandescent light or "black body radiation" is produced when light comes from a heated solid. Depending on the temperature of the material the photons released vary in their energies and colors, at low temperatures the materials emit radiation in infrared wavelengths. In black body radiation the trend follows as the temperature increases the peak shifts to shorter wavelengths, firstly produces a red then white and lastly a bluish-white color as the peak moves into the ultraviolet part of the spectrum from the visible part, an example of this is when metal is heated.

**Incandescent light** is the most common type of light it includes the sun, fires and light bulbs. Fires involve chemical reactions which release heat and gases, causing materials to reach high temperatures and eventually causes the gases and materials to incandescence. In contrast light bulbs produce heat, as an electrical current passes through a cable and heats the cable to high temperatures eventually causing the cable to incandescence. Incandescent light bulbs emit approximately ninety percent of their energy as infrared whereas the remainder is visible light.

## Luminescence

On the other hand luminescence involves only electrons. It generally occurs at lower temperatures, compared to incandescent light and is often referred to as light from different sources of energy that can take place at normal or lower temperatures.

**Luminescence light** is produced when an electron emits some of its energy as electromagnetic radiation. During specific energy levels electrons need to have energy. When electrons jump down to lower energy levels a certain amount of energy which becomes light of a specific color is released. Generally speaking to maintain continuous amounts of luminescence, the electrons require a continuous push to be pushed up to higher energy levels so that the cycle continues. This push or "kick" can be provided for by a range of sources - for example neon lights, fluorescence light, electrical currents, bioluminescence e.g. - even animals like fireflies. Neon lights produce light through electro luminescence which involves a high voltage which forces a current through the gas that excites it and eventually causes it to emit light. Bioluminescence is formation of light by living organisms e.g. fireflies. Fluorescence light involves two types of luminescence - electro luminescence and photoluminescence, common uses include televisions and computer screens.

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