

Electromagnetic Radiation-transverse energy waves produced by electrically charged particles. Has the properties of both waves and particles. These particles are called *photons*.

The wavelength and frequency of electromagnetic radiation can vary but they all travel at the same velocity, 300,000 km/s. As the wavelength decreases, the energy increases.

The arrangement of electromagnetic radiation based on their wavelengths is called the electromagnetic spectrum. ( see page 529 in book )

Types of Electromagnetic Radiation ( from long to short wavelength )

Radio -Long wavelengths and low frequency

Used for radio ( AM and FM ), TV, cell phones, Radar and Microwaves.

AM radio signals vary the amplitude of the wave while FM radio signals vary the frequency of the wave.

Microwaves are used for cooking as well as communication. When used for cooking ,it causes water molecules to vibrate faster,thus making it heat up.

Infrared A type of radiation we sense as heat. All objects above absolute zero give off infrared radiation. A picture showing the different temperatures in objects is called a *thermogram* . Heat lamps are designed to give off mainly this type of radiation.

Visible Radiation -referred to as light. Ranges from long wavelength red to short wavelength violet. ROYGBIV

Red

Orange

Yellow

Green

Blue

Indigo

Violet

Ultraviolet -electromagnetic radiation with a wavelength shorter than visible light. Known to cause skin cancer and wrinkling of the skin. Produces Vitamin D in our skin when our skin is exposed to it in sunlight. It kills cells and is used as a sterilizing agent in hospitals for example. If it weren't for the Earth's Ozone layer absorbing Ultraviolet radiation, it would kill all life on Earth. The Ozone layer is fragile and can be damaged by gases released into the atmosphere.

X rays and Gamma Rays - the most energetic radiation and the most damaging. Very short wavelengths. Can kill people. X rays are used for everything from medical to structural imaging. Gamma rays are used in cancer treatment to kill cancer cells.