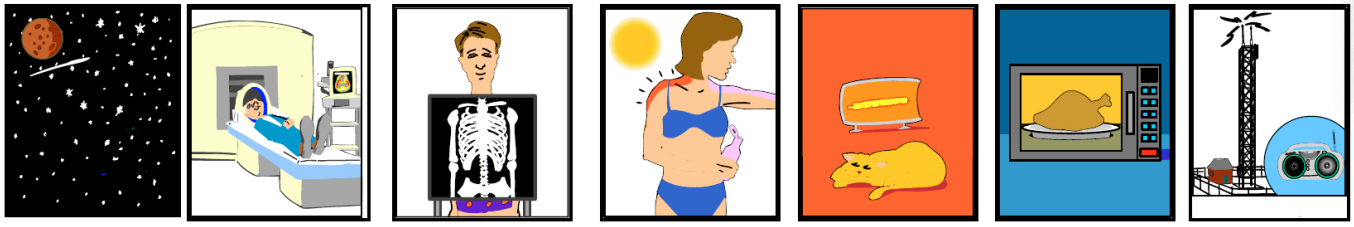
ORESOME RESOURCES
Minerals and Energy Education

Radiation Types

Radiation is all around us. It is energy travelling through space. Heat, light and sound are familiar to our senses, ultra-violet gives us sunburn, but radio waves require some instrument to discern them. As well as these there are several forms of ionising radiation, which also require instruments to discern and measure it.

Energy Spectrum

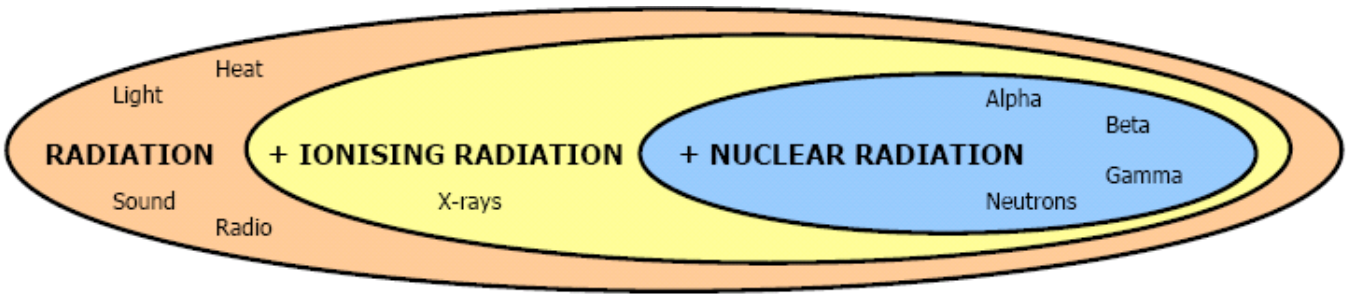


Cosmic | Gamma | X-Rays | Ultra Violet | Infrared | Microwaves | Radio

High Frequency ← → Low Frequency

Interactive version of the energy spectrum

Ionising radiation is so called because when it hits an atom it knocks off an electron and makes it into an ion with an electrical charge. Ionising radiation can damage living organisms, so exposure to it is limited.



Radiation Types

X-rays are probably the best known form of ionising radiation. Other kinds come from the nuclei of radioactive atoms, and are hence known as nuclear radiation. The three main types are alpha particles, beta particles and gamma rays.

Alpha particles are relatively large and so stopped even by human skin or a sheet of paper.

Beta particles are small, fast, and can travel quite far. They are typically electrons and can penetrate into human tissue. They need shielding such as a few millimeters of aluminium, e.g. aluminium foil.

Gamma rays are high-energy waves and can travel very long distances. They are identical to x-rays and require substantial mass (water, concrete, lead) to shield them.

Nuclear fission of uranium in a nuclear reactor gives rise to many kinds of radioactive atoms as wastes, as well as to direct radiations by neutrons. The reactor itself is well shielded when operating. The spent fuel removed from it contains all the wastes from the fuel, and hence emits all three kinds of ionising radiation described. Nuclear wastes require careful management and isolation, rather than being treated like other wastes. This also includes low level radioactive wastes, even if the radioactive impact is low.

The South Australian Chamber of Mines and Energy is acknowledged as the provider of this resource.