AQA GCSE Chemistry

# Atomic structure and the periodic table · Higher tier

Questions only

The newest questions on the Higher papers, about an hour. All 9 are in the exam generator.

| Questions | Total marks | Time allowed |
|---|---|---|
| **5** | **51** | **54 min** |

Name _____ Class or teacher _____ Date _____

**Instructions**

- Answer all questions in the spaces provided.
- Use black ink. Show your working for every calculation.
- You may use a scientific calculator and the periodic table insert.
- Print the separate mark scheme when you are ready to mark your answers.

**For marking**

| Q | Source | Marks | Score |
|---|---|---|---|
| 1 | 2024 P1H Q3 / P1F Q10 | 8 | |
| 2 | 2024 P1H Q2 / P1F Q9 | 11 | |
| 3 | 2025 P1H Q1 / P1F Q8 | 9 | |
| 4 | 2025 P1H Q4 | 11 | |
| 5 | 2025 P1H Q5 | 12 | |

**Total** _____ / 51 **Percentage** _____ %

Questions from AQA GCSE past papers, 2024–2025, reproduced for revision. Practise these topics online, with instant marking:
`whiteboardchemistry.com/revision/gcse-chemistry/exam-questions?topics=c1-atomic-structure&demand=standard,high&len=0`

# Questions

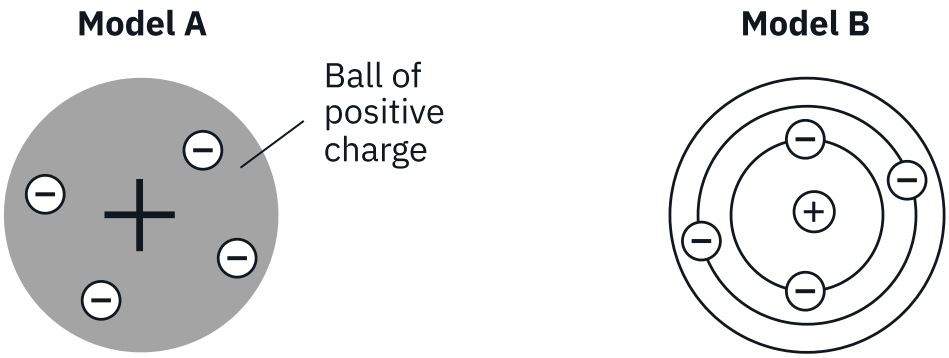
Atomic structure and the periodic table · Higher tier · 5 questions · 51 marks · time allowed 54 min

**Q1 · June 2024 · Paper 1 Foundation · Q10 · Paper 1 Higher · Q3 · [8 marks]**

This question is about models of the atom.

Figure 16 shows two early models of the atom.

Figure 16




**10.1** Name the models of the atom shown in Figure 16.

**[2 marks]**

Model A

Model B

**10.2** Compare model A with the model of the atom used today.

Use Figure 16.

**[4 marks]**

**10.3** Chadwick's experiments showed the existence of neutrons in an atom.

This led to an understanding of isotopes.

Define the term 'isotopes'.

Refer to subatomic particles in your answer.

**[2 marks]**

**Q2 · June 2024 · Paper 1 Foundation · Q9 · Paper 1 Higher · Q2 · [11 marks]**

This question also needs Chemical changes.

This question is about the periodic table.

Sodium and potassium are in Group 1 of the periodic table.

**09.1** Give **one** similarity and **one** difference between the electronic structures of sodium and potassium.

**[2 marks]**

Similarity

Difference

**09.2** Group 1 elements react with water.

Give **two** observations made when potassium reacts with water.

**[2 marks]**

1

2

**09.3** Potassium hydroxide solution is produced when potassium reacts with water.

What is the colour of universal indicator when added to potassium hydroxide solution?

Give **one** reason for your answer.

**[2 marks]**

Colour of universal indicator

Reason

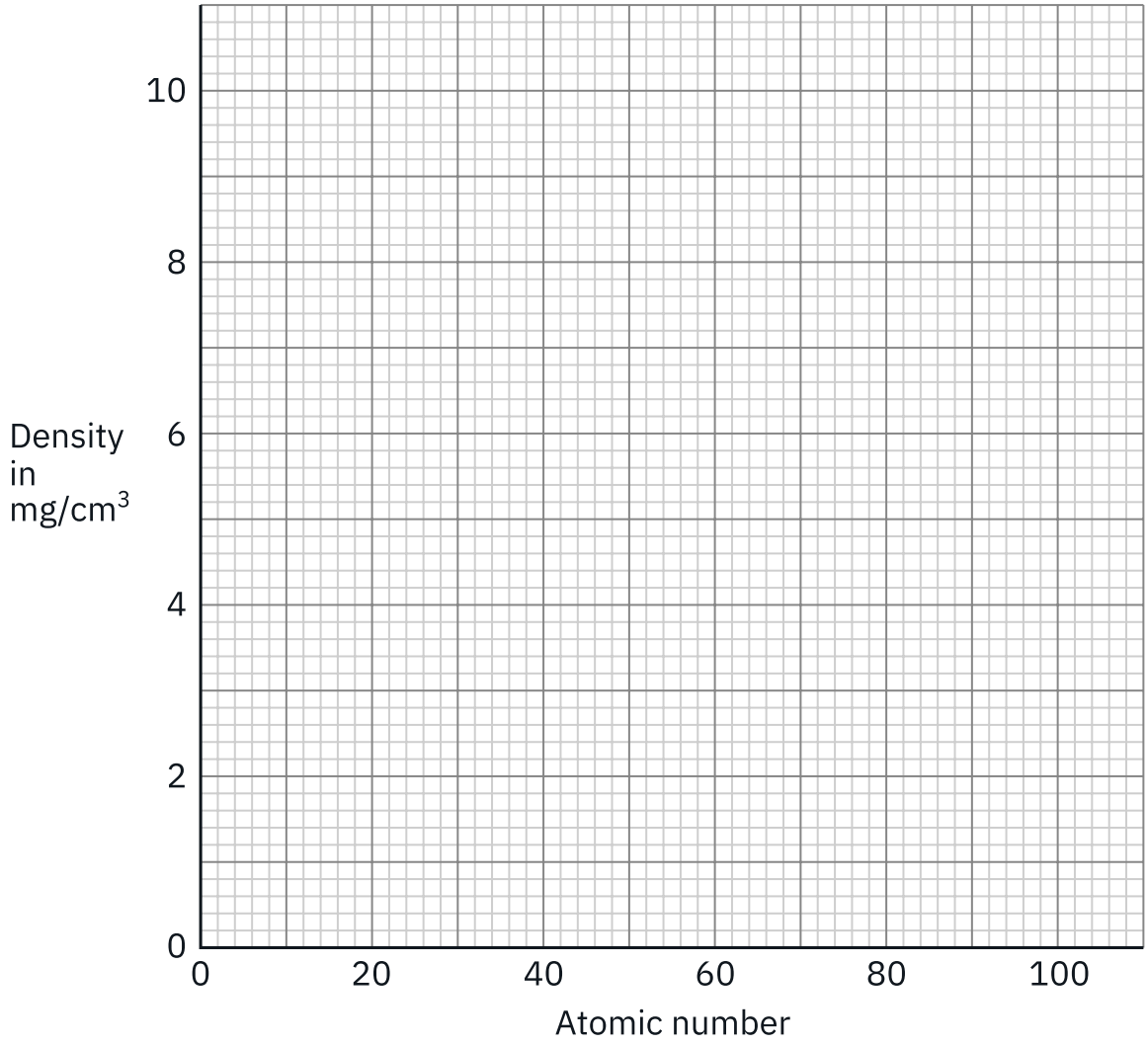
**09.4** Table 4 shows the densities of some of the elements in Group 0 of the periodic table.

Table 4

| Element | Atomic number | Density in mg/cm$^3$ |
|---|---|---|
| Helium | 2 | 0.2 |
| Neon | 10 | 0.8 |
| Argon | 18 | 1.6 |
| Krypton | 36 | X |
| Xenon | 54 | 5.4 |
| Radon | 86 | 9.1 |

Plot the data from Table 4 on Figure 15.

Figure 15




**[2 marks]**

*Draw your answer on the figure above.*

**09.5** Estimate the density (X) of krypton.

Use Figure 15 and Table 4.

Density = _____ $mg/cm^3$

**[1 mark]**

**09.6** The elements in Group 7 are called the halogens.

A more reactive halogen can displace a less reactive halogen from a solution of its salt.

Which combination of solutions will produce a reaction when mixed?

Tick (✓) **one** box.

| | |
|---|---|
| Chlorine and potassium fluoride | ☐ |
| Chlorine and potassium bromide | ☐ |
| Bromine and potassium fluoride | ☐ |
| Bromine and potassium chloride | ☐ |

**[1 mark]**

**09.7** Which of the following describes the trends going down Group 7?

Tick (✓) **one** box.

| | |
|---|---|
| Relative molecular mass decreases and boiling point decreases. | ☐ |
| Relative molecular mass decreases and boiling point increases. | ☐ |
| Relative molecular mass increases and boiling point decreases. | ☐ |
| Relative molecular mass increases and boiling point increases. | ☐ |

**[1 mark]**

**Q3 · June 2025 · Paper 1 Foundation · Q8 · Paper 1 Higher · Q1 · [9 marks]**

This question also needs Bonding, structure, and the properties of matter.

This question is about elements in the periodic table.

**08.1** Describe where the non-metallic elements are found in the periodic table.

**[1 mark]**

**08.2** Gallium (Ga) is a metallic element in Group 3.

Which of these properties of gallium is **not** typical of most metals?

Tick (✓) **one** box.

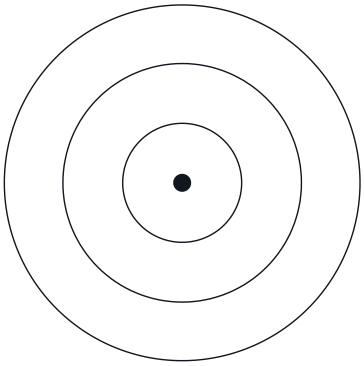
| | |
|---|---|
| A boiling point above 1000 °C | ☐ |
| A melting point below 100 °C | ☐ |
| Conducts electricity when solid | ☐ |
| Forms positive ions | ☐ |

**[1 mark]**

**08.3** A sodium atom can be represented as $^{23}_{11}Na$

Complete Figure 12 to show the electronic structure of a sodium atom.

Figure 12



**[1 mark]**

*Draw your answer on the figure above.*

**08.4** Mendeleev created an early periodic table.

Mendeleev placed most of the elements in order of atomic weight.

Tellurium and iodine were not placed in order of atomic weight.

Why did Mendeleev **not** place tellurium and iodine in order of atomic weight?

**[1 mark]**

**08.5** Argon is an element in Group 0 of the periodic table.

Explain why argon is unreactive.

**[2 marks]**

**08.6** An element X consists of two isotopes.

What is meant by 'isotopes'?

Answer in terms of subatomic particles.

**[2 marks]**

**08.7** Table 5 shows the mass numbers and percentage abundances of the isotopes of X.

Table 5

| Mass number | Percentage abundance (%) |
|---|---|
| 113 | 4 |
| 115 | 96 |

Which is the closest estimate to the relative atomic mass of X?

Tick (✓) **one** box.

| | |
|---|---|
| ~113 | ☐ |
| ~114 | ☐ |
| ~115 | ☐ |

**[1 mark]**

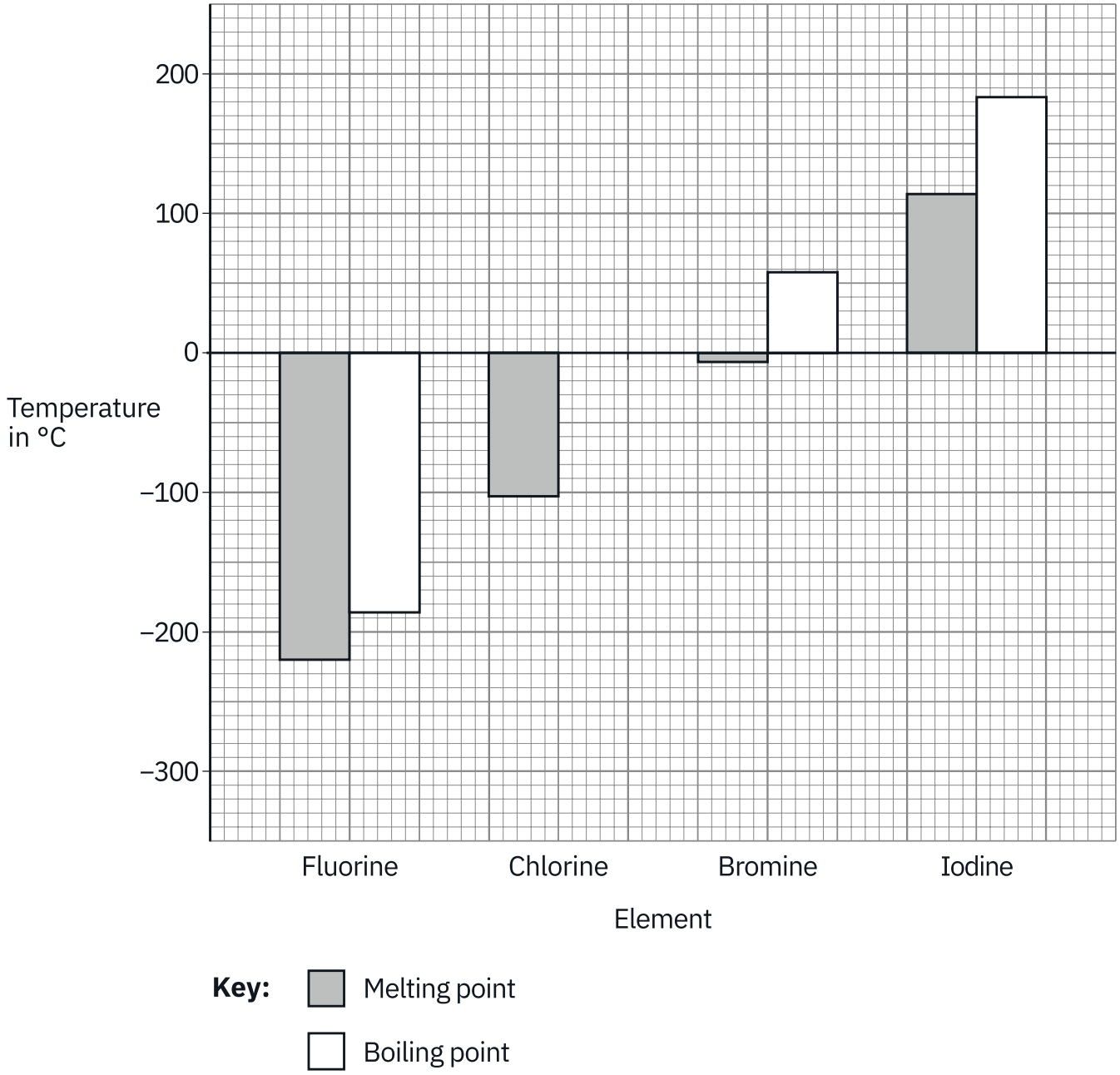
**Q4 · June 2025 · Paper 1 Higher · Q4 · [11 marks]**

This question also needs Bonding, structure, and the properties of matter.

The elements in Group 7 of the periodic table are known as the halogens.

Figure 4 shows information about some of the elements in Group 7.

Figure 4




**04.1** Predict the boiling point of chlorine.

Use Figure 4.

°C

**[1 mark]**

**04.2** What is the state of fluorine at –250 °C?

Use Figure 4.

**[1 mark]**

**04.3** Astatine (At) is an element in Group 7.

What is the number of electrons in the outer shell of an astatine atom?

**[1 mark]**

**04.4** Hydrogen reacts with astatine to produce hydrogen astatide.

Predict the formula of hydrogen astatide.

**[1 mark]**

**04.5** Explain the trend in reactivity of the elements going down Group 7.

**[4 marks]**

**04.6** A more reactive halogen can displace a less reactive halogen from a solution of its salt.

Write a balanced equation for the reaction between bromine and potassium iodide.

+ → +

**[3 marks]**

**Q5 · June 2025 · Paper 1 Higher · Q5 · [12 marks]**

This question also needs Bonding, structure, and the properties of matter.

This question is about small particles.

Before the discovery of the electron, atoms were thought to be tiny spheres that could not be divided.

**05.1** The discovery of the electron led to the plum pudding model of the atom.

Describe the plum pudding model of the atom.

**[2 marks]**

**05.2** The model of the atom changed again after the alpha particle scattering experiment.

Give **two** conclusions that were made from the alpha particle scattering experiment.

**[2 marks]**

1

2

**05.3** Niels Bohr made another change to the model of the atom.

What was this change?

**[1 mark]**

**05.4** A helium atom has a radius of $1.4 \times 10^{-10}$ m.

The nucleus of this atom has a radius of $1.7 \times 10^{-15}$ m.

How many times larger is the radius of the atom than the radius of the nucleus?

Tick (✓) **one** box.

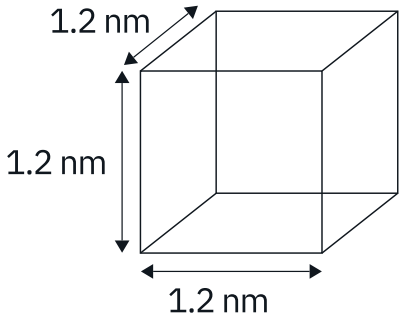
| | |
|---|---|
| ~1000 times larger | ☐ |
| ~10 000 times larger | ☐ |
| ~100 000 times larger | ☐ |
| ~1 000 000 times larger | ☐ |

**[1 mark]**

**05.5** Nanoparticles contain a few hundred atoms.

Figure 5 represents a cubic nanoparticle.

Figure 5




Calculate the simplest surface area : volume ratio of the cubic nanoparticle.

Simplest surface area to volume ratio = _____ : _____

**[4 marks]**

**05.6** Lenses in reading glasses often have a scratch-resistant coating that contains a hard substance.

Nanoparticles of the hard substance are used instead of fine particles of the hard substance.

Explain why nanoparticles are used instead of fine particles.

**[2 marks]**

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Mark scheme:
whiteboardchemistry.com/revision/gcse-chemistry/exam-questions/pdf/c1-atomic-structure-higher-mark-scheme.pdf