OCR A Physics GCSE

6.1 - Radioactive Emissions

Flashcards

Describe the arrangement of protons, neutrons and electrons in an atom.

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- The protons and neutrons are found in the atom's nucleus.
- The electrons are found in discrete energy levels around the nucleus.

What type of charge does the nucleus of an atom have? Why?

What type of charge does the nucleus of an atom have? Why?

- **Positive charge**
- The nucleus contains protons and neutrons
- Protons have a positive charge
- Neutrons have no charge

Give two ways that an atom's electron arrangement can be changed.

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1. Absorbing electromagnetic radiation.
2. Emitting electromagnetic radiation.

Explain how an atom's electron arrangement changes when it absorbs EM radiation.

Explain how an atom's electron arrangement changes when it absorbs EM radiation.

- Electrons move further away from the nucleus.
- They move to a higher energy level.

Explain how an atom's electron arrangement changes when it emits EM radiation.

Explain how an atom's electron arrangement changes when it emits EM radiation.

- Electrons move closer to the nucleus.
- They move to a lower energy level.

How does the ratio of electrons to protons in an atom result in the atom having no overall charge?

How does the ratio of electrons to protons in an atom result in the atom having no overall charge?

- The number of protons is equal to the number of electrons.
- Protons and electrons have equal and opposite charges, so charge cancels.

What do all forms of the same element have in common?

What do all forms of the same element have in common?

The number of protons.

What is the name given to the number of protons in an atom?

What is the name given to the number of protons in an atom?

Atomic Number

What is an atom's mass number?

What is an atom's mass number?

The total number of protons and neutrons in the atom.

What is an isotope of an atom?

What is an isotope of an atom?

An atom of an element that has a different number of neutrons, but the same number of protons.

How do atoms turn into positive ions?

How do atoms turn into positive ions?

- They lose one or more of their outer electrons.
- Electrons are negatively charged, so the resultant charge of the atom is positive.

Why do unstable nuclei give out radiation?

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- 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.

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.

Give the equation for an α particle.

Give the equation for a α particle.

$$\alpha\ {}^{4}_{2}$$

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).

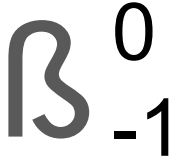
What will stop beta radiation from passing through a point?

What will stop beta radiation from passing through a point?

- A thin sheet of aluminium.
- Several metres of air.

Give the equation for a ß particle.

Give the equation for a ß particle.



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.

Give the equation for γ radiation.

Give the equation for γ radiation.

$$\gamma \; {}^{0}_{0}$$

γ radiation is an EM wave.

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.

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- 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.