

# 5. Atomic Physics

# 5.1 The Nuclear Atom

Syllabus points

5.1.1 Atomic Model

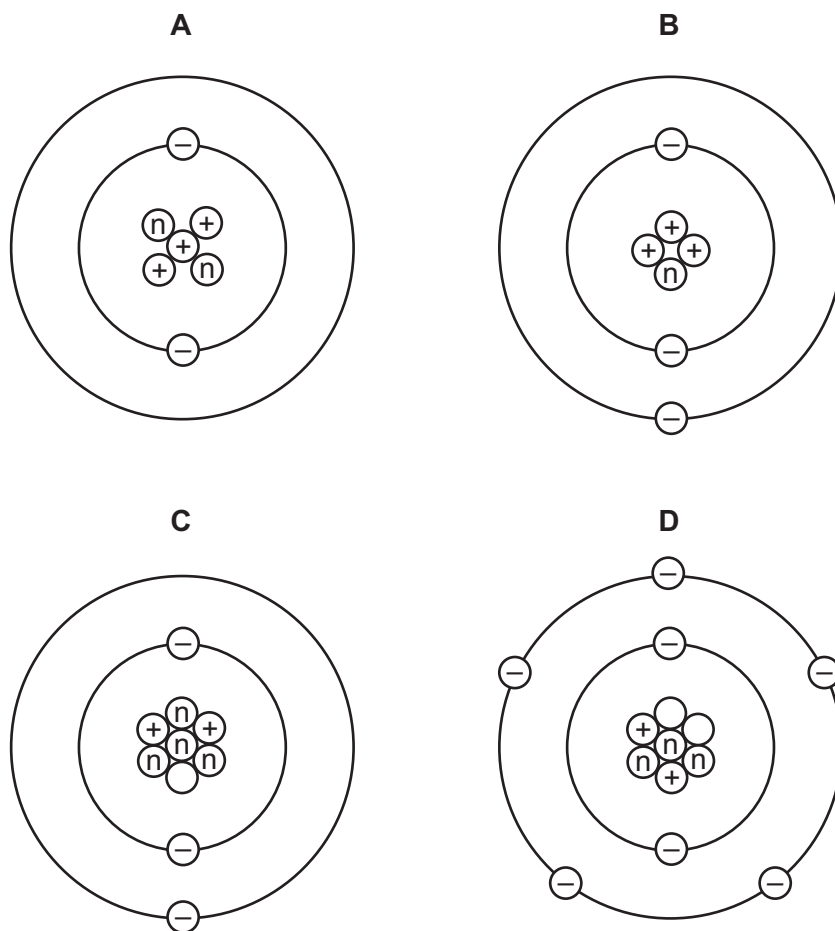
5.1.2 Nucleus

book p227-230

- Rutherford Scattering Experiment
- Radioactive Isotopes
- Nuclear Fission & Fusion

1 An atom of the element lithium has a nucleon number of 7 and a proton number of 3.

Which diagram represents a neutral atom of lithium?



key

Ⓝ = a neutron

⊕ = a proton

⊖ = an electron

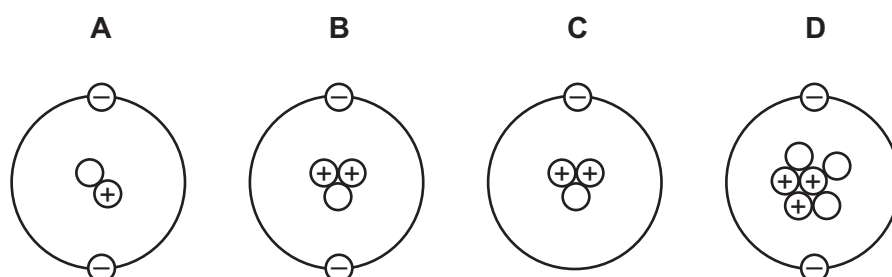
(not to scale)

2 A nuclide of substance X has the symbol  ${}_{12}^{26}\text{X}$ .

How many electrons are there in a neutral atom of substance X?

- A 12                      B 14                      C 26                      D 38

3 Which diagram could represent the structure of a neutral atom?



key

○ neutron

⊕ proton

⊖ electron

4 Which statement about a neutral atom of  ${}_{88}^{226}\text{Ra}$  is correct?

- A It has an equal number of neutrons and protons.
- B It has more electrons than neutrons.
- C It has more electrons than protons.
- D It has more neutrons than protons.

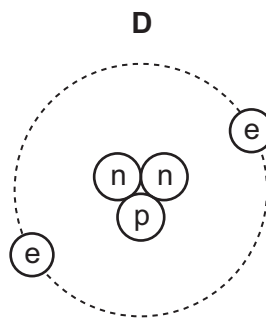
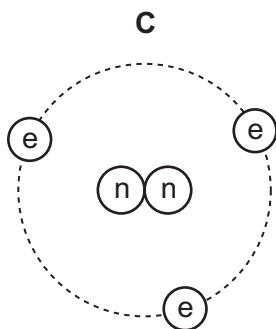
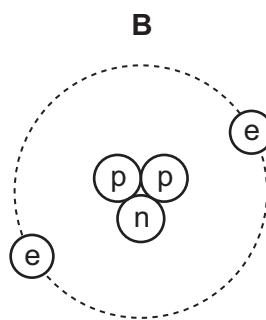
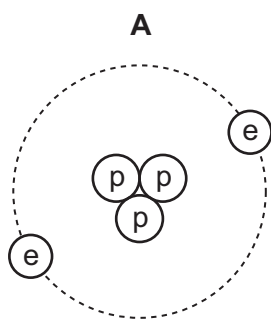
5 A nucleus X has 17 protons and 18 neutrons.

Which notation is correct for this nucleus?

- A  ${}_{18}^{17}\text{X}$       B  ${}_{35}^{17}\text{X}$       C  ${}_{17}^{18}\text{X}$       D  ${}_{17}^{35}\text{X}$

6 A nucleus of helium has the symbol  ${}_{2}^3\text{He}$

Which diagram represents an atom of  ${}_{2}^3\text{He}$ ?



key

(p) = proton

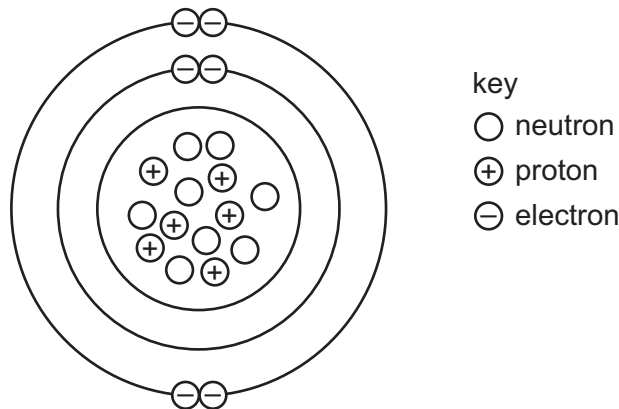
(n) = neutron

(e) = electron

7 Which statement about the nuclei of all atoms is correct?

- A They are very small compared with the size of the atoms.
- B They always contain the same number of protons as neutrons.
- C They contain electrons, neutrons and protons.
- D They have a total charge of zero.

8 The diagram represents a carbon atom.



What is the nucleon number (mass number) for this atom?

- A** 6                      **B** 8                      **C** 14                      **D** 20

9 A nuclide is represented by the notation shown.



How many nucleons are there in one atom of this nuclide?

- A** P                      **B** Q                      **C** P + Q                      **D** P – Q

10 A lithium nucleus contains 3 protons and 4 neutrons.

What is its nuclide notation?

- A**  ${}^3_4\text{Li}$                       **B**  ${}^4_3\text{Li}$                       **C**  ${}^7_3\text{Li}$                       **D**  ${}^7_4\text{Li}$

11 A particular nuclide of chlorine can be represented by the symbol shown.



How many electrons are there in a neutral atom of this nuclide?

- A** 17                      **B** 20                      **C** 37                      **D** 54

12 A nuclide is represented by the symbol  ${}^P_QX$ .

How many neutrons are in one nucleus of the nuclide?

- A** P                      **B** Q                      **C** P + Q                      **D** P – Q