AQA GCSE Chemistry

Atomic structure and the periodic table mark scheme · goes with “Atomic structure and the periodic table · Higher tier” · whiteboardchemistry.com/revision/gcse-chemistry/exam-questions

Mark schemes

Atomic structure and the periodic table · Higher tier · 5 questions

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

10.1

(model A) plum pudding

allow Thomson (model)

(model B) Bohr

allow nuclear (model)

allow planetary (model)

allow Rutherford-Bohr (model)

[2 marks]

10.2

Level 2 (3–4 marks): Scientifically relevant features are identified; the way(s) in which they are similar / different is made clear and (where appropriate) the magnitude of the similarity / difference is noted.

Level 1 (1–2 marks): Relevant features are identified and differences noted.

No relevant content (0 marks)

Indicative content

Similarities

- both contain electrons
- both are neutral overall

Differences

- model A has no nucleus **or** the model used today has a nucleus
- model A has no protons **or** the model used today has protons
- model A has no neutrons **or** the model used today has neutrons
- model A has positive charge spread throughout the atom **or** model A is a ball of positive charge
- the model used today has the positive charge in the centre
- model A the electrons are distributed randomly
- the model used today has electrons in shells / energy levels
- the mass was spread throughout model A
- the mass is concentrated at the centre of the model used today
- model A does not have empty space

- model used today is mostly empty space

[4 marks]

10.3

atoms with the same number of protons

allow atoms of the same element

allow atoms with the same atomic number

ignore references to electrons

with different numbers of neutrons

[2 marks]

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

09.1

allow energy level for shell

(similarity)

both have one outer (shell) electron

allow same number of outer (shell) electrons

(difference)

sodium has 3 shells but potassium has 4 shells

allow potassium has more shells

allow (different) number of shells

[2 marks]

09.2

any **two** from:

- effervescence / bubbles / fizzing
- (potassium) floats
- (potassium) moves around
- (potassium) becomes smaller
- (potassium) melts
- flame
- explosion

ignore gas produced

allow (potassium) forms a ball

ignore colour of flame

[2 marks]

09.3

blue / violet / purple

(the solution is) alkaline

allow (the solution) contains

OH^- (ions)

allow (the solution) contains hydroxide ions

allow the solution is basic

[2 marks]

09.4

all five points correctly plotted

allow a tolerance of ± ½ a small square

*allow **1** mark for three or four points correctly plotted*

[2 marks]

09.5

3.4 (mg/cm^3)

allow a value in the range 3.0 to 3.8 (mg/cm^3)

[1 mark]

09.6

chlorine and potassium bromide

[1 mark]

09.7

relative molecular mass increases and boiling point increases

[1 mark]

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

08.1

towards the right **and** the top

allow a description of the position in the periodic table

allow in Groups (3) 4 to 0

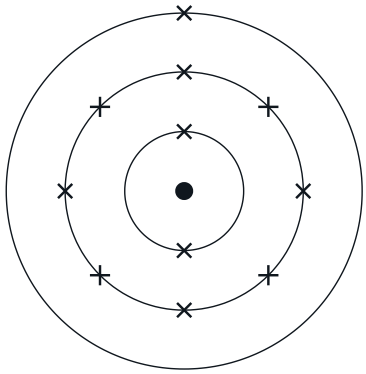
[1 mark]

08.2

a melting point below 100 °C

[1 mark]

08.3



allow any combination of ×, •, o, $e^{(-)}$ for electrons

[1 mark]

08.4

ignore reference to atomic structure

any **one** from:

- so elements / tellurium / iodine were in groups with similar properties
- iodine has similar properties to Group 7 elements
- iodine has different properties to Group 6 elements

allow named elements for Group 6 / 7 elements

allow converse arguments in terms of tellurium

[1 mark]

08.5

allow energy level for shell

argon has a full outer shell (of electrons)

allow argon has eight outer shell electrons

ignore argon has no outer shell electrons

(so argon) has a stable arrangement of electrons

or

(so argon) has a stable electronic structure

allow (so argon) does not gain / lose / share electrons

[2 marks]

08.6

atoms with the same number of protons

allow atoms of the same element

allow atoms with the same atomic number

ignore atoms with the same number of electrons

(but with) different numbers of neutrons

[2 marks]

08.7

~115

[1 mark]

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

04.1

–34 °C

allow a value in the range

–70 to –20 °C

[1 mark]

04.2

solid

allow (s)

[1 mark]

04.3

7

[1 mark]

04.4

HAt

[1 mark]

04.5

allow energy level for shell

reactivity decreases (going down the group)

(because) the outer shell / electrons become further from the nucleus

allow (because) the atoms become larger

allow (because) the atoms have more shells

(so) there is less (electrostatic) attraction between the nucleus and the outer electron(s)

allow (so) there is more shielding between the outer electron(s) and the nucleus

(so) gaining an electron is more difficult

[4 marks]

04.6

$Br_2 + 2KI \rightarrow I_2 + 2KBr$

allow multiples

*allow **1** mark for Br_2 **and** I_2*

*allow **1** mark for KI **and** KBr*

ignore state symbols

[3 marks]

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

05.1

a ball of positive charge

allow a positive(ly charged) ball

do not accept references to protons, nuclei, neutrons

with (negative) electrons embedded

[2 marks]

05.2

any **two** from:

- the mass of the atom is concentrated at the centre / nucleus
- the nucleus is positive / charged
- most of the atom is empty space
- electrons orbit the nucleus

do not accept references to shells

[2 marks]

05.3

electrons orbit the nucleus at specific distances

allow electrons orbit the nucleus in energy levels

allow electrons orbit the nucleus in shells

[1 mark]

05.4

~100 000 times larger

[1 mark]

05.5

(surface area = 6×1.2^2 =)

8.64 (nm^2)

(volume = 1.2^3 =) 1.728 (nm^3)

(ratio = 8.64 : 1.728 =)

(8.64)/(1.728) (: 1)

allow (ratio = 1.728 : 8.64 =)

(1 :) (1.728)/(8.64)

allow correct use of incorrectly determined values of surface area and / or volume

= 5 : 1

allow = 1 : 0.2

[4 marks]

05.6

allow converse arguments in terms of fine particles

(nanoparticles)

have a higher surface area to volume ratio

(so) less coating is used

(so) a thinner layer can be used

OR

(with nanoparticles)

a thinner layer can be used (1)

allow less coating is used

(so) more light gets through the lenses (1)

allow (so) visibility is not reduced (as much)

[2 marks]

Source: AQA GCSE Chemistry past papers. Reproduced for revision at whiteboardchemistry.com.