

# WJEC England GCSE Physics

## 9.2 - Absorption and Emission of Ionising Radiation

### Flashcards

This work by [PMT Education](https://www.pmt.education) is licensed under [CC BY-NC-ND 4.0](https://creativecommons.org/licenses/by-nc-nd/4.0/)



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



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

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.



# 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 they become more stable.



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



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

Radioactive decay.



Define the activity of an unstable nucleus.



Define the activity of an unstable nucleus.

Activity is the rate at which a source of unstable nuclei decays, expressed as decays per second.



# What is the unit of radioactive activity?





What is the unit of radioactive activity?

Becquerel (Bq)



State four types of nuclear radiation.



State four types of nuclear radiation.

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
- This is the same composition as a helium nucleus



Give the 3 types of radiation from least to most penetrating



Give the 3 types of radiation from least to most penetrating?

- Alpha
- Beta
- Gamma



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.



How does gamma emission affect the atom's mass/charge?



How does gamma emission affect the atom's mass/charge?

Both mass and charge remain unchanged.



How does beta emission affect the atom's mass/charge?



How does beta emission affect the atom's mass/charge?

- No change in mass
- An increase of +1 in charge



How does alpha emission affect the atom's mass/charge?



How does alpha emission affect the atom's mass/charge?

- The mass decreases by 4
- The charge decreases by 2



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 of 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 for the findings to be independently checked.
- This is known as peer review.

