

## **Nuclear Radiation**

**James Stewart:** Did you know that this smoke detector wouldn't work without nuclear radiation?

But don't worry, it's not as dangerous as it might sound.

Some atomic nuclei are unstable.

We call them radioactive.

As they decay, they become more stable.

They emit radiation.

There are three main types of decay: Alpha, Beta, and Gamma.

Ionising Power describes how easily radiation can knock electrons out of atoms, creating ions, which can damage the DNA within living tissue.

Here, we see a particle passing through a barrier.

Penetration is how easily radiation can pass through matter.

Radiation with high ionising power has low penetration and vice versa.

Alpha particles consist of two protons and two neutrons.

They have a relative charge of plus two and a relative mass of four.

Alphas have high ionising power but low penetration.

A piece of paper can stop them.

Beta particles are fast moving electrons and have a charge of negative one but a negligible mass.

They have lower ionising power than alpha particles and it takes a thin sheet of aluminium to stop them.

Four to six millimetres should do it.

Gamma radiation is an electromagnetic wave with no charge and no mass.

It has low ionising power but high penetration.

It takes thick lead or even concrete to stop them.

Five centimetres of lead should be enough.

The reason our smoke detectors are safe is because they emit alpha radiation, which cannot penetrate the smoke detector's plastic case.

To remember how to shield against different radiations, think alphabetical.

Alpha is stopped by paper, Beta is stopped by aluminium, and Gamma needs thick lead or concrete.

(MUSIC)