

AQA Physics GCSE

4.4.4 - Nuclear Fission and Fusion

(Physics Only)

Flashcards

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What is nuclear fission?



What is nuclear fission?

The splitting of large, unstable nuclei to form smaller more stable nuclei (+the emission of spare neutrons).



Give an example of a fissionable isotope.



Give an example of a fissionable isotope.

Uranium - 235



What usually needs to happen to induce fission?



What usually needs to happen to induce fission?

- The unstable nuclei must absorb a neutron
- Spontaneous fission (where no neutron absorption occurs) is rare



Alongside two smaller nuclei, what else is emitted in a fission reaction?



Alongside two smaller nuclei, what else is emitted in a fission reaction?

- Two or three neutrons
 - Gamma rays
 - Energy



What form of energy do all fission products have?



What form of energy do all fission products have?

Kinetic energy.



What takes place during a chain reaction
in a nuclear reactor?



What takes place during a chain reaction in a nuclear reactor?

- An unstable nucleus absorbs a neutron
 - The nucleus undergoes fission and releases 2 or 3 further neutrons
- These induce more fission, which results in a chain reaction



What is the consequence of an uncontrolled chain reaction?



What is the consequence of an uncontrolled chain reaction?

- The rate of fission events becomes too high and results in the production of too much energy
- This can lead to a nuclear explosion



What are the three main components of the core a nuclear reactor?



What are the three main components of the core a nuclear reactor?

1. Fuel rods
2. Control rods
3. Moderator



What is the role of the moderator in a nuclear reactor?



What is the role of the moderator in a nuclear reactor?

To slow down the neutrons so they are travelling at speeds which allow them to be absorbed by fissile nuclei and cause fission.



How is the chain reaction in a fission reactor kept under control?



How is the chain reaction in a fission reactor kept under control?

- Control rods are positioned in between the fuel rods
 - The rate of fission is controlled by moving these rods up and down
- The lower the rods are inserted, the slower the rate of fission



What term is used to describe nuclei in which fission can be induced through the absorption of slow neutrons?



What term is used to describe nuclei in which fission can be induced through the absorption of slow neutrons?

Fissile Nuclei



What is nuclear fusion?



What is nuclear fusion?

The joining of two light nuclei to produce a heavier nuclei and release energy.



Name two isotopes of hydrogen which are commonly used in nuclear fusion.



Name two isotopes of hydrogen which are commonly used in nuclear fusion.

Deuterium and Tritium



Which releases more energy, nuclear fission or nuclear fusion?



Which releases more energy, nuclear fission or nuclear fusion?

Nuclear fusion.



Explain the difficulty of generating energy through nuclear fusion.



Explain the difficulty of generating energy through nuclear fusion.

Fusion requires very high temperatures which in itself requires large quantities of energy and also requires casing which can withstand them.



Explain why nuclear fusion is currently not a viable way to produce energy on Earth.



Explain why nuclear fusion is currently not a viable way to produce energy on Earth.

With current equipment/techniques, the energy required is greater than the energy produced, resulting in a net energy loss.

