

AQA A-Level Chemistry

Periodicity

Questions only

All 17 periodicity questions

Questions

17

Total marks

29

Time allowed

38 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 AQA Data Sheet.
- Print the separate mark scheme when you are ready to mark your answers.

For marking

Q	Source	Marks	Score
1	2020 A-level P1 Q3	7	
2	2017 A-level P3 Q6	1	
3	2018 AS P1 Q18	1	
4	2018 A-level P3 Q17	1	
5	2019 A-level P1 Q3	7	
6	2025 A-level P3 Q15	1	
7	2025 A-level P3 Q16	1	
8	2025 A-level P3 Q22	1	
9	2020 AS P1 Q15	1	

Q	Source	Marks	Score
10	2021 AS P1 Q18	1	
11	2021 AS P1 Q17	1	
12	2022 AS P1 Q20	1	
13	2024 AS P1 Q16	1	
14	2024 A-level P3 Q19	1	
15	2020 AS P1 Q18	1	
16	2023 A-level P3 Q19	1	
17	2021 AS P1 Q23	1	

Total _____ / 29 Percentage _____ %

Questions from AQA past papers, 2017–2025, reproduced for revision. Practise these topics online, with instant marking:
whiteboardchemistry.com/revision/aqa-a-level-chemistry/exam-questions?topics=periodicity&len=0

Questions

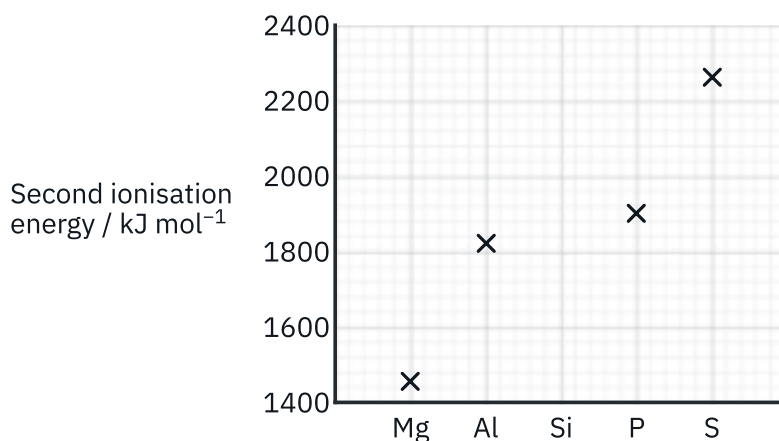
Periodicity · 17 questions · 29 marks · time allowed 38 min

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

This question also needs Atomic structure and Period 3 elements.

This question is about Period 3 elements.

The graph shows the second ionisation energies of some elements in Period 3.



(a) Draw a cross (x) on the graph above to show the second ionisation energy of silicon.

[1 mark]

Draw your answer on the figure above.

(b) Identify the element in Period 3, from sodium to argon, that has the highest second ionisation energy.

Give an equation, including state symbols, to show the process that occurs when the second ionisation energy of this element is measured.

If you were unable to identify the element you may use the symbol Q in your equation.

[2 marks]

Element

Equation

(c) Explain why the atomic radius decreases across Period 3, from sodium to chlorine.

[2 marks]

(d) Identify the element in Period 3, from sodium to chlorine, that has the highest electronegativity.

[1 mark]

(e) Phosphorus burns in air to form phosphorus(V) oxide.

Give an equation for this reaction.

[1 mark]

Q2 • June 2017 • Paper 3 • Q6 • [1 mark]

Which is the correct order of melting points of these Period 3 elements?

Tick (✓) one box.

- ☐ **A** phosphorus > sulfur > chlorine > argon
- ☐ **B** argon > chlorine > phosphorus > sulfur
- ☐ **C** sulfur > phosphorus > chlorine > argon
- ☐ **D** chlorine > phosphorus > sulfur > argon

Q3 · June 2018 · AS Paper 1 · Q18 · [1 mark]

Which element has the highest first ionisation energy?

Tick (✓) one box.

- ☐ **A** Aluminium
- ☐ **B** Phosphorus
- ☐ **C** Silicon
- ☐ **D** Sulfur
-

Q4 · June 2018 · Paper 3 · Q17 · [1 mark]

Which of these Period 3 elements has the highest melting point?

Tick (✓) one box.

- ☐ **A** Aluminium
- ☐ **B** Phosphorus
- ☐ **C** Sodium
- ☐ **D** Sulfur
-

Q5 · June 2019 · Paper 1 · Q3 · [7 marks]

This question also needs Period 3 elements.

This question is about periodicity, the Period 4 elements and their compounds.

03.1 State the meaning of the term periodicity.

[1 mark]

03.2 Identify the element in Period 4 with the highest electronegativity value.

[1 mark]

03.3 Identify the element in Period 4 with the largest atomic radius.

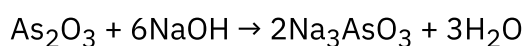
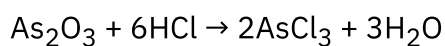
Explain your answer.

[3 marks]

Element

Explanation

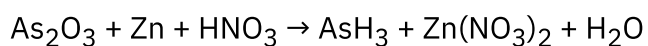
03.4 The equations for two reactions of arsenic(III) oxide are shown.



Name the property of arsenic(III) oxide that describes its ability to react in these two ways.

[1 mark]

03.5 Complete the equation for the formation of arsenic hydride.



[1 mark]

Q6 • June 2025 • Paper 3 • Q15 • [1 mark]

Which statement about trends from left to right across Period 3 is correct?

Tick (✓) one box.

- ☐ **A** Atomic radius increases from Na to Si and then decreases
 - ☐ **B** Atomic radius decreases
 - ☐ **C** First ionisation energy decreases
 - ☐ **D** Electronegativity decreases
-

Q7 • June 2025 • Paper 3 • Q16 • [1 mark]

Which statement about ionisation energies in Period 3 is not correct?

Tick (✓) one box.

- ☐ **A** The first ionisation energy of Mg is greater than that of Na
 - ☐ **B** The first ionisation energy of Al is less than that of Mg
 - ☐ **C** The first ionisation energy of P is less than that of S
 - ☐ **D** Ar has the highest first ionisation energy in the period.
-

Q8 • June 2025 • Paper 3 • Q22 • [1 mark]

Which statement is correct?

Tick (✓) one box.

- ☐ **A** Tollens' reagent contains linear $[\text{Ag}(\text{NH}_3)_2]^+$ ions.
- ☐ **B** Tollens' reagent contains octahedral $[\text{Ag}(\text{NH}_3)_6]^+$ ions.
- ☐ **C** Fehling's solution contains linear $[\text{Ag}(\text{NH}_3)_2]^+$ ions.
- ☐ **D** Fehling's solution contains octahedral $[\text{Ag}(\text{NH}_3)_6]^+$ ions.

Q9 • November 2020 • AS Paper 1 • Q15 • [1 mark]

Which represents the correct order of increasing radius of the ions?

Tick (✓) one box.

- ☐ **A** $\text{F}^- \text{O}^{2-} \text{Li}^+ \text{Be}^{2+}$
- ☐ **B** $\text{Li}^+ \text{Be}^{2+} \text{O}^{2-} \text{F}^-$
- ☐ **C** $\text{Be}^{2+} \text{Li}^+ \text{F}^- \text{O}^{2-}$
- ☐ **D** $\text{O}^{2-} \text{F}^- \text{Li}^+ \text{Be}^{2+}$
-

Q10 • November 2021 • AS Paper 1 • Q18 • [1 mark]

Which element in Period 3 has the highest melting point?

Tick (✓) one box.

- ☐ **A** Aluminium
- ☐ **B** Silicon
- ☐ **C** Sodium
- ☐ **D** Sulfur
-

Q11 • November 2021 • AS Paper 1 • Q17 • [1 mark]

Which element is classified as a d block element?

Tick (✓) one box.

- ☐ **A** Antimony
- ☐ **B** Molybdenum
- ☐ **C** Strontium
- ☐ **D** Uranium

Q12 · June 2022 · AS Paper 1 · Q20 · [1 mark]

Which block in the Periodic Table contains the element samarium (Sm)?

Tick (✓) one box.

- ☐ **A** d block
- ☐ **B** f block
- ☐ **C** p block
- ☐ **D** s block

Q13 · June 2024 · AS Paper 1 · Q16 · [1 mark]

Which row correctly shows general trends in properties across Period 3? Atomic radius First ionisation energy

Tick (✓) one box.

- ☐ **A** Decreases Increases
- ☐ **B** Decreases Decreases
- ☐ **C** Increases Increases
- ☐ **D** Increases Decreases

Q14 · June 2024 · Paper 3 · Q19 · [1 mark]

Consider the Period 3 elements from sodium to chlorine. Which statement is correct?

Tick (✓) one box.

- ☐ **A** Sodium has the smallest atomic radius.
- ☐ **B** Aluminium has the highest melting point.
- ☐ **C** Sulfur is the most electronegative.
- ☐ **D** Chlorine has the highest first ionisation energy.

Q15 · November 2020 · AS Paper 1 · Q18 · [1 mark]

Which of these elements has the highest melting point?

Tick (✓) one box.

- ☐ **A** Argon
- ☐ **B** Chlorine
- ☐ **C** Silicon
- ☐ **D** Sulfur

Q16 · June 2023 · Paper 3 · Q19 · [1 mark]

Which statement is not correct about the Period 3 elements sodium to chlorine?

Tick (✓) one box.

- ☐ **A** Sodium has the largest atomic radius.
- ☐ **B** Sodium has the lowest melting point.
- ☐ **C** Silicon has the highest melting point.
- ☐ **D** Chlorine has the highest first ionisation energy.

Q17 · November 2021 · AS Paper 1 · Q23 · [1 mark]

Which ion has the largest radius?

Tick (✓) one box.

- ☐ **A** F^-
- ☐ **B** Mg^{2+}
- ☐ **C** Na^+
- ☐ **D** O^{2-}

Source: AQA A-Level Chemistry past papers. Reproduced for revision at whiteboardchemistry.com.

Mark scheme:

whiteboardchemistry.com/revision/aqa-a-level-chemistry/exam-questions/pdf/periodicity-mark-scheme.pdf