Light frequency chart

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Learn about the region of the electromagnetic spectrum visible to human eyes, from violet to red, and the wavelengths and frequencies of each color. See how Newto...

The visible light spectrum is the region of the electromagnetic spectrum that human eyes see. It runs from wavelength of about 400 nanometers (nm) at the violet end of the spectrum to around 700 nm at the red end of the spectrum. Ultraviolet light and x-rays are the ionizing radiation beyond violet, while wavelength on the other side of red are infrared, microwaves, and radio waves.

RGB monitors aren’t able to reproduce the colors of the spectrum accurately. But, if you don’t have a prism handy, you can see the colors on a screen by rendering the spectrum against gray. You may see further than 400 nm or 700 nm, but most people see 425 nm to 690 nm.

The eyes and brain see many more colors than those of the visible light spectrum. For example, purple and magenta aren’t on the spectrum. They are the brain’s way of connecting red and purple. There are also desaturated and blended colors, such as pink and brown. Mixing pigments on a palette forms hues and tints that aren’t spectral colors.

A service of the High Energy Astrophysics Science Archive Research Center (HEASARC), Dr. Andy Ptak (Director), within the Astrophysics Science Division (ASD) at NASA/GSFC

The visible spectrum is the band of the electromagnetic spectrum that is visible to the human eye. Electromagnetic radiation in this range of wavelengths is called visible light (or simply light).The optical spectrum is sometimes considered to be the same as the visible spectrum, but some authors define the term more broadly, to include the ultraviolet and infrared parts of the electromagnetic spectrum as well, known collectively as optical radiation.[1][2]

The spectrum does not contain all the colors that the human visual system can distinguish. Unsaturated colors such as pink, or purple variations like magenta, for example, are absent because they can only be made from a mix of multiple wavelengths. Colors containing only one wavelength are also called pure colors or spectral colors.[8][9]

Colors that can be produced by visible light of a narrow band of wavelengths (monochromatic light) are called pure spectral colors. The various color ranges indicated in the illustration are an approximation: The spectrum is continuous, with no clear boundaries between one color and the next.[10]

In the 13th century, Roger Bacon theorized that rainbows were produced by a similar process to the passage of light through glass or crystal.[11]

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In the early 19th century, the concept of the visible spectrum became more definite, as light outside the visible range was discovered and characterized by William Herschel (infrared) and Johann Wilhelm Ritter (ultraviolet), Thomas Young, Thomas Johann Seebeck, and others.[17]Young was the first to measure the wavelengths of different colors of light, in 1802.[18]

The visible range of most animals evolved to match the optical window, which is the range of light that can pass through the atmosphere. The ozone layer absorbs almost all UV light (below 315 nm).[19] However, this only affects cosmic light (e.g. sunlight), not terrestrial light (e.g. Bioluminescence).

Under ideal laboratory conditions, subjects may perceive infrared light up to at least 1,064 nm.[25] While 1,050 nm NIR light can evoke red, suggesting direct absorption by the L-opsin, there are also reports that pulsed NIR lasers can evoke green, which suggests two-photon absorption may be enabling extended NIR sensitivity.[25]

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