



## UV Light

*What is UV light?*

UV light is a form of electromagnetic radiation which comes from the sun and is transmitted at different wavelengths and frequencies.

All radiation is a form of energy, most of which is invisible to the human eye. Ultraviolet (UV) radiation is only one form of radiation, and it is measured on a scientific scale called the electromagnetic (EM) spectrum. UV radiation is the portion of the EM spectrum between X-rays and visible light. The common designations of the electromagnetic spectrum are radio waves, microwaves, infrared (IR), visible light, UV, X-rays and gamma-rays.

As with all forms of light on the EM spectrum, UV radiation is classified by wavelength and frequency. UV light has frequencies of about  $8 \times 10^{14}$  to  $3 \times 10^{16}$  cycles per second, or hertz (Hz), and wavelengths of about 380 nanometers ( $1.5 \times 10^{-5}$  inches) to about 10 nm ( $4 \times 10^{-7}$  inches).

*Why do we measure UV light? What is the significance of studying UV Light?*

Using UV light sensors to identify the UV index in ambient light helps people to protect themselves from sunburns, cancer, or eye damage. UV radiation has enough energy to break chemical bonds and cause ionization, during which electrons break away from atoms. The resulting electron vacancy modifies the atom's chemical properties of the atoms, causing them to form or break chemical bonds.

This is useful for chemical processing and in disinfecting surfaces, but it can also be harmful to skin and eyes.

The UV index is directly proportional to the intensity of UV radiation that causes sunburn and is intended to help people effectively protect themselves from excessive UV which causes sunburn, skin cancer, immunosuppression, and eye damage.

*How does a UV light sensor work?*

UV Light sensor contains two integrated photodiodes for measure of ambient light and UV light in terms of the photocurrent generated from the two types of light detected.

*What data is collected? Units of measure?*

The ultraviolet (UV) index is an international standard measuring the strength of the sunburn-producing UV radiation.

The U.S. National Weather Service calculates the UV Index using a computer model that relates ground-level strength of UV to forecasted ozone concentration and cloud coverage, and elevation at specific locations.





The Index predicts UV intensity levels on a scale of 1 to 11+, where 1 indicates a minimal risk of overexposure and 11+ means a very high risk.

Resources:

- [Protect Yourself, Family and Pets from Excessive Ultraviolet \(UV\) Radiation \(weather.gov\)](#)
- [HEAT.gov - National Integrated Heat Health Information System](#)
- [Ultraviolet Waves | Science Mission Directorate \(nasa.gov\)](#)
- [UV Radiation | NCEH Environmental Health Features \(cdc.gov\)](#)
- [Observing Ultraviolet Light \(hubblesite.org\)](#)
- [Ultraviolet \(UV\) Radiation and Sun Exposure | US EPA](#)
- [Radiation Studies: CDC - Ultraviolet Radiation](#)
- [Ultraviolet radiation \(who.int\)](#)

Extension Activities:

- Light 1 and 2
- Brightness

Glossary:

[Ambient](#) (adjective): surrounding on all sides

[Diode](#) (noun): an electronic device with two electrodes that is used especially for changing alternating current into direct current

[Electromagnetic](#) (adjective): of, relating to, or produced by electromagnetism

[Electromagnetism](#) (noun): magnetism developed by a current of electricity; a natural force arising from interactions between charged particles

[Frequency](#) (noun): the number of repetitions of a periodic process in a unit of time: as the number of times per second that an electric current flowing in one direction changes direction then changes back a current having a frequency of 60 hertz; the number of waves (as of sound or electromagnetic energy) that pass a fixed point each second a sound having a frequency of 1500 hertz

[Gamma-Rays](#) (noun): a ray that is like an X-ray but of higher energy and that is given off especially by a radioactive substance

[Ion](#) (noun): an atom or group of atoms that carries a positive or negative electric charge as a result of having lost or gained one or more electrons

[Ionization](#) (noun): conversion of a substance into ions

[Photodiode](#) (noun): a diode that exhibits sensitivity to light, either by varying its electrical resistance like a photoresistor, or generating an electric potential in the manner of a photoelectric cell.

[Radiation](#) (noun): the action or process of radiating; especially the process of giving off radiant energy in the form of waves or particles

[Ultraviolet](#) (adjective): located beyond the visible spectrum at its violet end and having a wavelength shorter than those of visible light but longer than those of X-rays

