

What Types of Radiation Are There?

The radiation one typically encounters is one of four types: alpha radiation, beta radiation, gamma radiation, and x radiation. Neutron radiation is also encountered in nuclear power plants and high-altitude flight and emitted from some industrial radioactive sources.

1. Alpha Radiation

Alpha radiation is a heavy, very short-range particle and is actually an ejected helium nucleus. Some

helium nucleus. Some characteristics of alpha radiation are:

- Most alpha radiation is not able to penetrate human skin.
- Alpha-emitting materials can be harmful to humans if the materials are inhaled, swallowed, or absorbed through open wounds.
- A variety of instruments has been designed to measure alpha radiation. Special training in the use of these instruments is essential for making accurate

measurements.

- A thin-window Geiger-Mueller (GM) probe can detect the presence of alpha radiation.
- Instruments cannot detect alpha radiation through even a thin layer of water, dust, paper, or other material, because alpha radiation is not penetrating.
- Alpha radiation travels only a short distance (a few inches) in air, but is not an external hazard.
- Alpha radiation is not able to penetrate clothing.

Examples of some alpha emitters: radium, radon, uranium, thorium.

2. Beta Radiation

Beta radiation is a light, short-range particle and is actually an ejected electron. Some characteristics of beta radiation are:

- Beta radiation may travel several feet in air and is moderately penetrating.
- Beta radiation can penetrate human skin to the "germinal layer," where new skin cells are produced. If high levels of beta-emitting contaminants are

- Beta radiation may travel several feet in air and is moderately penetrating.
- Beta radiation can penetrate human skin to the "germinal layer," where new skin cells are produced. If high levels of beta-emitting contaminants are allowed to remain on the skin for a prolonged period of time, they may cause skin injury.
- Beta-emitting contaminants may be harmful if deposited internally.
- Most beta emitters can be detected with a

3. Gamma and X Radiation

Gamma radiation and x rays are highly penetrating electromagnetic radiation. Some characteristics of these radiations are:

- Gamma radiation or x rays are able to travel many feet in air and many inches in human tissue. They readily penetrate most materials and are sometimes called "penetrating" radiation.
- X rays are like gamma rays. X rays, too, are penetrating radiation. Sealed radioactive sources and machines

that emit gamma radiation and x rays respectively constitute mainly an external hazard to humans.

- Gamma radiation and x rays are electromagnetic radiation like visible light, radiowaves, and ultraviolet light. These electromagnetic radiations differ only in the amount of energy they have. Gamma rays and x rays are the most energetic of these.
- Dense materials are needed for shielding from gamma radiation. Clothing provides little shielding from

penetrating radiation, but will prevent contamination of the skin by gamma-emitting radioactive materials.

- Gamma radiation is easily detected by survey meters with a sodium iodide detector probe.
- Gamma radiation and/or characteristic x rays frequently accompany the emission of alpha and beta radiation during radioactive decay.

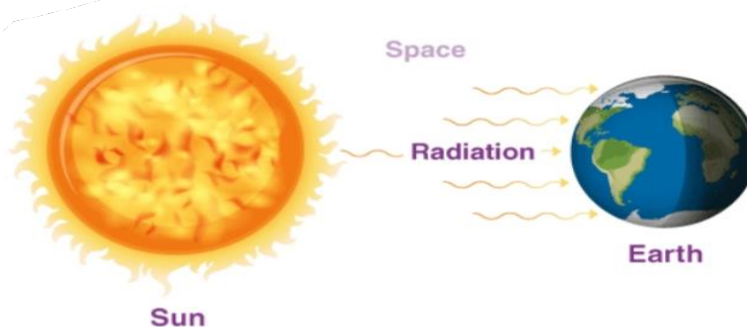
What is Radiation?

Radiation can be described as energy or particles from a source that travels through space or other mediums. Light, heat, microwaves and wireless communications are all forms of radiation. This includes the following:

- **Particle Radiation:** such as alpha radiation (α), beta radiation (β), and neutron radiation.
- **Gravitational Radiation:** such as radiation that takes the form of gravitational waves, or ripples in the curvature of space-time.

ultrasound, sound, and seismic waves.

- **Electromagnetic radiation:** such as radio waves, **visible light**, x-rays, and gamma radiation (γ).



Types of Radiation

Radiation is often categorized into two types depending on the energy of the radiated particles.

- **Ionizing Radiation** – Ionizing radiation carries more than 10 eV, which is enough to ionize atoms and molecules and break chemical bonds. The ionizing radiation consists of alpha particles, beta particles, and gamma rays.
- **Non-ionizing Radiation** – Ionization is not caused by these radiations. They usually emit heat, which can sometimes be so intense as to result in burns. Visible light and infrared

radiation are examples of non-ionizing radiation that may be seen by humans.

What is Nuclear Radiation?

Nuclear radiation is an energy that is released by elementary particles of the atomic nucleus that are caused by the process of nuclear decay. According to the International Atomic Energy Agency,

nuclear radiation can cause consequences to nature, human life and facility significantly. However, nuclear radiation could be both beneficial or harmful depending upon its utilization.

Types of Nuclear Radiation

There are three types of nuclear radiation emitted from radioactive atoms:

- Alpha Radiation
- Beta Radiation
- Gamma Radiation

Alpha Radiation:

Alpha radiation is a heavy and very short-range particle. It is actually an ejected helium nucleus. Alpha radiation is another name for the alpha particles emitted in the type of radioactive decay called alpha decay. Alpha particles are helium-4 (^4He) nuclei.

Beta Radiation:

They are classified into two categories: Beta-minus (β^-) and Beta-plus (β^+).

The Beta-minus radiation consists of an energetic electron. It is more penetrating than alpha radiation but less than gamma. While, the Beta-plus radiation is the

emission of positrons, which are the antimatter form of electrons.

Gamma Radiation:

The Gamma rays or **Gamma radiation** consists of photons with a wavelength less than 3×10^{-11} metres. The emission is a nuclear

process that occurs to rid an unstable nucleus of excess energy after most nuclear reactions.

X-Ray Radiation:

It is a form of electromagnetic radiation. The x-rays are powerful waves of electromagnetic energy. Most X-rays have a

What are the types of nuclear radiation?

The following are the types of nuclear radiation:

- Alpha Radiation
- Beta Radiation
- Gamma Radiation

wavelength ranging from 0.01 to 10 nanometres, corresponding to frequencies in the range 30 petahertz to 30 exahertz and energies in the range 100 eV to 100 keV.

How are beta radiations classified?

Beta radiations are classified into:

- Beta-minus (β^-)
- Beta-plus (β^+)

State true or false: X-ray is the form of electromagnetic radiation?

True.

Define nuclear radiation

Nuclear radiation is an energy that is released by elementary particles of the atomic nucleus that are caused by the process of nuclear decay.