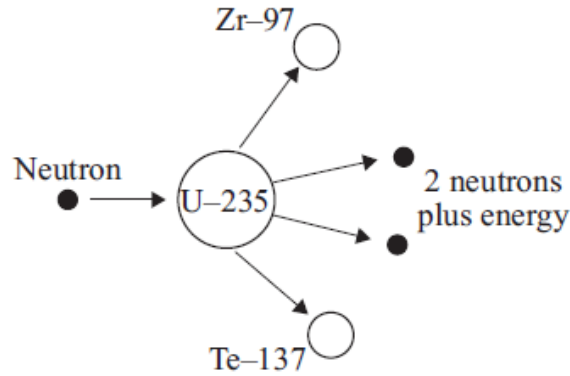


Nuclear Fission and Fusion

1.

- (a) The diagram shows what can happen when the nucleus of a uranium atom absorbs a neutron.



- (i) What name is given to the process shown in the diagram?

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(1 mark)

- (ii) Explain how this process could lead to a chain reaction.

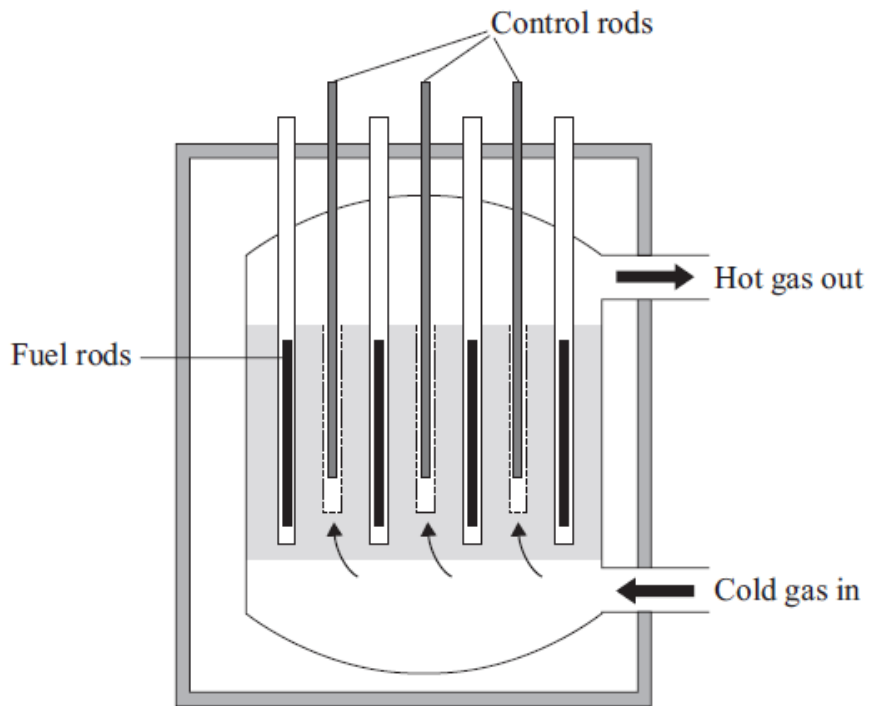
You may wish to add further detail to the diagram to help your answer.

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(2 marks)

- (iii) How does the mass number of an atom change when its nucleus absorbs a neutron?

.....
(1 mark)

(b) Uranium-235 is used as a fuel in some nuclear reactors.



The reactor contains control rods used to absorb neutrons.

Suggest what happens when the control rods are lowered into the reactor.

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(2 marks)

2.

The table gives information about the three types of particle that make up an atom.

Particle	Relative mass	Relative charge
Proton		+1
Neutron	1	
Electron	very small	-1

(a) Complete the table by adding the **two** missing values. (2 marks)

(b) Use the information in the table to explain why an atom has no overall electrical charge.

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(2 marks)

(c) Uranium has two natural isotopes, uranium-235 and uranium-238.
Uranium-235 is used as a fuel inside a nuclear reactor.
Inside the reactor, atoms of uranium-235 are split and energy is released.

(c) (i) How is the structure of an atom of uranium-235 different from the structure of an atom of uranium-238?

.....

.....

(1 mark)

(c) (ii) The nucleus of a uranium-235 atom must absorb a particle before the atom is able to split.

What type of particle is absorbed?

.....

(1 mark)

(c) (iii) The nucleus of an atom splits into smaller parts in a reactor.

What name is given to this process?

.....

(1 mark)

3.

(a) The process of nuclear fusion results in the release of energy.

(a) (i) Describe the process of nuclear fusion.

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(2 marks)

(a) (ii) Where does nuclear fusion happen naturally?

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(1 mark)

(b) For many years, scientists have tried to produce a controlled nuclear fusion reaction that lasts long enough to be useful. However, the experimental fusion reactors use more energy than they produce.

(b) (i) From the information given, suggest **one** reason why nuclear fusion reactors are not used to produce energy in a nuclear power station.

.....
.....

(1 mark)

(b) (ii) Suggest **one** reason why scientists continue to try to develop a practical nuclear fusion reactor.

.....
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(1 mark)