1 A Short History

DEFINITION

Radioactivity.

The spontaneous breaking up of certain unstable nuclei, accompanied by the emission of radiation.

- Radioactivity was first discovered by a French physicist called Henri Becquerel in 1896.
- A substance that gives off rays is said to be radioactive.
- Uranium was the first radioactive substance discovered.

1.1 Marie Curie

- Pierre and Married Currie, 1898.
- Investigated the radioactivity of uranium salts.
- Isolated radioactive isotopes.
- Discovered Polonium and Radium.
- Discovered Alpha, Beta and Gamma radiation.

DEFINITION

Radioisotope.

A radioactive isotope

2 Radioactivity

- Radiation is emitted in three forms:
  - Alpha particles (α)
  - Beta particles (β)
  - Gamma particles (γ)

2.1 Alpha Particles (α)

- Consist of two protons and two neutrons, stuck together.
- Same as nucleus of a Helium atom.
- Therefore alpha particles can be represented as ${}^{4}_{2}\mathrm{He}$.

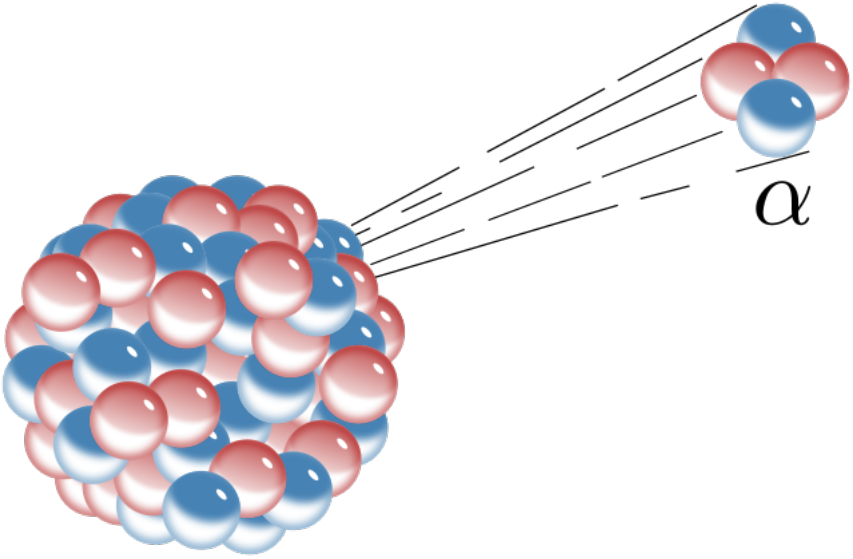

Figure 1: Diagram of Alpha Radiation

- Emitted out of an unstable nucleus of a radioactive element as it becomes more stable.
- Example: Smoke detectors contain Americum-241 which is a source of radioactive alpha particles.

2.2 Beta Particles (β)

- Just an electron.
- A beta particle is formed when an unstable neutron is changed into a proton and an electron, the electron is then emitted.
- Carbon-14 emits beta particles.

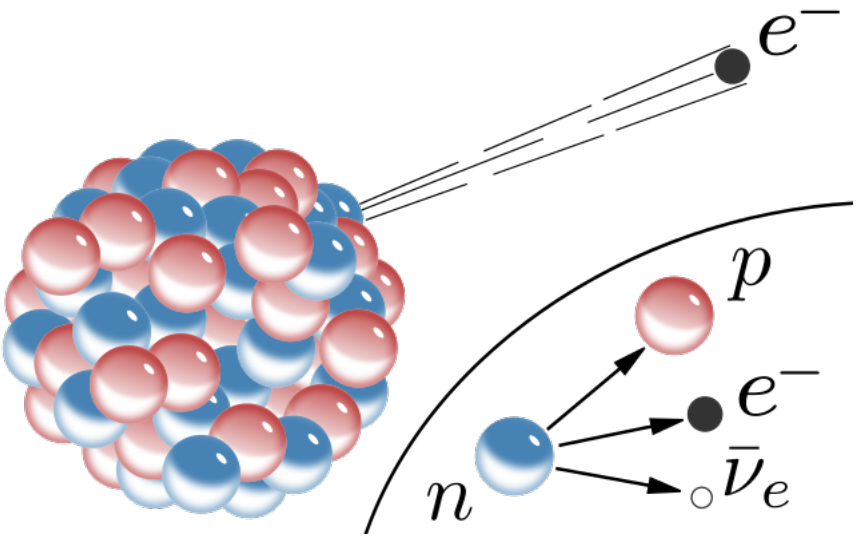

Figure 2: Diagram of Beta Radiation

2.3 Gamma Radiation (γ)

- Gamma radiation is a form of energy similar of X-Rays.
- Therefore it doesn't contain particles.
- An unstable nucleus emits gamma radiation to lose surplus energy.

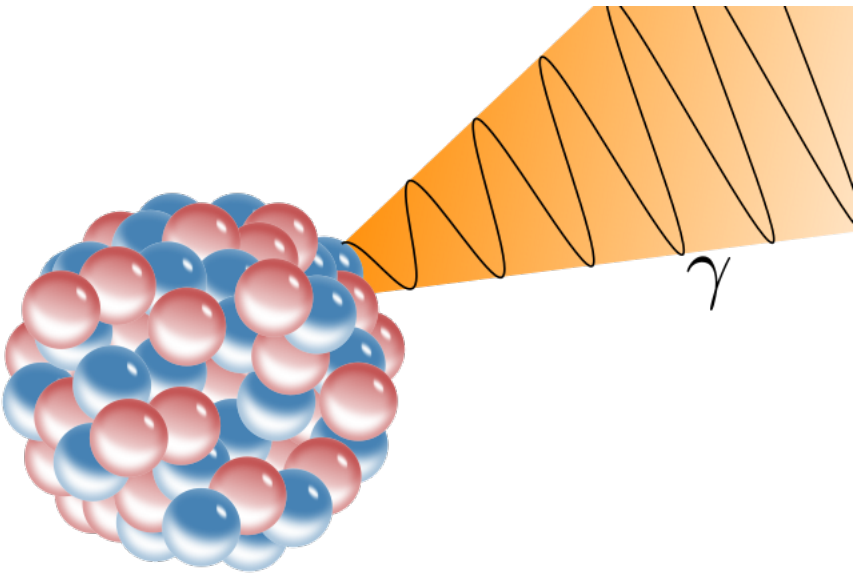

Figure 3: Diagram of Gamma Radiation

- If it is absorbed in large quantities into the body it can alter chemicals in our bodies and cause cancer.
- It can also be used to kill cancer cells by focusing the gamma rays on specific areas of the body.

- Cobalt-60 gives off gamma rays.