AQA Physics GCSE

4.4.2 - Atoms and Nuclear Radiation

Flashcards

Why do unstable nuclei give out radiation?

Why do unstable nuclei give out radiation?

- Unstable nuclei undergo decay to become more stable
- As they release radiation their stability increases

What is the name of the process in which an unstable nucleus gives out radiation to become more stable?

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Radioactive decay.

Define the activity of an unstable nucleus.

Define the activity of an unstable nucleus.

Activity is the rate of decay of a source of unstable nuclei.

What is the unit of radioactive activity?

What is the unit of radioactive activity?

Becquerel (Bq)

What is count-rate?

What is count-rate?

The number of radioactive decays per second for a radioactive source.

Give an example of a detector that may be used to measure count-rate.

Give an example of a detector that may be used to measure count-rate.

Geiger-Muller tube

State four types of nuclear radiation.

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1. Alpha particles
2. Beta particles
3. Gamma rays
4. Neutrons

What are the constituents of an alpha particle?

What are the constituents of an alpha particle?

- Two protons and two neutrons
- It is the same as a helium nucleus

What is the range of an alpha particle through air?

What is the range of an alpha particle through air?

A few centimetres (normally in the range of 2-10cm).

What will stop beta radiation from passing through a point?

What will stop beta radiation from passing through a point?

- A thin sheet of aluminium
- Several metres of air

What will stop gamma radiation from passing through a point?

What will stop gamma radiation from passing through a point?

- Several centimetres of lead
- A few metres of concrete

Which type of radiation is most ionising?

Which type of radiation is most ionising?

Alpha radiation.

Which type of radiation is least ionising?

Which type of radiation is least ionising?

Gamma radiation.

State any changes to mass or charge that occur due to the emission of a gamma ray.

State any changes to mass or charge that occur due to the emission of a gamma ray.

Both mass and charge remain unchanged.

Describe the nature of radioactive decay.

Describe the nature of radioactive decay.

- Random
- Which nuclei decays and when is determined only by chance
- It is impossible to predict which nuclei will decay and when

Define the half-life of a radioactive isotope.

Define the half-life of a radioactive isotope.

- The time it takes for the number of unstable nuclei in a substance to halve
- The time it takes for the count rate from a sample to fall to half its initial level

What is radioactive contamination?

What is radioactive contamination?

The presence of unwanted radioactive nuclei on other materials.

What is irradiation?

What is irradiation?

- The process of exposing a material to nuclear radiation
- The material does **not** become radioactive

Why is it important for the results of studies on the effects of radiation to be published and shared with other scientists?

Why is it important for the results of studies on the effects of radiation to be published and shared with other scientists?

- To allow the findings to be independently checked
- This is known as **peer review**