

AQA A-Level Chemistry

Group 2

Questions only

The newest questions, about an hour. All 27 are in the exam generator.

Questions

13

Total marks

46

Time allowed

1 h

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	2024 AS P1 Q2	7	
2	2021 AS P1 Q2	8	
3	2023 A-level P3 Q21	1	
4	2024 AS P1 Q4	6	
5	2024 AS P1 Q14	1	
6	2021 AS P1 Q22	1	
7	2022 AS P1 Q22	1	

Q	Source	Marks	Score
8	2019 AS P1 Q16	1	
9	2019 AS P1 Q17	1	
10	2025 AS P1 Q4	6	
11	2025 A-level P1 Q1	11	
12	2025 A-level P3 Q14	1	
13	2025 A-level P3 Q20	1	

Total _____ / 46 Percentage _____ %

Questions from AQA past papers, 2019–2025, reproduced for revision. Practise these topics online, with instant marking:

whiteboardchemistry.com/revision/aqa-a-level-chemistry/exam-questions?topics=group-2&len=0

Questions

Group 2 · 13 questions · 46 marks · time allowed 1 h

Q1 · June 2024 · AS Paper 1 · Q2 · [7 marks]

This question also needs Atomic structure.

This question is about the elements in Group 2.

(a) Explain why the third ionisation energy of beryllium is much higher than the second ionisation energy of beryllium.

[3 marks]

(b) Magnesium reacts slowly with cold water but rapidly with steam.

Compare these reactions, in terms of the products formed.

You should identify one similarity in, and one difference between, these reactions.

[2 marks]

Similarity

Difference

(c) The reaction of calcium with water is a redox reaction.

Explain, in terms of oxidation states, why this reaction involves both oxidation and reduction.

[2 marks]

Q2 · November 2021 · AS Paper 1 · Q2 · [8 marks]

This question is about magnesium and its compounds.

(a) State one observation when magnesium reacts with steam.

Give an equation, including state symbols, for this reaction.

[2 marks]

Observation

Equation

(b) Describe the bonding in magnesium.

[2 marks]

(c) Explain, in terms of structure and bonding, why magnesium chloride has a high melting point.

[3 marks]

(d) Give one medical use for magnesium hydroxide.

[1 mark]

Q3 · June 2023 · Paper 3 · Q21 · [1 mark]

Barium metal is added to a large excess of water. Which observation is correct and complete?

Tick (✓) one box.

- ☐ **A** a colourless solution
- ☐ **B** a colourless solution with effervescence
- ☐ **C** a dense white precipitate
- ☐ **D** a dense white precipitate with effervescence

Q4 · June 2024 · AS Paper 1 · Q4 · [6 marks]

A student is provided with separate unlabelled samples of four different solutions for analysis.

The four solutions are known to be ammonium nitrate, potassium sulfate, sodium carbonate and magnesium nitrate, but the student does not know which sample is which.

Outline a series of test-tube reactions that the student can use to identify each of these solutions.

Include:

- the expected observations

- ionic equations for any reactions.

Q5 • June 2024 • AS Paper 1 • Q14 • [1 mark]

Which statement is correct?

Tick (✓) one box.

- ☐ **A** Calcium oxide is used to remove sulfur dioxide from flue gases.
- ☐ **B** Calcium has a larger atomic radius than barium.
- ☐ **C** Magnesium has a lower electronegativity than barium.
- ☐ **D** Magnesium is used to oxidise titanium(IV) chloride in the extraction of titanium.

Q6 • November 2021 • AS Paper 1 • Q22 • [1 mark]

What is a use for barium sulfate?

Tick (✓) one box.

- ☐ **A** In agriculture to act as a fertiliser
- ☐ **B** In agriculture to neutralise acidic soil
- ☐ **C** In medicine to produce an X-ray image
- ☐ **D** In medicine as an antacid to treat indigestion

Q7 · June 2022 · AS Paper 1 · Q22 · [1 mark]

Which statement is correct?

Tick (✓) one box.

- ☐ **A** Magnesium reacts with steam to give magnesium oxide as one of the products.
 - ☐ **B** Magnesium acts as an oxidising agent in the extraction of titanium.
 - ☐ **C** Magnesium has a lower melting point than sodium.
 - ☐ **D** Magnesium hydroxide is very soluble in water.
-

Q8 · June 2019 · AS Paper 1 · Q16 · [1 mark]

Which property would you expect the element radium, Ra, to possess?

Tick (✓) one box.

- ☐ **A** It forms a soluble sulfate.
 - ☐ **B** It does not react with water.
 - ☐ **C** It is a good conductor of electricity.
 - ☐ **D** It forms a covalent fluoride.
-

Q9 · June 2019 · AS Paper 1 · Q17 · [1 mark]

Which statement is not correct?

Tick (✓) one box.

- ☐ **A** Strontium has a lower first ionisation energy than calcium.
- ☐ **B** Strontium has a larger ionic radius than calcium.
- ☐ **C** Strontium reacts less vigorously with water than calcium.
- ☐ **D** Strontium hydroxide is more soluble in water than calcium hydroxide.

Q10 · June 2025 · AS Paper 1 · Q4 · [6 marks]

This question is about the Group 2 metals Mg to Ba

04.1 Strontium and calcium have the same metallic structure.

Explain why strontium has a lower melting point than calcium.

[2 marks]

04.2 The atomic radius increases down Group 2 from Mg to Ba

Give a reason for this trend.

[1 mark]

04.3 Give an equation, including state symbols, for the reaction between barium and water.

[1 mark]

04.4 Give an equation, including state symbols, for the process that occurs when the second ionisation energy of calcium is measured.

[1 mark]

04.5 Identify the Group 2 metal with the lowest second ionisation energy.

[1 mark]

Q11 · June 2025 · Paper 1 · Q1 · [11 marks]

This question is about some Group 2 elements and their compounds.

01.1 Magnesium is reacted with titanium(IV) chloride to extract titanium metal.

Give the equation for this reaction.

State the role of magnesium in this reaction.

[2 marks]

Equation

Role of magnesium

01.2 Complete Table 1 by giving the formula of a suitable calcium compound for each use.

Table 1

Use	Formula of calcium compound
Decrease acidity of soil	
Remove SO ₂ from flue gases in power stations	

[2 marks]

01.3 Magnesium hydroxide is used to relieve the symptoms of indigestion by neutralising stomach acid.

Suggest why magnesium hydroxide is safer than sodium hydroxide as a treatment for indigestion.

An ionic compound of a Group 2 element dissolves in water to form solution X.

Separate samples of solution X are tested to identify the ions.

Table 2 shows the observations.

Table 2

	Reagent added	Observation
Test 1	NaOH(aq)	White precipitate
Test 2	HNO ₃ (aq) and AgNO ₃ (aq)	Cream precipitate

[1 mark]

01.4 Identify the Group 2 cation in solution X.

Give an ionic equation for the reaction that occurs in Test 1.

[2 marks]

Group 2 cation

Ionic equation

01.5 Identify the anion in solution X.

Give an ionic equation, including state symbols, for the reaction that occurs in Test 2.

Explain why $\text{AgNO}_3(\text{aq})$ is acidified.

[3 marks]

Anion

Ionic equation

Explanation

01.6 Give one property of barium sulfate that makes it useful in hospitals.

[1 mark]

Q12 • June 2025 • Paper 3 • Q14 • [1 mark]

A piece of strontium is added to an excess of water.

Which observation is correct and complete?

Tick (✓) one box.

- ☐ **A** Colourless solution
- ☐ **B** Colourless solution and effervescence
- ☐ **C** Dense white precipitate
- ☐ **D** Dense white precipitate and effervescence

Q13 · June 2025 · Paper 3 · Q20 · [1 mark]

Which property of the Group 2 elements increases with increasing atomic number?

Tick (✓) one box.

- ☐ **A** Atomic radius
- ☐ **B** Electronegativity
- ☐ **C** First ionisation energy
- ☐ **D** Melting point

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/group-2-mark-scheme.pdf