

Nuclear Fission

Nuclear fission

Draw the reaction — label the particles in the diagram

Describe the process of nuclear fission

KEY WORDS TO USE

- ☐ slow-moving neutron
☐ 2 or 3 neutrons

- ☐ large nucleus
☐ gamma radiation

- ☐ 2 smaller nuclei

Chain reaction

Draw a chain reaction diagram

KEY WORDS TO USE

- ☐ neutron absorbed
☐ uranium splits into 2 smaller nuclei
☐ fission
☐ neutrons released
☐ cause further fission events

Inside a nuclear fission reactor

Draw and label a fission reactor

space for diagram — label the fuel rods, control rods, moderator and shielding

Explain the purpose of each part

Control rods

Moderator

Shielding

KEY WORDS TO USE

- ☐ absorb neutrons
☐ absorbed by uranium

- ☐ rate of fission
☐ absorb radiation

- ☐ slow down neutrons
☐ prevent irradiation outside

Exam-style question

A nuclear power station uses the fission of uranium-235 to release energy.

- (a) State the name of the particle that must be absorbed by a uranium-235 nucleus for fission to take place. [1]
 (b) Explain how a chain reaction is set up in the reactor. [3]
 (c) The control rods are lowered further into the reactor core. Explain the effect this has on the rate of fission. [2]
 (d) The reactor core is surrounded by thick concrete shielding. Explain why this is needed. [2]

(Total for question = 8 marks)

ANSWER

Nuclear Fusion

What is nuclear fusion?

Explain what happens during nuclear fusion.

KEY WORDS TO USE

- | | |
|---------------------------------------|---------------------------------|
| ☐ nucleus | ☐ nuclei |
| ☐ loss of mass | ☐ energy |

$$E = mc^2$$

A small amount of **mass is lost** and released as **energy (E)**.
c = the speed of light.

Conditions required for fusion

Explain the conditions needed for two nuclei to fuse.

KEY WORDS TO USE

- | | |
|--|---|
| ☐ positive nuclei | ☐ repel |
| ☐ high KE | ☐ overcome electrostatic repulsion |
| ☐ high pressure | ☐ more frequent collisions |

Exam-style question

Stars, including the Sun, release energy by nuclear fusion.

- (a) Describe what happens to the nuclei of two small (light) atoms during nuclear fusion. [2 marks]
- (b) Explain why very high temperatures and pressures are needed for fusion to take place. [3 marks]
- (c) Give one reason why nuclear fusion is difficult to achieve on Earth. [1 mark]

ANSWER
