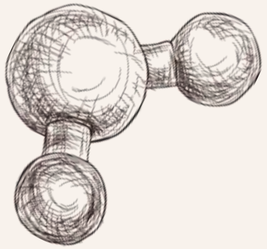
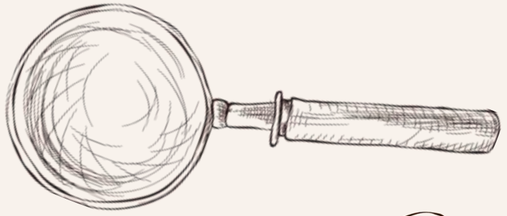
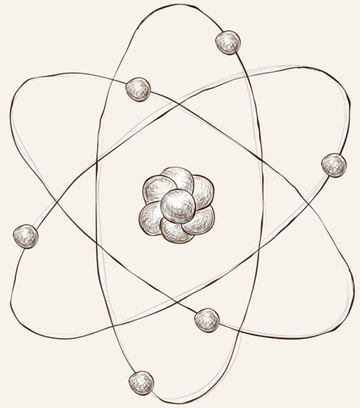
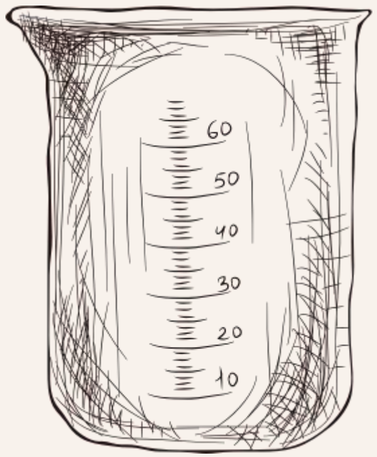
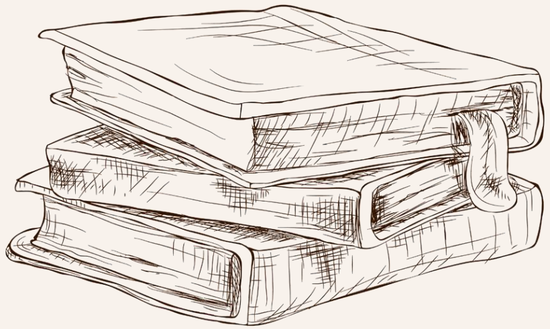






RADIOACTIVITY





Presented by Group 2 members

History

Radioactivity was discovered in 1896 by scientists Henri Becquerel and Marie Skłodowska-Curie, while working with phosphorescent materials. These materials glow in the dark after exposure to light, and Becquerel suspected that the glow produced in cathode ray tubes by X-rays might be associated with phosphorescence.

Henri Becquerel

History

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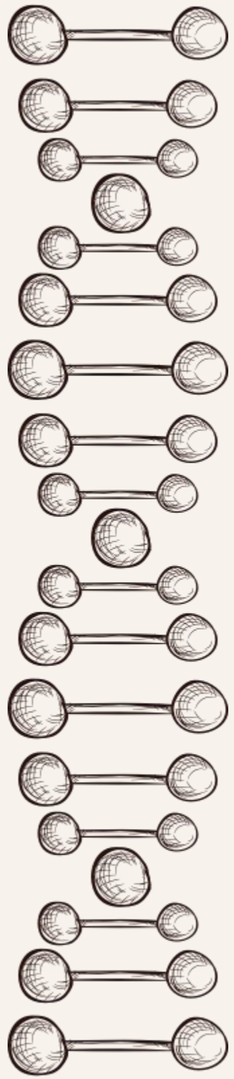
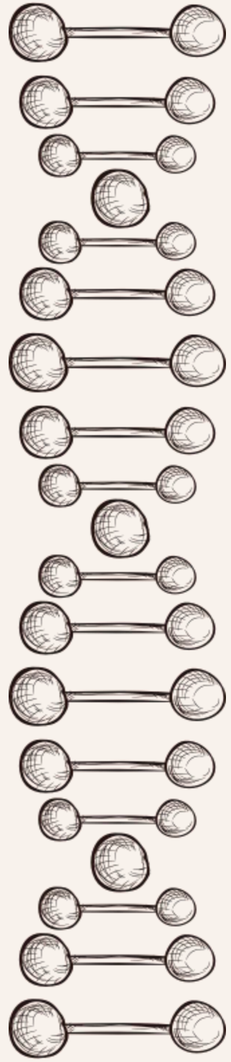
Marie Curie

Types of Nuclear Radiation and Their Ionization and Penetration



Nuclear radiation (also called ionising radiation) is energy released as high-speed charged particles or electromagnetic waves. Radiation can come from many sources, both natural and manufactured.



Types of Nuclear Radiation and Their Ionization and Penetration

Alpha Radiation

Characteristics

- Heavy particles
- High Energy particles
- Low penetration
- Directional emission

Ionization power: Alpha particles create high ionization densities, which can lead to the formation of reactive oxygen species (ROS) and other oxidative stressors that can damage biological tissues.

Types of Nuclear Radiation and Their Ionization and Penetration

Beta Radiation

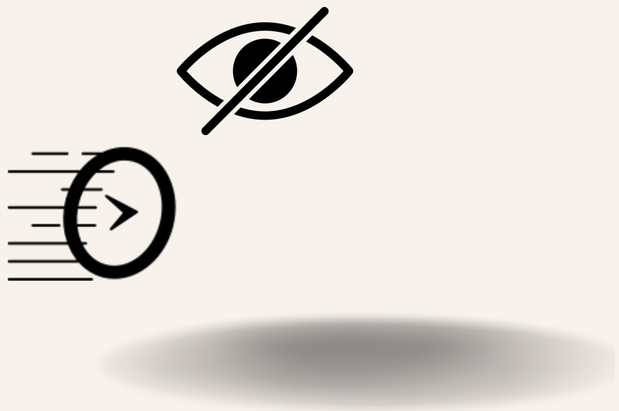
Characterstics

- Faster and Lighter
- Decay in to negative and positive particles
- Very small mass

Penetration Power: Beta rays can penetrate a few millimeters of skin or tissue, travel several meters in air, and are blocked by a few millimeters of aluminum, plastic, or glass.

Beta rays have a moderate ionization power, which is higher than gamma rays but lower than alpha particles.

Types of Nuclear Radiation and Their Ionization and Penetration



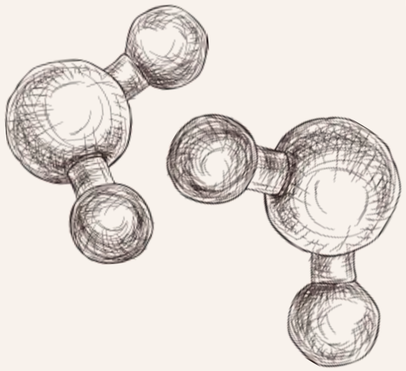
Gamma Radiation

Characteristics

- Invisible but Powerful
- Speed of Light
- Companions to Alpha and Beta

High Penetration Power: They can penetrate deeply into materials, including several centimeters of lead or meters of concrete.

Low Ionization Power: Despite their high energy, they ionize atoms and molecules less effectively than alpha or beta particles because they are less likely to interact with matter as they pass through.



Source of Ionizing Radiation

- Cosmic rays from outer space.
- Radon gas from the decay of uranium in the Earth's crust.
- Naturally occurring radioactive materials in soil, water, and living organisms.
- Nuclear weapons testing and accidents.
- Nuclear power plants and nuclear fuel processing.

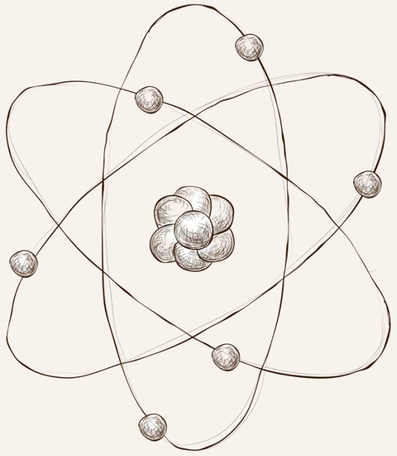
Biological Effects of Ionizing Radiation and Dangers of Ionizing Radiation

Short term

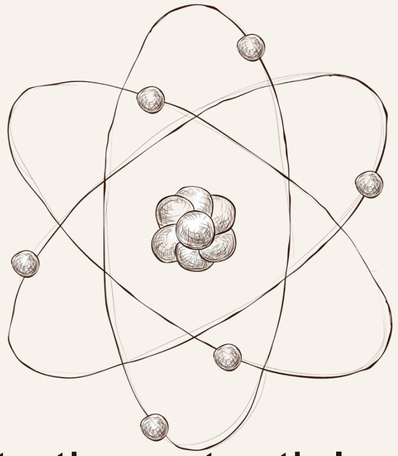
- Acute Radiation Syndrome (ARS)
- Radiation Burns
- Temporary Sterility

Long term

- Cancer
- Genetic Mutations
- Cardiovascular Diseases
- Cataract



Effective Dose



The effective dose is a measure used in radiation protection to estimate the potential risk of harm from exposure to ionizing radiation. It represents the amount of radiation absorbed by the body, adjusted for the different sensitivities of various tissues and organs.

Radioactivity can have various health effects depending on the level of exposure and the type of radiation emitted. These effects can include radiation sickness, increased risk of cancer, genetic mutations, and damage to organs and tissues. Long-term exposure to high levels of radiation can significantly increase the risk of developing cancer and other illnesses.

Nuclear Decay and Conservation Laws

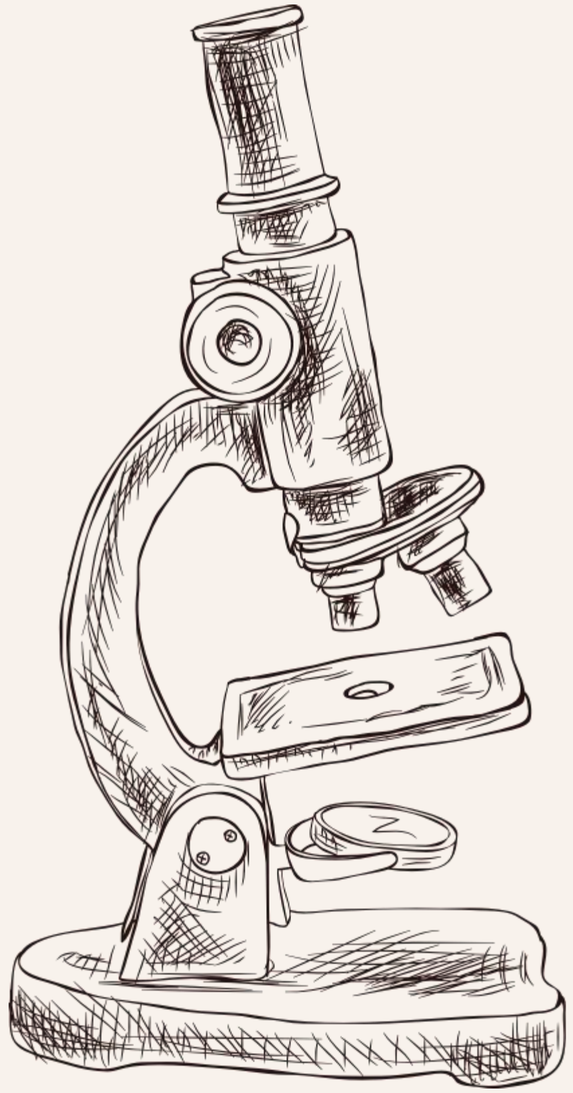
Nuclear decay is the process by which an unstable atomic nucleus emits radiation (such as alpha particles, beta particles, or gamma rays) to become more stable. Conservation laws, like the conservation of energy and conservation of momentum, dictate that the total energy and momentum before and after nuclear decay must remain constant. This ensures that the fundamental properties of particles involved in nuclear decay are preserved throughout the process.

Radiation Detector

01 Geiger-Müller Counters

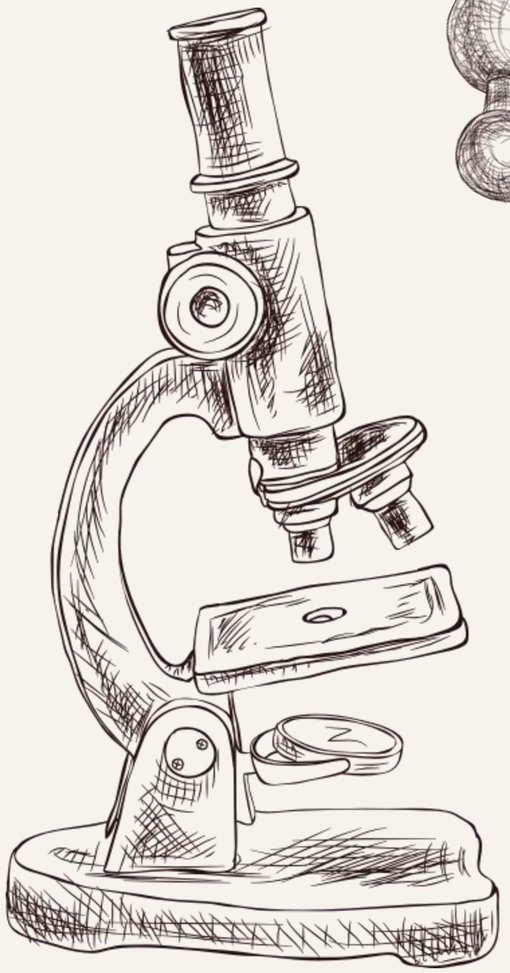
02 Scintillation Detectors

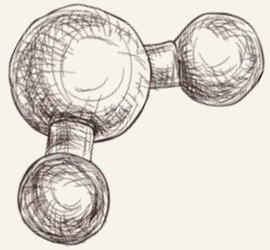
03 Ionization Chambers

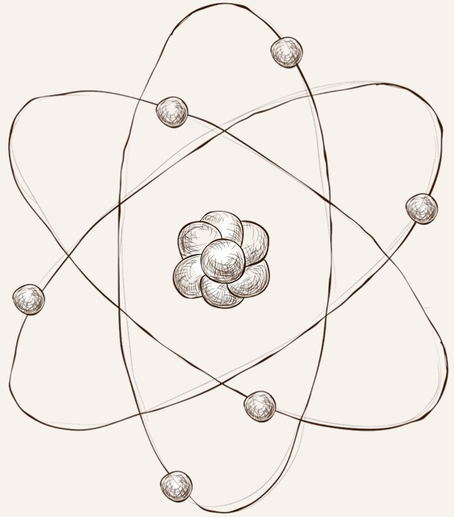


The Half - Life

Half-life is the time required for a quantity (of substance) to reduce to half of its initial value. The term is commonly used in nuclear physics to describe how quickly unstable atoms undergo radioactive decay or how long stable atoms survive. The term is also used more generally to characterize any type of exponential (or, rarely, non-exponential) decay.







Thank you!

Do you have any questions?