Edexcel GCSE Physics

Topic 6.10-6.22 - Radioactive Decay

Flashcards

State four types of nuclear radiation.

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

What is meant by background radiation?

What is meant by background radiation?

- Radiation that is always present
- It is in very small amounts and so not harmful

Give 4 sources of background radiation.

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1. Rocks
2. Cosmic rays from space
3. Nuclear weapon testing
4. Nuclear accidents

How do you measure and detect background radiation?

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1. Photographic film
2. Geiger-Muller counter

How is photographic film used to measure radiation?

How is photographic film used to measure radiation?

A photographic film turns dark when it absorbs radiation. This is useful for people who work on radiation as the more radiation they are exposed to, the darker the film becomes. Therefore the workers know when they have been exposed to too much radiation.

How is Geiger-Muller tubes used to measure radiation?

How are Geiger-Muller tubes used to measure radiation?

When the Geiger-Muller tube absorbs radiation it produces a pulse, which a machine uses to count the amount of radiation. The frequency of the pulse depends on how much radiation is present. A high frequency would mean the tube is absorbing a large amount of radiation.

What constitutes an alpha particle?

What constitutes 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 block beta radiation?

What will block beta radiation?

- A thin sheet of aluminium
- Several metres of air

What will block gamma radiation?

What will block gamma radiation?

- 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.

How does gamma emission affect mass/charge of an atom?

How does gamma emission affect the mass/charge of an atom?

Both mass and charge remain unchanged.

Describe the plum-pudding model of the atom

Describe the plum-pudding model of the atom

A sphere of positive charge, with the negatively charged electrons distributed evenly throughout it.

Prior to the discovery of the electron what was believed about the atom?

Prior to the discovery of the electron, what was believed about the atom?

The atom was believed to be indivisible.

Which experiment led to the plum-pudding model being discarded?

Which experiment led to the plum-pudding model being discarded?

Rutherford's alpha-Scattering experiment.

What is the name given to the currently accepted model of the atom?

What is the name given to the currently accepted model of the atom?

The Bohr model.

Describe Rutherford's experiment

Describe Rutherford's experiment

- Alpha particles (charge +2) were fired at a thin sheet of gold foil
- Most particles went straight through
- Some particles were deflected by small angles (< 90º)
- A few particles were deflected by large angles (> 90º)

What are the conclusions of Rutherford's experiment?

What are the conclusions of Rutherford's experiment?

- Most of an atom is empty space
- The nucleus has a positive charge
- Most of the mass is concentrated in the nucleus

What happens in the process of beta plus decay?

What happens in the process of beta plus decay?

A proton turns into a neutron and a positron (in order to conserve charge).

What is the process called when a neutron changes into a proton and an electron?

What is the process called when a neutron changes into a proton and an electron?

Beta minus decay.

When alpha decay occurs, what happens to the atomic number and the mass number of the atom?

When alpha decay occurs, what happens to the atomic number and the mass number of the atom?

- The atomic number decreases by 2
- The mass number decreases by 4
- A new element is made since the atomic number has changed

What effect does beta minus decay have on the mass number and atomic number of an atom?

What effect does beta minus decay have on the mass number and atomic number of a atom.

- The mass number stays the same as the total number of neutrons and protons hasn't changed (one has just turned in the other).
- The atomic number increases since there is one more proton.