AQA A-Level Chemistry

Periodicity mark scheme · goes with “Periodicity” · whiteboardchemistry.com/revision/aqa-a-level-chemistry/exam-questions

Mark schemes

Periodicity · 19 questions

Q1 · November 2020 · Paper 1 · Q3 · [7 marks]

(a) Cross at 1580

Allow a cross drawn for Si that is between the values for Mg and Al

[1 mark]

(b) M1 Na

[1 mark]

M2 $Na^+(g) \rightarrow Na^{2+}(g) + e^-$

M2 Allow $Q^+(g) \rightarrow Q^{2+}(g) + e^-$

State symbols essential

Allow correct equation consequential on their element

[1 mark]

(c) The number of protons increases OR nuclear charge increases

[1 mark]

Shielding is similar/same OR electrons are added to the same shell

Allow same number of shells

[1 mark]

(d) Chlorine/Cl

[1 mark]

(e) $4P + 5O_2 \rightarrow P_4O_{10}$ OR $P_4 + 5O_2 \rightarrow P_4O_{10}$

Allow multiples

Ignore state symbols

Do not allow equations with P_2O_5

[1 mark]

Q2 · June 2016 · AS Paper 1 · Q10 · [1 mark]

Answer: **C**

Q3 · June 2016 · AS Paper 1 · Q2 · [7 marks]

02.1

$Mg(^{2+})$ or Magnesium

Because Mg^{2+} has more protons

AND

With the same shielding/screening/electron arrangement/number of electrons (or isoelectronic)

Na^+ CE=0

Allow larger/stronger nuclear charge

Ignore atomic radius

[2 marks]

02.2

$Na(g) \rightarrow Na^+(g) + e^-$

1 for correct species and gas phase

Allow e without charge

Allow $Na(g) - e^- \rightarrow Na^+(g)$

$Na(g) + e^- \rightarrow Na^+(g) + 2e^-$

[1 mark]

02.3

Mg between 600-800

S between 800-1040

e^- paired in (3)p orbital in S (owtte)

Paired e^- repel (so less energy needed to remove)

If S not lower than P on graph then M1 only

If no plots on graph must state S below P to

access M3 & M4

Allow (3)p subshell/sublevel provided pair

mentioned

[4 marks]

Q4 · June 2017 · Paper 3 · Q6 · [1 mark]

Answer: **C**

Q5 · June 2018 · AS Paper 1 · Q12 · [1 mark]

Answer: **D**

Q6 · June 2018 · AS Paper 1 · Q18 · [1 mark]

Answer: **B**

Q7 · June 2018 · Paper 3 · Q17 · [1 mark]

Answer: **A**

Q8 · June 2019 · Paper 1 · Q3 · [7 marks]

03.1

Repeating pattern/trends (of physical or chemical properties/reactions)

Allow named property

Penalise groups

[1 mark]

03.2

Bromine/Br

Not Br_2

Accept Kr or Krypton

[1 mark]

03.3

Potassium /K

Smallest number of protons/smallest nuclear charge

Similar shielding / same number of shells (as other elements in period 4)

If Na or Rb lose M1 but allow access to M2 and M3

If other incorrect elements 0/3

Allow same shielding

[3 marks]

03.4

Amphoteric

[1 mark]

03.5

$As_2O_3 + 6Zn + 12HNO_3 \rightarrow 2AsH_3 + 6Zn(NO_3)_2 + 3H_2O$

Accept multiples

[1 mark]

Q9 · June 2025 · Paper 3 · Q15 · [1 mark]

Answer: **B**

Atomic radius decreases.

Q10 · June 2025 · Paper 3 · Q16 · [1 mark]

Answer: **C**

The first ionisation energy of P is less than that of S

Q11 · November 2020 · AS Paper 1 · Q15 · [1 mark]

Answer: **C**

Be^{2+} Li^{+} F^{-} O^{2-}

Q12 · November 2021 · AS Paper 1 · Q18 · [1 mark]

Answer: **B**

Silicon

Q13 · November 2021 · AS Paper 1 · Q17 · [1 mark]

Answer: **B**

Molybdenum

Q14 · June 2022 · AS Paper 1 · Q20 · [1 mark]

Answer: **B**

f block

Q15 · June 2024 · AS Paper 1 · Q16 · [1 mark]

Answer: **A**

Decreases Increases

Q16 · June 2024 · Paper 3 · Q19 · [1 mark]

Answer: **D**

Chlorine has the highest first ionisation energy.

Q17 · November 2020 · AS Paper 1 · Q18 · [1 mark]

Answer: **C**

Silicon

Q18 · June 2023 · Paper 3 · Q19 · [1 mark]

Answer: **B**

Sodium has the lowest melting point.

Q19 · November 2021 · AS Paper 1 · Q23 · [1 mark]

Answer: **D**

O^{2-}

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