

The color of light observed when a substance is heated in a flame varies from one substance to another. Because each element has a different spacing of electron energy levels, the possible electron transitions for a given substance are unique. Therefore, the difference in energy between energy levels, the exact energy of the emitted photon, and the corresponding wavelength and color are unique to each substance. As a result, the colors observed when a substance is heated in a flame may be used as a means of identification.

The Visible Portion of the Electromagnetic Spectrum

Visible light is a form of electromagnetic radiation. Other familiar forms of electromagnetic radiation include γ -rays, X-rays, ultraviolet (UV) radiation, infrared (IR) radiation, microwave radiation, and radio waves. Together, all forms of electromagnetic radiation make up the electromagnetic spectrum. The visible portion of the electromagnetic spectrum is the only portion that can be detected by the human eye—all other forms of electromagnetic radiation are invisible.

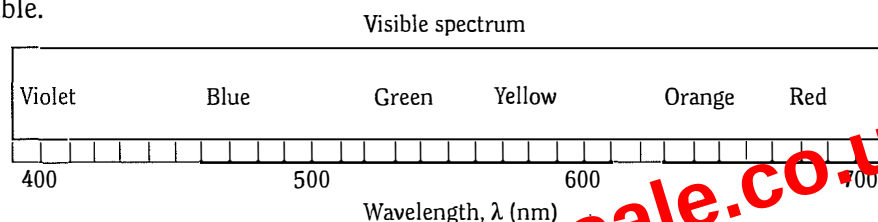


Figure 2. The visible spectrum.

The visible spectrum spans the wavelength region from about 400 to 700 nm (Figure 2). Light of 400 nm is seen as violet and light of 700 nm is seen as red. According to Equation 1, wavelength is inversely proportional to energy. Therefore, violet light is higher energy light than red light. As the color of light changes, so does the amount of energy it possesses.

Table 1 lists the wavelengths associated with each of the colors in the visible spectrum. The representative wavelengths may be used as a benchmark for each color. For example, instead of referring to green as light in the wavelength range 500–560 nm, we may approximate the wavelength of a green light as 520 nm. An infinite number of shades of each color may be observed.

Table 1.

Representative Wavelength, nm	Wavelength Region, nm	Color
410	400–425	Violet
470	425–480	Blue
490	480–500	Blue-green
520	500–560	Green
565	560–580	Yellow-green
580	580–585	Yellow
600	585–650	Orange
650	650–700	Red