Your notes

GCSE Physics: revision notes

Nuclear fission and fusion

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Nuclear fission

- **Nuclear fission** is the splitting of a large and unstable nucleus, such as **uranium** or plutonium, into two smaller nuclei of roughly equal size.
- Spontaneous fission is rare. Usually the nucleus must first absorb a neutron.
- Fission releases energy, two or three neutrons and gamma rays. All the fission products have kinetic energy.

Chain reactions

- The neutrons released may go on to start more fission reactions, causing a **chain reaction**.
- In a nuclear reactor, the **chain reaction** is controlled to control the energy released: **control rods** absorb neutrons, and a **moderator** slows neutrons down so they can be absorbed by fuel nuclei.
- The explosion caused by a nuclear weapon is the result of an uncontrolled **chain reaction**.

Nuclear fusion

- **Nuclear fusion** is the joining of two light nuclei to form a heavier nucleus.
- In this process, some of the mass may be converted into the energy of radiation.
- Fusion powers the stars, including the Sun, where hydrogen nuclei fuse to form helium.

Using fission and fusion

- Nuclear power stations use fission to heat water, making steam to turn turbines and generate electricity.

- Fusion would produce more energy and less radioactive waste, but it needs extremely high temperatures and pressures, so it is not yet used to generate electricity.

Your notes

Key terms

Nuclear fission	The splitting of a large, unstable nucleus into two smaller nuclei, releasing energy.
Nuclear fusion	The joining of two light nuclei to form a heavier nucleus, releasing energy.
Chain reaction	When neutrons from one fission go on to cause further fissions.
Control rods	Rods that absorb neutrons to control the chain reaction in a reactor.
Moderator	A material that slows down neutrons so they can cause fission.
Uranium	A heavy element used as fuel in nuclear reactors.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. What is nuclear fission?
2. What usually has to happen before a nucleus undergoes fission?
3. What is released in fission?
4. What is a chain reaction?
5. What do control rods do?
6. What causes the explosion of a nuclear weapon?
7. What is nuclear fusion?
8. What happens to some mass in fusion?

Answers

1. The splitting of a large nucleus into two smaller nuclei
2. It absorbs a neutron
3. Energy, two or three neutrons and gamma rays
4. Neutrons from one fission causing more fissions
5. Absorb neutrons to control the chain reaction
6. An uncontrolled chain reaction
7. The joining of two light nuclei to form a heavier nucleus
8. It is converted into energy

What to do next

Practise 10 questions on this topic

Try 7 exam questions, with mark schemes

Read the lesson, one step at a time

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