

Properties of ionising radiation

Alpha, beta and gamma radiation are examples of ionising radiation. They have different properties related to their range in air, penetrating power and ionising power.



Geiger counter

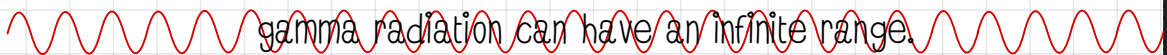
Range in air



alpha particles are large and travel only about 5cm before they collide with air particles and stop.

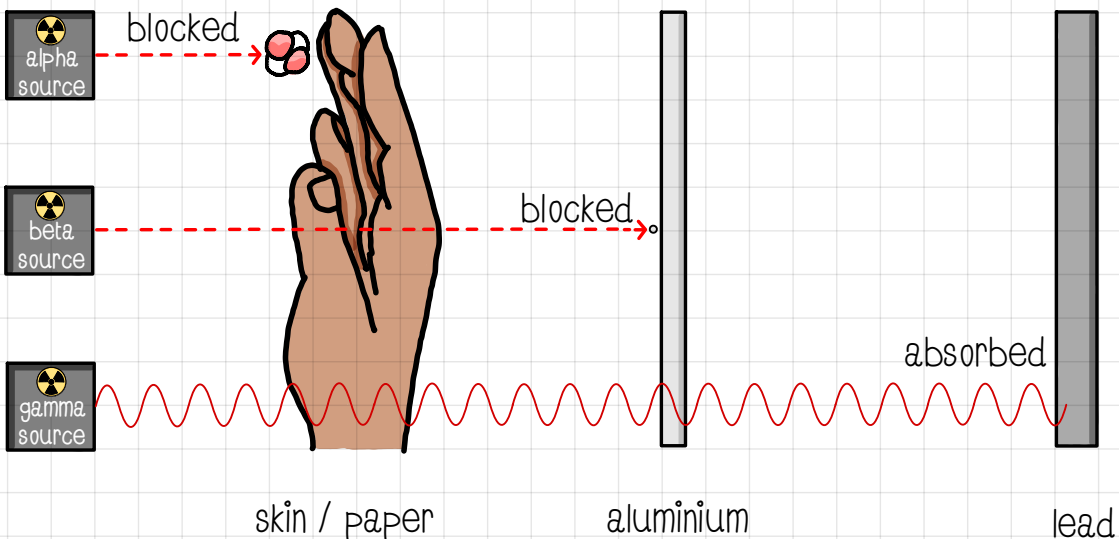


beta particles are smaller and can travel about 1m in air.



gamma radiation can have an infinite range.

Penetration



Ionisation

Ionising radiation will knock electrons off atoms they pass. This will turn the atoms into positively charged ions.



Alpha particles have two protons and a charge of +2. They are strongly ionising.

- Beta particles are an electron with a charge of -1. They are moderately ionising.



Gamma rays are a wave. They have no charge. They are weakly ionising.

Properties of ionising radiation...

Summary table

Type of radiation	Range in air	Penetration	Ionisation
alpha	a few centimetres	blocked by skin / paper	strongly ionising
beta	about a metre	blocked by aluminium	moderately ionising
gamma	infinite	absorbed by lead	weakly ionising

Speed and mass



An alpha particle has a relative atomic mass of 4. It travels at roughly 5% of the speed of light, but is considered relatively slow.

- A beta particle has a relative atomic mass of 0.0005, so is considered relatively light. It travels at speeds approaching the speed of light.

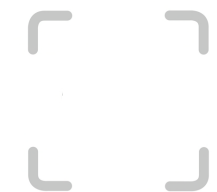


Gamma rays are electromagnetic waves. Waves transfer energy so they have no mass. They travel at the speed of light.

Practice questions

A student suggests that the radioactive source should be stored in a freezer at -20°C . The student thinks that this would reduce the radiation emitted from the source. Suggest why the student would be wrong.

You have an unknown radioactive source. Suggest an experiment to work out what type of emission is being released by the radioactive source.



watch video