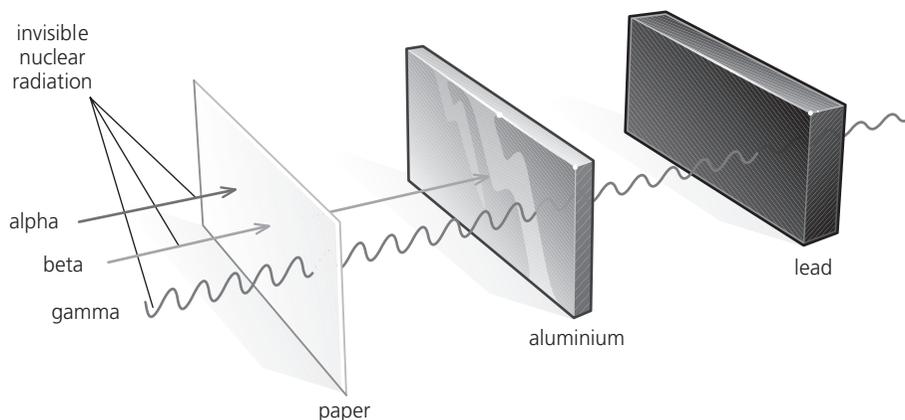




11 Identification of the nature of radiation by attenuation



Warning: Be careful in handling and storing radioactive sources. Use metal tongs and wear gloves to handle the sources.

Aim: To demonstrate the existence of background radiation, and a method to identify the nature of radiation emitted from a radioactive source using the attenuation properties of the emitted radiations.

Equipment:

- Geiger-Müller detector
- Alpha, beta, and gamma emitting sources
- Lead shielding to place around the Geiger-Müller tube
- Paper
- 3 mm of aluminium
- A few centimetres of lead

Demonstration 1

- Switch on the Geiger-Müller detector and record the background count rate.
- Place the Geiger-Müller tube in the lead shielding and demonstrate that the background count rate decreases.

Demonstration 2

- Switch on the Geiger-Müller detector and record the background count rate.
- Place the paper, aluminium, and lead between the alpha, beta, and gamma sources and detector, and record the measured count rates in each case.
- Show that paper can stop alpha radiation, 3 cm of aluminium can stop beta radiation, and 3 cm of lead will reduce the intensity of gamma radiation.

Measure count rates under various conditions

Source of radiation	Attenuation material		
	paper	aluminium	lead
background			
alpha			
beta			
gamma			

Explanation

Each type of radiation has a different probability of interaction by ionising the medium through which it travels. Alpha particles are the most strongly ionising and therefore require little material to stop them. Gamma rays are not strongly ionising and require a lot of matter to stop them or, more precisely, attenuate their intensity.