

30 An isotope of strontium has the nuclide notation $^{84}_{38}\text{Sr}$.

How many protons and neutrons are there in a nucleus of this isotope?

	protons	neutrons
A	38	46
B	38	84
C	46	38
D	46	84

32 What occurs during nuclear fusion?

- A** Two light atomic nuclei join together and emit energy.
- B** Two light atomic nuclei join together and absorb energy.
- C** A heavy atomic nucleus splits and emits energy.
- D** A heavy atomic nucleus splits and absorbs energy.

9 (a) An experiment directs alpha particles at a very thin sheet of gold foil.

(i) Most of the alpha particles pass through the thin foil in a straight line.

State the conclusion about atoms from this observation.

.....
..... [1]

(ii) Some of the alpha particles are deflected through angles less than 90° and a few are deflected through 180°.

State and explain **two** conclusions about the nuclei of atoms from this observation.

conclusion 1
explanation 1
.....
conclusion 2
explanation 2
..... [4]

(b) A source contains a radioactive isotope of strontium. This isotope decays by emission of β -particles. The half-life of this isotope is 29 years.

(i) State the change in the nucleus which occurs when a β -particle is emitted.

..... [1]

(ii) The initial mass of this isotope of strontium in the source is 25 μg .

Calculate the mass of the strontium isotope that decays in 87 years.

mass = μg [3]

[Total: 9]

33 The scattering of α -particles by a thin metal foil supports the nuclear model of an atom.

Why are α -particles used rather than neutrons?

- A because they always travel more slowly
- B because they are heavier
- C because they are larger in diameter
- D because they have a positive charge

9 (a) A nuclear power station has a reactor where controlled nuclear fission of uranium-235 takes place.

(i) Explain what is meant by nuclear fission.

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..... [3]

(ii) State **one** advantage and **one** disadvantage of generating electrical power in nuclear power stations compared with electrical power generated using wind turbines.

advantage

disadvantage [2]

(b) Deuterium is an isotope of hydrogen (H) with 1 proton and 1 neutron. Nuclear fusion occurs when two nuclei of deuterium combine. An isotope of helium (He) and a neutron are formed.

Use nuclide notation to write down the nuclide equation for this reaction.

[3]

[Total: 8]