

Atomic structure – GCSE Chemistry

1. June/ 2023/Paper_ 8462/1F/No.1

0 1

This question is about atoms.

Atoms contain three types of particle:

- electrons
- neutrons
- protons.

0 1 . 1

Which particle has no electrical charge?

[1 mark]Tick (✓) **one** box.

Electron

☐

-1

Neutron

☒

Proton

☐

+1

0 1 . 2

Which particles have the same relative mass?

[1 mark]Tick (✓) **one** box.

An electron and a neutron

☐

An electron and a proton

☐

A neutron and a proton

☒

Mass = proton + Neutron

0 1 . 3The formula of a compound is N_2O How many of each type of atom are in one molecule of N_2O ?**[2 marks]**Nitrogen TwoOxygen One

An atom of element **Z** contains:

- 3 electrons
- 4 neutrons
- 3 protons.

0 1 . 4 Give the name of element **Z**.

Use the periodic table.

[1 mark]

Lithium

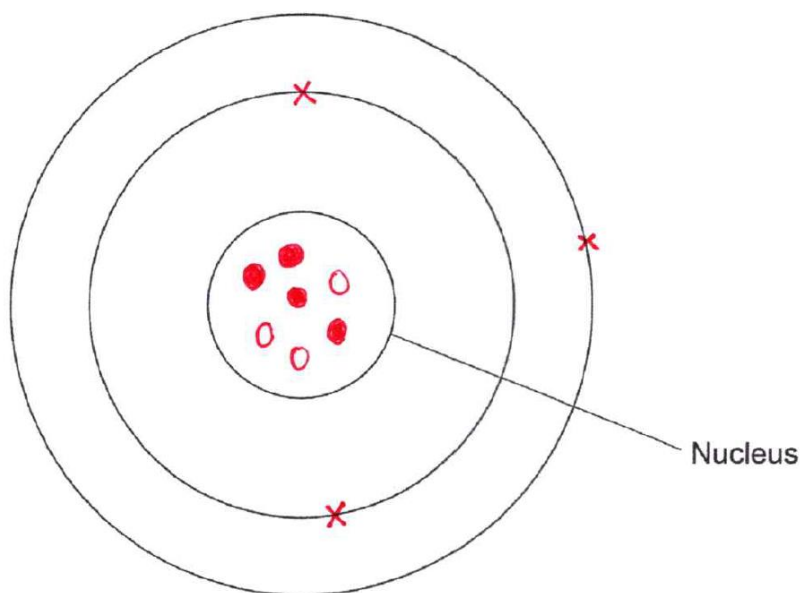
0 1 . 5 Complete **Figure 1** to show the position of the particles in an atom of element **Z**.

Use the symbols:

- × = electron
- = neutron
- = proton

[4 marks]

Figure 1



2. June/ 2023/Paper_ 8462/1F/No.9

09

Discoveries in chemistry led to a better understanding of atomic structure.

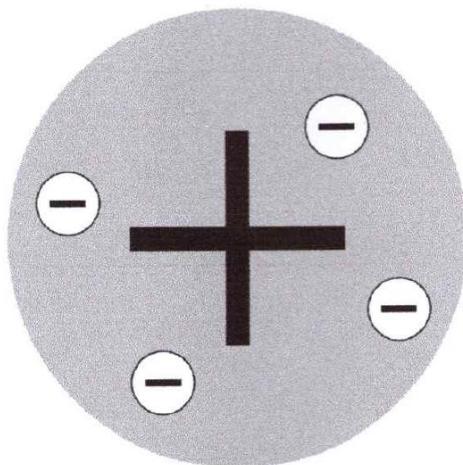
09.1

Atoms were originally thought to be tiny spheres that could not be divided.

The plum pudding model of the atom was then developed.

Figure 10 represents the plum pudding model of the atom.

Figure 10



Describe the plum pudding model of the atom.

[2 marks]

It consists of a positively charged sphere ("pudding") with negatively charged electrons ("plum") embedded within it. The positive charge is uniformly distributed throughout the sphere while the negative electrons are scattered within the positive sphere.

09.2

Atoms contain electrons, neutrons and protons.

Write these three particles in order of their discovery.

[1 mark]

Earliest ElectronProtonLatest Neutron

Very few atoms of the element tennessine (Ts) have ever been identified.

The atomic number of tennessine is 117

0 9 . 3

Predict the number of outer shell electrons in an atom of tennessine.

Give **one** reason for your answer.

Use the periodic table.

[2 marks]

Number of outer shell electrons 7

Reason Tennessine is located in group 7, which has 7 electrons in outer shell.

0 9 . 4

Tennessine was first identified by a small group of scientists in 2010.

Suggest **one** reason why tennessine was **not** accepted as a new element by other scientists until 2015.

[1 mark]

They needed time to review the data, conduct independent experiment, and reach a consensus on the validity of the discovery.

09.5

The discovery of isotopes explained why some relative atomic masses are not whole numbers.

Element **R** has two isotopes.

Table 5 shows the mass numbers and percentage abundances of the isotopes of element **R**.

Table 5

Mass number	Percentage abundance (%)
6	7.6
7	92.4

Calculate the relative atomic mass (A_r) of element **R**.

Give your answer to 1 decimal place.

[3 marks]

$$A_r = \frac{\sum (\text{mass number} \times \text{percentage abundance})}{100}$$

$$A_r = \frac{(6 \times 7.6) + (7 \times 92.4)}{100} = \frac{45.6 + 646.8}{100} = \frac{692.4}{100}$$

$$= 6.924$$

Relative atomic mass (1 decimal place) = 6.9

3. June/ 2023/Paper_ 8462/1H/No.1

0 1

Discoveries in chemistry led to a better understanding of atomic structure.

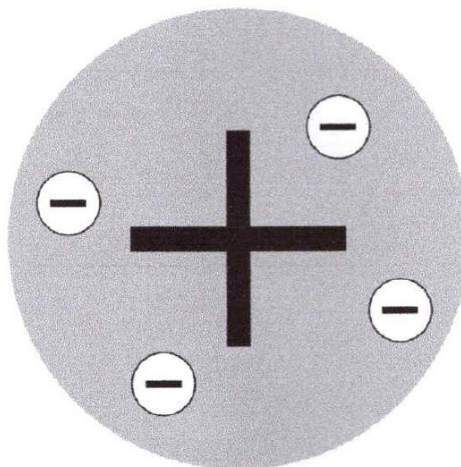
0 1 . 1

Atoms were originally thought to be tiny spheres that could not be divided.

The plum pudding model of the atom was then developed.

Figure 1 represents the plum pudding model of the atom.

Figure 1



Describe the plum pudding model of the atom.

[2 marks]

Atom is a sphere of positive charge with negatively charged electrons embedded within this positively charged sphere.

0 1 . 2

Atoms contain electrons, neutrons and protons.

Write these three particles in order of their discovery.

[1 mark]

Earliest ElectronsProtonsLatest Neutrons

Very few atoms of the element tennessine (Ts) have ever been identified.

The atomic number of tennessine is 117

0 1 . 3

Predict the number of outer shell electrons in an atom of tennessine.

Give **one** reason for your answer.

Use the periodic table.

[2 marks]

Number of outer shell electrons 7

Reason It is a member of group 7; which have 7 electrons in their outer electron shell.

0 1 . 4

Tennessine was first identified by a small group of scientists in 2010.

Suggest **one** reason why tennessine was **not** accepted as a new element by other scientists until 2015.

[1 mark]

Needed time to review data, conduct independent experiment and reach a consensus on the validity of the discovery

0 1 . 5

The discovery of isotopes explained why some relative atomic masses are not whole numbers.

Element **R** has two isotopes.

Table 1 shows the mass numbers and percentage abundances of the isotopes of element **R**.

Table 1

Mass number	Percentage abundance (%)
6	7.6
7	92.4

Calculate the relative atomic mass (A_r) of element **R**.

Give your answer to 1 decimal place.

[3 marks]

$$A_r = \frac{(6 \times 7.6) + (7 \times 92.4)}{100}$$

$$= 6.924$$

Relative atomic mass (1 decimal place) = 6.9