

2.1 Electromagnetic spectrum

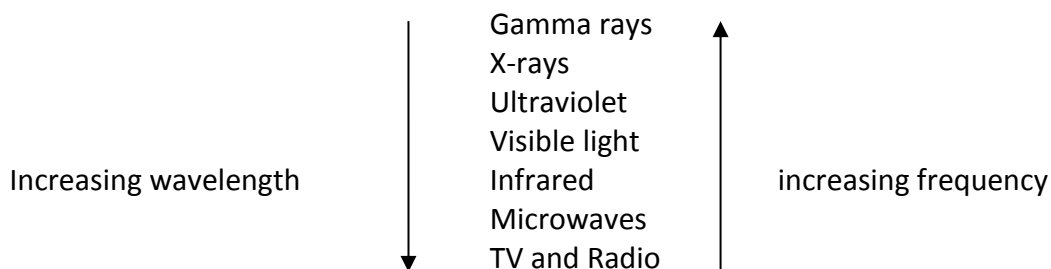
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Electromagnetic spectrum

There are a number of waves which travel at the speed of light. They are all part of the **electromagnetic spectrum**. These waves are all transverse waves and travel at $300\,000\,000\text{ ms}^{-1}$ ($3 \times 10^8\text{ ms}^{-1}$) in a vacuum.

The different parts of the electromagnetic spectrum differ in wavelength and frequency



The different parts of the electromagnetic spectrum can also be distinguished by their energy. Higher frequency electromagnetic radiation has a greater energy than lower frequency electromagnetic radiation.

Some information on each part of the spectrum is given below

| Type of e-m radiation | Typical source | Application | Detector | Possible hazard |
|-----------------------|----------------------------|-----------------------------|--|--|
| Radio & TV | Electrical antennae | Telecommunications | Aerial | Potential increased cancer risk |
| Microwaves | Cosmic sources, magnetron | Cooking, Telecommunications | Diode probe | Heating of body tissues |
| Infra-red | Heat-emitting objects | Thermograms | Phototransistor, blackened thermometer | Over heating of body tissues causing dehydration |
| Visible light | Stars | Vision | Eye, photographic film | Intense light can damage the retina |
| Ultraviolet | Sunlight | Treating skin conditions | Fluorescent paint | Skin cancer |
| X-rays | X-ray tube, cosmic sources | Medical imaging | Photographic plates | Destroys cells which can lead to cancer |
| Gamma rays | Nuclear decay | Treating tumours | Geiger–Müller tube and counter | Destroys cells which can lead to cancer |

