

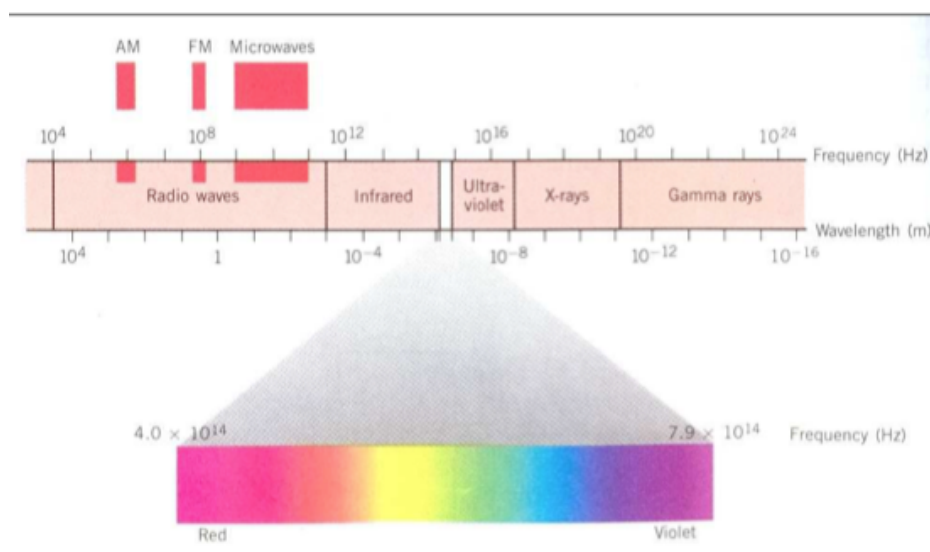
## Technical environmental system – Weekly submission IV

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The transmission of energy through space is called radiation. This process of heat transmission does not depend on the presence of a material. Unlike conduction and convection, radiation does not need a medium to occur, because the thermal energy in this process is transferred by electromagnetic waves, which are able to propagate in a vacuum. Solar energy, for example, comes that way. Because the planet and the sun are situated in a vacuum, this form of propagation is the only one that allows the earth to receive solar energy.

All bodies emit energy by radiation at all times. At temperatures close to the environment, this phenomenon can usually not be perceived by human eyes, but can be seen when the body is at very high temperatures, such as glowing embers. In very cold periods, some animals, such as rattlesnakes, hibernate in flocks so that each individual can enjoy the energy radiated by the other members of the group.

The energy transmitted in this way is called radiant energy and is in the form of electromagnetic waves, as are radio waves, microwaves, visible light, ultraviolet (UV) radiation, x-rays and gamma rays. These forms of radiant energy are classified in order of wavelength (or frequency) constituting the electromagnetic spectrum.



In increasing order of energy, the spectrum includes: radio waves, infrared radiation, visible light, ultraviolet light, x-rays, and  $\gamma$  beams. Infrared radiation comprises wavelength rays longer than those of visible light and which are noted for their caloric action.

Radiation heat transfer generally involves the spectrum range known as infrared (IR). Any object releases radiant energy. Higher temperature objects release more radiant energy than lower temperature objects.

The physical qualities of an object determine its ability to absorb or reflect radiation. Rough and / or opaque surfaces are generally good radiant heat absorbers and therefore easily heated by radiation. Smooth, polished surfaces are usually good reflectors so that they do not remain efficiently heated. Objects that are good absorbers are often good emitters. Objects that are good reflectors are often poor emitters. Similarly dark colored objects absorb radiant energy better than light colored objects.



Photograph taken with a film or infrared-sensitive sensor showing the temperature distribution in a winter residence. Yellow, red and white colors indicate large heat losses through windows, doors and walls where insulation is poor