

Atomic structure

- 1 (a) Complete the sentences by selecting the correct words from those provided. You can use the words more than once.

protons

neutrons

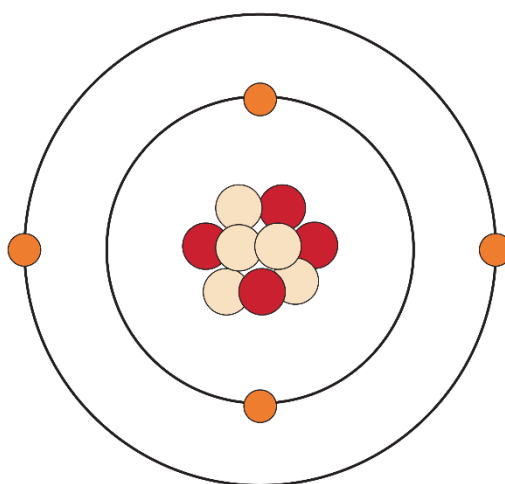
electrons

An atom consists of a nucleus surrounded by _____ in shells. The nucleus of most atoms contains _____ and _____.

All atoms of the same element have the same numbers of _____ and _____.

(3 marks)

The diagram represents an atom of beryllium.



● 4 protons ● 5 neutrons ● 4 electrons

- (b) State the atomic number of beryllium.

_____ **(1 mark)**

- (c) State the mass number of beryllium.

_____ **(1 mark)**

(d) An atom of sodium can be represented as: ${}_{11}^{23}\text{Na}$

Complete the symbol for beryllium:



(1 mark)

(e) Complete the table to show the relative masses and charges of the sub-atomic particles.

Sub-atomic particle	Relative mass	Relative charge
proton	1	+1
neutron		
electron		

(2 marks)

(f) Explain why an atom of beryllium has no overall electrical charge.

(1 mark)

2 Atoms are very small.

(a) Where is most of the mass of an atom found?

(1 mark)

(b) Which is the correct approximate radius of an atom? Circle the correct answer.

(1 mark)

- A. 1×10^{10} m
- B. 1×10^{-10} m
- C. 1×10^{-10} nm
- D. 1×10^{10} nm

- 3 (a) Which equation shows how the number of neutrons in an atom can be calculated from its atomic number and mass number? Circle the correct answer.

(1 mark)

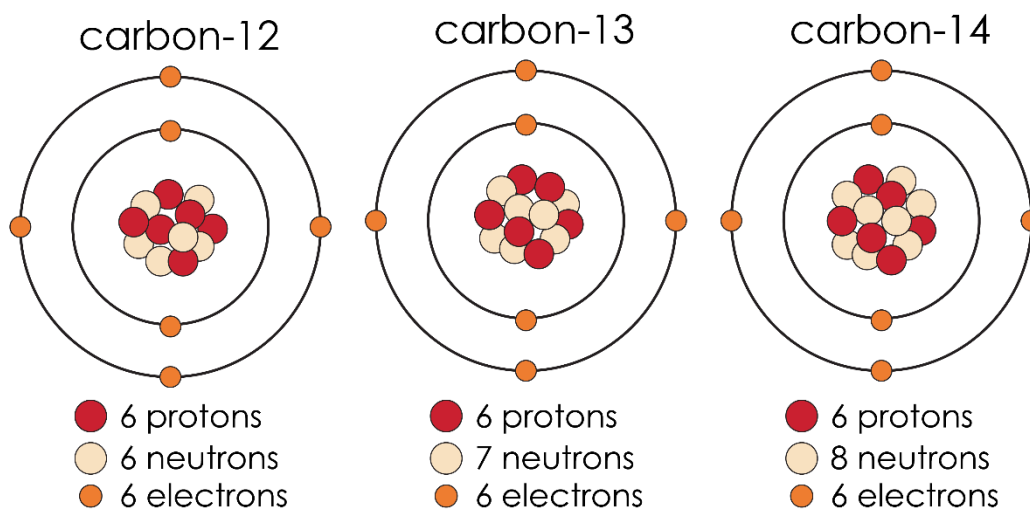
- A. number of neutrons = atomic number – mass number
 B. number of neutrons = mass number – atomic number
 C. number of neutrons = atomic number + mass number
 D. number of neutrons = mass number × atomic number

- (b) These are the atomic numbers and mass numbers of some atoms. Complete the table to show the numbers of protons, neutrons and electrons. Some have been done for you.

Atom	Atomic number	Mass number	Number of protons	Number of neutrons	Number of electrons
aluminium	13	27	13		
phosphorus	15	31		16	
scandium	21	45			21

(3 marks)

- 4 These diagrams represent atoms of isotopes of carbon.



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- (a) Complete the sentences defining isotopes by adding the correct words from those provided.

atomic **mass** **protons** **neutrons** **electrons**

Isotopes of an element have the same number of _____ and _____, but different numbers of _____.

They have the same _____ number but different _____ numbers.

(5 marks)

- (b) The symbol for carbon-12 is $^{12}_6\text{C}$. Write similar symbols for:

i. carbon-13 _____ (1 mark)

ii. carbon-14 _____ (1 mark)

- (c) Two isotopes of chlorine are $^{35}_{17}\text{Cl}$ and $^{37}_{17}\text{Cl}$.

i. How many neutrons are present in one atom of $^{35}_{17}\text{Cl}$?
_____ (1 mark)

ii. How many neutrons are present in one atom of $^{37}_{17}\text{Cl}$?
_____ (1 mark)

[Total: 24 marks]



Which question(s) did you get wrong? Why?

What will you do next time you're asked a similar question?