

5. Atomic Physics

5.1 The Nuclear Atom

Syllabus points

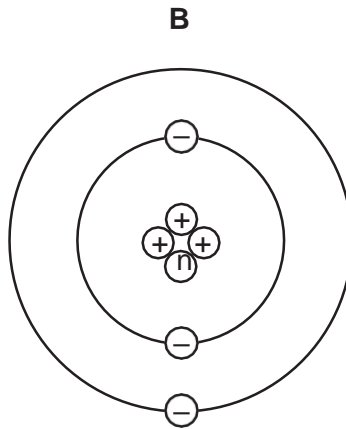
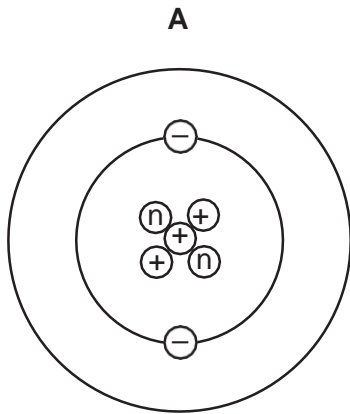
1. Atomic Model
2. Nucleus

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?



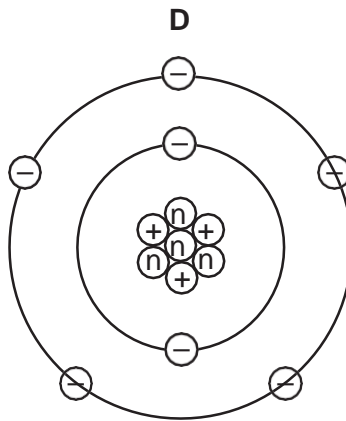
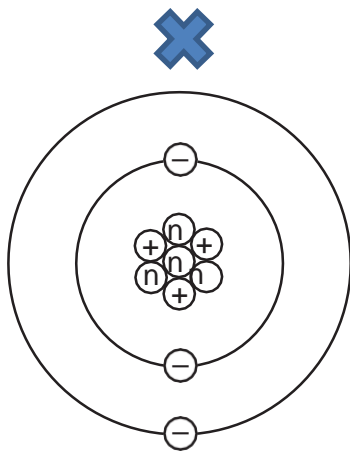
key

⊖ = 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?



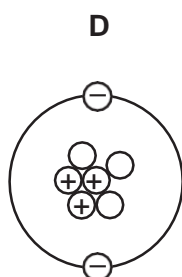
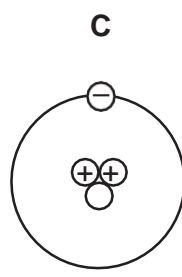
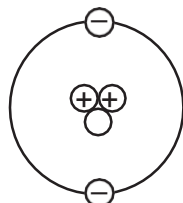
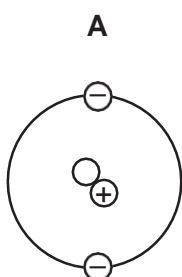
12

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 ${}^{226}_{88}\text{Ra}$ 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.

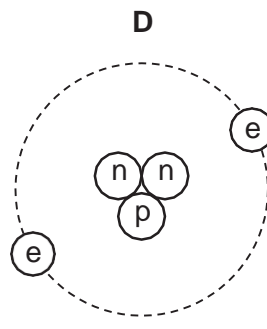
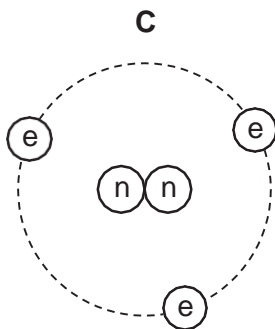
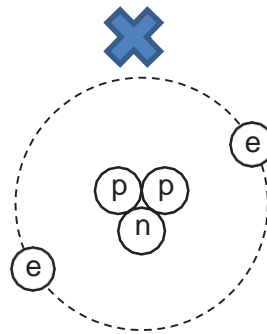
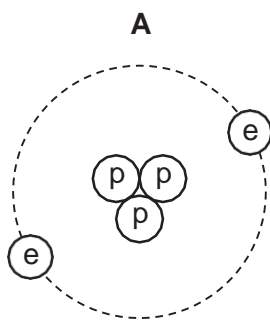
5 A nucleus X has 17 protons and 18 neutrons.

Which notation is correct for this nucleus?

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

6 A nucleus of helium has the symbol ${}^4_2\text{He}$.

Which diagram represents an atom of ${}^4_2\text{He}$?

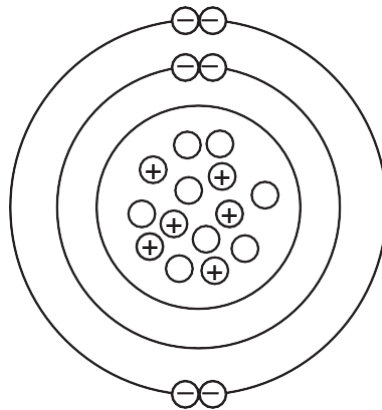


- key
- = proton
 - = neutron
 - = electron

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.



key
 ○ neutron
 ⊕ proton
 ⊖ electron

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

- A 6 B 8 14 D 20

9 A nuclide is represented by the notation shown.



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

- 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 ${}^4_3\text{Li}$ ${}^7_3\text{Li}$ 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?

- 17 B 20 C 37 D 54

12 A nuclide is represented by the symbol P_ZX .

How many neutrons are in one nucleus of the nuclide?

- A P B Q C P + Q P - Q